Republic of Iraq

Ministry of Environment

# IRAQI FOURTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY

السنة الدولية للتنوع البيولوجي 2010

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# Foreword

Although Iraq's accession to the Convention on Biodiversity (CBD) was a mere seven months ago, the Iraqi Ministry of Environment (MOE) has initiated a number of significant first steps to fulfill the country's new obligations. Among the most prominent examples are the establishment of a national committee to implement the Convention and the preparation of the national report. Additionally, the MOE has initiated several other aspects of protection, such as the creation of protected areas and national programs for biodiversity.

Iraq has become a member party of the Convention at a pivotal time as the international community struggles to reach the 2010 biodiversity goals as well as set forth future milestones as yet to be determined. The obligations fulfilled by Iraq are a noteworthy example of international cooperation, which should be fostered to address the growing threats to the health of the planet.

The MOE shares the international community's concerns regarding the social, economic, cultural and environmental implications of the loss of biodiversity due to the negative impacts of climate change, and the need to educate the masses in order to conserve biodiversity, encourage sustainable use, and explain the benefits derived from biodiversity. As the Executive Director of the Convention has pointed out, no progress has been made in stopping the loss of biodiversity on a global scale during the previous period. The present goal, therefore, is to bring forth a new vision of the preservation and sustainability of biodiversity to acknowledge the inextricable link between natural capital and sustainable goals.

The MOE is in a unique position to identify the root causes for biodiversity degradation in Iraq, and take the necessary mitigating actions. This Ministry calls for a change in policies to reflect the true value of species and their habitats, and to recognize that biodiversity is life -- our life -- so let us strive to protect it before all is lost.

A fundamental impediment to the protection of Iraq's biodiversity is the lack of institutional structure and necessary legislative framework to protect important species, establish protected habitats, or create a sufficiently strong but feasible work plan. In addition to this institutional failure, there is a general lack of environmental awareness among the public and government, a lack of research institutions to aid in the creation of work plans, a dangerous expansion of unplanned urbanization and illegal hunting, and a threat from invading species.

The MOE aims, with the aid of other governmental and non-governmental institutions, to address this degradation by establishing new laws and regulations and launching various protection programmes. The accession to the CBD can be regarded as an important first step in this direction, through which we aim to raise the capabilities of Iraqis in the field of biodiversity preservation and conduct joint programmes on both international and regional levels.

I would like to take this opportunity to thank all who have contributed to the preparation of this report. I would particularly like to thank the members of the joint committee from both the MOE and NI, who undertook the task of preparing this report, and, the Secretariat of the CBD for the continuous support in this critical period.

Narmin Othman Hassan
Minister of Environment
Republic of Iraq - 22nd July 2010

# Introduction

It is fitting that as Iraq issues its first comprehensive report on the biological diversity of the country, the United Nations designates 2010 as the International Year of Biodiversity. Environmental issues such as biodiversity have not played a large part in the recent public discourse in Iraq, which to a large extent has been preoccupied with security and reconstruction. That being said, environmental concerns represent a significant challenge within Iraq that are complicating the development of the country, such as: water resource management; decline in biodiversity; waste management; oil development and industrial pollution and environmental impacts caused by decades of war and conflict.

In 2009, Iraq signed the Convention for Biological Diversity (SCBD, 2009a) and initiated the first attempt to address the issue of biodiversity degradation that has plagued the country. This document is the first national report to be submitted to the CBD Secretariat as part of Iraq's obligations as a Party to the Convention. It will examine and report on the status of biodiversity within Iraq and lay the groundwork for development of a national biodiversity strategy and action plan (NBSAP) to protect the diverse and vital species and ecosystems of Iraq.

Article 1 of the Convention (SCBD, 2009b) provides three overall objectives:

1. **the conservation of biological diversity;**
2. **the sustainable use of its components, and**
3. **the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.**

Article 6 of the Convention requires the Parties to develop "national strategies, plans or programmes for the conservation and sustainable use of biological diversity", and article 26 requires regular reporting. Although Iraq is a new party to the convention and this is the country's first report to the Secretariat, the authors of this report used the guidelines for the Fourth National Report in the preparation of this document (SCBD, 2009c).

As a new party to the convention, Iraq is in the process of establishing the institutional and legal framework for CBD implementation. Therefore, this first national report by Iraq may not cover all the content as suggested in the guidelines for the IV National Report, although it is likely that a significant baseline can be established. As much information as possible has been pooled together in this report and an initial set of indicators for biodiversity has been elaborated for assessing gaps in information. Iraq has not yet developed a National Biodiversity Strategy and Action Plan (NSBAP) but this first national report will provide a preliminary evaluation of priorities and a pathway forward to the creation of this plan.

# Executive summary

This is the first National Report submitted by Iraq since its ratification of the Convention on Biological Diversity in 2009.

Chapter I of the report provides an overview of the biodiversity of Iraq with a review of some of the historical work that has taken place as well as more current information collection efforts. An Ecoregion approach, using a method defined by the World Wildlife Fund & The Nature Conservancy, has been used to organize the review of status of the major ecosystems of the country. Each ecoregion is fully described in Chapter I with a list of key associated species and, in most cases, their current conservation status. Iraq falls within the Palearctic Realm and its terrestrial ecosystems fall within five primary and four secondary ecoregions (in terms of land area). These include:

- Tigris-Euphrates alluvial salt marsh (PA0906) – 35600 $km^2$ Area – Critical/Endangered
- Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) – 1851300 $km^2$ Area – Critical/Endangered
- Mesopotamian Shrub Desert (PA1320) – 211000 $km^2$ Area - Vulnerable
- Middle East Steppe (PA0812) – 132300 $km^2$ Area - Vulnerable
- Zagros Mountains Forest Steppe (PA0446) – 397800 $km^2$ Area – Critical/Endangered
- Eastern Mediterranean conifer-sclerophyllous-broadleaf forest (PA1207) – 143800 $km^2$ Area
- Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1325) – 651300 $km^2$ Area
- South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) – 351500 $km^2$ Area
- Gulf Desert and Semi-Desert (PA1323) – 72600 $km^2$ Area

Iraq freshwater ecosystems fall within three additional ecoregions: the Arabian Interior (440), Lower Tigris and Euphrates (441), and the Upper Tigris And Euphrates (442). The Tigris River has a catchment area of 235,000 $km^2$, the Euphrates River has a catchment area of 388,000 $km^2$, and the Shatt Al Arab has a catchment area of 108000 $km^2$. The final ecoregion reviewed in Chapter I is the upper Gulf Marine Ecoregion also known as the ROPME Sea Area.

Chapter I also provides some information on important species in Iraq, particularly those of global importance that include migratory, endemic, semi-endemic and IUCN Red-listed species. Information is most complete for Iraqi bird species that are the focus of current field research under a national rapid assessment effort called the Key Biodiversity Areas (KBA) Project (described below). A preliminary checklist of the Birds of Iraq has been developed (currently in press) that includes 417 bird species of which 182 are considered passage migrants to Iraq and an additional 27 are vagrant species. Of these, 18 species are considered to be of conservation concern. Important fish species have also received some recent study. Some 106 species of fish (including freshwater and marine entrant species) have now been recorded in the non-marine waters of Iraq (Coad et al. in preparation) and of these 53 species are marine fish (Abd, Rubec & Coad, 2009). Little current information exists on other globally important fauna species of insects, amphibians, reptiles, and mammals, though there are some efforts to collect limited information in these sectors by the KBA project. Botanical and habitat assessments have been done primarily in the marshlands of southern Iraq and in Kurdistan, Northern Iraq. Efforts are underway to complete the Flora of Iraq and the Royal Botanic Gardens Edinburgh's

(RBGE's) Center for Middle East Plants has developed a draft checklist of species for Iraq of over 4500 plants with a secondary list of approximately 195 endemic Iraqi species (Knees et al 2009).

Finally, Chapter I reviews the major threats to and challenges for biodiversity in Iraq, which according to the United Nations Environmental Programme state four main causes: 1) lack of institutional or legal framework for the conservation of biodiversity; 2) lack of any effective protected areas network; 3) lack of a national biodiversity strategy or action plan, and 4) many species under threat from ecosystem degradation especially from the loss of the Mesopotamian marshlands and oil spills. Each eco-region listed above sometimes face unique threats, including large-scale drainage that took place in the marshes of southern Iraq in the 1990s under the Saddam Regime that caused major declines in biodiversity, and changes in traditional land management in the desert and steppe regions that is causing increasing dust storm events and desertification. Other threats may affect a variety of ecosystems and habitats such as: major changes caused by war and past conflicts; increasing municipal solid and sewage wastes that are untreated; and industrial pollution and toxic sites, particularly related to increasing development and oil exploration. Overall for the major threats of habitat change, climate change, invasive species, over exploitation and nutrients & pollutants, most threats are either increasing or remaining steady in Iraq.

A trial list of indicators for biodiversity are presented in Chapter I as part of the Pressure-State-Response Model used for tracking changes over time. In many cases, Iraq lacks the data to fully utilize these indicators and all are presented with an analysis of the gaps that need to be filled to fully utilize the indicators. The state and pressure indicators, which have enough information to provide some indication of trends in Iraq, are presented in Chapter I and additional information on these as well as response indicators are provided in the Appendix.

As stated in Chapter II, the National Biodiversity Strategy and Action Plan (NBSAP) does not yet exist in Iraq at this time. Strategic biodiversity objectives and activities have not been officially defined and included into relevant legislation and planning, although some actions beneficial to biodiversity conservation have been initiated under the supervision of the MOE and other relevant institutions. This report gives a preliminary assessment of the status of some biodiversity components and identifies the gaps that need to be filled in order to develop the Iraqi NBSAP. In Chapter II, some general objectives and main policy goals for the Iraqi NBSAP are defined. These objectives would need to be integrated into a global approach, involving all stakeholders at the governmental, public and private level.

Although the national strategic objectives are not yet defined, it is worth mentioning that 81% of the globally important, ecological region "Tigris and Euphrates alluvial salt marsh" is contained within the borders of Iraq and priority will surely be given to marshland protection and restoration. Some achievements have already been reached in this field.

There is a proposal for creating a Mesopotamian Marshlands National Park with several components and ongoing projects, carried out as activities of the New Eden Group (a joint venture under a Memorandum of Understanding (MoU) with IMELS, the MOE, the Iraqi Ministry of Water Resources (MOWR), the Iraqi Ministry of Municipalities and Public Works (MOMPW), and Nature Iraq (NI)).

In the southeastern part of Iraq a marshland area called Hawizeh has been designated as a Ramsar wetland of international importance. A management plan has been drafted for this area as a part of the New Eden Group initiatives; unfortunately the management plan has not yet been implemented and there is no national legislation to implement further protections to this area.

In addition, since 2003, the MOE has been involved in a number of initiatives to carry on research in the recently restored Mesopotamian Marshlands of southern Iraq. These efforts have lead to a national program called the Key Biodiversity Areas (KBA) Project to survey the country's biological diversity.

These existing biodiversity projects have exposed considerable obstacles for implementation and challenges for future development, mainly related to stakeholders outreach and involvement, jurisdictional disputes, lack of legislation, difficulties in the legislative process, difficulty in raising awareness, funding availability, capacity building, and security constraints. In the marshes area a major problem is the availability and quality of water due to upstream dam-building, embankment building in the border zone with Iran, and oil industry development, where the water of the marshes is used for oil extraction activities.

There is urgent need for global involvement and commitment in order to overcome these obstacles. Capacity building activities, with support of the Convention Secretariat, as well as constant funding provisions are necessary to address biodiversity research activities. Information and involvement of the public is also a strategic tool to improve protection.

Some of the mentioned activities and actions try, to some extent, to address major threats to biodiversity conservation in Iraq, as outlined in detail in Chapter I. These refer mainly to the marshland conservation and restoration, the drafting of new legislative protective measures, and the collection of data and scientific research. Nevertheless the drafting of a NBSAP is fundamental to comprehensively addressing major threats.

Chapter III discusses the absence of biodiversity concerns in broader national policies regarding poverty reduction or economic planning. Biodiversity issues are being addressed in a broader context only by the MOE, the Ministry of Agriculture and MoWR, some universities, and national NGOs such as Nature Iraq. A few temporary committees exist like a National Biodiversity Committee, comprising all institutional associations involved with biodiversity protection, and the committee for the management and research of the Ramsar site of Hawizeh. There are some agreements such as the memoranda of understanding between the Twin River Institute for Scientific Research (TRI), MoWR, the Kurdistan Regional Government and the Ministry of Agriculture, which addresses various issues related to water resources. There are also joint ventures such as the New Eden Group.

These are attempts to bring the biodiversity discussion into a broader institutional, private and public context, but there are still many steps to take to begin the basics of a mainstreaming process. For example, no strategic environmental assessment exists. Ad hoc environmental departments have often been created inside various ministries and institutions; nevertheless the communication and coordination in the drafting of relevant policies between these institutions is still very poor.

The Parties committed themselves, as reviewed in Chapter IV, to a more effective and coherent implementation of the three objectives of the Convention: by 2010, achieve a significant reduction of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth. A preliminary assessment of the global biodiversity status in Iraq for each focal area of the Convention is summarized here.

- Agricultural biodiversity: as for the genetic diversity of crops, a gene bank for crop seeds exists, but very little is known on this project. Indeed, little attention is paid to sustainable crop productions while the use of fertilizers and potentially hazardous chemicals is still widespread.

- Dry and sub-humid lands biodiversity: very little is known in Iraq about the status of these ecosystems; many important mammal, bird and reptile species may occur (or have in the past) in steppe areas, grasslands, shrublands and deserts; the vegetation is poorly investigated. Many ecosystems of this focal area are considered, within Iraq, from vulnerable to critical/endangered. Security is often a serious constraint to investigation.
- Forest biodiversity: forest ecosystems can be found mainly in the northern part of Iraq, in the Iraqi Kurdistan region. Extensive logging activities have deteriorated large parts of the oak-dominant deciduous forests and pistachio-almond forests typical of this area. Although the area is considered to be Critical/Endangered legislative provisions of the Kurdistan regional government prohibit and control logging in this area.
- Inland waters biodiversity: the most important freshwater system in Iraq is formed by the Tigris Euphrates alluvial salt marsh ecological region. This can be distinguished by three main systems: the Central Marshes, the Hammar Marshes (Hor al Hammar) and the Hawizeh Marshes (Hor Hawizeh). During the 1970s, these marshes achieved an area of up to 15,000 $km^2$ making them the third largest wetland ecosystem in the world. These marshes have always been subject of seasonal drying effect but, as mentioned above, underwent a major campaign of intentional desiccation under the Saddam regime in the 1990s. Today the water flow has been partially restored and the global status of the southern marshes has improved a great deal, allowing the return of many important and rare migratory bird species. Due to the frequent occurrence of wetland areas in Iraq, which form 81% of the one of the important ecoregions in the country (Tigris Euphrates alluvial salt marsh), it would be enough to protect the three main marshes systems to achieve 10% protection of one of the world's important ecological regions.
- Marine and coastal biodiversity: Iraq has approximately 105 km of coastline and 716 $km^2$ of territorial seas. The water quality in the Gulf has suffered from the decline in the water quality of the input rivers. The marshland drainage alone has eliminated nursery areas, increased the sedimentation in the Gulf, and produced significant declines to the fishery within the Iraqi territorial waters and surrounding areas.

Regarding the 21 targets of the 2010 biodiversity goals, Iraq has registered progress for only 5: Target 1.1 (at least 10% of each of the world's ecological regions effectively conserved); Target 1.2 (areas of particular importance to biodiversity protected); Target 6. 2 (management plans in place for major alien species that threaten ecosystems, habitats or species); Target 7.2 (reduce pollution and its impacts on biodiversity); Target 11.2 (Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4). For the other targets set, there has been no significant action taken or there is not enough information known to assess whether progress has been achieved. The first big challenge for Iraq appears to be the collection of information and stakeholder involvement.

Important first steps have been taken to protect a basic component of Iraqi biodiversity by restoring the marshes and starting a process to effectively protect these areas by making a portion of them Iraq's first National Park and first Ramsar site. Wetland restoration and protection represents important progress that Iraq has made towards the implementation of the Convention but even within these two sites full protection has not yet been measured on the ground. Also, many other biodiversity-related activities are still either poorly implemented or completely unimplemented. In particular, progress is lacking in regards to legislation updates and enforcement, species protection and trade controls, stakeholder involvement, mainstreaming and capacity building.

Overall, the Convention is still poorly implemented in Iraq. Considering its recent accession to the Convention, however, overall Iraq can be regarded as a commendable example of commitment towards nature conservation.

## Background

At the end of July 2009, Iraq deposited its instrument of accession to the Convention on Biological Diversity (CBD) with the Secretary-General of the United Nations, and on the 26th October of 2009 became **the 192nd Party to the Convention**.

Iraq has taken several steps to address environmental issues in the country. Since 2004, the Iraqi Ministry of Environment (MOE) has been involved in a number of initiatives to begin research in the recently restored Mesopotamian Marshlands of southern Iraq. These efforts, conducted with support from the Canadian International Development Agency (CIDA), the United Nations Environmental Program (UNEP) and the Italian Ministry of Environment, Land & Sea (IMELS) and with logistical and staff support from Nature Iraq (NI), have led to a national program to survey the country's biological diversity. This program is called the Key Biodiversity Areas (KBA) Project. In addition, Iraq signed the Ramsar Convention on Wetlands of International Importance and designated Hawizeh marsh as its first Ramsar Site in 2008. At the time of writing, Iraq is in the process of joining several other international environmental conventions, including the Convention on International Trade in Endangered Species (CITES), the Convention on the Conservation of Migratory Species (CMS), the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocols, and the United Nations Convention for Combating Desertification (UNCCD). The MOE has also participated in discussions for joining other regional agreements such as the African-Eurasian Waterbird Agreement (AEWA).

Iraq is also now working towards the development of the Mesopotamian Marshlands National Park in the Central Marshes, and the area may also be proposed as a World Heritage Site.

A coordination meeting between the MOE, NI, the Twin Rivers Institute for Scientific Research (TRI, a part of the American University of Iraq-Sulaimani (AUIS)), and Italian consultants took place in January of 2010 in Sulaimani, Iraqi Kurdistan. The methodology and scope of work for the implementation of the CBD was discussed. The key role of the central government in terms of coordination of the activities of the different ministries as well as the governorates was emphasized.

The MOE has begun the implementation process by setting up the National Committee for Biological Diversity. This Committee is headed by Dr. Ali Al-Lami, representing the the MOE. The other committee members from:

1. Dr. Mihsin Abid Ali / Educational consultant / Ministry of Education (MOE)
2. Dr. Fawzi Rasheed Al-Aani / Manager of Genetic Engineering Center / Ministry of Science and Technology (IMSAT)
3. Mr. Ahmed Mohamed Azeez / Expert / Ministry of Water Resources (IMWR)
4. Mr. Shakir Mahmood Nadeem / Senior manager / Ministry of Finance (IMOF)
5. Dr. Adil Mishaan Rabee / University of Baghdad / Ministry of Higher Education and Scientific Research (IMOHE)
6. Mr. Haitham Abood Mohamed / Manager / State Ministry of Tourism and Archaeology (SMTA)
7. Mr. Mazin Shihab Ahmed / Mead of environment section / Ministry of Agriculture (IMOA)
8. Mr. Mahmed Jawad Kadhum Al-Khatab / Senior engineer / Ministry of Planning (IMOP)

9. Dr. Bilal Mahmood Atiyah / Third secretary / Ministry of Foreign Affairs (IMOFA)
10. Mr. Lidin Salah Khudhur / Kurdistan Ministry of Environment (Kurdish Commission on the Environment)
11. Mrs. Hawra Abil-Jabbar / Legal section / Ministry of Environment (MOE)
12. Mr. Nadheer Abood Faaza / Nature Iraq (NI)

At the first meeting of the CBD National Committee, the MOE tasked NI and consultants from IMELS to lead the effort in drafting this first National Report on Biological Diversity, the bulk of which was done in February and March of 2010.

# I. Overview of the Biodiversity Status in Iraq

## I.1 *Biological Diversity and Ecosystems in Iraq*

The complex mosaic of species information in Iraq has been investigated by many individuals through the last 100 years with major contributions from a variety of both amateur and professional botanists and zoologists. These have included, but are not limited to:

- Zohary (1946), Rechinger (1964) and Townsend & Guest (1966-1985) for Plants;
- Berwesh (1965) for Insects;
- Khalaf [1961], Mahdi [1962]. Daham [1982] and Brian Coad for Fish;
- Allouse (1953, 1962) and Salim et al (2006) for Birds;
- Allouse (1955), Boulenger (1920a, b), Corkill (1932), Khalaf (1959), Mahdi & George (1969), Mertens (1924), and Reed & Marx (1959) for Amphibians and Reptiles;
- Harrison (1956), Hatt (1959), Harrison (1964, 1968, 1971), Nader (1971), Harrison & Bates (1991), and Al Robaae & Kingswood (2001) for Mammals.

In addition, major collections of specimens of Iraqi species exist within various herbariums, universities, and museums across the world. These collections have become particularly important as much of the stored collections within the country were destroyed during or after the 2003 war in Iraq, although small collections of various types likely exist at different universities and institutions across Iraq.

The following section provides a basic overview of the biological diversity and various ecosystems of the country as well as some of their characteristics and key species. But it should be noted that after over 25 years of war and sanctions in which very little work was done to document or protect Iraq's biological diversity, large gaps in information still remain to be filled.

As mentioned in the previous section, an extensive survey effort has existed within Iraq since 2004 as part of the KBA Project. This project is conducted by Nature Iraq (NI) in cooperation with the MOE and support from the Italian Ministry of Environment, Land and Sea (IMELS) and has involved district environmental offices, universities as well as staff from the former Kurdistan Ministry of Environment (now the Kurdistan Commission on the Environment). Although these surveys cover large sections of the country on a bi-annual (winter & summer) basis, large areas of the country remain to be surveyed and the KBA Project has touched on only a few areas of biota (specifically birds, fish, plants, and some micro-organisms). There are likely localized efforts conducted through universities but these have been greatly restricted due to poor security in the country.

This report will touch on the available information and will also discuss globally and regionally important species that include migratory, endemic species or species with special conservation status as well as covering ecosystem services and values within Iraq.

### I.1.1 Ecoregions of Iraq

The macro-ecosystems of the country have been defined by the World Wildlife Fund & The Nature Conservancy in their development of terrestrial, freshwater, and marine "ecoregions" of the world, with their associated species and conservation status (867 terrestrial ecoregions are categorized within 14 biomes and eight biogeographic realms). According to the World Wildlife Fund (2010), an ecoregion is defined as a large area of land or water that contains a geographically distinct assemblage of natural communities that:

(a) share a large majority of their species and ecological dynamics;
(b) share similar environmental conditions, and;
(c) interact ecologically in ways that are critical for their long-term persistence.

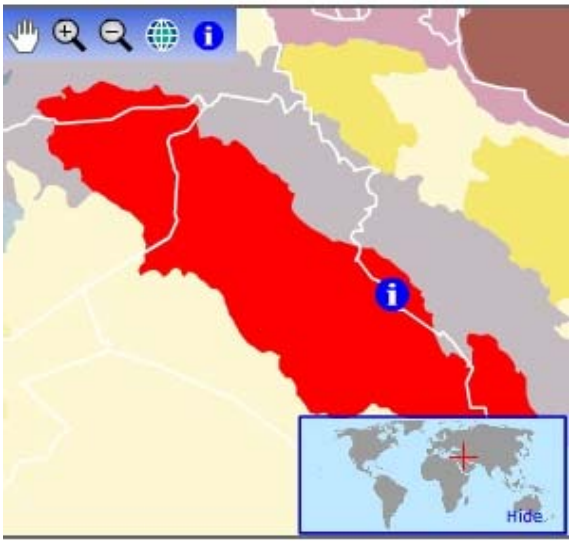
Among these there are several primary and secondary ecoregions belonging to the Palearctic Realm that make up the terrestrial ecosystems of Iraq (See the figure below). The five primary ecoregions that make up the bulk of Iraq include:

- Tigris-Euphrates alluvial salt marsh (PA0906) – 35600 $km^2$ Area
- Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) – 1851300 $km^2$ Area
- Mesopotamian Shrub Desert (PA1320) – 211000 $km^2$ Area
- Middle East Steppe (PA0812) – 132300 $km^2$ Area
- Zagros Mountains Forest Steppe (PA0446) – 397800 $km^2$ Area

In addition, small portions of the following ecoregions can also be found in Iraq:

- Eastern Mediterranean conifer-sclerophyllous-broadleaf forest (PA1207) – 143800 $km^2$ Area
- Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1325) – 651300 $km^2$ Area
- South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) – 351500 $km^2$ Area
- Gulf Desert and Semi-Desert (PA1323) – 72600 $km^2$ Area

The World Wildlife Fund & the Nature Conservancy also defined major freshwater ecoregions and have identified 426 units worldwide. The Lower Tigris and Euphrates River Basins are included because they, and the extensive network of marsh habitats that form at their southernmost end, are among the most important wetland ecosystems of the world associated with these two major rivers (WWF/TNC, 2008). This system also contains a series of large reservoirs, several of which have been designated as Important Birds Areas (IBAs) by BirdLife International including Dukan, Darbandikhan, Mosul, Tharthaar, Razaza Lakes and others.



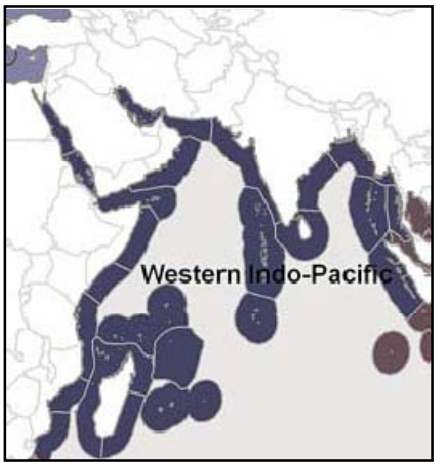

**Tigris-Euphrates Basins Freshwater Ecoregion 441 - Temperate floodplain rivers and wetlands (WWF/TNC, 2008)**

**441 Lower Tigris and Euphrates:** This ecoregion represents the lower Tigris-Euphrates river system. It is bounded by the Zagros Mountains to the east, the Gulf to the south, the deserts of Arabia and Syria to the west, and the Turkish Highlands to the north. Surrounding ecoregions include the Upper Tigris & Euphrates to the north and east and Arabian Interior to the west.

**440 Arabian Interior:** includes the internal basins of the Arabian Peninsula.

**442 Upper Tigris and Euphrates:** This ecoregion includes essentially the upper sections of the Tigris and Euphrates rivers and their tributaries, with adjacent drainages in Iran that flow into the northern Gulf and other neighbouring internal basins, and the Quwaiq River basin in Syria.

Among the 232 coast and shelf marine ecoregions identified by WWF, the Gulf, which is bounded by Iraq and Kuwait on its northwest terminus, the Arabian Peninsula to its south and Iran to its north, is considered an important marine ecoregion of the Western Indo-Pacific Realm (Somali/Arabian Province) and has its own unique ecosystems and species assemblages.




**Marine Ecoregions of the World (M. Spalding et al. 2007)**

### I.1.2 Terrestrial Ecosystems

The following information on the biodiversity of the terrestrial ecoregions of Iraq comes from the WildFinder Online database (www.worldwildlife.org/wildfinder) (WWF 2006), UNEP-WCMC (2009),

and from KBA Surveys (Nature Iraq, 2007-2009). As stated above, there are five main ecoregions within Iraq. These are described below along with their representative or key species and current status. It should be noted that evaluations of ecosystems using the ecoregion approach may have significant drawbacks where desert ecosystems are concerned, as these are often made up of a mosaic of different micro-habitats with diverse species associations.

**Tigris-Euphrates Alluvial Salt Marsh (PA0906) –** Although bounded by deserts and dry shrubland, this region is characterized by marshlands and seasonally inundated plains in a basin covered by recent (Pleistocene and Holocene) alluvial deposits and forming a vast inland delta of the Euphrates, Tigris, and Karun Rivers. Here the waters of Turkey, Syria, Iraq and the western mountains of Iran collect before entering the Gulf. The climate is subtropical, hot, and arid. Some small sections of the South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) ecoregion extend into the border region of Iraq from Iran.

*Biodiversity* - The vegetation of the ecoregion is dominated by aquatic plants such as reeds (*Phragmites* sp) and rushes (*Typha* sp). The ecoregion is important for both winter migratory birds from Eurasia, spawning fish from the Gulf, as well as many endemic and semi-endemic species. At the start of the KBA Project (Nature Iraq, 2009) the initial sites chosen for field surveys were focused in this area and were selected from the list of Important Bird Areas (IBAs) of Iraq as published by Evans (1994) and supplemented by a listing of important wetlands in Iraq by Scott (1995). A total of 43 possible initial sites were selected for the country overall, with more than half (26) located in this ecoregion, as well as the Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) and South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) ecoregions in southern Iraq. Twelve of the IBA sites listed by Evans (1994) or approximately 29% of all IBAs for Iraq are found in the Tigris-Euphrates Alluvial Salt Marsh ecoregion, which is considered an Endemic Bird Area, an area that encompasses the overlapping breeding area of at least two restricted-range bird species: the Iraq babbler (*Turdoides altirostris*) and the Basra reed-warbler (*Acrocephalus griseldis*).

As stated above, the area is important for wintering migratory bird species from Eurasia. Data obtained from the KBA survey between 2005 and 2008 in southern Iraq recorded 159 species of birds of which 34 are considered to be of conservation concern, including eight that are globally threatened (Salim, Porter & Rubec, 2009). These include: Marbled Duck (*Marmaronetta angustirostris*), Ferruginous Duck (*Aythya nyroca*), White-headed Duck (*Oxyura leucocephala*), Basra Reed Warbler (*Acrocephalus griseldis*), Black-tailed Godwit (*Limosa limosa*), Asian Imperial Eagle (*Aquila heliaca*), Greater Spotted Eagle (*Aquila clanga*), and Macqueen's Bustard (*Chlamydotis macqueenii*).

Two unique species of mammals, the Bunn's Short-tailed Bandicoot Rat (*Erythronesokia bunnii*) and Mesopotamian gerbil (*Gerbillus mesopotamiae*) as well as a subspecies of smooth-coated otter (*Lutra perspicillata maxwelli*) are reported in this ecoregion but little is known on their current status although there is evidence that the last species has made a comeback in the region.

Two species that have made a successful return to the marshland areas since their reflooding in 2003 are the Asian water buffalo (*Bubalus bubalis*) and wild boar (*Sus scrofa*) that now inhabit most wetlands areas in southern Iraq down to the Fao peninsula. Other species that are commonly seen or reported include Honey badger (*Mellivora capensis*), Small Asian Mongoose (*Herpestes auropunctatus*), Golden Jackal (*Canis aureus*), Red Fox (*Vulpes vulpes*), Rüppell's Fox (*Vulpes rueppelli*), and wolves

(*Canis lupis*). But mammals, as well as insects, amphibians, and reptiles, remain poorly studied. Numerous fresh and marine-water fish species are reported in this ecoregion and will be covered in Section I.1.3.

*Conservation Status* - This terrestrial zone is considered to be "Critical/Endangered", primarily due to large scale ecosystem conversion with the drainage of the marshlands of southern Iraq (this is discussed more fully in section I.1.3).

**Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303)** – This desert ecosystem, which is located on the Arabian Peninsula and extends from Oman into Iraq, has little biological diversity. A portion of this ecoregion is overlapped by the Syrian desert (518,000 $km^2$) that covers parts of Iraq, Jordan, Syria, and Saudi Arabia as well as the Nafud desert (65,000 $km^2$) which extends into Iraq from northern Saudi Arabia. It is a region of little rain fall (annual precipitation is approximately 5 inches (125 mm)) with occasional oases. Many dry river channels (wadis) criss-cross the desert (Encyclopædia Britannica, 2010) and these carry water only during winter and spring rains. Daily temperature varies considerably reaching over 45°C or higher in July and August and dropping to the teens in January and February. Occasional brackish salt flats exist in some areas, a few of which in Iraq have been utilized for water storage (e.g. Razaza Lake). The Bedouins (nomads) cross the region with the seasons seeking pasture for their herds of goats, sheep and camels. Contained within this ecoregion are two small sections of the Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1325) ecoregion that occurs along the Saudi border and extend slightly into Iraq, and the Gulf Desert and Semi-Desert (PA1323) ecoregion that abuts the southernmost border of Iraq.

*Biodiversity* – The biodiversity of this region is the least known in the country but the efforts of past researchers as well as some of the findings from the KBA Project have provided some information. Unfortunately, the vegetation of the area has received almost no study in recent years during the spring annuals growth and flowering after winter rains. Several uniquely adapted plants are likely to exist in this region. Some of the common desert birds found in this ecoregion include: Steppe Eagle *(Aquila nipalensis*), Bar-tailed Lark (*Ammomanes cincture*), Temminck's Lark (*Eremophila bilopha*), Eurasian Eagle Owl (*Bubo bubo*), Macqueen's Bustard (*Chlamydotis macqueenii*), Spotted Sandgrouse (*Pterocles senegallus*), Cream-coloured Courser (*Cursorius cursor*), Desert Wheatear (*Oenanthe deserti*), and Desert Finch (*Rhodospiza obsoletus*).

Although little is known about their status, this region was known to contain many important mammal species such as wolves, hyenas, gazelles, wild boars, fox, bats and others. Several species have probably been eradicated from the area such as Arabian Oryx (*Oryx leucoryx)* and Asiatic Cheetah (*Acinonyx jubatus*). Spiny-tailed lizards (*Uromastyx* sp) as well as other unidentified reptile species have been seen in the area and it is known that there is active hunting of the Macqueen's Bustard (*Chlamydotis macqueenii*). All species in this ecoregion require more study.

*Conservation Status* - This terrestrial zone is considered to be "Critical/Endangered". Some information on this zone exists from the KBA Project surveys but the area has received little focused study because of security concerns.

**Mesopotamian Shrub Desert (PA1320)** – This ecoregion cuts across the Fertile Crescent located in the Tigris & Euphrates River valleys and, as a transition zone, includes parts of the Syrian Desert and the steppe region further north. The climate is arid and has temperatures similar to the Arabian

Desert and East Sahero-Arabian Xeric Shrublands (PA1303) ecoregion discussed above. The elevations of the region are 600 m towards the west falling to less than 100 m in the east until the Zagros foothills region is reached. Human settlement is primarily centred in and around the river basins.

*Biodiversity* - Evans (1994) listed only a few terrestrial areas of importance for birds, including Augla, Gasr Muhaiwir, Attariya plains and Abu Habba. Survey sites were first visited within this ecoregion by the KBA Project in the winter of 2009 but have been focused almost exclusively on birds with only anecdotal information on other species. The eastern Zagros edge of the ecoregion is characterized by umbrella-thorn acacia trees and shrub species accustomed to semi-arid conditions. The vegetation of western Iraq within this ecoregion have, as stated above, received almost no study but are characteristic of the flora found in the Syrian Desert. Permanent and seasonal wetlands and occasionally wet drainages/wadis within the region are important to a variety of species such as: Macqueen's Bustard (*Chlamydotis macqueenii*), Sociable Lapwing (*Vanellus gregarius*) and other important Eurasian migratory species. The Sociable Lapwing is currently the subject of special survey efforts by NI in 2009/2010 in this region as well as the steppes further north. The area may have sparse but important populations of wolves, hyenas, gazelles, wild boars, and more. Now most likely eradicated, four important species that would have been found in this ecoregion are the Leopards *(Panthera pardus)*, Asiatic Cheetah (*Acinonyx jubatus*), Arabian Oryx (*Oryx leucoryx),* the Arabian Ostrich (*Struthio camelus syriacus*). Several of these species were hunted to extinction by the middle of the 20th century; the latter two are subject to breeding programs elsewhere in the Middle East.

As with the Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) ecoregion, the Mesopotamian Shrub Desert ecoregion also holds wolves (*Canis lupus*), Golden jackals (*Canis aureus*), Striped hyenas (*Hyaena hyaena*), Caracals (*Caracal caracal*), Jungle cats (*Felis chaus*), Rüppell's Fox (*Vulpes rueppelli*) and Goitered gazelles (*Gazella subgutturosa*), Mesopotamian gerbil (*Gerbillus mesopotamiae*) and wild boars (*Sus scrofa*). Other characteristic species of this ecoregion are the Euphrates jerboa (similar to a gerbil), Long-eared Hedgehog (*Hemiechinus auritus*), Desert hedgehog (*Paraechinus aethiopicus*), Mehely's Horseshoe Bat (*Rhinolophus mehelyi*), Spiny-tailed lizards (*Uromastyx* sp) and Desert Monitor (*Varanus griseus*). All of these species as well as insects of this region are poorly studied and little information is available on their current status.

*Conservation Status* - This terrestrial zone is considered to be "Vulnerable". Some information on this zone exists from the KBA Project 2009/2010 surveys but the area has received little focused study because of security concerns.

**Middle East Steppe (PA0812)** – Guest (1966) divided this area into a dry and moist steppe consisting of mostly open shrub/grasslands extending from western Jordan and south-western Syria to northern Iraq, overlapping the Tigris-Euphrates River Valleys, and ending in the foothills of the Zagros Mountains near Iran. Geologically it includes calcareous Mesozoic and Tertiary rocks and alluvial-colluvial soils in the river valleys with areas of black basalt in the south-eastern portion of this region. The climate is continental with high summer heat and low rainfall (less that 250 mm) with cold winters with periods of frost.

*Biodiversity* – Vegetation reflects the Mesopotamian province of the Irano-Turanian region. Herbaceous and dwarf shrub sage brush (*Artemisia* sp) communities tend to dominate in deeper, non-saline soils and often occur in association with grasses. These are important grassland habitats and

during summer many Bedouin can be seen bringing their herds northward to take advantage of the spring and summer grazing. This ecoregion also contains areas of barren, hard, rocky soils called Hammada. Areas along the Euphrates and Tigris Rivers provide riparian vegetation and habitats with mixes of *Tamarix*, *Salix* and *Populus* species as well as *Typha* sp and *Phragmites* sp.

A number of important bird species use the diverse dry and wet ecosystems within this ecoregion; conservation concern species like the Lesser kestrel (*Falco naumanni*), Eurasian griffon vulture (*Gyps fulvus*) and Egyptian Vulture (*Neophron percnopterus*) are all confirmed breeders. Greater flamingos (*Phoenicopterus ruber*); and the pygmy cormorant (*Phalacrocorax pygmeus*), which breeds in the south, are winter visitors to this ecoregion. Some other confirmed breeding birds include: Turtle dove (*Streptopelia turtur*), Pin-tailed sandgrouse (*Pterocles alchata*) Long-legged Buzzard (*Buteo rufinus*), Steppe Buzzard (*Buteo buteo vulpinus*), Iraq Babbler (*Turdoides altirostris*), See-see Partridge (*Ammoperdix griseogularis*), Red-wattled Lapwing (*Vanellus indicus*), Graceful Prinia (*Prinia gracilis*), Slender-billed Gull (*Chroicocephalus genei*) and Finsch's Wheatear (*Oenanthe finschii*). Other visitors to the area are Eastern Imperial Eagle (*Aquila heliaca*), Armenian Gull (*Larus armenicus*), Northern Lapwing (*Vanellus vanellus*), Greater & Lesser White-fronted Goose (*Anser albifrons* & *Anser erythropus*) and Eurasian Teal (*Anas crecca*).

Large mammals that are associated with this ecoregion include: wolves (*Canis lupus*); Red fox (*Vulpes vulpes*); Golden jackals (*Canis aureus*); caracals (*Caracal* caracal); jungle cats (*Felis chaus*); Mongoose species (*Herpestes* sp); wildcats (*Felis silvestris*); Common otter (*Lutra lutra*); and Greater Horseshoe Bat (*Rhinolophus ferrumequinum*). Goitered gazelle (*Gazella subgutturosa*) and European badgers *(Meles meles*) can be found in more vegetated areas, and wild boar (*Sus scrofa*) can be found in reed thickets and semi-desert terrain. Again, the status of these and other mammal species as well as insects, amphibians, and reptiles is not well known.

*Conservation Status* - This terrestrial zone is considered to be "Vulnerable". Much of the original vegetation in this region can now only be found in small patches. According to the WWF (2006), there is evidence that this area was once a steppe-forest but was reduced to its current form after centuries of grazing and wood cutting. Some information on this zone exists from the KBA Project surveys that are within the Kurdistan region but the area closer to the Syrian border has received little focused study because of security concerns.

**Zagros Mountains Forest Steppe (PA0446)** – Though primarily running from northwest to southeast Iran, this ecoregion overlaps the northern-most mountainous border of Iraq, within the Kurdish areas of the country (known as Iraqi Kurdistan). It is an extensive mountain-forest-steppe ecoregion that has a semi-arid temperate climate with an annual precipitation ranging from 400mm to 800mm, falling mostly in winter and spring. Winters temperatures can sink to -25°C or more and summer temperatures can climb to up to 40°C in some areas (Anderson; Frey & Probst in WWF, 2006). In high alpine areas with mountain peaks reaching as high as 3,611 m (CIA, 2009), snow can persist through the summer months. This ecoregion is also part of the Irano-Anatolian biodiversity Hot Spot, an area globally important for biological diversity because of the high rate of endemism (Conservation International, 2009).

*Biodiversity* - The area supports oak-dominanted deciduous and pistachio-almond forests amidst a diversified steppe flora. In the northern reaches of the mountain range, lower altitudes (400m to

500m) host communities dominated by *Astragalus* spp., *Salvia* spp., or others while higher up (700m to 800m) forests contain *Quercus brantii* and/or *Q. boissieri* up to an altitude of about 1,700m. Above the timber line (1,900m to 2,000m) appears a relatively wide zone of sub-alpine vegetation (Zohary in WWF, 2006). In the Dohuk governorate, a remnant pine forests of *Pinus brutia* (in Zawita, northwest of Dohuk city) is likely part of the Eastern Mediterranean conifer-sclerophyllous-broadleaf forest (PA1207) ecoregion that extends slightly into Iraq. On the south side of the range, the forest becomes more steppic with scattered shrubs.

Evans (1994) listed only three terrestrial sites within this ecoregion that are of importance for birds. These are primarily along the Iraq/Turkey Border (Benavi, Dure and Ser Amadia). Birds found in this ecoregion include: Golden Eagle (*Aquila chrysaetos*), Greater Spotted Eagle (*Aquila clanga),* Eurasian Griffon Vulture (*Gyps fulvus*), Egyptian Vulture (*Neophron percnopterus*), Long-legged Buzzard (*Buteo rufinus*), Lesser Kestrel (*Falco naumanni*), Chukar Partridge (*Alectoris chukar*), Eurasian Crag Martin (*Ptyonoprogne rupestris*), Kurdistan Wheatear (*Oenanthe xanthoprymna*), Syrian Woodpecker (*Dendrocopos syriacus*), and Smyrna Bunting (*Emberiza semenowi*).

A variety of mammals, such as brown bear, wolves, jackals, wild cats, leopard, gazelle, roe deer and wild goat have been found in the Zagros Mountains Forest Steppe ecoregion. The highly endangered Persian fallow deer (*Dama mesopotamica*), once believed extinct, has recently been rediscovered in the western foothills of the mountain range, though their presence in Iraq is not yet established. Five *taxa* of lizards are endemic to the Zagros range and the contiguous mountains of Anatolia (Anderson in WWF, 2006). Leopards are primarily found in the border regions between Iran and Iraq but are particularly difficult to study due to the extensive mine fields in this region.

*Conservation Status* - This terrestrial zone is considered to be "Critical/Endangered" but there are greater protections offered in this ecoregion due to rules enacted by the Kurdistan Regional Government relating to resource protection (e.g. seasonal fishing moratoriums, hunting and wood cutting controls). Large sections of the border zones with Iran and Turkey, mostly higher elevation sites, are covered with extensive land mines.

### I.1.3 Freshwater Ecosystems

The following information on the Lower Tigris-Euphrates Basins [441] ecoregion comes primarily from the New Eden Master Plan for Integrated Water Resource Management in the Marshland Areas (New Eden Group, 2006) and the UNEP-WCMC (2009). A figure showing these basins is provided below.

**The Tigris River** is one of the largest rivers of the Middle East stretching for over 1,900 km, of which 1,415 km are within Iraq with a catchment area of 235,000 km$^2$.

- The Greater Zab River, originating in the mountains of the Kurdistan ridge at an altitude of 3,000 m above sea level. The river receives most of its flow water along its left bank from the contribution of four large tributaries.
- The Rawanduz River, joining the Tigris River 159 km from the outfall, and the Kazir River at 33 km, are the largest tributaries. The total river length is 473 km, catchment area 26,470 km$^2$. The two rivers join the Greater Zab first and Tigris River later at 1,161 km from the outfall.

- The Lesser Zab River originates in Iran in the Zagros Ridge at the altitude of about 3,000m (mean sea level (msl)). Within the territory of Iraq, the river runs along the Rania Valley. An arc dam built in 1959 regulates its flow near Dukan, 233 km away from the outfall. The total river length is 456 km, catchment area is 22,250 km$^2$. The Lesser Zab joins the Tigris River 1,046 km from its outfall.
- The Adhaim River originates at the confluence of the Taukchai, Arou, and Kazachai Rivers, form at an altitude between 1,400 and 1,800m (msl). The river runs only within Iraq. The river length is 230 km and its catchment area is 10,780 km$^2$.
- The Diyala River originates at the confluence of the Keshlak and Gaverud Rivers in Iran, on the southeast spurs of the Zagros Ridge at an altitude of about 3,000 m. The upstream part of the Diyala River, flowing via the mountainous area up to the Aiwend River confluence, is called Sirwan River. Within Iraq it receives considerably large tributaries: the Tanjero and Limkana; the Abbasan and Aiwend Rivers downstream; and the Dewana River from the right side. There is a dam built in the 1950s near the city of Darbandikhan forming Darbandikhan Lake in the Kurdistan Region collecting the waters of the Tanjero and Sirwan rivers. The Diyala River length from the point of confluence with the Aiwend River is 231 km, but the total river length from the points of confluence with the Keshlak and Gaverud Rivers is 485 km. The catchment area is 29,900 km$^2$.

The earthen Mosul Dam was completed in the early 1980s on the Tigris River upstream of the city of Mosul in the governorate of Ninawa. It is the largest dam in Iraq, with the capacity to hold 11 billion cubic meters of water but was poorly placed in an area of gypsum that dissolves in contact with water. Since construction the structure has required regular injections of grout, a liquefied mixture of cement and other additives, to stop the dam from collapsing.

**The Euphrates River** is the largest river in the Middle East in terms of catchment area and length, and the second largest in terms of water volume. It originates in the mountains of Turkey on the Armenian plateau at an altitude of 3,000-3,500 m above sea level. It is formed by the confluence of two rivers: the Karasy River (470 km long and 22,000 km$^2$ catchment area) and the Murad River (650 km long and 40,000 km$^2$ catchment area). The total length of the Euphrates River from the source of the Murad River to its confluence with the Tigris River is 2,940 km, 1,159 km of which runs within Iraq. The catchment area is 388,000 km$^2$.

The lakes in central Iraq (e.g. Tharthar Lake) were saline depressions that were converted to store water for flood control and now support a fish fauna.

**The Shatt Al Arab** is formed by the confluence of the Tigris and Euphrates Rivers near the village of Qurnah in southern Iraq. It carries the waters of these two rivers and the southern marshlands to the Gulf. It forms a vast protruding delta in its southern reaches. The total river length is 195 km and the catchment area is up to 108000 km$^2$.

**The Mesopotamian Marshlands** of southern Iraq are one of the most important features of the freshwater & brackish water ecosystems of Iraq, and are found in the terrestrial ecoregion previously discussed in section I.1.2 above (Tigris-Euphrates Alluvial Salt Marsh). It is comprised of a large network of interconnected wetlands covered with extensive *Phragmites australis* reed beds created as the rivers reach the lower Mesopotamian plains, meander and form an extensive inland delta above the head of the Gulf. Three primary marsh ecosystems make up the Mesopotamian Marshlands: the Central Marshes formed between the Tigris and Euphrates Rivers; the Hammar Marshes (Hor al Hammar) formed to the south of the Euphrates River between the cities of Nasiria and Basra; and the transboundary Hawizeh Marshes (Hor Hawizeh) to the east of the Tigris River between the city of Amarah and Basra and extending into Iran (where it is called Hor Al Azim). There are numerous other smaller wetland systems (permanent and seasonal, freshwater and brackish water) around these three major systems (e.g. Auda Marsh, Dalmaj Marsh, Sinnaf Marsh, etc.).

**Reed mace beds in the Central Marshes by M. Shibil**

During the 1970s, the marshes covered an area of up to approximately 12,000 to 15,000 km$^2$ making them the third largest wetland ecosystem in the world. These marshes have always been subject of seasonal drying effect but in the 1990s faced a major campaign of intentional desiccation under the Saddam regime conducted for largely political reasons. The result was that the two major marshes that were a part of this complex, the Central & Hammar marshes, were completely dry for over 10 years and the third transboundary marsh, the Hawizeh Marshes on the border between Iraq and Iran, were partially dried (it could not be fully drained because of waters entering the marsh from Iran). Such a period of drainage was to have vast and far-reaching ramifications for the biodiversity of Iraq and surrounding regions, including significant effects on fisheries, local climate, and migratory and endemic species that relied upon the marshlands. The recovery of this system after 2003 when waters were partially restored to this area was initially monitored by the UNEP Iraq Marshlands Observation System (IMOS) using remote sensing technology. This program was discontinued by UNEP at the end of 2006 (by which time it was estimated that 58% of the area, when compared to the 1970s footprint of the marshes, had been restored to wetlands) but the New Eden Group has continued the remote sensing program, providing information as needed to the Iraqi government and stakeholders.

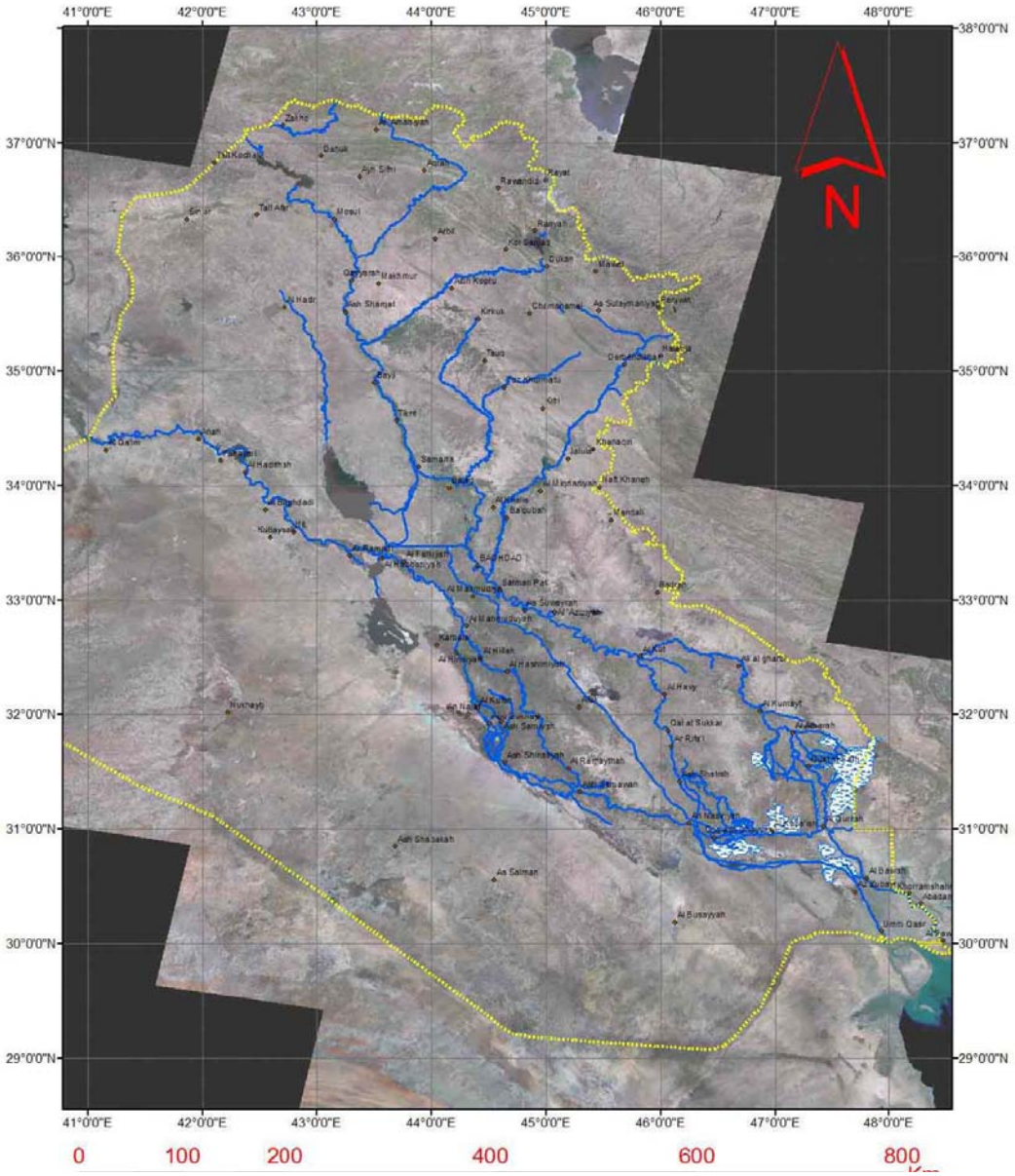
*Biodiversity* – The following information on the biodiversity of the Lower Tigris-Euphrates ecoregion [441] of Iraq comes from the Freshwater Ecoregions of the World website (www.feow.org) (WWF/TNC, 2008) and from KBA Surveys (KBA, 2007-2009).

Reeds and rushes grow in the wetland areas and poplars, willows and tamarisk trees grow along river channels, banks, and beside irrigation ditches throughout the country. The freshwater habitats of the marshlands, which are part of the Tigris-Euphrates River Ecoregion, are surrounded by often arid deserts with xeric vegetation, are particularly rich and important corridors for wildlife species. Many of these were mentioned above in section I.1.2 on terrestrial ecoregions. Birds have been well studied as have most plants and macrophytes, particularly in the southern marshlands. The KBA Project has

collected extensive information on aquatic organism such as phyto & zooplankton as benthic macroinvertebrates. Benthic macroinvertebrates from Iraq are now subject to a study in cooperation with the Smithsonian Natural History Museum and the Bar Code of Life Project. In addition, extensive information has been collected on fish in the fresh and brackish water habitats of Iraq.

The fauna of the freshwater ecoregion of Iraq is dominated by cyprinids that represent around 75% of the ecoregion's species. The native fauna is dominated by species of the genus *Barbus* and these have historically been an economically important species. The upper reaches are freshwater systems characterized by fresh, often hard waters while the lower reaches of the basin become brackish water with significant tidal influences. Several marine fish can be found in the lower basin including: the bull shark (*Carcharhinus leucas*), which has been seen as far north as Baghdad; Hilsa shad (*Tenualosa ilisha*), which enters the rivers and marshes of Iraq for spawning; and Yellowfin seabream (*Acanthopagrus latus*). The basin shares much of its fauna with the Upper Tigris & Euphrates ecoregion [442], but the marine influence of the Gulf and the Mesopotamian Marshlands created by the two rivers results in a unique ecosystem with both fresh and saltwater influences.

Other noteworthy freshwater-associated species of this system are or have been: Several cave fish species such as the Iraq blind barb *(Typhlogarra widdowsoni*); the smooth-coated otter subspecies (*Lutra perspicillata maxwelli)*; the Bunn's short-tailed bandicoot rat (*Erythronesokia bunnii*); a commercially important shrimp *Metapenaeus affinis*; the softshell turtle (*Rafetus euphraticus*); certain prawns and mollusks of both African and Oriental taxa; and endemic mussels.




**Tigris & Euphrates Basins and major tributaries in Iraq (New Eden Group, 2006)**

### I.1.4 Marine Ecosystems

The Gulf Ecoregion, also known as the ROPME Sea Area, is surrounded by Iran to the north, the Arabian Peninsula to the south, and Iraq and Kuwait to the northwest where the waters of the Shatt Al Arab and Shatt Al Basrah/Khor Az Zubayr enter the Gulf. These waters represent some of the most important freshwater influences to the Gulf. Iraq has approximately 105 km of coastline and 716 km$^2$ of territorial seas (Earth Trends Country Profile, 2003). The waters of the Gulf are high in salts due to high temperatures, low precipitations, and high evaporation. The Gulf floor is flat and made up of mostly soft sediments. Water quality in the Gulf has suffered as water quality in the input rivers has

declined, particularly suffering from increased sedimentation from the drainage of the Iraqi marshlands in the 1990s. Coral reefs in the region (in Kuwait, Iran and along the Arabian Peninsula, Iraq has no coral reefs within its territorial waters) are under threat, and fisheries in the Gulf underwent a major decline with the drainage of the marshlands.

*Biodiversity* - Several marine, endangered, and threatened turtle species have been reported in Iraqi marine waters, such as: the Loggerhead Sea Turtle (*Caretta caretta*); Green Turtle (*Chelonia mydas*); Hawksbill Turtle sub-species (*Eretmochelys imbricata bissa*); Olive Ridley (*Lepidochelys olivacea*); and Leatherback Sea Turtle sub-species (*Dermochelys coriacea schlegelii*). Two sea snakes are also reported: Beaked sea snake/Hook-nosed sea snake (*Enhydrina schistosa)* and Graceful Small-headed Sea Snake/Slender Sea Snake (*Microcephalophis gracilis*). Several marine fish that utilize the freshwater ecoregion of Iraq have already been mentioned above: Bull Shark (*Carcharhinus leucas*); Hilsa shad (*Tenualosa ilisha*); and Yellow-finned seabream (*Acanthopagrus latus*). But there are also other important marine species that occur in the marine waters in and near Iraq such as the Silver Pomfret (Zobaidy) (*Pampus argenteus).* Marine birds that are using the coastal flats and marine waters of Iraq include: Crab-Plover (*Dromas ardeola*) and Slender-billed Gull (*Chroicocephalus genei*).

## I.2 *Importance of Species Biodiversity in Iraq*

Biodiversity can be discussed at many levels (from genetic material to species to entire ecosystems) and on different scales (local, national, regional, or global). Three specific types of species relate to the global importance of Iraqi biodiversity. These include:

- Migratory species -species for which Iraq is important during one point of their life cycle when they migrate through Iraq);
- Endemic or semi-endemic species - species that are unique to Iraq or regional ecosystems found in Iraq; and lastly
- Species that are endangered, threatened, or vulnerable to extinction.

**Siberian Stonechat by K. Ararat**

The IUCN Red List of Endangered Species provides conservation status on many species (both migratory and endemic) that are facing declines and potentially extinction through its on-line Red List (www.iucnredlist.org ).

The primary and most up-to-date information on species for Iraq comes from the KBA bi-annual surveys that have occurred in the country since 2005. A preliminary checklist of the Birds of Iraq has been developed (currently in press) that includes 417 bird species of which 182 are considered passage migrants to Iraq and an additional 27 are vagrant species. Of these, 18 species are considered to be of conservation concern, the majority of which are

either possible or confirmed breeders (See Appendix IV). Five species of birds are either endemic or have endemic races found in Iraq (See Appendix 4).

NI is currently preparing several papers for publication concerning a wide variety of new records of bird species, new breeding records, and range extensions.

Another group that has received some recent study are fish species in Iraq. Many marine fish that are important in the fisheries of the Gulf countries utilize the Iraqi marshlands for spawning and nursing grounds making this ecosystem particularly important to regional biodiversity. Some 106 species of fish (including freshwater and marine entrant species) have now been recorded in the non-marine waters of Iraq (Coad et al. in preparation) and of these 53 species are marine fish (Abd, Rubec & Coad, 2009). According to the Freshwater Ecoregions of the World website (www.feow.org/index.php), three of these fish are endemic in the Tigris/Euphrates Basins ecoregion (WWF/TNC, 2008): *Glyptothorax steindachneri; Caecocypris basim,* and Iraq blind barb (*Typhlogarra widdowsoni*). *Caecocypris basimi* and the Iraq blind barb are endemic *genera* and species from a cave habitat near Haditha on the Euphrates, and are listed as Vulnerable on the IUCN Red List. Another near-endemic cyprinid, *Hemigrammocapoeta elegans* is probably restricted to the lowlands, as is an undescribed tooth-carp (*Aphanius* sp.).

Little information exists on other globally important fauna species of insects, amphibians, reptiles, and mammals. KBA Surveys have collected only anecdotal information on these species to date though it is likely that more information exists in Iraq. NI is in the process of verifying the presence of the smooth-coated otter in Iraq (an endemic sub-species of this otter, *Lutra perspicillata maxwelli*, existed in the marshes prior to their desiccation), and the presence of the near-threatened leopard (*Panthera pardus*) has been verified in the border regions between Iraq and Iran.

A list of ten amphibians, ninety-seven reptiles and seventy-four mammals has been compiled from the literature by NI (Amr, 2009a & b). Many are conservation concern species and several of these may be endemic or near-endemics such as the vulnerable Mountain newt (*Neurergus crocatus*), the endangered Kurdistan Newt (*Neurergus microspilotus*) and the endangered Euphrates Softshell Turtle (*Rafetus euphraticus*). Twenty species of mammals are of conservation concern and Iraq has two endemic/semi-endemic species: the Mesopotamian gerbil (*Gerbillus mesopotamiae*) and Cheesman's gerbil (*Gerbillus cheesmani*). Again, little is known about their current conservation status.

Plant species in Iraq, which were partially treated in the incomplete Flora of Iraq that was released between the 1960s and 1980s through a joint effort by the Ministry of Agriculture (IMOA) and Kew Gardens in the UK, are now subject to renewed research. KBA surveys were primarily focused on macrophytes of the Marshland areas but when surveys began in Kurdistan, Iraq in 2007, it began collection of terrestrial plants in this botanically rich area. The IMOA and Kew Gardens are now involved in an effort to complete the unpublished volumes of the old Flora of Iraq and a new effort to create a modern Flora is being lead by a joint effort between the MOE, NI/TRI, the Royal Botanic Gardens Edinburgh's (RBGE's) Center for Middle East Plants, the Missouri Botanical Gardens and Old Dominion University. The RBGE did an initial review of the published books of the existing Flora of Iraq, the Flora Iranica and work by Zohary in the 1940s. They developed a draft checklist of species for Iraq, with no attempt to update the taxonomy, of over 4500 plants with a secondary list of approximately 195 endemic Iraqi species (Knees et al 2009). There are also local efforts to create regional plants lists (for example, the faculty at the College of Agriculture at the University of Sulaimani have developed a list of the vegetation in the Sulaimani District including medicinal plants).

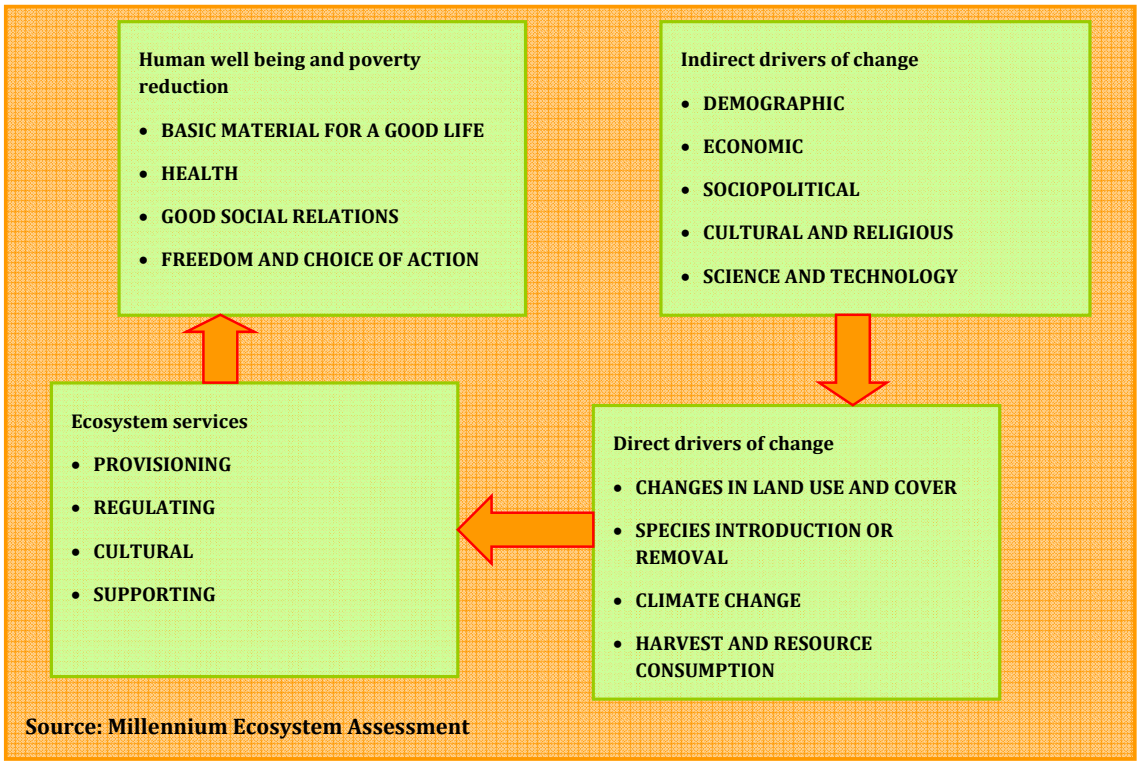
***Alium* sp by N. Abdulhasan**

Iraq must also consider the issue of invasive species and their effects on global biodiversity. As the Millennium Ecosystem Assessment (2005) stated, "The homogenization of biodiversity—that is, the spread of invasive alien species around the world—thus also represents a loss of biodiversity at a global scale (since once-distinct groups of species in different parts of the world become more similar) even though the diversity of species in particular regions may actually increase because of the arrival of new species." As the birthplace of agriculture, Iraq was responsible for exporting important grain crops to the world but exported numerous invasive weed species as well. The on-line Global Invasive Species Database (www.issg.org/database/welcome/), provides a list of 25 species of micro-organisms, insects, fish, mammals, herbs, grasses, shrubs, or trees in Iraq that are either invasive to Iraq (13 species) or are native to Iraq and are invasive of other regions (22 species) as well as two invasive species for whom the bio-status is not yet specified (see appendix). These numbers are likely low estimates and with future study and survey efforts more information on invasive species to and from Iraq will be discovered.

## I.3 *Challenges & Threats for Biodiversity Protection in Iraq*

Challenges and threats that can affect biodiversity can be distinguished in two categories: indirect drivers of change and direct drivers of change. Some factors such as population increase, technology, and lifestyle can lead to changes in factors that directly affect ecosystems, such as the catch of fisheries or the use of fertilizers to increase production. Such changes in ecosystems may also cause a change in

the services that the ecosystems are providing, potentially adversely impacting human health and well-being.




The United Nations Environmental Programme (2003) listed four main threats to biodiversity in Iraq.

1) Lack of institutional or legal framework for conservation of biodiversity
2) Lack of any effective protected areas network
3) Lack of a national biodiversity strategy, or action plan
4) Many species under threat from ecosystem degradation especially from the loss of the Mesopotamian marshlands and oil spills.

As already stated in this Chapter, Iraq is made up of five main terrestrial ecoregions, an overlapping freshwater ecoregion and the Gulf marine water ecoregion. The major threats and direct drivers of ecosystem change to each of these regions, which has been touched on above is more fully described below. Much of the information is based on the findings of the KBA Project (Nature Iraq, 2007-2009), which is done in cooperation with the Iraqi Ministry of Environment and this has been augmented by the work of the New Eden Group (2006), IMELS/NI (in preparation), (Evans 1994), and the WildFinder Online database (www.worldwildlife.org/wildfinder) (WWF, 2006). Additional information on threats in Iraq can be obtained in reports by UNEP (2003, 2005) and USAID (2008).

### I.3.1 Terrestrial Ecoregion Threats & Challenges

**Tigris-Euphrates Alluvial Salt Marsh (PA0906)** – Various large-scale water diversion projects have degraded the Tigris-Euphrates alluvial salt marsh and had major impacts on land-use patterns in this region. These changes were most pronounced in the 1990s but began as far back as the 1950s (Evans, 1994). Oil and gas production has caused the drainage of large sections of wetlands as well as causing oil spills and pollution related to oil production. The Iran/Iraq conflict also heavily impacted the area particularly along the border region with Iran and the eastern portion of the Central marshes. Agricultural runoff threatens water quality and results in increasing salinity in many areas of this ecoregion. Uncontrolled hunting is a threat to many waterfowl and other fauna, and fishing is also uncontrolled with the prevalent use of electro-fishing. These threats will be more fully discussed in the section on Pressure Indicators below.

**Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303)** – Although less is known about the conservation status of this region, typical threats are changes to traditional land management resulting in overgrazing by camels and goats, off-road vehicles, agricultural and irrigation projects, as well as unassessed impacts from past and current conflicts. The Ministry of Industry and Minerals is currently seeking investments in mining and industrial development that may affect this area (e.g. Petrochemicals and phosphates). Many species have declined or become extinct in this area due to hunting and human encroachment. During at least 2010 large expeditions of hunters/falconers have been entering Iraq from surrounding countries and protected by security forces to hunt MacQueen's Bustard and other prey species without conservation controls or oversight. Reports indicate local eradication of some of these species has occurred as a result of these activities.

**Mesopotamian Shrub Desert (PA1320) –** Many of the same impacts that affect the previous ecoregion are present in the Mesopotamian Shrub Desert. Most human impacts and threats are often concentrated in areas near river basins and springs/oases. Changes in traditional management that has resulted in water diversion, irrigation works and associated agriculture and livestock grazing of goats, sheep and camels have had the most significant impacts on biodiversity of this region. Unsustainable fishing is also a problem in the river basins. As with the previous ecoregion, during at least 2009/2010 large expeditions of hunters/falconers have been entering Iraq from surrounding countries to hunt MacQueen's Bustard and other prey species without any conservation controls or oversight.

**Middle East Steppe (PA0812)** – As stated in section I.1.2, there is evidence that this region was once a forest-steppe ecosystem. Relating what travellers to the Sinjar Mountain region wrote 100 years previously, Guest (1966), who took pictures of the same region in the 1933, indicated a history of forest cutting for fuel that had prevented the forest from regenerating and left certain areas abandoned. These past threats may still affect remnant stands of trees within the region but as with the other regions mentioned above, the most important current threats are changes in traditional land management resulting in overgrazing, conversion of remnant steppe ecosystems and wetlands to agriculture and related irrigation, and unsustainable hunting and fishing.

The Ministry of Industry and Minerals is currently seeking investments in petrochemicals, fertilizer, phosphate, and sulphur plants. It should be noted that there is already a State company called the Mishraq State Sulphur Mine Plant located within this ecoregion about 40 km southeast of Mosul in an

area of high sulphur deposits. On 24 June 2003, a fire accidentally ignited at the Mishraq State Sulfur Mine Plant and burned for approximately three weeks creating a smoke plume containing concentrations of sulphur dioxide (SO2) and hydrogen sulphide (H2S) and other contaminants that were visible from satellites. Health effects for exposure to the smoke were assessed but the environmental effects from this fire are unknown. There have been numerous pollution-causing incidents of this type as well as many contaminated sites that exist throughout the site (UNEP, 2005).

**Zagros Mountains Forest Steppe (PA0446) -** In areas of the Zagros range and mountainous areas of Iraqi Kurdistan, deforestation has had significant impacts. Calculating from Guest's (1966) descriptions of traveller accounts from the 1830s, the Sulaimani-Halabja-Penjween district appears to have been largely deforested at least 200 or more years ago. Significant impacts to forests in this region still exist particularly with the development of new roads (themselves a major ecosystem threat), which bring woodcutters, hunters, and developers into new areas. But there are now at least loose regulations preventing tree-cutting, and coppicing is more uniformly practiced as a more sustainable fuel-collection method throughout the region. Forests and Forest-Steppe ecosystems as well as species were also heavily impacted during the periods of human conflict during the last century. Today, landmine fields restrict human activities in certain areas (particularly along the borders with Turkey & Iran). Direct impacts were felt on wild species as well as humans during the chemical attacks of the Anfal campaign when numerous accounts of birds falling from the skies heralded an incoming attack. The legacy of these attacks is poorly understood. Another example of how conflicts directly affected species is the walling up of "Kuna Ba" (lit. "Hole of the Wind") an important cave near Darbandikhan. In the 1980s, Iraqi forces closed the cave in trying to stop Peshmerga forces from using it as a base of operations. This action likely had severe impacts on the bat populations using the cave, which, like other areas in the region, are reported to hold thousands of different species of bats, all of which are poorly studied in Iraq.

Agricultural activities and grazing continue to have major effects on species compositions from lowlands to sub-alpine zones. Many herds are brought from south to the north to take advantage of summer grazing within this ecoregion but little is known about how this is affecting the habitats found here. Throughout this ecoregion, "advanced degradation is visible even in densely forested areas of the Zagros Mountains and species that are better able to withstand grazing and pruning have crowded out original species, such as *Carpinus* spp. and *Quercus* spp., in many areas" (Frey & Probst in WWF, 2006). Development, which with increased security is moving at a fast pace in the Iraqi Kurdistan region, is also threatening biodiversity in the region as new roads, homes, and industries are expanding with little regard to ecosystem values. This development has also worsened regional pollution threats as increasing untreated sewage and industrial wastes and emissions are released without controls into air, land, and water.

### I.3.2 Freshwater Ecoregion Threats & Challenges

**Lower Tigris-Euphrates Basins [441]** – Sewage and industrial pollution pose a particular threat to much of the freshwater ecosystems of Iraq as they can spread far from the point of contamination. There are few if any properly functioning sewage treatment facilities in the country and most liquid wastes are simply drained into streams, rivers, and wetlands. In addition, solid waste (municipal and

industrial) is simply dumped in ditches and low drainage areas and often burned where they can adversely affect both surface and groundwater resources.

Due to the extensive redevelopment and the high demand for construction materials in Iraq, there have been many investments in new greenfield cement projects utilizing available raw materials (limestone) found throughout Iraq. Such projects have been known to cause air pollution that can travel great distances and the drying up of water resources. Gravel mining for these cement factories can cause erosion, destroys riparian habitat and in-stream beds for fish spawning and other organisms, and has potentially significant adverse effects on aquifers and groundwater storage. Nearly all Iraqi rivers have multiple gravel mines along their length.

As stated above, the hydrology of lower Iraq has faced significant changes since the 1950s. This includes oil and gas development as well as the drainage of the marshlands.

Agricultural drainage from irrigated lands has caused deteriorating water quality and rises in salinity as one travels southward in Iraq. Many communities must rely on reverse osmosis units to obtain any potable water but the increasing salinity has led to extensive changes in flora and fauna as freshwater marshes turn brackish.

### I.3.3 Marine Ecoregion Threats & Challenges

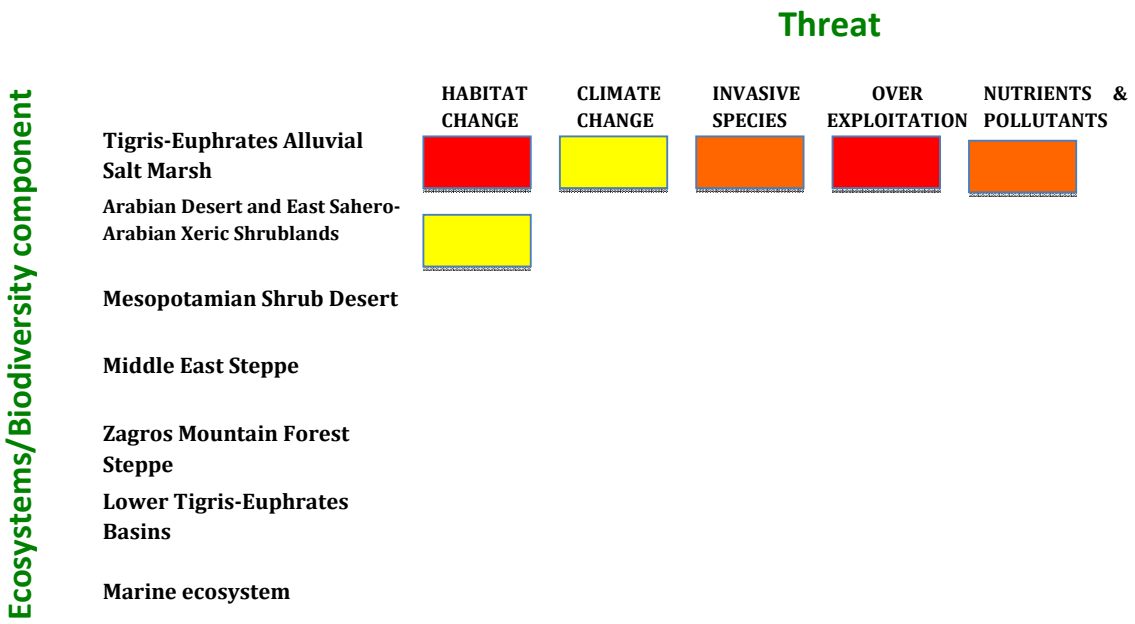
**Gulf Ecoregion** – Threats to the marine and coastal areas of Iraq are caused by lowering water quality of waters from the Tigris-Euphrates Basins, Karun and Shatt Al Arab Rivers. Localized pollution from oil transfers and spills, sunken ships, and nearby municipal and industrial wastes is also threatening these waters. KBA Surveys have noted oiled birds and shorelines as a result of oil spills and sunken vessels. There are no emergency response mechanisms in place to address these problems.

Fishing remains uncontrolled and poorly characterized with very little information on marine fisheries resources and what would constitute a sustainable catch by species. The KBA surveys have seen road building and shore development causing degradation to habitats but security in the region remains a challenge to full and proper assessment.

### I.3.4 Direct drivers of changes and their impact on ecosystems, a summary table for Iraq

Direct drivers of change are affecting the ecosystems and therefore the services these provide to society. It is important to get a clear picture of the current situation in Iraq and the extent to which the seven main ecosystems that have been discussed throughout this Chapter are affected by change. This knowledge will allow Iraqi to prioritize actions and plans in the drafting process for the NBSAP.

In the Table below the background colour of the cells represents the extent to which the ecosystem has changed (going from light yellow to red to represent minor to great change) while the arrows represent the current situation of change taking place (from downwards arrow to upwards arrow to represent decreasing or increasing changes).

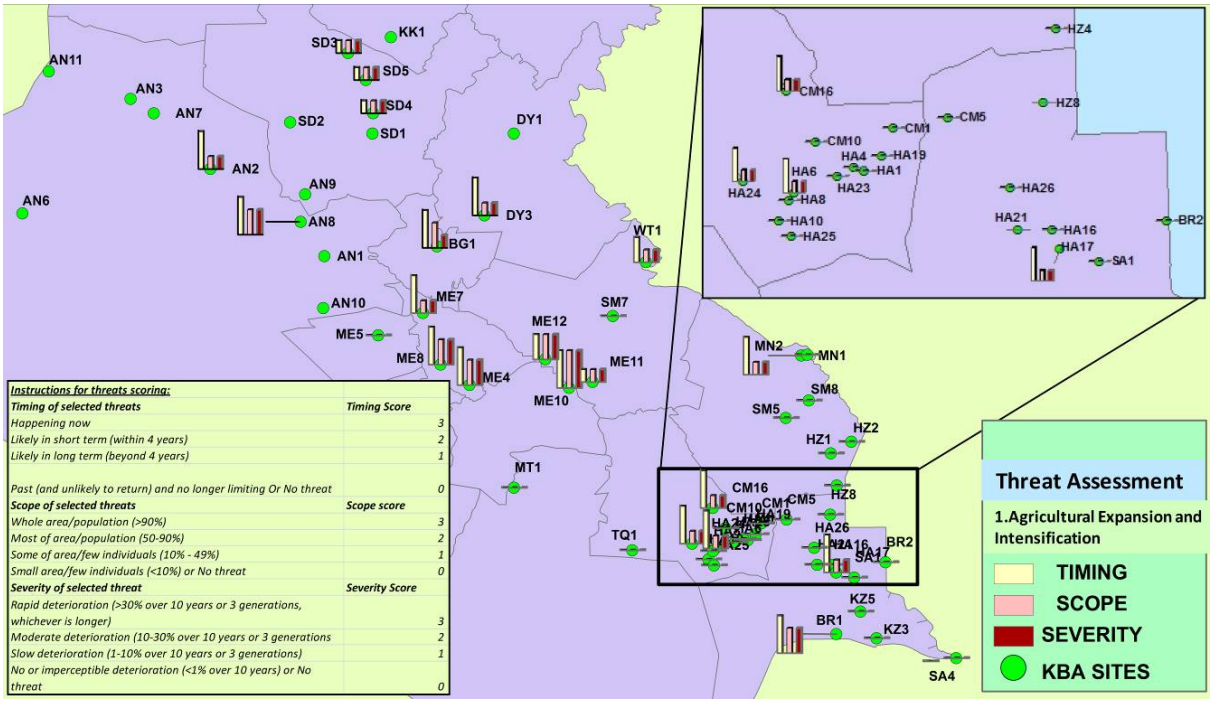



### I.3.5 Threat Assessment

In 2010, the KBA Project survey teams instituted a standardized threat assessment methodology for all sites. Twelve threat categories (shown below) are assessed on a four level scale (0-3) based on their timing, scope, and severity.

1. Agricultural Expansion and Intensification
2. Residential and Commercial Development
3. Energy Production and Mining (gravel mining, oil development, electrical towers, etc.)
4. Transportation & Service Corridors (development of roads and shipping corridors)
5. Over-exploitation, Persecution and Control (logging, hunting, over-fishing, etc.)
6. Human Intrusions and Disturbance - Effects related to non-consumption of biological resources – recreational activities, war, military exercises, work and other activities
7. Natural Systems Modification (dams and changes water mgmt, filling in wetlands, drainage, dredging, canalizations)
8. Invasive or Other Problematic Species
9. Pollution (municipal and industrial waste and garbage, noise, air, light, & thermal pollution)
10. Geological Events (threats from catastrophic geological events)
11. Climate change, Severe weather, Drought, Floods
12. Other threats

The following map was developed based on scoring for the first threat category (Agricultural Expansion and Intensification) during the winter 2010 survey in Central & Southern Iraq and provides to stakeholders an indication of where to target mitigation efforts for threats causing adverse impacts.




**Agricultural Expansion and Intensification Threats at potential Key Biodiversity Areas in Central & Southern Iraq, winter 2010.**

### I.3.6 National, Regional & Global Threats & Challenges (Indirect drivers of change in ecosystems)

Many of the threats and challenges listed above are not restricted to a single ecoregion or locality but are, to varying degrees, effecting Iraq nation-wide. These include:

- Illegal and/or unsustainable practices of fishing and hunting;
- ecosystem conversions, such as drainage of wetlands for agriculture;
- municipal and industrial pollution;
- agricultural chemical impacts
- overgrazing;
- poor water resource management;
- salinization;
- road building and development;
- drought and desertification; and
- others.

All of these threats and challenges will need to be addressed through effective policies, laws, enforcement mechanisms, and resource planning.

Although the socio-economic, cultural and sometimes religious aspects may indirectly effect the ecosystems by causing, for instance, illegal hunting and fishing, agricultural conversion and chemical pollution , perhaps the primary threat to biodiversity is a simple lack of awareness in both the general public and within government agencies about the importance of biodiversity and environment services that underlie all human activities within Iraq. This is in some way the most significant problem in the country and yet does not require expensive technology or expertise to be solved. Instead, it requires a systemic and comprehensive educational campaign involving all citizens within the country.

An additional challenge in the country is the current state of research institutions as regards to their capacity to conduct comprehensive, country-wide surveys for biodiversity. To date, the only such program that approaches this is the KBA Project but there are still some local and regional attempts to collect field data. These have the potential to be important efforts but to date have been poorly coordinated, suffered from an unwillingness to be inclusive and share information among researchers and organizations, and have not benefitted from more modern methodologies, training, or oversight/data verification activities. These are serious capacity-building issues that must be addressed as the country moves forward in the effort to fully characterize the biodiversity of the country require international support to be overcome.

Iraq is not alone in addressing these problems and though the country has only recently joined the convention, all of Iraq's neighbours are parties to the Convention on Biological Diversity (Jordan and Syria became party to the convention in 1993, Iran in 1996, Turkey in 1997, Saudi Arabia in 2001, and Kuwait in 2002). This shows a significant concern regarding biodiversity in the region and that environmental problems such as species loss and ecosystem degradation affect all of these countries. Yet regional cooperation to resolve these issues remains low and needs to be changed.

Turkey, Syria, Iran, and Iraq are all connected via the watersheds and basins that make up the Tigris-Euphrates basins, thus any changes in these basins can have far-reaching, regional effects. This has clearly been the case for Iraq with upstream dam-building in the upper watersheds of these basins in Turkey, Syria, Iran and even northern Iraq that continues to date. These activities have caused declines in both water quality and water quantity reaching the Gulf, and yet the issue has proven to be so contentious that few workable solutions have been achieved and no binding agreement has been defined to create equitable water sharing and management.

It was felt that more agreement could be reached between these nations if the focus was shifted towards the issue of biodiversity. As a result, an initiative was presented by NI at the Aqaba Middle East Biodiversity Symposium in October 2008 called, “Towards a Mesopotamian Headwaters to Oceans Biodiversity Initiative”, which suggested the five actions below:

1. A basin-wide program, including the headwaters and watercourses of the Tigris, Euphrates and Karkeh rivers as well as other rivers feeding the Mesopotamian Marshes and extending to the Shatt al-Arab and into The Gulf, should be established to promote the wise use, conservation, and management of biological resources in this region.
2. Such a program should be based on international standards with a general coordinating function to be developed in cooperation with BirdLife International and its national partners,

national governments, and other national and international inter-governmental and non-governmental organizations.

3. Such a program should welcome international donors and interested and complementary parties and partners that may have capacity to contribute to any or all of its components.
4. The Key Biodiversity Areas Program established in Iraq should be examined in other nations of the region to be adapted and modelled to fit the natural resources management and political situation in those countries.
5. An informal working group should be established as soon as feasible to jointly develop a proposal including common objectives, scope, terms of reference and plan for initial steps towards a Headwaters to Oceans Biodiversity Initiative.

Global challenges are also affecting biodiversity within Iraq and are poorly understood. This is primarily reflected in the potential effects of climate change and global warming on species distributions, habitat changes, and desertification. These issues are poorly understood and have received almost no study within the country. Despite a general awareness about their importance and the need to be addressed, there is little information within Iraqi institutions regarding specific actions that can be taken to study, understand, or mitigate global environmental issues.

## I.4 *Biodiversity Indicators*

### I.4.1 Initial Trial Indicators selected for Iraq

In order to assess progress in Iraq of protecting the biodiversity of the country and to effectively communicate trends in biodiversity related to the objectives of the Convention, Iraq has selected a limited number of trial indicators. In many cases, at this time, Iraq lacks the data to use many of these indicators as tools for measuring improvements in biological diversity. They are included here to provide targets that the national government should work towards improving so that a more complete understanding of the trends in biodiversity within the country can be understood.

The core set of indicators derived from a list provided by the SCBD (2007) is provided here focusing on the most relevant issues for biodiversity in an Iraqi context. These are indicators for general application: forest biodiversity; agricultural and rangeland biodiversity; terrestrial biodiversity; freshwater biodiversity; marine and coastal waters biodiversity; etc.

Gap Analysis is greatly aided by indicators that are useful for monitoring important aspects of Iraq's biodiversity. Key Indicators for Iraq's biodiversity are organized around four questions or concepts: What is changing and to what extent? (state); why is it changing? (pressure); what are we doing about it? (response); and do we have the means to formulate and implement response measures? (capacity).

Since the response indicators deal with the strategies, plans and actions that a country is able to put in place to biodiversity conservation, these will be more properly addressed in Chapter II.

| STATE INDICATORS | PRESSURE INDICATORS |
|---|---|
| Ecoregions of Iraq | Land Cover and Use Variables |
| Water Resources in the Tigris-Euphrates River Basins | Change in land use, conversion of forest & steppe |

| STATE INDICATORS | PRESSURE INDICATORS |
|---|---|
| | lands to other land uses (e.g. deforestation rate) |
| Changes in habitat boundaries | Fish Catch Assessments |
| Biodiversity of Terrestrial Ecosystems | Alien & Invasive Species |
| List and total number of threatened species by group in terrestrial ecosystems | Hunting Pressure |
| Biodiversity in freshwater ecosystems | Unsustainable Fishing Practices |
| List and total number of threatened species by group in freshwater ecosystems | Desertification |
| Biodiversity of Marine Ecosystems | Road Building Impacts |
| List and total number of threatened species by group in marine ecosystems | Mining & Resource Extraction |
| Water Quality- Nutrients, Physical & Chemical Parameters, BOD, heavy metals, and other pollutants | Polluted & Hazardous Sites |
| Soil Quality | Land Mines |
| Ethnic & Language Groups | |

This initial gap assessment focuses only on core issues. Future assessments may need to address other more detailed indicators so a more comprehensive list of potential indicators is also provided in each area.

The gap analysis for each indicator is presented below and provides:

1. A brief description of the gap analysis.
2. The information and/or datasets needed to fully develop each indicator and develop a more complete picture of the biodiversity of the country.
3. A list of the sources and/or stakeholders who should be involved in filling the gaps in information.

This table is augmented by more detailed information on each indicator found in Appendix IV.

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| **I.4.2 Indicators of STATUS of Biodiversity and Ecosystems** | | | |
| ***Ecoregions in Iraq*** | The republic of Iraq is located in the Middle East, surrounded by Iran, Kuwait, Saudi Arabia, Jordan, Syria and Turkey. It is 432,162 km$^2$ and is comprised of five major and four smaller terrestrial ecoregions. The ecological status of each of these areas is not well assessed and though many individual terrestrial and freshwater sites have been studied in Iraq since 2005 by the KBA Project and other initiatives, for logistical and support reasons, few efforts have been taken to ensure that all ecoregions are adequately represented in the survey effort; almost no efforts have been made to assess habitat in the territorial seas of Iraq. | Seasonal surveys to identify quality representative habitat for each ecoregion. | Ministry of Environment, Iraqi Universities and research organizations, NGOs, and related institutions in Kurdistan, Iraq. (Seasonally) |
| ***Water Resources in the Tigris-Euphrates River Basins*** | Information and future trends in water availability in the Tigris-Euphrates Basins are subject to change due to damming, irrigation and water diversion projects in upstream riparian states. It is important to characterize in-stream water resources and hydrological functions. In addition, information on changing management and operations of dams, gates and other water control structures within Iraq is not always available or, if available, is not evaluated by Iraqi agencies responsible for river basin ecosystems and biodiversity. | Center for information sharing and developing management agreements over water resource issues between different stakeholders, decision-makers, and users. | Ministry of Water Resources, Ministry of Agriculture, Ministry of Interior, Ministry of Planning, Ministry of Foreign Affairs, and related institutions in Kurdistan, Iraq. |
| ***Change in habitat boundaries*** | Long term tracking of habitats and habitat boundaries using remote sensing/GIS technology as demonstrated by the IMOS system. | Habitat classification system development; Remote sensing/GIS mapping with ground-truthing surveys | Ministry of Environment, Ministry of Agriculture, Iraqi Universities and research organizations, Local NGOs, Related institutions in Kurdistan, Iraq. (Seasonally) |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| ***Biodiversity in terrestrial ecosystems*** | A systematic census and classification has not been done to determine status of species within major terrestrial habitats and ecoregions. Draft marshland habitat classification system developed under the NI Habitat Project should be completed and expanded to include terrestrial habitats. | Develop Iraq terrestrial species checklists; Mapping major habitats types for species conservation; Database of species of the different groups (birds, mammals; amphibians etc) based on habitat utilized; Habitat surveys; and develop an Iraqi Habitat Classification system for all terrestrial habitats found in Iraq based on international standards (e.g. EUNIS, others). | Ministry of Environment, International Agencies -IUCN, WRI, UNEP, etc., Local authorities KRG and Iranian Public Authorities, and Local NGOs. (Seasonal) |
| ***List of threatened species by group in terrestrial ecosystems*** | Determining conservation status of other species groups is still needed; The development of systematic checklists for flora and fauna groups is needed. | Checklists informed and verified by field survey work for flora and fauna groups; Updating status on species and habitats | Ministry of Environment, Ministry of Agriculture, Iraqi Universities & Research organizations, International Agencies -IUCN, WRI, UNEP, etc., and related institutions in Kurdistan, Iraq |
| ***Biodiversity in freshwater ecosystems*** | A systematic census and classification has not been done to determine status of species within major freshwater habitats and ecoregions. Draft marshland habitat classification system developed under the NI Habitat Project should be completed. Benthic Macroinvertebrates & Plankton data has been used in a limited fashion primarily as a water quality tool but this methodology should be improved and information on aquatic organisms should be evaluated for biodiversity values. Few if any studies on other aquatic organisms (amphibians) have been conducted. | Mapping major freshwater habitats types for species conservation; Database of species of the different groups (birds, mammals, amphibians etc) based on habitat utilized; Develop an Iraqi Habitat Classification system for all terrestrial, freshwater and marine and coastal habitats based on international standards (e.g. EUNIS, others); The collecting of adult (flying terrestrial) phase organisms should be initiated as a tool for identifying important species and for estimating water quality; Checklist of Iraqi amphibians with their habitat requirements and conservation status; Improved information on fish assemblages and conservation status for streams, rivers and lakes and caves ecosystems; and Locating important spawning habitats of Iraqi species. | Ministry of Environment, International Agencies -IUCN, WRI, UNEP, etc., Iraqi Universities, Twin Rivers Institute for Scientific Research-AUIS & other research institutions, related institutions in Kurdistan, Iraq, and Local NGOs |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| ***List and total number of threatened species by group in freshwater ecosystems.*** | A systematic census and classification has not been done to determine status of species within major freshwater habitats and ecoregions. Draft marshland habitat classification system developed under the NI Habitat Project should be completed. | Mapping major freshwater habitats types for species conservation; Database of species of the different groups (birds, mammals; amphibians etc) based on habitat utilized; Develop an Iraqi Habitat Classification system for all terrestrial, freshwater and marine and coastal habitats based on international standards (e.g. EUNIS, others), and Updating status on species and habitats. | Ministry of Environment, International Agencies -IUCN, WRI, UNEP, etc., Related institutions in Kurdistan, Iraq, Twin Rivers Institute for Scientific Research-AUIS & other research institutions, and Local NGOs. |
| ***Biodiversity in marine ecosystems*** | A systematic census and classification has not been done to determine status of species within major marine habitats. Draft habitat classification system developed under the NI Habitat Project should be completed and expanded to include these habitats. | Develop checklist and database of species of the different groups (birds, mammals; amphibians etc) based on habitat utilized; Fauna and habitat surveys; Develop an Iraqi Habitat Classification system for all marine and coastal habitats based on international standards (e.g. EUNIS, others). | Ministry of Environment, International Agencies -IUCN, WRI, UNEP, etc., and Local NGOs. (Seasonally) |
| ***List and total number of threatened species by group in marine ecosystems.*** | Regularly updated information about fisheries in all Iraqi commercial fishing locations handling marine fish. It is not currently possible to find such data covering wild marine fisheries. No or only informal fisherman associations exist. Changes in catch should be accessed through time. The extent to which other marine non-fish species (e.g. sea turtles, marine mammals, sharks and rays) are present in Iraq waters has been poorly studied. | Regular monitoring of key fisheries in rivers, lakes and marshlands (Frame & Landing Surveys) to characterize the fishing effort, fishing gear, species landed (by species type, weight, and time); Verify status of Iraqi species through surveys and update species checklist | Ministry of Agriculture, Marine Science Center, University of Basrah, (Seasonally or depending on information, surveys may be required several times during the fishing season) |
| ***Water Quality-Nutrients, Physical & Chemical Parameters, BOD, heavy metals, and*** | Regular monitoring campaigns are needed on a basin level (integrated watershed, catchment and river basin protection and management). At the moment it is not possible to find data covering all basins. No water quality data is | Updated water quality status of running and standing waters within Iraqi Watersheds; Monitoring network along the main tributaries and main stem of each watershed throughout the country; Continued research and | Ministry of Environment, Ministry of Health, Iraqi Universities, Twin Rivers Institute for Scientific Research-AUIS & other research institutions, and related institutions in Kurdistan, Iraq. (Minimum of 3-4 times a year) |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| ***other pollutants*** | available for waters entering Iraq from neighbouring countries; No quality standards are available for Iraqi surface waters and ground water. Benthic Macroinvertebrates & Plankton data has been used in a limited fashion primarily as a water quality tool but methodology requires more study to modify to Iraqi context and should be applied consistently throughout the country and over time to be most effective | development of WQIs & IBIs at research institutes; The exact tolerance value for benthic macroinvertebrates and plankton inhabiting Iraq should be found; an Iraqi Tolerance Index should be implemented instead of modifying the American and Australian indexes; and the collecting of adult (flying terrestrial) phase organisms should be initiated as a tool for estimating water quality and identifying important species. | |
| ***Soil Quality*** | At this stage, no information is available. | Soil quality in term of soil pollutant (e.g. nutrient N, P loads, heavy metal, pesticides, etc); Satellite images of different years (annually) | INMA Project (USAID), Ministry of Agriculture, Local public authorities, Iraqi University Colleges of Agriculture, Twin Rivers Institute for Scientific Research-AUIS & other research institutions, and related institutions in Kurdistan, Iraq. |
| ***Ethnic & Language Groups*** | Census Information is not complete. Ethno-biology/Ethno-medicine information is incomplete or lacking. There is also a lack of information on overall ethno-religious groups as this information may have other political implications. | Identifying the major ethno-religious groups and update maps of the ethno-diversity of the country and collect information on the use of biological diversity by these different groups (ethno-biology/ethno-medicine). Conduct survey efforts to document ethno-biology of Iraqi ethno-religious groups. | Iraqi Universities and other research organizations. |
| **I.4.3 Indicators of PRESSURE on Biodiversity and Ecosystems** | | | |
| ***Land Cover and Use Variables*** | A comprehensive system for land cover and land use classification does not exist for all lands of Iraq. Land use in undeveloped areas, particularly those of high value to biological diversity, is not well understood. | Develop land-use/land cover maps of natural and wildlands of Iraq and develop a classification scheme for these regions. | Ministry of Agriculture, Ministry of Planning, Ministry of Environment, NGOs, Ministry of Water Resources, Related ministries, directorates and research centers in Kurdistan, Iraq. (Seasonally) |
| ***Change in land use, conversion of forest*** | Gaps exist in current data collection efforts related to wildland forest resource and | Surveys to map existing stands of mature and important forests, remnant steppe ecosystems | Ministry of Agriculture- Forestry departments, Universities of Kurdistan, Iraq (Seasonally) |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| ***& steppe lands to other land uses (e.g. deforestation rate)*** | steppe/rangeland uses. Coppicing is practiced and tree cutting prohibited in the Kurdistan Region of Northern Iraq but information is lacking on the extent of this practice and the effectiveness of anti-cutting rules. Information on remnant steppe ecosystems is lacking, as well as current impacts of grazing and other use activities in the steppe, steppe-forest, and forest zones. | and evaluate species assemblages, status and threats of deforestation, overgrazing, and/or habitat conversion. Improved reporting on commercial forestry practices is needed. | |
| ***Fish Catch Assessments*** | Regularly updated information about fisheries in all Iraqi commercial fishing locations is not available. Some information is available for aquaculture but this should be developed further to identify interactions with wild fisheries. No or only informal fisherman associations exist. Changes in catch should be accessed through time. A system is needed that will be able to identify species requiring additional protection; determine sustainable catch limits; set and enforce fishing quotas on commercial fisheries. Information on fish stocking programs (fish species, frequency and locations) is lacking. | Regular monitoring of key fisheries in rivers, lakes and marshlands (Frame & Landing Surveys) to characterize the fishing effort, fishing gear, species landed (by species type, weight, and time). | Ministry of Agriculture, Marine Science Center, University of Basra, Related ministries, directorates and research centers in Kurdistan, Iraq (Depending on information, surveys may be required several times during the fishing season) |
| ***Alien & Invasive Species*** | Information is lacking on all alien and invasive species currently present in Iraq and their current effects on Iraqi ecosystems. Few if any management activities have been conducted in Iraq beyond physical removal of nuisance species (e.g. collection of Wild Hyacinth from choked water ways). | Checklist of nuisance, alien, invasive species currently of management concern in Iraq; Information on level of current trade in species across borders. | Ministry of Agriculture, Ministry of Water Resources, Ministry of Health, Ministry of Environment, Ministry of Trade, and related ministries, directorates and research centers in Kurdistan, Iraq. (From Seasonal Surveys) |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| ***Hunting*** | It is important to characterize the hunting pressures based on species with the goal of developing a system that will be able to: identify species requiring additional protection; determine sustainable hunting limits by species; develop educational materials and programs to educate hunters and hunting associations, and enact legislation and enforcement mechanisms to set and enforce hunting limits. | Information on degree of current hunting efforts and target species; information on species entering animal markets and zoos; information on species crossing national borders. | Animal markets, Zoos, Enforcement agencies and border officials, hunting associations, Ministry of Trade, Ministry of Interior, Ministry of Environment, NGOs, and related institutions in Kurdistan, Iraq. (Seasonally; market information may need to be done more frequently) |
| ***Unsustainable Fishing Practices*** | Use of electroshock, and sometimes poison and/or explosives in fisheries is common throughout Iraqi stream and marshlands. Studies are needed to characterize and determine appropriate actions to stop these unsustainable practices. | Case studies at multiple sites to determine the reasons behind the use of these methods and most effective means for controlling such activities; Fisheries studies based on target species to determine proper timing of fishing moratoriums. | Ministry of Agriculture, Marine Science Center, University of Basrah, Related ministries, directorates and research centers in Kurdistan, Iraq. (At least Quarterly) |
| ***Desertification*** | Few studies have been carried out and most information on desertification in Iraq is anecdotal. Few studies have been conducted in this area. A national plan to guide activities to prevent desertification is needed. | Studies on extent and threat of desertification. | Ministry of Water Resources, Ministry of Agriculture, Ministry of Environment, Ministry of Sciences and Technology, Ministry of Higher Education and Scientific Research, Related ministries, directorates and research centers in Kurdistan, Iraq, Iraqi Universities, NGOs and the private sector. (Seasonally) |
| ***Road Building Impacts*** | Few or no information or studies have been conducted on such impacts. | Studies on road building impacts, methods and mitigation techniques; Dataset of proposed road projects mapped in sensitive areas. | Ministry of Planning, Ministry of Transportation, Ministry of Environment, Iraqi Universities & NGOs, and related ministries, directorates and research centers in Kurdistan, Iraq (Yearly) |
| ***Mining & Resource Extraction*** | Few or no information or studies have been conducted on such impacts. | Studies on oil development, mining & road building impacts, methods and mitigation techniques; Dataset of proposed projects | Ministry of Planning, Ministry of Industry & Minerals, Ministry of Oil, Ministry of Environment, Iraqi Universities & NGOs, and |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| | | mapped in sensitive areas. | related institutions in Kurdistan, Iraq (Yearly) |
| ***Polluted & Hazardous sites*** | UNEP produced a report on Hot Spots in Iraq in 2005 that reviewed a short list of sites within several industrial sectors and prioritized five top hazardous waste sites. A list of all polluted and hazardous sites is needed, characterized by site size and extent, pollutant, mitigation and clean-up measures completed and/or planned. | National Database of Polluted & Hazardous Sites; Impact assessment to surrounding ecosystems; and Mitigation plans & activities | Ministry of Environment, Ministry of Health, Related institutions in Kurdistan, Iraq. (Yearly) |
| ***Land mines*** | Impacts on Iraqi native species is unknown; mine field clearance rates not available, such an indicator would need to display the extent of mine fields areas (expressed as a percentage of the total land); little is known about how different clearance methods effect biodiversity. | Updated information on delineated field boundaries; Information on recently cleared lands to identify new, priority survey sites. | International & National Mine Clearance organizations and NGOs, Related institutions in Kurdistan, Iraq. (Yearly) |

### I.4.4 PRESSURE & STATUS TRENDS for the Management of Biodiversity

Several of the indicators that have been selected for Iraq have enough data or information to start providing quantifiable trends in biodiversity within Iraq. Some basic information on these is provided here and more detailed information is provided in Appendix IV.

## *Indicators of STATUS of Biodiversity and Ecosystems*

### *Indicator: Ecoregions in Iraq*

The republic of Iraq is located in the Middle East, surrounded by Iran, Kuwait, Saudi Arabia, Jordan, Syria and Turkey. It is 432,162 km² and is comprised of five major and four smaller terrestrial ecoregions.

| TERRESTRIAL ECOREGIONS | TOTAL AREA (KM²) | AREA IN IRAQ (KM²) | % IN IRAQ |
|---|---|---|---|
| Tigris-Euphrates alluvial salt marsh (PA0906) | 35,600 | 28,795 | 81% |
| Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) | 1,851,300 | 192,853 | 10% |
| Mesopotamian Shrub Desert (PA1320) | 211,000 | 129,995 | 62% |
| Middle East Steppe (PA0812) | 132,300 | 37,598 | 28% |
| Eastern Mediterranean conifer-sclerophyllous-broadleaf forest (PA1207) | 143,800 | 1,475 | 1% |
| Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1325) | 651,300 | 5,189 | 1% |
| South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) | 351,500 | 7,993 | 2% |
| Gulf Desert and Semi-Desert (PA1323) | 72,600 | 1,480 | 2% |
| Zagros Mountains Forest Steppe (PA0446) | 397,800 | 29,376 | 7% |
| **Total** | 3,847,200 | 434,753 | |

Four freshwater ecoregions make up the country, roughly divided by the upper and lower Tigris Euphrates River Basin, the western desert (Arabian Interior), and a small portion of the Orumiyeh Ecoregion.

| FRESHWATER ECOREGIONS | TOTAL AREA (KM2) | AREA IN IRAQ (KM2) | % IN IRAQ |
|---|---|---|---|
| 441 Lower Tigris and Euphrates River Basin | 340,633 | 227,497 | 67% |
| 442 Upper Tigris and Euphrates River Basin | 507,236 | 64,745 | 13% |
| 440 Arabian Interior | 2,334,454 | 142,494 | 6% |
| 445 Orumiyeh | 51,772 | 17 | 0.03% |

Iraq borders one marine ecoregion at the southern terminus of the Shatt al Arab and Khor Az Zubayr where they meet the head of the Gulf.

| MARINE ECOREGIONS | TOTAL AREA (KM²) | AREA IN IRAQ (KM²) | % IN IRAQ |
|---|---|---|---|
| 90 The Gulf | 251,000 | Territorial sea 4,910 | 2% |

### *Indicator: Water Resources in the Tigris-Euphrates River Basins*

The waters of the Tigris and Euphrates as well as the smaller river basins within the country have been heavily utilized for irrigation, in many cases for several thousands of years, resulting in extensive irrigation networks, canals, escapes, and other diversions. Some of the greatest changes to the water resources of the country have been the large scale dam and water diversion projects in Turkey, Syria, and northern Iraq.

These have led to a significant decline in Iraq's water resources, which is demonstrated in the left figure below showing water to the Iraqi marshlands before and after 1990.

Given the severe drought conditions that occurred in 2008/2009, the flow volume of water of the Euphrates River downstream from Hindiyah for the period 01 Oct 1991 – 30 Sept 2009, was recalculated and water available after 1990, listed above as 10.61 BCM, is 2.1 BCM lower (8.54 BCM). For the Karkheh river, a dike between Al Azim (in Iran) and Hawizeh marshes (an adjoining Ramsar site in Iraq) completed on 31 July 2009, now allows no water flow from the Iranian side, which changed the hydrodynamic system of the Hawizeh marshes (see image to the right below). This needs to be well-monitored with a continuous monitoring system.

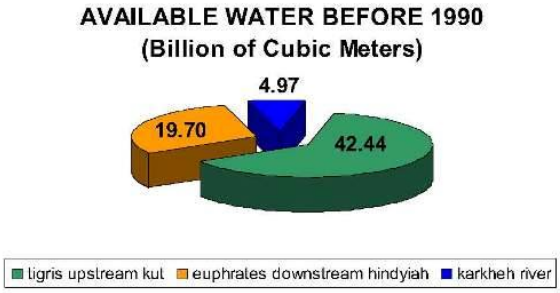



Figure 64: Available water in the marshlands area before 1990

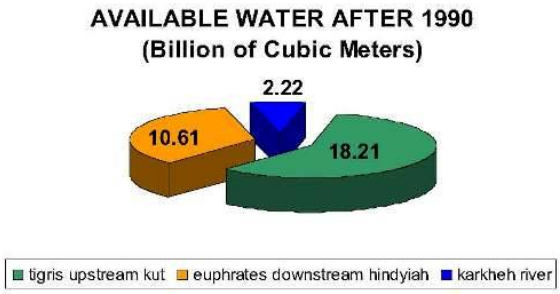
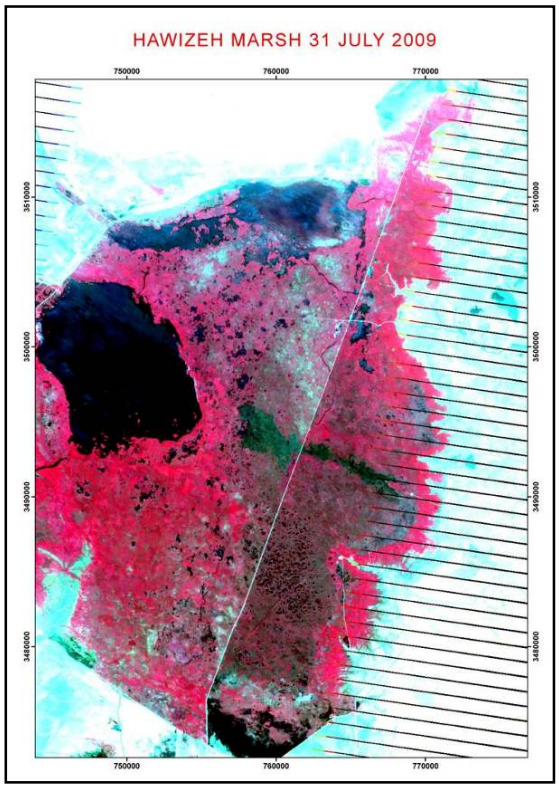



Figure 65: Available water in the marshlands area after 1990

**Available Water Before and after 1990**




**Hawizeh/Al Azim Embankment**

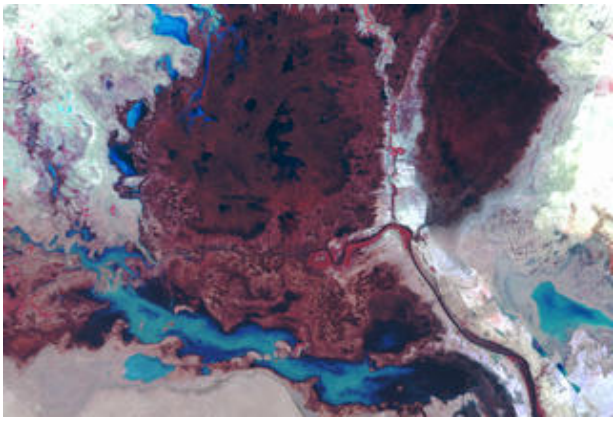
### *Indicator: Change in habitat boundaries*

There have been two significant changes to habitat boundaries in the latter half of the last century in Iraq. The first is the building of dams and reservoirs in the upper watersheds of the Tigris Euphrates River Basin (reviewed above). The second was the large-scale drainage program of the Mesopotamian Marshlands of southern Iraq in the 1990s. Both of these are documented by a UNEP report in 2001 called, "The Mesopotamian Marshlands: Demise of an Ecosystem" (UNEP/DEWA/GRID, 2001). As stated in this report, the Ataturk Dam in Turkey, which can store the more than the annual flow of the Euphrates River, has had a significant effect on the ecology of the entire system. Dam construction, both large and small, are still planned in the riparian countries of the upper basin, the most significant of which is the planned Ilisu Dam on the Tigris River in Turkey, which will have far reaching and adverse consequences for the downstream water resources, ecology, and overall habitats of Iraq. In addition, MoWR is promoting several large projects that will have significant effects on biodiversity. Some of these include:

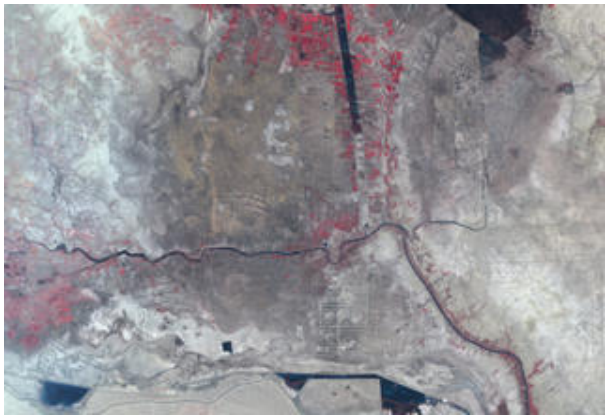
- Construction of Badoush Dam on the Tigris
- Construction of Al Baghdadi Dam on the Euphrates
- Construction of Bekhma and Mindawa Dam on the Greater Zab River
- Construction of Taq-Taq Dam on the Lesser Zab

MoWR is currently preparing a Strategy for Water Resources and Land in Iraq that will have a large effect on biodiversity as it will practically re-design the use of land for agriculture in Iraq.

In addition to dam construction, drainage of the Mesopotamian marshlands has also led to the most significant, recent habitat changes for southern Iraq. This is shown in the two maps below from the year 1970, which is often used as a baseline period for comparison, and the year 2000.

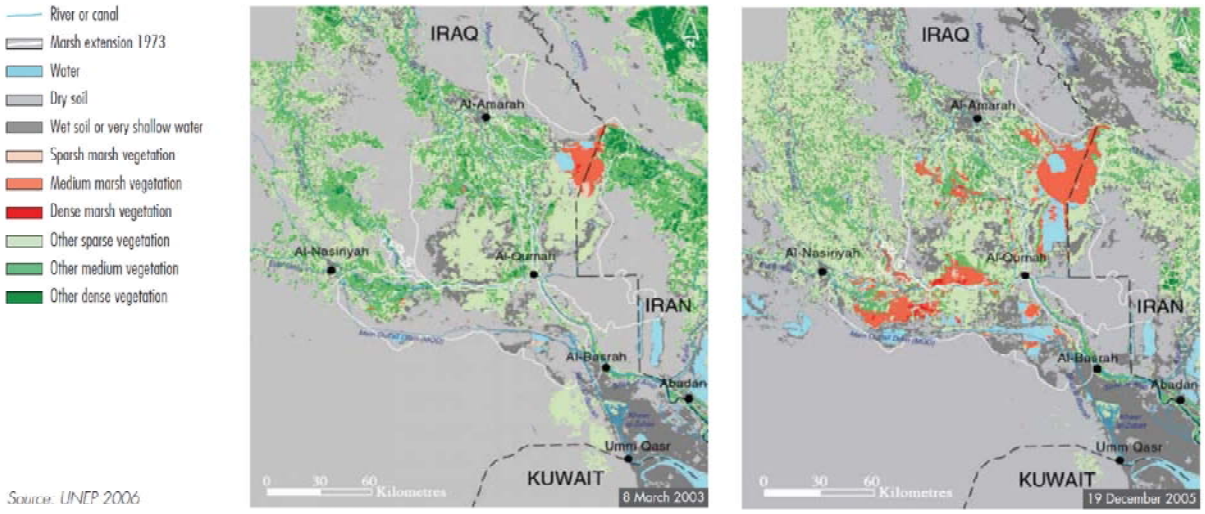


**Extension of Mesopotamia Marshlands in 1970**



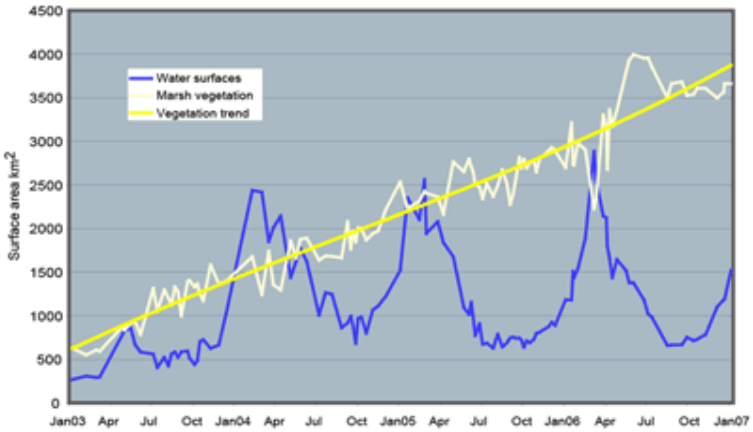
**Extension of Mesopotamia Marshlands in 2000**

The recovery of this system after the Gulf War of 2003 when waters were partially restored to this area was initially monitored by the UNEP Iraq Marshlands Observation System (IMOS) using remote sensing technology. As was stated in section I.1.3, this program was discontinued but the New Eden Group has continued the remote sensing program, providing information as needed to the Iraqi government and stakeholders.




**"*Restoration of the Mesopotamian marshes in Iraq*" UNEP-GRID-Arendal Maps and Graphics Library. 2009.**

The figure below documents a five year period showing the vegetation and water level trends that occurred in the reflooded marsh areas between 2003 and 2007. This is an important habitat that has been greatly reduced and will continue to see enormous change.




**Recovery of the Mesopotamia Marshlands 2003-2007 (UNEP-GRID, 2007)**

## *Indicator: Water Quality- Nutrients, Physical & Chemical Parameters, BOD, heavy metals, and other pollutants*

Water quality in Iraq is impacted by largely uncontrolled municipal and industrial wastes, and is declining throughout the country. Limited monitoring activities have been undertaken by government, universities and NGOs in various efforts but few basin-wide, regular monitoring programs exist. A

monitoring program was conducted by NI, in and around the areas of the Mesopotamian Marshlands, under the KBA project between 2005 and 2008. Many areas were found to be suffering from poor water quality, lack of flow-through, and high salinity. This work primarily focused on physical parameters (temperature, pH, salinity, dissolved oxygen) and a limited number of chemical parameters. This program was extended to Kurdistan, Northern Iraq in 2007, but discontinued in the south in 2008 for logistical reasons. In 2009, again for logistical reasons, the water quality survey was limited to Sulaimani but was more intensively focused on sites within the upper Little Zab and Diyala Basins and for the first time included bacteria and heavy metal tests to soils, sediments, and water.

In 2008/2009, some attempts were made by NI/TRI to implement a Water Quality Index (WQI) and Indices for Biotic Integrity (IBIs), to examine overall water quality and health of ecosystems, which are straightforward and simple methods that are useful for pin-pointing high priority areas for intervention.

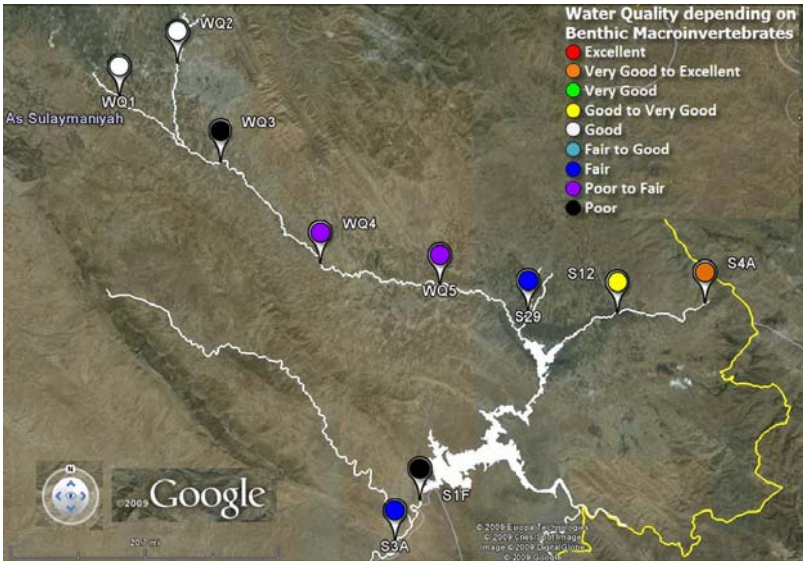
The water quality index provides a single number that expresses overall water quality at a certain location and time based on several water quality parameters. The objective of the index is to turn complex water quality data into information that is understandable and useable by the public. It should be noted that the use of an index to "grade" water quality is a controversial issue among many water quality scientists (http://bouldercommunity.net/basin/watershed/wqi_info.html) because a single number cannot tell the whole story of water quality.

The NI KBA surveys and other project surveys have looked at phytoplankton, zooplankton, benthic macroinvertebrates, and fish as biotic indicators of water quality. Indices of Biological Integrity (IBIs) can be important assessment tool for evaluating water quality.

Additional water quality tools used in the KBA surveys in Iraqi Kurdistan were the Pollution Tolerance Index (PTI) (Mitchell and Stapp, 2000) and Pollution Index (PI) (Waterwatch South Australia, 2004). These indices were modified based on the species observed in Kurdistan-Iraq waters.

Included below is an example of benthic macroinvertebrate biotic indicators results in the upper Diyala (Darbandikhan Lake) Basin for the summer of 2009.

Neither WQIs nor IBIs have been applied broadly in Iraq and more work is required to adapt available indices to Iraqi conditions and baseline levels. But, if used consistently and uniformly, they may prove to be an important tool for monitoring trends in water quality for Iraqi researchers as well as decision-makers.

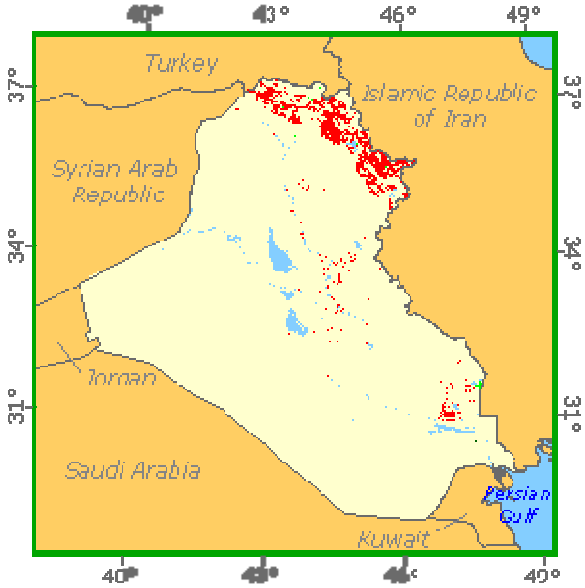



**Water quality ranks in Diyala River Watershed (Darbandikhan Basin) sites during Kurdistan KBA - summer surveys 2009, depending on benthic macroinvertebrates' results.**

## *Indicators of PRESSURE of Biodiversity and Ecosystems*

### *Indicator: Change in land use, conversion of forest & steppe lands to other land uses (e.g. deforestation rate)*

Iraqi forest lands are located primarily in northern Iraq as shown in the image below.




**Forested areas of Iraq (Source: FAO, 2010)**

The following tables show changes in the Iraq Forest Cover from the periods between 1990-2000-2005 (Table 1), and the total Degradation/Conversion for the periods between 1990-2000-2005 for Forest Area+Wooded Area-Plantation in Iraq (Table 2).

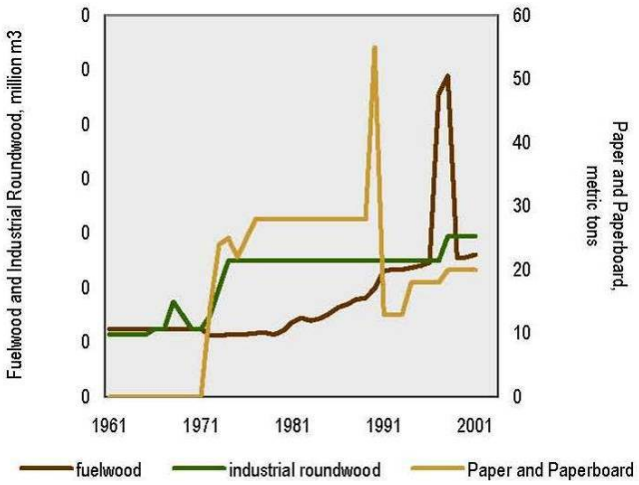
**Table 1: Change in Iraq Forest Cover (1990-2000-2005)**

| | | |
|---|---|---|
| **TOTAL FOREST COVER** | | |
| Forest 1990 (ha) | 804,000 | |
| Forest 2000 (ha) | 818,000 | |
| Forest 2005 (ha) | 822,000 | |
| Annual Change 1990-2000 (ha \| %) | 1,400 | 0.17% |
| Annual Change 2000-2005 (ha \| %) | 800 | 0.10% |
| Total Change 1990-2005 (ha \| %) | 18,000 | 2.24% |
| **PRIMARY FOREST COVER** | | |
| Primary 1990 (ha) | NA | NA |
| Primary 2000 (ha) | NA | NA |
| Primary 2005 (ha) | NA | NA |
| Annual Change 1990-2000 (ha \| %) | NA | NA |
| Annual Change 2000-2005 (ha \| %) | NA | NA |
| Total Change 1990-2005 (ha \| %) | NA | NA |
| **OTHER WOODED LAND** | | |
| Other Wooded Land 1990 (ha) | 1,245,000 | |
| Other Wooded Land 2000 (ha) | 1,033,000 | |
| Other Wooded Land 2005 (ha) | 927,000 | |
| Annual Change 1990-2000 (ha \| %) | (21,200) | -1.70% |
| Annual Change 2000-2005 (ha \| %) | (21,200) | -2.05% |
| Total Change 1990-2005 (ha \| %) | (318,000) | -25.54% |
| **PLANTATIONS** | | |
| Plantations 1990 (ha) | 15,000 | |
| Plantations 2000 (ha) | 15,000 | |
| Plantations 2005 (ha) | 13,000 | |
| Annual Change 1990-2000 (ha \| %) | - | 0.00% |
| Annual Change 2000-2005 (ha \| %) | (400) | -2.67% |
| Total Change 1990-2005 (ha \| %) | (2,000) | -13.33% |

**Table 2: Total Degradation/Conversion (1990-2000-2005) for Forest Area+ Wooded Area-Plantation in Iraq**

| | | |
|---|---|---|
| Other 1990 (ha) | 2,034,000 | |
| Other 2000 (ha) | 1,836,000 | |
| Other 2005 (ha) | 1,736,000 | |
| Annual Change 1990-2000 (ha \| %) | (19,800) | -0.97% |
| Annual Change 2000-2005 (ha \| %) | (20,000) | -1.09% |
| Total Change 1990-2005 (ha \| %) | (298,000) | -14.65% |

The figure below indicates the trends in fuelwood, industrial roundwood, and paper/paperboard production in Iraq between 1961 and 2001. Both fuelwood and paper/paperboard production saw spikes (in the late 1990s and the early 1990s respectively) and industrial roundwood saw a large increase in the early 70s and remained steady until a slight production increases appeared again in the mid-to-late 1990s.




**Forest Products Production, Iraq, 1961-2001 (Earth Trends, 2003)**

### *Indicator: Fish Catch Assessments*

Available freshwater and marine fisheries catch data is shown below but accuracy of these figures is not certain.

**Iraqi Commercial Fish Catch (Earth Trends, 2003)**

| FRESHWATER FISH CATCH | IRAQ | MIDDLE EAST & NORTH AFRICA |
|---|---|---|
| 1990 (metric tons) | 18,875 | 252,334 |
| 2000 (metric tons) | 9,700 | 416,938 |
| **MARINE FISH CATCH** | | |
| 2000 (metric tons) | 11,066 | 2,461,334 |

# II. Implementation of Relevant Biodiversity Strategies and Plans and Status of a National Biodiversity Strategy for Iraq

Article 6 of the Convention states that each Party shall, in accordance with its particular conditions and capabilities:

- Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, *inter alia*, the measures set out in the Convention relevant to the Contracting Party concerned;
- Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

A framework strategy, such as a National Biodiversity Strategy and Action Plan (NBSAP), that coordinates, streamlines and focuses efforts for the conservation of biodiversity at the national level and beyond, will be developed as a tool to:

- set out medium range (5-10 year) strategies for conservation of biodiversity, its sustainable use and benefit sharing;
- translate policy objectives into actions with timeframes, as well as address gaps in existing national biodiversity policy;
- enable Iraq to develop coherent and prioritised biodiversity programmes and projects;
- allow Iraq to effectively coordinate, monitor and evaluate biodiversity actions;
- allow Iraq to strategically allocate resources with respect to biodiversity management;
- improve capacity development with respect to biodiversity conservation and sustainable use; and
- clarify roles of stakeholders, including national, provincial and local government, statutory bodies, research institutions, universities, and civil society.

To develop a NBSAP for Iraq, the first step is to monitor and review existing plans and programmes on conservation and sustainable use of natural resources and biodiversity, in relation to the objectives of the Convention.

Iraq will move on from existing strategies and objectives, and define the national priorities for conservation and sustainable use of biological diversity, highlighting environmental emergencies and/or endangered species of wild fauna and flora for which conservation and management actions are needed. In this process, Iraq will pay particular attention to integrating the purposes of conservation and sustainable use of biodiversity with other relevant sectoral and cross-sectoral plans, in order to allow the necessary balance between conservation and development needs of the country.

The drafting of such a national strategy for biodiversity would therefore need to follow the framework given by the Thematic Programmes and cross-cutting issues of the Convention, properly integrated with national issues and priorities.

## II.1 *RESPONSE Indicators for the Management of Biodiversity*

The following biodiversity indicators are key issues that are addressed through policy or management interventions. Suitable indicators to address policy and management needs could be, in the specific case of Iraq: the capacity of creating and managing a network of protected areas; the institutional capacity of drafting and issuing adequate policies and a regulatory framework; and the capacity of various stakeholders involved in biodiversity protection.

The following table listing the three above mentioned indicators are analyzed in terms of what is needed to evaluate biodiversity conservation actions (gap analysis), what kind of data is still required, and where this information can be obtained.

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| **Protected Areas** | Although some protected areas have been designated, few protection measures are applied, thus sites often are protected only on paper. The proposed Mesopotamian Marshlands National Park is the most comprehensively studied site. Little information is known about regional and local efforts concerning parks and protected areas. Sites that have informal protection are not delimited and are poorly studied in many cases. Protected Area legislation and support is needed. | List of proposed and accepted sites; Delimitation of sites; Threat assessments and prioritization of sites; Management and research plans; Stakeholder involvement process and periodic status reporting from central reporting body. | Central Government & Kurdistan Regional Government Central and District MoA & MoE offices, Municipalities, Iraqi State Board of Antiquities & Heritage, Iraq Interministerial Ramsar Committee, Central Government and Regional Parks Boards, International Coordination Committee for the Safeguarding of the Cultural Heritage of Iraq (yearly) |
| **Institutional Capacity, Policy & Regulatory Framework** | Determine the existence of institutional capacity, policy and regulatory framework for the planning, management, and conservation of biological diversity. No MoE Website exists. | | Multi-sector Stakeholder groups |

| INDICATOR | GAP ANALYSIS | REQUIRED INFORMATION &/OR DATASETS | SOURCE/STAKEHOLDER (FREQUENCY OF UPDATE) |
|---|---|---|---|
| **Stakeholder Capacity** | Determine the existence of stakeholder capacity in different biodiversity sectors (fishing, hunting, industry, farming groups, environmental education, research and advocacy). | Expanded list of stakeholder groups; Establishment of joint Stakeholder/Government committees for the development of management plans (e.g. Hawizeh, National Parks, etc.), fishing and hunting rules and regulations, pollution limitations and standard setting; educational and advocacy campaigns | Multi-sector Stakeholder groups |

### II.1.1 RESPONSE TRENDS for the Management of Biodiversity

Information on two of the response indicators has been evaluated and assessed for initial trends (Protected Areas and Institutional Capacity Policy and Regulatory Framework) and is provided below. Additional information as well as information on Stakeholder Capacity is provided in Appendix IV.

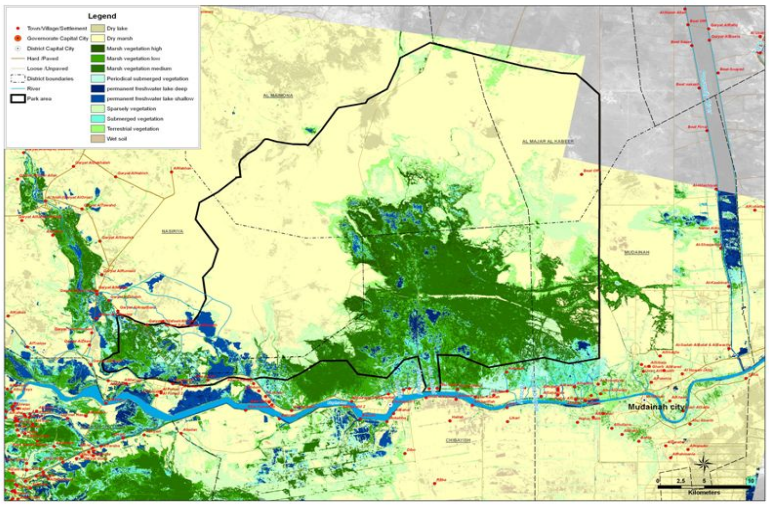
#### *Indicator: Protected Areas*

The World Conservation Union (IUCN) has outlined six protected area management categories. A protected area is defined as: "An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN, 1994). In addition, several international conventions define other types of protected areas such as Ramsar Wetland Sites of Global Importance, UNESCO World Heritage, Biosphere Reserves, and others.

Iraq has three UNESCO World Heritage cultural sites. These include Hatra in Ninewa Governorate and two sites currently listed as in danger: Ashur (Aql'at Sherqat), which is threatened by a large dam project; and Samarra Archaeological City, which has lacked management control, both in Salah Ad Din Governorate. A tentative list of nine other sites has been proposed since 2000 (which are included in the table below). Most of these are cultural sites but one, the Mesopotamian Marshlands, is a mixed site.

In February 2008, Iraq designated the Hawizeh Marsh located in southern Iraq as a Ramsar site. A draft management plan was prepared and is under review by the National Ramsar Committee. In addition, in July of 2010, a revised operational plan was developed and also submitted to the National Ramsar Committee. The updated plan proposes the development of a National Park in Hawizeh. Unfortunately, to date no protected areas management actions have taken place in Hawizeh and no national legislation has been passed to strengthen protection of this area. Below is a map showing the Ramsar site.

The MOE is working with NI and the New Eden Group to designate Iraq's first National Park in the Central Marshes. A draft management plan exists for this park and the site information is currently being updated by NI/New Eden Group. A map of the proposed park site is included below.




**Delineation and land cover of Hawizeh Ramsar Site**

**Delineation and land cover of proposed Mesopotamia Marshlands National Park**

The following provides information on the list of established and proposed protected areas in Iraq listed by type. There are additional protected areas designated under IMOA but no information is available on their locations or extent at this time.

| Protected Area Type | Number | Area | Ecoregion |
|---|---|---|---|
| **National (using IUCN categories)** | | | |
| Ia: Strict Nature Reserve: protected area managed mainly for science | 0 | | |
| Ib: Wilderness Area: protected area managed mainly for wilderness protection | 0 | | |
| II: National Park: protected area managed mainly for ecosystem protection and recreation | 0 | | |
| III: Natural Monument: protected area managed mainly for conservation of specific natural features | 0 | | |
| IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention | 1 proposed with a designation that may include other IUCN categories (II, V, VI) | Approx. 141,615 ha (1416 $km^2$) | PA0906, 441 |
| V: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation | 0 | | |
| VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems | 0 | | |
| Other | 1 established | unknown | PA0446, 442 |

| Protected Area Type | Number | Area | Ecoregion |
|---|---|---|---|
| | (informal Barzan Tribal Protected Area) | | |
| International Protected Area Categories | | | |
| World Heritage (WH) Sites<br><br>Ashur (2003) -Cultural site under criteria: (iii)(iv)<br><br>Hatra (1985) -Cultural site under criteria: (ii)(iii)(iv)(vi)<br>Samarra Archaeological City (2007) -Cultural site under criteria: (ii)(iii)(iv) | 3 established (Cultural Sites) | Total: 46965.75 ha (470 km²)<br>*70 ha with 100 ha buffer*<br>*323.75 ha*<br>*15058 ha with 31414 ha buffer* | |
| Proposed WH Sites:<br><br>Ur (2000) -Cultural site under criteria: (i)(iii)(iv)<br>Nimrud (2000) -Cultural site under criteria: (i)(ii)(iii)<br>Ancient City of Nineveh (2000) -Cultural site under criteria: (i)(ii)(iii)(iv)(v)(vi)<br>Fortress of Al-Ukhaidar (2000) -Cultural site under criteria: (i)(ii)<br>Wasit (2000) -Cultural site under criteria: (i)(ii)(iv)<br>Sacred Complex of Babylon (2003) -Cultural site under criteria: (iii)(vi)<br>Marshlands of Mesopotamia (2003) – Mixed site<br>Erbil Citadel (2010) -Cultural site under criteria: (i)(ii)(iii)(iv)(v)<br>Site of Thilkifl (2010) -Cultural site under criteria: (i)(ii)(iii)(iv)(v)(vi) | 9 proposed (8 Cultural & 1 Mixed site) | Unknown<br>Unknown<br>Unknown<br>Unknown<br>Unknown<br>Unknown<br>Unknown<br>Unknown<br>Unknown | |
| Ramsar Sites | 1 established but not implemented (Hawizeh) | 137700 ha (1377 km²) | PA0906, 441 |
| Other: Ministry of Agriculture (MoA) Protected Areas/Reserves | 14 established | 31.8 km² | Unknown |

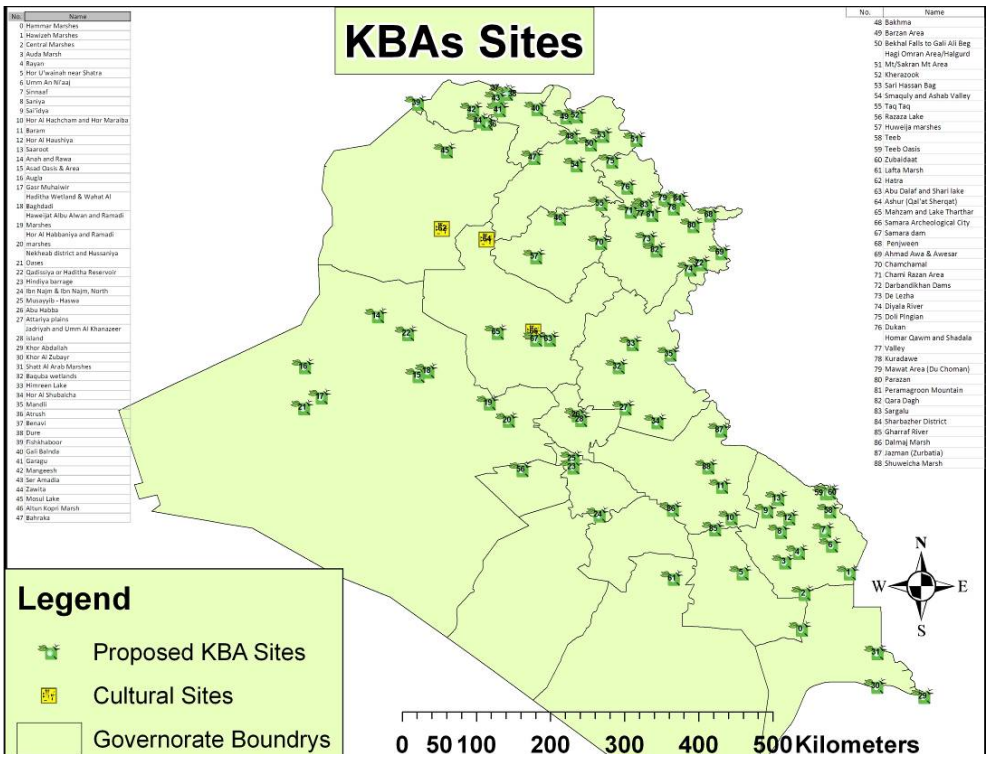
Based on the above information, it is possible to examine the total area that has official protection and the percentage of protected areas as compared to the total area of Iraq as well as by ecoregions found in Iraq. Please note, the official designation here implies only an initial commitment to the protection of these sites and in most cases, these sites have seen few if any conservation actions on the ground. In addition, the 14 MOA Protected Areas, which include wildlife breeding centers, certain water bodies, and areas set aside for plants, are not included in the following calculations due to lack of information on their location, nature, and status. More information on these sites is available in Appendix IV.

The following table provides the total area of officially designated protected area overall as well as by ecoregion:

| PROTECTED AREAS | AREA PROTECTED (KM²) | % OF TOTAL AREA |
|---|---|---|
| Total area of officially-designated protected areas (cultural sites) | 470 | 0.1% |

| PROTECTED AREAS | AREA PROTECTED ($KM^2$) | % OF TOTAL AREA |
|---|---|---|
| Total area of officially-designated protected areas (natural sites) | 1377 | 0.3% |
| Total area of officially-designated protected areas (natural and cultural sites) | 1846.7 | 0.4% |
| Total area of proposed protected areas (natural sites) | Approx. 1416 | 0.3% |
| Other protected areas | Unknown | Unknown |
| **Protected Areas by Ecoregion** | | |
| **Terrestrial Ecoregions** | | |
| Tigris-Euphrates alluvial salt marsh (PA0906) | 1377 (2793 with proposed PA) | 5% (9.6%) |
| Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) | 0 | 0% |
| Mesopotamian Shrub Desert (PA1320) | 0 | 0% |
| Middle East Steppe (PA0812) | 0 | 0% |
| Eastern Mediterranean conifer-sclerophyllous-broadleaf forest (PA1207) | 0 | 0% |
| Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1325) | 0 | 0% |
| South Iran Nubo-Sindian Desert and Semi-Desert (PA1328) | 0 | 0% |
| Gulf Desert and Semi-Desert (PA1323) | 0 | 0% |
| Zagros Mountains Forest Steppe (PA0446) | 0 | 0% |
| **Freshwater Ecoregions** | | |
| 441 Lower Tigris and Euphrates River Basin | 1377 (2793 with proposed PA ) | 0.6% (1.2%) |
| 442 Upper Tigris and Euphrates River Basin | 0 | 0% |
| 440 Arabian Interior | 0 | 0% |
| 445 Orumiyeh | 0 | 0% |
| **Marine Ecoregions** | | |
| 90 The Gulf | 0 | 0% |

Based on the KBA Surveys from 2005-2010, an initial list of Important Bird Areas and Important Wetland sites was greatly expanded, and an updated list of 88 proposed KBA Sites has been developed. These are shown in the map below along with Iraq's three World Heritage Sites but assessment is still on-going and sites may ultimately be added or dropped from this list.




**Key Biodiversity Areas of Iraq (Nature Iraq, 2010)**

It is important to keep in mind that proposed sites such as the KBA sites or the Mesopotamian Marshlands National Park do not yet have any official protected area status and in some cases some of these sites may never receive such status but they remain important for scientific and biological diversity interests. As previously stated, at the time of this report though the Hawizeh Marshes are officially recognized by Iraq as a Ramsar site and a draft management plan was written in 2008 they have no actual protection on the ground at this time. There are other plans to designate the Marshlands as a UNESCO World Heritage Site and there are plans within the MOE and possibly the Kurdistan Regional Government to develop "parks" but there is no information on the status of these activities at this time.

## *Indicator: Institutional Capacity, Policy & Regulatory Framework*

Iraq is a parliamentary democracy. The Iraqi Constitution was ratified on 15th October 2005.

### *Administrative division*

The territory of Iraq is divided in 18 Governorates and 1 Region*: Al Anbar, Al Basrah, Al Muthanna, Al Diwaniya, An Najaf, Babil, *Baghdad, Dahuk, Dhi Qar (Thi Qar), Diyala, Karbala, Kirkuk, Maysan (Missan), Ninawa, Salah ad Din, Wasit and the three governorates of the Kurdistan region, namely Erbil (Arbil), As Sulaymaniyah (Sulaimani) and Dohuk.

### *Environmental Institutions*

Environmental institutions of Iraq can be classified as governmental, such as:

- Parliamentary Committee of Health and Environment
- Ministry of Environment
- Ministries and non-ministerial entities included in the Council of protection and improving the environment
- Supervisory Committee on the Environment of Kurdistan Regional Government
- Environmental Institutions in Kurdistan Regional Government
- Environment protection and improvement sub-councils in the Governorates.

There are also non-governmental organizations, such as civil society groups interested in environmental issues.

Iraqi national, regional, and local institutions must have the political will, clear legal mandate, and powerful regulatory mechanisms to designate and manage protected areas, species and habitat conservation, and initiate research in these areas. The central authority for biodiversity is the MOE. The ministry is made up of several directorates, offices and divisions, including the Minister, a Technical Deputy, and an Administration Deputy.

***The Iraqi Ministry of Environment***

The MOE was established in 2003, and has the following responsibilities and duties:

- develop and follow up of the national policy for protection and improvement of the environment and the quality of the environment
- draft short, mid- and long-term environmental strategies and plans for Iraq
- suggest environmental legislations, regulations, criteria, standards, guidelines, instructions and limitations
- monitor the enforcement of the environmental legislation, regulations, criteria, instructions and limitations
- monitor pollutants and protect the environment from pollution
- biodiversity protection
- raise environmental awareness
- EIA/SEA procedures
- promote and apply new and environmentally-friendly technologies
- promote sustainable development
- protect cultural-environmental sites
- coordinate between governmental and non-governmental activities related to the environment
- environmental regional and international relationships
- international environmental conventions

Additionally, many Iraqi Ministries have environmental directorates and committees that maintain biodiversity information. These are listed in the next section but little information is available on their activities as there is a lack of inter-ministerial communication and cooperation.

Until 2009, the Kurdistan Regional Government (KRG) also maintained an environmental ministry that worked autonomously but at the end of 2009 the ministry was abolished and replaced with a supervisory committee that reports to the KRG's Prime Minister's office. Little information is available on the structure, organization or operational budget of this supervisory body. There is a military environmental force (a division of the Peshmerga) and a Forestry Police tasked with dealing with forest protection, fires, and hunting in the KRG area.

***Environmental Structures within other Iraqi Ministries***

The majority of other Iraqi Ministries involve some environmental structures, sometimes at the level of General Directorates. In some cases these structures may not be actively involved in addressing issues related to the environment currently but they are the most likely existing organizations that might do so in the future. The following is a list of these government ministries and their committees and departments that currently do or could address environmental concerns in the future.

| GOVERNMENT ENTITY | STRUCTURE |
|---|---|
| Ministers Council (Cabinet) | Directorate of Committees affairs, marshes and wetlands Commission |
| Ministry of Agriculture | Department of Planning and Follow-up, Department of the environment. |
| Ministry of Construction and Housing | Technical directorate, Department of the environment. |
| Ministry of Finance | No environmental structures but general authority for customs posts |
| Ministry of Foreign Affairs | Directorate of Organizations and International Cooperation, Environment department. |
| Ministry of Health | Department of Public Health and Primary Health Care |
| Ministry of Health | Technical directorate, Treatment dept., Environment protection section |
| Ministry of Higher Education and Scientific Research | University of Technology, Centre for Environmental Research |
| Ministry of Human Rights | Research Directorate |
| Ministry of Industry | Service development and industrial organization, Department of the environment |
| Ministry of Industry | Department of Industrial Development, Department of environment. |
| Ministry of Interior | General Directorate of Civil Defence, Police Directorate of Environmental Protection, Department of the environment. |
| Ministry of Labor and Social Affairs | National Center of the Vocational Health and Safety |
| Ministry of Municipalities and Public Works | Planning and Follow-up Directorate, Department of the environment. |
| Ministry of Oil | Directorate of Studies and Planning and follow-up, Department of the environment. |
| Ministry of Oil | Refinery of Al Doora, Department of the environment |
| Ministry of Planning and Development | Central Organization for Statistics and Information Technology (COSIT) |
| Ministry of Science and Technology | Environmental Technologies and Testing Directorate |
| Ministry of State for Tourism and Antiquities | Tourism Authority |
| Ministry of Trade | Directorate of Supply and Planning |

| GOVERNMENT ENTITY | STRUCTURE |
|---|---|
| Ministry of Trade | Directorate of Planning and follow-up |
| Ministry of Transport | Department of Planning and Follow-up, Division of Environment |
| Ministry of Water Resources | Department of Planning and Follow-up, Department of the environment. |
| Ministry of Water Resources | Centre for Research in the Iraqi Marshlands (CRIM) |
| Ministry of Work and Social Affairs | General Authority for Health and Environmental Safety |
| Municipality of Baghdad | Directorate of Solid Waste and the environment, Environment Department |
| Parliament Council | Health and Environment Committee |
| State Ministry for the Marshes | |

***Financial Resources:***

The annual operational budget of the MOE is provided for the 2010 calendar year, along with the Ministry investment budget.

- 2010 Operational Budget from Ministry of Finance: 56 Billion ID (47,922,637.16 Million USD)
- 2010 Investment Budget for Projects from Ministry of Planning: 25 Billion (21,394,034.45 Million USD)

## II.2 *Main existing activities and case studies for the Protection of Biodiversity*

The biodiversity indicators discussed above provide a great overview of the current status of biodiversity, the related policy framework, and the need for actions and strategies to be developed as part of the NBSAP. Some of the protection measures started or planned for the protected areas will also be considered in this section as examples of biodiversity protection and a starting point for developing a national strategy. The main existing environmental laws will also be considered to assess an additional legislative process and the implementation and enforcement tools to include in the NBSAP.

### II.2.1 UNEP, UNDP, & UNESCO Initiatives

A wide range of activities were carried out by UNEP in Iraq between 2003 and 2006, primarily through the Post-Conflict and Disaster Management Branch (PCDMB) based in Geneva, Switzerland, and the International Environmental Technology Centre (IETC) based in Osaka and Shiga, Japan. Many activities continued into 2007 and beyond. UNEP was active in Iraq even before the 2003 conflict, but attention was particularly focused on the environmental situation during the conflict and ensuing reconstruction period, and the establishment of the Ministry of Environment provided UNEP with a key counterpart institution in its capacity-building efforts.

The UNEP Iraqi Marshlands Observation System (IMOS) played a critical role in providing remote-sensing data on marshland recovery in Iraq. To support the MOE in developing capacity for

environmental governance, and to address some of the key priority environmental management issues, UNEP's interventions had the following key objectives:

1. Assess the existing environmental issues in Iraq that require focused attention from the ministry and support from the international community;
2. Assess the existing capacity within the Ministry of Environment and other ministries to address those environmental priorities;
3. Undertake field-based assessments of environmental contamination caused by conflict and by industrial activities;
4. Support the sustainable management of the Iraqi marshlands;
5. Re-link Iraq to regional and multilateral institutions dealing with environmental issues;
6. Re-establish cooperation between Iraq and its neighbours on issues relating to the environment;
7. Strengthen the institutional capacity of the ministry for environmental monitoring and information management;
8. Strengthen the institutional capacity in Iraq for responding to environmental emergencies;
9. Mainstream environmental concerns into other activities undertaken by the United Nations in Iraq, and
10. Support Iraq in accessing multilateral environmental agreements.

As major military operations in Iraq were drawing to an end in late April 2003, UNEP published its Desk Study on the Environment in Iraq, aimed at providing a timely overview of key environmental issues in the context of the recent conflict.

The UNEP "support for Environmental Management of the Iraqi Marshland" commenced in August 2004, in order to respond to the Iraqi priorities in the Marshland area in an environmentally sound manner. The UNEP project aims to support the sustainable management and restoration of the Iraqi Marshlands, by facilitating strategy formulation, monitoring marsh conditions, raising capacity of Iraqi decision makers, and providing water, sanitation, and wetland management options on a pilot basis.

The first phase of the project (Phase I) was funded through the UNDG Iraq Trust Fund in 2004, with earmarked contributions from the Government of Japan. In 2006, the project was extended with additional bilateral funding from the Government of Italy and the Government of Japan (Phase II-A and II-B). The project also received a funding pledge from the Government of Japan that allowed it to proceed to Phase III in 2007 and 2008, with the official completion in 2009.

The UNDP conducts a Local Area Development Program (LADP) as part of a joint initiative with seven agencies designed to improve living conditions and contribute to sustainable poverty reduction in the areas (Sulaymaniyah, Babylon and the Marshlands). According to the UNDP website 12.8% of the funding for the project is spent on Agriculture & Environment and 8% on projects related to culture and traditions.

A new UNEP-UNESCO project launched in July of 2009 focused on the "Natural and Cultural Management of the Iraqi Marshlands as World Heritage." This is funded by the Italian Government through the UNDG Iraq Trust Fund. This project has four components: 1) Preservation and Management Plan Development towards World Heritage Inscription; 2) Preservation and Management Plan Implementation; 3) Capacity Building and Raising Awareness, and 4) International Cooperation to build support for the conservation and management of the Iraqi Marshlands heritage. The project is currently on-going (UNEP-UNESCO, 2010).

### II.2.2 New Eden Group Initiatives

Many biodiversity-related activities have been carried out in Iraq or are still in progress by the New Eden Group. The Group was sponsored by the Italian Ministry for the Environment, Land and Sea (IMELS) and is a joint venture under a Memorandum of Understanding (MoU) with IMELS, MoE; MoWR, Iraqi Ministry of Municipalities and Public Works (MoMPW), and NI. The project team has received technical assistance from a variety of other organizations and local Iraqi consulting firms.

#### *Proposed Marshland National Park*

Priority is given to the Mesopotamian marshland restoration, research, and monitoring as well as the international importance this area has had as a wintering ground for many Eurasian bird species. It is suggested as at least one priority strategy for biodiversity conservation and possible sustainable use of resources is the development of a National Park in this area. The proposed Mesopotamian Marshlands National Park has several components and ongoing projects, which are carried out as activities of the New Eden Group:

- Environmental Education program of the National Park
- Socio-Economic Survey Program
- Stakeholder Program
- Archaeological Sites Research
- Wildlife Centre
- Research on Water Buffalo Pilot Project
- Water Buffalo Fodder Plant
- Aquaculture "Fish Cages" Pilot Project, and
- Pilot Project on Date Palms

As mentioned above, the national park has not yet been finalized and remains only a proposal.

Major problems of implementation and challenges for future development for this project are mainly: water availability; stakeholders outreach and involvement; jurisdictional disputes; lack of legislation; difficulties in the legislative process; difficulty in raising awareness; funding availability; capacity building and training of park staff for enforcement; drafting and implementation of the Park management plan.

### *Hawizeh Ramsar site*

The development of the Hawizeh Marshlands (Ramsar Site) Management Plan has been an important biodiversity-related activity that was developed as part of the New Eden Group initiatives.

The main problems for implementing the effective protection of the Ramsar site are: lack of implementation of the (draft) management plan; lack of continuous water availability; jurisdictional problems; need of specific legislation to protect the area; the building of an embankment by the Iranian government that has stopped water from entering the marshes and has dramatically changed the hydrological asset of the marshes; oil well development in the southern part of the marshes and use of the marshes' water for oil extraction activities.

### *Key Biodiversity Area (KBA) Project*

One of the important activities of the New Eden Group is the KBA Project that has taken place in Iraq starting from 2004. The main objectives and activities carried out have already been discussed in Chapter I and section II.1.1. above.

The main problems of implementation and future challenges for this project are related with capacity, lack of historical data, restricted access to sites due to security, and the difficulties in finding funding resources.

### *Other New Eden Group Strategies and Initiatives*

Besides the New Eden Master Plan for Integrated Water Resource Management in the Marshland Areas, the proposed Mesopotamian Marshlands National Park, the assistance for the development of the Hawizeh Marshlands Management Plan (Ramsar Site), and the KBA Project, there are currently other activities under of the New Eden Group:

- Support for the UNEP-UNESCO Joint Project "World Heritage Inscription Process as a Tool to Enhance Natural and Cultural Management of the Iraqi Marshlands"
- Support to the Ministry of Environment for the Adoption of International Environmental Conventions
- Darbandikhan State of the Basin Report – an attempt to collect all available information on the Darbandikhan Basin (Upper Diyala Watershed) to determine major threats, gaps in information and a strategy for addressing the problems of the entire basin.
- Study for the Reutilization of the Main Outfall Drain Water – A study to examine the potential use of MOD waters in wetland restoration in southern Iraq
- Expansion of the Italian Environmental Pavilion – Sulaimani – Twin Rivers Institute
- Support to the Ministry of Environment for various initiatives, meetings and conferences
- Detailed environmental and sustainability assessment for a large park project in Sulaimani
- Water Quality Index (WQI) Project
- Conservation and Monitoring Program of Macqueen's Bustard *(Chlamydotis macqueenii)*
- Flora of Iraq Project

- Sustainable Agriculture Project
- Assistance to the Ministry of Water Resources on the Management of the Hydrological Monitoring Network in Iraq
- General Assistance to the Ministry of Water Resources for the Implementation of the new Eden Master Plan
- Various capacity building programs.

### II.2.3 World Health Organization (WHO) Initiative

With the active help of the WHO and of the Environment and Health Committee of the parliament and representatives of the Kurdistan Regional Government, the IMoE held meetings in April and November of 2009 to define a "National Environmental Strategy". This National Strategy adresses various environmental concerns and includes the protection of Iraq's biodiversity as a core component.

The Iraqi institutions involved in developing the Strategy included the Iraqi Ministries of Environment, Municipalities and Public Works, Agriculture, Health, Higher Education and Scientific Research, Interior (GD of Traffic), Oil, Planning and Development Cooperation, Industry, Water Resources, Electricity, Labor and Social Affairs – National Center of Professional Health and Safety, various ministries and entities from Kurdistan Regional Government, the Baghdad Municipality, and one NGO, NI. Unfortunately, the strategy has not yet been implemented.

### II.2.4 United States Agency for International Development (USAID) Initiatives

USAID operates Provincial Reconstruction Teams (PRTs) with the U.S. Military throughout Iraq. These teams are focused primarily quick response aid and support of governance, development, and humanitarian aid issues. They support several projects related to sustainable development and the environment, such as the proposed Mesopotamian Marshlands National Park.

The U.S. Foreign Assistance Act (FAA) of 1961 contains several sections that require that USAID funded projects take into account the impact of foreign assistance programs and projects on the environment, natural resources, and endangered species. Some of the USAID funded projects operating in Iraq that to a greater or lesser degree may have some involvement or repercussions for the environment and biodiversity include: the Local Governance Program (LGP); Iraq Community-based Conflict Mitigation (ICCM); Community Action Program (CAP); Iraq Legislative Strengthening Program; Community Stabilization Program (CSP); Economic Governance II (EGII); Private Sector Development (Tijara); Agribusiness Project (Inma), and National Capacity Development for Public Managment (Tatweer).

### II.2.5 Additional activities and an overview of all existing initiatives that have been started or are proposed in Iraq to date

In addition to the above activities other broadly-scoped strategies related to biodiversity that have been initiated by outside agencies and parties with Iraqi partnerships have included the Canada-Iraq Marshlands Initiative (CIMI), which originally initiated the KBA Project and the World Bank, which has sponsored the Iraq Emergency Environmental Management Project (EEMP) with the MOE. The CIMI project began in 2005 and was focused on training Iraqi wetlands scientists at the University of

Waterloo. The second phase started in 2007 through the Univeristy of Victoria, University of Waterloo, and the Fraser Basin Council of British Columbia. The World Bank EEMP project was at $25M project that dealt with the solid waste management and general public administration sectors.

The following table provides an overview of most of the key activities and initiatives that have already begun or are proposed for Iraq at this time:

| KEY ISSUE | EXISTING ACTIVITIES AND INITIATIVES |
|---|---|
| BIODIVERSITY RESEARCH AND MONITORING | Key Biodiversity Areas Surveys (KBA) Nature Iraq 2004-2009 |
| | Flora of Iraq project |
| | Smithsonian Natural History Museum and Bar Code of Life project research on aquatic invertebrates |
| | Development of draft checklists of birds, mammals, reptiles, amphibians and fish of Iraq, as well as initial development of a plant list based on historical information. |
| INTERNATIONAL CONVENTIONS | Hawizeh Marsh designed as Wetland of International Importance under the Ramsar Convention on Wetlands |
| | Three UNESCO World Heritage sites in Iraq (Hatra, Ashur and Samarra archaeological city) |
| PROTECTED AREAS | Al Garbi Breeding Project in Amarah for goitered gazelle (*Gazella subgutturosa*) by the Ministry of Agriculture |
| | Gazelle breeding project in Rutba by the Ministry of Agriculture |
| | Barzan tribal reserve in the Iraqi Kurdistan |
| | Mesopotamian Marshland National Park (under approval) |
| | Activities towards the designation of the Marshlands as a UNESCO World Heritage Site |
| | Designation of Hawizeh as a Ramsar Site and development of the Management Plan |
| | The Ministry of Environment has prepared a draft protected area regulation and has submitted it to the Protected Areas National Committee and to international experts (Syria, Egypt and Italy) for review. The Ministry of Agriculture is developing draft legislation on agricultural protected areas. |
| | Local tribes in the Abu Zirig Marshlands (Central Marshes) have curtailed the use of unsustainable fishing practices. |
| | There are some activities related to the development of protected areas in the KRG. |
| WATER RESOURCES MANAGEMENT | New Eden Master Plan for Integrated Water Resource Management in the Marshlands Area (2006). |
| | Dalmaj marsh is managed by Ministry of Agriculture for the supply of brood stock for Bunni (*Barbus sharpeyi*). |
| | An MoU has been signed between TRI (Twin River Institute) and Ministry of Water Resources-Baghdad & KRG and the Ministry of Agriculture to try to address the following issues related to water resources:<br>• Establishment of a unified data bank and system.<br>• Assessing the quality of the available data.<br>• Prepare technical reports concerning the water quality of the Euphrates, Tigris, their tributaries and the marshes.<br>• Establishment of rating curves at some key points and stream sites.<br>• Exchange data and information.<br>• Developing a drought management system.<br>• Study the balance between the water availability and demand. |

| KEY ISSUE | EXISTING ACTIVITIES AND INITIATIVES |
|---|---|
| INVASIVE SPECIES | Management plan for Water Hyacinth *(Eichhornia* spp.*)* in Ministry of Water Resources. |
| FORESTRY | During previous years the Ministry of Agriculture rented forest lands to local contractors who cut the forest. In 2005, the Ministry of Agriculture stopped this activity and developed, in 2009, a new law for forest protection. |
| | The Ministries of Environment, Higher Education and Scientific Research, Agriculture and others conducted research in 2005, on the degradation or decline of Iraqi forested areas. |
| FISHERIES | Fishing moratorium in several lakes during a portion of the year |

### II.2.6 Review of implementation of existing national activities for the protection of Biodiversity (Marshland restoration)

| GOALS | OBJECTIVES/ TARGETS | KEY ACTIVITIES | KEY OUTCOMES | INDICATORS FOR MEASUREMENT |
|---|---|---|---|---|
| Marshland restoration (Proposed marshland National Park; Hawizeh Ramsar site) | Restore the 1970 footprint of the marshlands | Remote sensing to monitor marsh boundaries | Maps | Percentage of re-flooded areas and marsh habitats |
| | Create a National Park in the central marshes | Stakeholder involvement and meetings | Protected areas | Size and number of protected areas |
| | Implement Hawizeh Management Plan | Development of fishing hunting and wildlife trading regulations | Increase species diversity and populations | Fishing catch size and diversity of species caught |
| | Designate Hawizeh as UNESCO site | Education campaign | Effective protection & reduction of poaching | Decrease in poaching activities |
| | Develop overall plan for biodiversity protection in the marshes | Increase or create control mechanisms | Increased awareness of the people | More participation from locals to protection activities |
| | Develop overall plan for biodiversity protection in the marshes | Increase or create control mechanisms | Increased awareness of the people | More participation from locals to protection activities |

## II.3 *Environmental legislation in Iraq*

In Iraq there are various laws concerning the environment that aare mainly concerned with the assessment, control, and monitoring of environmental pollution.

The Supreme Council for the Protection and Improvement of the Environment in Iraq was charged with creating environmental policies from 1975 to 1997. *Law Number 3 of Protection and Improvement*

*of the Iraqi Environment* was issued by the Iraqi government in 1997. The Iraqi government used this law until 2008.

After the war in 2003, there were extensive changes in Iraq's political structure, especially with regards to Iraqi legislation. One of the most important challenges that the Iraqi parliament faced was the drafting of legislation. With worsening environmental problems, and the weakness of enforcement of existing environmental laws, it became necessary to find institutions that have a greater role in the drafting of environmental legislation.

For the first time in Iraq, in September 2003, a Ministry of Environment was established and began to gradually replace the environment department structure in the Ministry of Health, with concerted cooperation between the two ministries.

During the last four years the Iraqi parliament focused on reviewing environmental laws and regulations. In spite of the efforts made, there is still no clear vision. Twelve environmental laws and 15 related laws were legislated during the last four years by the Iraqi parliament; another 10 proposed legislations were left to a future parliament to act on.

### II.3.1 Existing Iraqi Environment-related Legislation

| REFERENCE | TITLE | CURRENT STATE |
|---|---|---|
| 2009 – Law No. 30 (formerly 1955 – LAW No. 75) | Forest Law | Updated 2009, Ongoing |
| 1965 –LAW No. 64 | Cities land use | Ongoing |
| 1965 – LAW No. 106 | Rangelands and their Protection | Ongoing |
| 1966 –LAW No. 21 | Noise prevention | Ongoing |
| 1967 –LAW No. 25 | System of rivers and other water resources protection from pollution (includes 45 pollutants) | Updated 2001, Ongoing |
| 1976 -LAW No. 48 | Fishing, exploitation and protection of living aquatic species. | Ongoing |
| 2010 – LAW No. 17 (formerly 1979-LAW No. 21) | Law on the protection of wild animals and birds | Updated in 2010, Ongoing |
| 1980 –LAW No. 99 | Protection from Ionizing radiation | Ongoing |
| 1981 –LAW No. 89 | Public health (drinking water provision, sanitation and environmental monitoring) | Ongoing |
| 1997 –LAW No. 3 (formerly 1986 LAW No. 79) | Protection and improvement of environment | Updated 2008, Ongoing |
| 1994 – LAW No.24 | Planning Body | Ongoing |
| 1995 – LAW No.12 | Maintenance of networks of irrigation and drainage | Ongoing |
| 2001 –LAW No. 2 | Water systems protection | Ongoing |
| 2009 – Law No. 29 (1986-Regulation No. 67) | Updates Regulation No. 67, Regulate the regions for collecting debris (landfills). | Ongoing |
| OTHERS | | |
| 1961 – Regulation No. 33 | Lease of beaches, islands and Miri surf lands on which pastures or liquorice are naturally grown | Ongoing |
| 1981 - Regulation No. 13 | Agricultural Research and Water Resources Centre | Updated 2008, Ongoing |
| 2009 – Regulation No. 17 (formerly 1985-Resolution No. 995) | Establishment of aquaculture operations | Updated 2009, Ongoing |
| 1990 – Order No. Unknown | Environmental criteria for agricultural, industrial and | Ongoing |

| REFERENCE | TITLE | CURRENT STATE |
|---|---|---|
| | public service projects | |
| 1991 - Decision No. 1 (EPB) | Cutting of trees | Ongoing |
| 1992 - Instructions No. 11 | Prohibition of plant importation into Iraq | Ongoing |

One example of the implementation of Iraqi Environmental Law occurred in 2010 when the MOE brought a court case over Law No. 17 (Law on the protection of wild animals and birds) regarding illegal hunting activities in Missan Governorate by foreign hunters/falconers who had entered into Iraq to hunt threatened Iraqi species (particularly MacQueen's Bustard and birds of prey). An agreement was reached with the Ministry of Interior to stop these activities.

### II.3.2 New Iraqi Environmental legislation

| REFERENCE | TITLE | CURRENT STATE |
|---|---|---|
| 2010- Law No.1 | Consumer protection law | Approved |
| 2010 – Law No.11 | Protection of the Iraqi production | Approved |
| 2009 Law No. 3 | Joining in Basil convention for controlling the danger hazards. | Approved |
| 2009 – Law No.7 | Iraq joining the convention of Desertification | Approved |
| 2009 – Law No. 27 | Iraqi Environmental protection and improvement law | Approved |
| 2009 – Law No.28 | Agricultural Loans to support the Iraqi farmers | Approved |
| 2009 – Law No. 30 | Law of Forests and nurseries | Approved |
| 2008 – Law No. 7 | Iraq joining the Climate Change Convention and Kyoto protocol | Approved |
| 2008 – Law No.12 | Iraq joining UNESCO Convention to protect the cultural intangible heritage | Approved |
| 2008 – Law No. 37 (formerly 2003 – CPA ORDER 44) | Ministry of Environment Law - Establishment of the Ministry (instead of the former Council of Protection and Improvement of Environment) | Updated in 2008 |
| 2007 – Law No. 6 | Iraq joining the Arabian memorandum of understanding in cooperation in marine transportation | Approved |
| 2007- Law No. 7 | Iraq joining RAMSAR Convention for the wetlands | Approved |
| 2007 – Law No. 22 | Iraq joining the international agreement for Olive Oil | Approved |
| 2007 –Law No. 42 | Iraq joining Vienna convention and Montreal protocol to protect the Ozone layer. | Approved |
| 2007 – Law No. 48 | Iraq joining the regional commission for Fish traps | Approved |
| 2007 – Law NO NUMBER | Investment law for Oil refineries | Approved but not published |
| 2008 – Law No. 31 | Iraq joins the Convention for Biological Diversity | Approved |
| 2010 – Order No. 74 | Prohibition of plant importation into Iraq - Identifies the MoE and MoA as having sole authority over plant importation and states that all plants are prohibited for importation. Supports Instructions No. 11 | Ongoing |

There are other important laws promoted by the MOE and currently under approval, such as: the Draft Regulation on Nature Protected Areas and the Draft Law for Regulating Hunting Activity.

NI will work with the MOE and the Iraqi parliament in the next four years to develop and revise the Iraqi environmental laws and regulations.

### II.3.3 Other legislative instruments: Coalition Provisional Authority (CPA) Orders

The Coalition Provisional Authority, which along with the Governing Council was the governing body in Iraq from 2003 to 2004, enacted a series of legislative measures that concern biodiversity. The most notable was Order No. 44 that created the Iraqi Ministry of Environment.

CPA order No. 100 of June 28th, 2004 states, "the laws, regulations, orders, memoranda, instructions and directives of the CPA remain in force unless and until rescinded or amended by legislation duly enacted and having the force of law, as set forth in Article 26(C) of the Law of Administration for the State of Iraq for the Transitional Period ("TAL")".

Here follows a list of CPA orders that directly or indirectly affect or relate to biodiversity issues in Iraq. Several of these orders may have been revised, amended, or integrated into other laws since their first issue.

| ORDERS | TITLE | DATE |
|---|---|---|
| Order 9 | Management and Use of Iraqi Public Property (Revised) | 27-Jun-04 |
| Order 24 | Ministry of Science and Technology | 24-Aug-03 |
| Order 26 | Creation of the Department of Border Enforcement | 24-Aug-03 |
| Order 27 | Establishment of the Facilities Protection Service | 4-Sep-03 |
| Order 33 | Ministry of Municipalities and Public Works | 8-Sep-03 |
| Order 44 | Establishment of The Ministry of Environment | 14-Nov-03 |
| Order 45 | Non-Governmental Organizations | 23-Feb-04 |
| Order 51 | Suspension of Exclusive Agency Status of Iraqi State Company for Water Transportation | 14-Jan-04 |
| Order 54 | Trade Liberalization Policy 2004 with Annex A (Amended) | 4-Apr-04 |
| Order 59 | Protection and fair Incentives for Government Whistleblowers | 1-Jun-04 |
| Order 60 | Establishment of the Ministry of Human Rights | 22-Feb-04 |
| Order 72 | Iraqi Radioactive Source Regulatory Authority | 15-Jun-04 |
| Order 81 | Patent, Industrial Design, Undisclosed Information, Integrated Circuits and Plant Variety Law | 26-Apr-04 |
| Order 100 | Transition of Laws, Regulations, Orders, and Directives Issued by the CPA | 28-Jun-04 |

## II.4 *A roadmap to a National Biodiversity Strategy and Action Plan*

The scope of the NBSAP will include core strategies for the conservation of biodiversity, sustainable use, equitable sharing of benefits derived from the use of genetic resources, and conservation of agriculturally important biodiversity. Support strategies may also be developed for improving the institutional framework, and human and financial resources required to implement the core strategies of the NBSAP.

All aspects and levels of biodiversity will be taken into account, as well as how economic sectors may impact biodiversity resources (e.g. industry, energy, agriculture and forestry, tourism etc.).

Experience from other countries indicates that the NBSAP will not be effectively implemented without broad commitment of all interested stakeholders to the process and its outcomes. In order to secure the involvement of stakeholders in the process, a number of structures should be formed, including a steering committee, reference group, project management team, and thematic task teams.

Here follows a tentative scheme for structuring the various phases and stakeholder involvement in preparing the NBSAP.

### II.4.1 General objectives of Iraqi NBSAP

Clear policy objectives within the framework of the NBSAP is essential to both the implementation process at the national level and to the development of suitable biodiversity indicators to monitor whether specific objectives have been achieved.

Main policy objectives concerning biodiversity for the Iraqi National Biodiversity Strategy are as follows:

- Review and update of all Environmental legislation
- Creation of a NATIONAL law for protected areas
- Pollution remediation and control
- Environmental Impact Assessment and Strategic Environmental Assessment policies for biodiversity protection
- Legislation and practical control concerning Invasive species
- Development of management plans for protected areas
- Establishment of a national network of protected areas
- NATIONAL law for forest management and protection
- NATIONAL law for regulating hunting activities and the collection and trade of wild fauna and flora

- Establishment and reorganization of environmental/agriculture departments at local governorates to communicate with local communities and manage/plan the sustainable use of their livelihoods
- Enhancement and promotion of local, traditional knowledge and practices to sustainably manage the environment and resources
- Capacity building and training initiatives
- Promote activities that would generate revenue from sustainable use of nature resources.

### II.4.2 Define other National priorities

The leading motivation behind the National Biodiversity Strategy and Action Plan is to give the basics for an integrated global approach that addresses biodiversity conservation across the country and beyond. The first step for Iraq is to consider the knowledge and experience gained from the KBA project, the development of the Mesopotamia Marshland National Park and the Hawizeh Ramsar wetland and try to define cross-cutting themes and relevant key issues that may guide further research on biodiversity and conservation for the country. The next step will be the drafting of a tentative National Strategy and Action Plan for future work and achievements.

# III. Mainstreaming Biodiversity

Sectoral and cross-sectoral integration of biodiversity policies and actions is required under Article 6 of the Convention. The relevant sectors, excluding the environment, to take into account in the drafting of the NBSAP include: agriculture, water management, education, health, rural development, forestry, fishery, trade, industry, tourism, and finance.

Some of the existing actions for biodiversity conservation in Iraq span a number of these sectors: the Mesopotamia Marshland National Park Management Plan, the New Eden Master Plan for Integrated Water Resource Management in the Marshland Areas, and the Dalmaj Marsh Management for Aquaculture Operations of Bunni (*Barbus sharpeyi*), for instance, cross-cut with agriculture, health, water management, rural development, tourism, fishery and trade. The KBA projects cross-cut rural development, forestry, fishery, education, and tourism.

Additionally, some of the policy measures, processes, and actions started or already in place for the implementation of other international conventions (e.g. CITES, CMS, Ramsar, the World Heritage Convention, UNFCCC, and UNCCD) also involve multiple sectors.

In addition to the MOE, many other institutional bodies have environmental functions and that been involved in a number of environmental projects. Unfortunately, even for those ministries with core environmental functions (like Environment, Water Management and Agriculture) communication and cooperation capacity is still poor. Some examples of mutual involvement in environmental issues by different bodies include:

- The designation, in February 2008, of the Hawizeh marsh as a Ramsar site involved higher government level cooperation to ratify the Convention. Moreover, in Iraq the instrument of adoption of an international convention (e.g. the National Law) has to be approved by the Parliament with the consensus of all the Ministries. A Ramsar National Committee has also been established involving all ministries concerned; since a Management Plan for the marsh exists, the National Committee has to approve it and implement it. Unfortunately, as stated previously, the plan has not been implemented as of yet, and therefore further cooperation and the functioning of the National Committee is under discussion.
- A Memorandum of Understanding has been signed between TRI, MOWR, the Kurdistan Regional Government, and MOA to try to address various issues related to water resources (see also paragraph II.2.5). This is an attempt to stimulate cooperation and mainstreaming between different institutional bodies, even though the outcomes of these activities are sporadic and do not have the necessary commitment and continuity.
- The Ministries of Environment, Higher Education and Scientific Research, and Agriculture conducted research in 2005 on the degradation of Iraqi forested areas. Also in the collection of data and research activities more cooperation and communication is needed. Very often data are collected twice and used by the various stakeholders separately, replicating both efforts and results.

- A Biodiversity National Committee has been established (see also Background Information above), involving all relevant governing bodies. Hopefully this Committee with time and increasing capacity will launch a new vision of the institutional roles and will take on the primary responsibility for mainstreaming biodiversity protection.

**Main existing biodiversity activities and International Conventions and related environmental sectors involved**

| EXISTING STRATEGY/PLAN | RELEVANT SECTORS | | INTERNATIONAL CONVENTION |
|---|---|---|---|
| Mesopotamia Marshland National Park Management Plan | **Agriculture, Health, Rural development, Fishery, Tourism, Water management** | **Trade, Agriculture, Rural development, Forestry, Fishery, Finance, Interior** | CITES |
| New Eden Master Plan for Integrated Water Resource Management in the Marshland Areas | **Agriculture, Health, Rural development, Fishery, Water management** | **Agriculture, Rural development, Forestry, Fishery, Trade, Tourism** | CMS |
| Dalmaj marsh management Plan for aquaculture operations | **Rural development, Fishery, Trade, Water management, Agriculture** | **Water management Agriculture, Rural development, Fishery, Tourism** | Ramsar |
| Poverty reduction Plan | **Agriculture, Education, Health, Rural development, Forestry, Fishery, Trade, Industry, Tourism, Finance** | **Rural development, Education, Tourism** | World Heritage Convention |
| Oil Resources Management Plan | **Agriculture, Education, Health, Rural development, Forestry, Fishery, Trade, Industry, Finance** | **Agriculture, Health, Rural development, Forestry, Fishery** | UNFCCC |
| Hawizeh (Ramsar Site) Management Plan | **Water management Agriculture, Rural development, Fishery, Tourism** | **Agriculture, Health, Rural development, Forestry** | UNCCD |

## III.1 *Institutional Structure for CBD and core competencies*

In order to implement a cross-sectoral approach to achieve biodiversity goals, it is essential to clarify the Iraqi institutional framework and the functions of the various stakeholders at all levels of law issuance and implementation. This subject has been partially addressed in paragraph II.1.2.

For each institutional level the relevant sectors of interest are mentioned, together with the specific tasks performed by that institution.

- Ministry of Education: *Education. Tasks: organize lectures for students in schools, organize exhibitions, promulgate laws on the school structure, and cooperate with UNESCO as local focal point for Iraq.*

- Ministry of Science and Technology: *Health, Industry, Rural development. Tasks: conduct research and implement scientific projects proposed by other ministries, and conduct applied research.*
- Ministry of Water Resources: *Water management, Health, Rural development. Tasks: control of water quality, water quantity, water allocations and water engineering projects.*
- Ministry of Finance: *Finance. Tasks: manage the national budget on a yearly basis - working budget (salaries) and investment budget (given to the Ministry of Planning that distributes funds to the other ministries for projects and activities).*
- Ministry of Higher Education and Scientific Research: *Education, Agriculture, Rural development, Forestry, and Fishery. Tasks: academic research and projects carried on at the university level.*
- State Ministry of Tourism and Archaeology: *Tourism, Education, and Rural development. Tasks: develop tourism; investigate and manage archaeological and holy sites.*
- Ministry of Agriculture: *Agriculture, Fishery, Rural development, Forestry, and Trade. Tasks: sanitary control of cattle, livestock and breeding operations, veterinary controls, (with inspectors from other ministries like MOE and Ministry of Health), control of aquaculture operations, control of wild animals, forest management, promulgate relevant legislation, and issuance of hunting permits.*
- Ministry of Planning: *Agriculture, Education, Health, Rural development, Forestry, Fishery, Trade, Industry, Tourism, and Finance. Tasks: develop national strategies based on the projects and activities defined by all the other ministries and set priorities.*
- Ministry of Foreign Affairs: *Agriculture, Education, Health, Rural development, Forestry, Fishery, Trade, Industry, Tourism, and Finance. Tasks: organization of all international activities and relations.*
- Ministry of Environment: *Environment, Agriculture, Fishery, Trade, Forestry, and Rural development. Tasks: implementation of measures for compliance with all international conventions on the environment, other tasks broadly overlapping with those of the Ministry of Agriculture.*
- Ministry of Oil: *Industry and Health. Tasks: paying for restoration projects, control on the extraction and production activities.*
- Ministry of Trade: *Trade and Industry. Tasks: control of products in national and international trade, quality control of traded products and control of prices.*
- Ministry of Interior: *Security and Border control. Tasks: maintain police corps to enforce the laws of other ministries, environmental police department, control of import and export at customs.*
- State Ministry of Marshes: *Environment, Rural development and Water management. Tasks: Funds and provide logistical support for project in the marshland areas. Cooperates with Iraqi Ministries, NGOs and international agencies regarding activities in the marshlands.*
- *Governorates: All sectors. Tasks: implement the national laws*

- *Provinces: All sectors. Tasks: implement the national laws*
- *Municipalities: All sectors. Tasks: implement the national laws*
- *Tribal councils: All sectors. Tasks: solve local problems through agreements.*

## III.2 *Cross-sectoral legislative needs to achieve main policy goals*

The process to build a strong national cross-sectoral legislative framework for the protection and sustainable use of biodiversity has to take into account main policy goals as defined in section II.3.1 on the tentative NBSAP, as well as strategies, activities, and processes started or existing under other sectors.

To achieve the three main policy goals concerning protected areas, there needs to be: Creation of a national law for protected areas; development of a national management plan for protected areas; and establishment of a national network of protected areas. The legislative framework to build these activities will rest on the first goal: a national protected areas law issued possibly by the MOE. The law will give the baseline of norms and principles for protection. Proceeding from the general principles contained in the law, a series of national decrees, issued in consultation with the other competent ministries, will regulate the structure and functioning of the management plans and networking initiatives.

A the national law for forest management and protection, a national law for regulating hunting and the collection and trade in wild fauna and flora, already exist (*viz*. Law n°30/2009 on Forestry and Nurseries and Law on Wildlife Protection approved but not yet published). The implementation of these laws and the substantial provisions they contain will require close cooperation between the MOE and MOA in order to address the extensive environmental threats these sectors are facing.

For example, forest management is strictly linked to productive land use and rural development. The National Law on Forestry should, as much as possible, delegate the drafting of forest management plans to local authorities with an emphasis on traditional and sustainable forest management. It should also provide for forest protected areas, the management of which would be the responsibility of MOA in conjunction with the MOE.

As for the law on wildlife protection, the implementation of wild fauna and flora management plans should again be delegated to the local authorities with an emphasis on conservation of species, and MOA and other ministries, as appropriate, provide support and guidance.

For pollution, proceeding from the existing laws (*viz*. System of Rivers and Other Water Resources Protection from Pollution Law 25/1967; Ionizing Radiation Law 99/1999; Public Health Law 89/1981; Investment Law for Oil Refinery of 2007) a National Committee needs to be established, comprising all relevant stakeholders, with the tasks of: reviewing the existing legislation on pollutants in various sectors; integrating and drafting new legislation; strengthen the implementation, control, and enforcement of these provisions through appropriate training of the environmental police corps.

In terms of invasive alien species, this issue has to be dealt transversally and is relevant to all ministries and sectors involved with trade, protection, and use of nature resources. The main ministries involved are the MOE, MOA, Ministry of Trade, but also Ministry of Health, MOWR, State

Ministry of Marshes, and Ministry of Higher Education and Scientific Research. A significant first step would be for major legislation of each of the above ministries to be amended to contain a provision for prohibiting the introduction into the wild, and in some cases even the import, of a list of species considered invasive or dangerous to Iraq. The drafting of such a list could be delegated to the National Biodiversity Committee, with adequate advice from national and international experts.

The establishment or reorganization of environmental and agricultural departments in local governorates to communicate with local communities to manage the sustainable use of natural resources for a community's livelihood will involve the issuance of a national law outlining the structure of the government and the powers given to the various ministries, to the governorates, and to other local authorities.

Capacity building and training initiatives as well as the promotion of activities that would generate revenues from sustainable natural resource uses will mainly involve the MOE and MOA (i.e. forestry law, law on protected areas, national laws for regulating the hunting activity and the collection and trade of wild fauna and flora).

## III.3 *Cross-sectoral legislative needs to address existing and future strategies and other International Conventions*

### III.3.1 Existing strategies

The legislation to address the various management plans for marshland areas, wildlife reserves, and tribal reserves could also address protected areas. The law for regulating hunting and the collection and trade of wild fauna and flora could also be used as the framework for addressing species-specific protection measures. Both these laws are to be issued under the competence of MOE. Fishery and aquaculture operations as well as forest cutting provisions fall into the duties of MOA. The MOWR plays a primary role in the marshland protection and restoration, which has the duty of regulating water flow and availability through the territory. Close cooperation and strong communication are necessary to implemente laws and regulations among these three authorities, and it is paramount to the meaningful implementation of the Convention.

At the higher institutional levels, there will also need to be a local management dimension, where consultations are performed whenever a management plan crosses the core competencies of other sectors or ministries. At the local scale, the management committee should involve a comprehensive set of representatives from other sectors.

### III.3.2 International conventions

All international conventions require a national law for ratification, usually consisting of a translation of the convention text into the official language of the country. Additionally, one or more laws are needed to regulate and implement the provisions of the convention, depending on the specific legislative and institutional structure of the country.

<u>CITES</u>

For this convention, a specific law is needed to be issued by the MOE in consultation with the MOA and Ministry of Trade to address: the continuous updating of the Appendices of protected species; the establishment of an administrative structure functioning as a management authority for the issuance of import and export permits; the empowerment of an enforcement authority to control illegal activities; the establishment of a scientific authority, and a strong sanction system.

CMS/Ramsar

For the implementation of these conventions, the three main legislative instruments suitable to grant protection for the migratory species and for wetland areas are: the National Law for Protected Areas; the National Law for Forest Management and Protection; and the National Law for Regulating Hunting and the Collection and Trade of Wild Fauna and Flora. The two competent ministries are the MOE and MOA. The management of particular cases in which wetland areas or protected areas along migratory routes interact or cross into other sectors and competencies (e.g. human settlements with productive activities, oil extraction sites, and industrial areas) may require specific legislative or regulatory actions at the national, regional, and/or local scale.

World Heritage Convention

Depending on the specific values and resources found in the three Iraqi cultural sites currently listed as UNESCO World Heritage Sites, their protection will be addressed nationally by laws issued by various ministries and local bodies (e.g. Ministry of Tourism and Archaeology, and the MOE).

UNFCCC

Addressing climate change is no doubt the most challenging environmental issue that Middle Eastern countries have to face in upcoming years. Scientific evidence confirms that the major impacts of climate change in the MENA region would increase droughts and reduce freshwater supplies.

On 28 July 2009, Iraq conpleted the ratification of UNFCCC and Kyoto Protocols that entered into force on 26 October 2009. NI and TRI have agreed with the MOE on a 5-year work program supported by IMELS that is focused on providing technical assistance to the MOE in implementing these agreements.

Besides MOE, several other ministries are involved in addressing the effects of climate change, including: MOA (sustainable agriculture and forestry, combating desertification, addressing salinization of soil and waters, maintaining agro-biodiversity, ensuring bio-safety, and conserving biodiversity), MOWR (sustainable management of water resources, combating desertification, addressing salinization of soil and waters, and conserving biodiversity), Ministry of Planning (urbanization, infrastructures, control and reduction of GHG emissions), Ministry of Oil (oil sector development, control and reduction of GHG emissions), and Ministry of Energy and Transport (infrastructures, control and reduction of GHG emissions).

UNCCD

In the framework of the Convention to Combat Desertification, the responsibility for implementation at a national level belongs to the MOA, which has the duty of enacting legislation on land tenure and territorial assets, and of delegating, at the local scale, the task of drafting rural development plans.

These plans will also involve core competencies of the MOE, such as the restoration and management of water resources and marshland areas to combat and mitigate the adverse effects of drought and prevent desertification.

### III.3.3 Upcoming Iraqi National Biodiversity Strategy and Action Plans (NBSAP)

With National Law No 31, Iraq has confirmed its commitment to fulfilling its obligations under the Convention for Biological Diversity. In order to draft a NBSAP for Iraq as soon as possible, it is important to address legislative and regulatory needs that would be necessary to implement it. The NBSAP will encompass a variety of subjects and issues normally delegated to various institutional bodies. Therefore though useful, a law to adopt the strategy approved by all existing ministries cannot, by itself, be the only answer to the complex problem of implementing the NBSAP. Too often perfect laws remain unimplemented because of lack of interest or shared vision among the stakeholders. The only way a NBSAP can be drafted and applied in Iraq is the enthusiastic participation of the relevant institutions in the entire process.

The National Biodiversity Committee has to build its own capacity and become the leader of the strategy, supported by a law that would state the obligations and responsibilities of each Ministry.

# IV. Conclusions: Progress towards the 2010 Target and Implementation of the Strategic Plan

In 2002, 10 years after the Convention on Biological Diversity was opened for signature, the Parties developed the Strategic Plan of 2002 (Decision VI/26). The main goal of the Strategic Plan is to effectively halt the loss of biodiversity through the conservation and sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources.

The Parties committed themselves to achieving by 2010 a significant reduction of the rate of biodiversity loss at the global, regional, and national level as a contribution to poverty alleviation and to the benefit of all life on earth.

## IV.1 *Iraqi progress towards the achievement of the 2010 target*

In the following table the existing biodiversity actions in Iraq is evaluated against the 2010 targets. The relevant activities and the progress status for the specific goal/target considered are listed and, in the last column, a general evaluation on the extent to which the goal has been achieved in Iraq is provided.

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|---|
| **Protect the components of biodiversity** | | | |
| **Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes** | Target 1.1: At least 10% of each of the world's ecological regions effectively conserved. | ▪ Marshland areas (81% of the global ecoregion) "Tigris Euphrates alluvial salt marsh" (9.6% will be protected if Iraq protects the Hawizeh marsh Ramsar Site and the proposed Central Marshes National Park)<br>▪ Not yet protected but the law on protected areas is under approval to create a protected area in the marshlands. | |
| | Target 1.2: Areas of particular importance to biodiversity protected | ▪ Marshlands (see above)<br>▪ Key Biodiversity Area in Iraq: 88 sites important to biodiversity conservation identified and surveyed but not yet protected | |
| **Goal 2. Promote the conservation of species diversity** | Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups | ▪ Restoration of the marshland since 2003 has brought back many important bird species<br>▪ Tree plantation project in Iraq (1.000.000 trees) in 2008-2009; prohibition against forest clearing | |
| | Target 2.2: Status of threatened species improved. | ▪ A list of the number of species (threatened, endemic) is in progress but protection for threatened species lacking<br>▪ 15 freshwater fish may have | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|---|
| | | benefited from marshland restoration; other marine species now able to utilize nursery areas in the marshlands but lack of comprehensive assessments remain a problem; unsustainable fishing practices common | |
| **Goal 3. Promote the conservation of genetic diversity** | Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained. | ▪ Gene bank of crop seed exists in the Ministry of Agriculture<br>▪ DNA bar code of microinvertebrates (Smithsonian Institute)<br>▪ University research on plant species genetics (Ministry of Higher Education and Scientific Research) | **?** |
| **Promote sustainable use** | | | |
| **Goal 4. Promote sustainable use and consumption.** | Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity. | ▪ Existence of a specific department for sustainable use and consumption at the MOE. It is not working yet, not implemented. | **?** |
| | Target 4.2: Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced | ▪ Fishing moratorium to reduce overfishing in some areas of the KRG<br>▪ Some areas of the central marshes restrict unsustainable fishing practices (Tribal agreement)<br>▪ Tribal agreement in Barzan prohibits hunting activity<br>▪ No fishing in some areas of Iraq during the period of fish reproduction | ☹ |
| | Target 4.3:No species of wild flora or fauna endangered by international trade | ▪ Nothing has been achieved and there are species of major concern (Saker Falcon and other birds of prey, Bustard, Wild Goats, otters....) | ☹ |
| **Address threats to biodiversity** | | | |
| **Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.** | Target 5.1: Rate of loss and degradation of natural habitats decreased | ▪ IMOS/New Eden calculation for restoration rate of the Iraqi marshlands.<br>▪ Preliminary work was started to develop a habitat classification system for the Iraqi Marshlands but this work needs to be re-started and expanded to other habitat types. | ☹ |
| **Goal 6. Control threats from** | Target 6.1: Pathways for major potential alien | ▪ There is some structure at the Cabinet level to carry on quality | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|---|
| **invasive alien species** | invasive species controlled. | control on agricultural, pharmaceutical and food products, it could be improved to carry out alien species control | ☹ |
| | Target 6. 2: Management plans in place for major alien species that threaten ecosystems, habitats or species. | ▪ Water Hyacinth management plan under Ministry of Water Resources in cooperation with Ministry of Agriculture and Ministry of Environment and Ministry Science and Technology and Ministry of Higher Education and Scientific Research. | ☺ |
| **Goal 7. Address challenges to biodiversity from climate change, and pollution** | Target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change | ▪ Tree plantation (as above)<br>▪ National desertification committee (structure exist) | **?** |
| | Target 7.2: Reduce pollution and its impacts on biodiversity | ▪ Municipalities planning for sewage treatment<br>▪ Ministry of Water Resources has some structure (largely unknown) for addressing pollution spills in Iraqi waterways<br>▪ Ministry of Environment has cleaned up two of the high priority hot spots<br>▪ The Radiation Centre of the Ministry of Environment has cleaned up the Tuwaitha Nuclear Site.<br>▪ International and national NGOs working in cooperation with the Iraqi Government and the KRG are clearing mine fields.<br>▪ Ministry of Environment has issued an order prohibiting brick factories from using black oil as fuel and requiring scrubbers in smoke stacks.<br>▪ Liquid medical waste is prohibited from being dumped in the rivers<br>▪ Prohibition against use of pesticides and electro-fishing to catch fishes from the rivers and lakes exist in some areas. | ☺ |
| **Maintain goods and services from biodiversity to support human well-being** | | | |
| **Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods** | Target 8.1: Capacity of ecosystems to deliver goods and services maintained. | ▪ Restoration of the marshlands has provided some improvement in comparison to the situation of the mid '90 by providing for cleaner water, fisheries, buffalo, reeds, but the services provided are not stable. | **?** |
| | Target 8.2: Biological resources that support sustainable livelihoods, | ▪ The marshland resources and products have been partially restored and the local people have returned to | 😐 |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|---|
| | local food security and health care, especially of poor people maintained | the area and are benefitting from those services. | |
| **Protect traditional knowledge, innovations and practices** | | | |
| **Goal 9 Maintain socio-cultural diversity of indigenous and local communities** | Target 9.1: Protect traditional knowledge, innovations and practices | ▪ Reed constructions in the marshlands have been restored<br>▪ Traditional handcrafts from local communities are being promoted by local NGOs. | ? |
| | Target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing | ▪ No information available | ? |
| **Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources** | Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements. | ▪ No mechanism exists | ? |
| | Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources | ▪ No mechanism exists | ? |
| **Ensure provision of adequate resources** | | | |
| **Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention** | Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20. | ▪ Iraq is not to be considered a developing country, but more a country with an economy in transition, although in some areas living conditions of rural communities have to be improved a great deal.<br>▪ Not enough information is available right now to assess whether financial resources are adequately transferred from other countries/donors and also from internal institutional bodies and/or private sector. | ? |
| | Target 11.2: Technology is transferred to developing country Parties, to allow for the | ▪ Though Iraq is not a developing country, still some technology transfer, especially as regards pollution remediation, would be very | ☺ |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|---|
| | effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4. | useful.<br>▪ Information is only available on current practices used by NI and the New Eden Group for the collection and analysis of data. To some extent there has been an improvement in relation to monitoring techniques of the marshes and the KBA sites. | |

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## IV.2 *Iraqi progress towards the implementation of the Strategic Plan of the Convention*

The following table assesses and compares biodiversity actions in Iraq to the Convention Strategic Plan. National goals to achieve the Strategic Plan of the Convention have not been officially defined yet in Iraq and also a NBSAP has not yet been drafted. As a starting point some of the existing strategies and actions will be assessed instead, as was done in the preceding table.

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|
| **Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues.** | | |
| 1.1 The Convention is setting the global biodiversity agenda. | ▪ Iraq has not the knowledge yet to assess whether these sub-goals have been achieved at the global level. As for Goals 1.1 and 1.2, the opinion and direct experience of Iraq until now, is that the Convention is certainly leading these activities. | ? |
| 1.2 The Convention is promoting cooperation between all relevant international instruments and processes to enhance policy coherence. | | ? |
| 1.3 Other international processes are actively supporting implementation of the Convention, in a manner consistent with their respective frameworks | ▪ Iraq has not enough information on Goal 1.3, although Iraq is aware of the existence of an MoU with the CITES Convention.<br>▪ At the national level Iraq is trying to spread as much as possible information on the importance and role of the Convention, trying to promote the idea of the Convention setting the global biodiversity agenda among national institutional bodies. | ? |
| 1.4 The Cartagena Protocol on Biosafety is widely implemented | ▪ Iraq is not a Party of the Protocol | Not relevant |
| 1.5 Biodiversity concerns are being integrated into relevant sectoral or cross-sectoral plans, programmes and policies at the regional and global levels. | ▪ A Biodiversity National Committee has been established, involving all relevant institutional bodies, but capacity, communication and actions are still poor<br>▪ No integration of regional and local management plans (e.g. tribal reserves) exists | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|
| 1.6 Parties are collaborating at the regional and sub-regional levels to implement the Convention. | ▪ As for the international level, this is largely unknown to Iraq, for the national level this is not fully implemented, though some steps forward have been made (e.g. participation in international workshops of the Convention).<br>▪ The Ministry of Environment has prepared a draft protected area regulation and has submitted it to the Protected Areas National Committee and to international experts (Syria, Egypt and Italy) for review. | ☺ |
| **Goal 2: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.** | | |
| 2.1 All Parties have adequate capacity for implementation of priority actions in national biodiversity strategy and action plans. | ▪ Lack of capacity in all biodiversity-related fields is one of the limitations to the implementation of the Convention in Iraq, still some improvements have been achieved and, with support of the NGO NI, important scientific data on biodiversity has been collected.<br>▪ Hopefully workshops will be organized in cooperation with the Secretariat of the Convention | ☺ |
| 2.2 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have sufficient resources available to implement the three objectives of the Convention. | ▪ Iraq can be regarded as a country with an economy in transition, due to the presence of oil extraction activities; resources might be available to a certain extent. However, due also to many health and reconstruction emergencies, these resources might not be allocated to address the three biodiversity objectives. No reliable information is available on the extent to which internal resources have been allocated to biodiversity protection | **?** |
| 2.3 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety. | ▪ Not relevant | Not relevant |
| 2.4 All Parties have adequate capacity to implement the Cartagena Protocol on Biosafety. | ▪ Not relevant | Not relevant |
| 2.5 Technical and scientific cooperation is making a significant contribution to building capacity. | ▪ Capacity has been increased to some extent, thanks to the work of NI and to the activities carried out under the following activities:<br>1. the New Eden Group activities;<br>2. the Smithsonian Natural History Museum and Bar Code of Life Project research on aquatic organisms; | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|
| | 3. UNEP Iraqi Marshlands Observation System (IMOS) and its Marshlands Project;<br>4. the Canada-Iraq Marshlands Initiative (CIMI);<br>5. the UNDP projects in the Iraqi Marshland areas;<br>6. World Bank, which sponsored the Iraq Emergency Environmental Management Project (EEMP) with the Iraqi Ministry of Environment;<br>7. IMOA and Kew Gardens are completing the unpublished volumes of the old Flora of Iraq and a new effort to create a modern Flora is being lead by the MOE, Twin Rivers Institute (TRI)/Nature Iraq (NI), the Royal Botanic Gardens Edinburgh's (RBGE's) Center for Middle East Plants, the Missouri Botanical Gardens and Old Dominion University. | |
| **Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.** | | |
| 3.1 Every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities. | ▪ Iraq has not yet developed national strategies, plans and programmes for achieving the objectives of the Convention.<br>▪ Some priority have been defined in this report as follows:<br>1. Review and update of all Environmental legislation;<br>2. Creation of a national law for protected areas;<br>3. Pollution remediation and control;<br>4. Environmental Impact Assessment and Strategic Environmental Assessment policies for biodiversity protection;<br>5. Legislation and practical control concerning Invasive species;<br>6. Development of management plans for protected areas;<br>7. Establishment of a national network of protected areas;<br>8. Law for forest management and protection;<br>9. Law for regulating the hunting activity and the collection and trade of wild fauna and flora;<br>10. Establishment and reorganization of environmental/agriculture | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|
| | departments at local Governorates to communicate with local communities and manage/plan the sustainable use of their livelihoods;<br>11. Enhancement and promotion of local traditional knowledge and practices to sustainably manage the environment and resources;<br>12. Capacity building and training initiatives;<br>13. Promotion of activities that would generate revenue from sustainable use of nature resources. | |
| 3.2 Every Party to the Cartagena Protocol on Biosafety has a regulatory framework in place and functioning to implement the Protocol. | ▪ Not relevant | Not relevant |
| 3.3 Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies. | ▪ This objective is very far from being reached in Iraq due to lack of cross-sectoral communication and cooperation | |
| 3.4 The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda. | ▪ The priorities outlined in this report have not been integrated and implemented in a systematic way because no NBSAP exists.<br>▪ Some of the priorities proposed here have already been partially addressed as a result of other projects, plans or researches. | |
| **Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.** | | |
| 4.1 All Parties are implementing a communication, education, and public awareness strategy and promoting public participation in support of the Convention. | ▪ Iraq is committed to organizing such activities, but there will be a need of training and capacity building in this field;<br>▪ Few relevant communication activity has been started and/or carried out with the general public | |
| 4.2 Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the Protocol. | ▪ Not relevant | Not relevant |
| 4.3 Indigenous and local communities are effectively involved in implementation and in the processes of the Convention, at national, regional and international levels. | ▪ In Iraq indigenous communities have their own tribal decision-makers that can broadly decide on the use of their territories;<br>▪ Unfortunately these decision-making mechanisms are not linked with the central government; moreover often tribal authorities are not aware of biodiversity issues and of the international context. | |

| PROVISIONAL FRAMEWORK FOR GOALS AND TARGETS | PROGRESS STATUS IN IRAQ | EVALUATION |
|---|---|---|
| 4.4 Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies. | ▪ Right now in Iraq some tentative communication with biodiversity-involved stakeholders has been made only at the institutional level;<br>▪ No committees or technical panels exist within the private sector | |

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## IV.3 *Conclusions*

Iraq is a very recent Party to the Convention (2009), therefore although the new born Republic is showing a strong interest and commitment towards environmental issues and related international agreements, many challenges and environmental emergencies still need to be addressed.

The creation of the Ministry of Environment in 2003, was a first step in recognizing an urgent need for action that would not only address specific damage to the environment like pollution, deforestation, and desertification, but would try to embrace a more global vision of the environment, comprising ecosystems, their functions and services, and the human society depending on them. In this perspective the Iraqi government and the MOE have recognized in the Convention on Biological Diversity a most suitable tool to globally protect the environment at various levels of action.

Nevertheless, the overall assessment of CBD implementation in Iraq is still poor and influenced in most cases by a lack of historical and current data as well as a lack of institutional capacity, cooperation, and coordination. In particular, with reference to the progress towards the achievement of the 2010 Target and of the Strategic Plan of the Convention as from the Tables above, we can summarize as follows:

### IV.3.1 2010 Target

Out of 11 Goals and 21 targets set, Iraq shows five (5) to be improving, four (4) to be worsening, three (3) where no significant changes have been recorded, and nine (9) cases in which not enough information is available to make an evaluation. The main areas in which achievements have been reached include:

*Target 1.1* (at least 10% of each of the world's ecological regions effectively conserved) and *Target 1.2* (areas of particular importance to biodiversity protected) will be met if the marshland area of Hawizeh and the Central Marshes achieve effective protection and if current plans to implement the Ramsar Site Management Plan and the National Park are put into place. These two areas together form the 9.6% of the global ecological region "Tigris and Euphrates alluvial salt marsh". In Iraq, 88 Key Biodiversity Areas have been identified; unfortunately not all of them have been surveyed due to lack of funds, capacity, and security concerns.

In regards to *Target 6.2* (management plans in place for major alien species that threaten ecosystems, habitats or species), a management plan for Water Hyacinth has been drafted and approved, showing that the problem of Invasive Alien Species (IAS) is recognized and, where possible, addressed.

For *Target 7.2* (Reduce pollution and its impacts on biodiversity), some polluted sites have been cleaned up and some laws and orders to stop dumping waste in the rivers have been enacted as well as mandates to treat sewage waters.

In the case of *Target 11.2* (technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4), Iraq will need consistent transfers of technology from Parties, especially related to pollution remediation.

Overall, some improvements have been registered through the activities carried on by NI and the New Eden Group in cooperation with the MOE, particularly with the monitoring and analysis of data of the marshes and KBA sites.

Areas in which, on the contrary, very little progress has been made are as follows:

For *Target 2.2* (Status of threatened species improved), very little information is available on the status of endemic and/or threatened species, but some figures taken from other international sources (e.g. the CITES Convention) are reporting alarming numbers of species in trade whose control is completely absent.

In the case of *Target 4.2* (unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced), the achievements in this field are very poor and Iraq still relies on unsustainable natural resource extractions such as electro-fishing and intensive production techniques that make large use of pesticides and chemicals.

For *Target 4.3* (no species of wild flora or fauna endangered by international trade), nothing has been achieved in this field, as already mentioned for Target 2.2.

And for *Target 6.1* (pathways for major potential alien invasive species controlled), there are no border controls for checking the entrance of IAS, and there is no list of IAS that are dangerous for Iraqi ecosystems or legislation to prohibit their introduction into the country.

### IV.3.2 Strategic Plan of the Convention

Out of four (4) main goals and 19 sub-goals, we have three (3) sub-goals in which some improvement has been achieved, three (3) sub-goals in which a worsening of the situation has been registered, four (4) sub-goals in which no significant changes have been recorded, four (4) sub-goals in which not enough information is available to make an evaluation, and five (5) sub-goals in which the targets set were considered not relevant to the Iraqi situation at this time.

In terms of *Goal 1.6* (Parties are collaborating at the regional and sub-regional levels to implement the Convention), Iraq has registered some improvement and some efforts have been made to collaborate at the regional and sub-regional level. Important activities to improve further progress toward this goal will include broad participation of organizations at regional meetings and workshops.

*Goal 2.1* (all Parties have adequate capacity for implementation of priority actions in national biodiversity strategy and action plans), has not been achieved in Iraq but some important improvements have been achieved thanks to the activities of NI. Improvements are also expected with the forthcoming organization of trainings and workshops in collaboration with the CBD Secretariat.

For *Goal 2.5* (technical and scientific cooperation is making a significant contribution to building capacity), various initiatives carried out by NI, the New Eden Group, the Smithsonian Natural History Museum, UNEP, and others have significantly contributed to build capacity in biodiversity issues. This can be regarded as an improvement.

Other areas of action and goals for which progress or improvement is lacking are as follows.

Progress towards *Goal 3.1* (every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities), is still lacking. The main national priorities and goals are defined in this report, but there is no national plan or coordination to implement the Convention at this time.

There has been no improvement to achieve *Goal 3.3* (biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies). The idea of integrating biodiversity issues in all relevant sectors is something completely new for the institutional structure of Iraq and it will pose significant challenges to achieve.

For *Goal 3.4* (the priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda), no strategy or plans exist therefore they are not actively implemented. The few existing actions to protect biodiversity do not yet fit into a coherent national strategy and prioritized scheme.

It is worth noting that the overall assessment carried out in the two tables above shows a great number of goals and targets that cannot be properly evaluated because no information is available. This problem is partially due to a lack of data and to the difficulties of collecting data in the field but are also the result to the lack of communication and cooperation between the involved stakeholders.

### IV.3.3 Main challenges to implementation of the Convention

The main challenges for Iraq to implement the Convention are: lack of institutional capacity and coordination; lack of effective and ad hoc legislation to address environmental emergencies and needs; lack of legislation implementation and enforcement; lack of environmental monitoring and control; lack of scientific capacity; lack of communication and involvement of local people and rural communities; lack of resource allocation planning; and security constraints.

### IV.3.4 Future priorities

The future priorities for Iraq are to meet the main challenges to the implementation of the Convention as defined above. These largely correspond to the tentative general objectives of the NBSAP, as illustrated in Chapter II (paragraph II.3.1) and from the table above (under Goal 3.1).

The most important achievement that has to be set as an absolute priority for the Iraqi process towards biodiversity protection, however, is a radical change of mind in the stakeholders at all levels of engagement towards nature, ecosystems, resources, and species. Only with a different attitude towards nature and a full understanding of its immense value and importance to the country will effective protection and conservation be achieved.

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## Appendix 1: Information concerning reporting Party

**REPORTING PARTY**

| | |
|---|---|
| Contracting Party | IRAQ |
| **NATIONALFOCALPOINT** | |
| Full name of the institution | The Ministry of Environment |
| Name and title of contact officer | Dr. Ali Al-Lami, Minister Advisor |
| Mailing address | Baghdad, PO Box 10062, Iraq |
| Telephone | +964-7901232413 |
| Fax | NA |
| E-mail | aaza59@yahoo.com |
| **CONTACT OFFICER FOR NATIONAL REPORT** | |
| Full name of the institution | *same* |
| Name and title of contact officer | *same* |
| Mailing address | *same* |
| Telephone | *same* |
| Fax | *same* |
| E-mail | *Same* |
| **SUBMISSION** | |
| Signature of officer responsible for submitting | Ali Allami |
| Date of submission | 22 July 2010 |

# Appendix 2: Process of preparation of national report and further sources of information

The MOE, through financial and technical support from GEF and UNEP, is preparing a NBSAP to be submitted to the Secretariat of the CBD. This is Iraq's first report to the CBD but it utilized the structure and main themes of the 4th National Report to conduct an initial assessment of the applicable 2010 Biodiversity Targets.

Preparation of the report was done using the guidelines and format provided at: http://www.biodiv.org/reports/guidelines.aspx .

A task force made up of representatives of the MOE and the Iraqi non-governmental organization Nature Iraq was formed to prepare an initial draft of the report in English, which was completed by the end of March 2010. An Iraqi delegation headed by the MOE attended a regional workshop for Asia and Horn of Africa on the Fourth National Report held in Bahrain from 12-15 April, 2010, which resulted in the development of a second draft of the report. The report revisions, comments, compilation, translations and editing was done by Nahla Mohammed (MOE), Samer Hany (MOE), Anna Bachmann (NI); Nadheer Abood (NI), Virginia Tice (NI), Samad Ali (NI), Mia Fant (Italian consultant to NI), and Allessandra Rossi (Italian consultant to NI).

The draft report was circulated to the National Biodiversity Committee in July of 2010 (members are listed in the Background to this report).

The fourth national report was submitted to the CBD Secretariat in July 2010.

# Appendix 3: Progress towards Targets of the Global Strategy for Plant Conservation and Programme of Work on Protected Areas

## *Global Strategy for Plant Conservation*

In 2002, the Conference of the Parties, by decision VI/9, adopted the Global Strategy for Plant Conservation. The objectives and targets of the Global Strategy for Plant Conservation are taken from CBD's website on the GSPC (http://www.cbd.int/gspc/strategy.shtml). The objectives of the strategy are as follows:

1. The ultimate and long-term objective of the Global Strategy for Plant Conservation is to halt the current and continuing loss of plant diversity.
2. The Strategy will provide a framework to facilitate harmony between existing initiatives aimed at plant conservation, to identify gaps where new initiatives are required, and to promote mobilization of the necessary resources.
3. The Strategy will be a tool to enhance the ecosystem approach to the conservation and sustainable use of biodiversity and focus on the vital role of plants in the structure and functioning of ecological systems and assure provision of the goods and services such systems provide.
4. The Strategy will also:
   a) Provide a pilot exercise under the Convention for the setting of targets that relate to ultimate objectives of the Convention;
   b) Act as a means to develop and implement the thematic programmes of work of the Convention.
5. Within the ultimate and long-term objective, a number of sub-objectives can be identified as follows:
   a) Understanding and documenting plant diversity:
      i. Document the plant diversity of the world, including its use and its distribution in the wild, in protected areas and in ex situ collections;
      ii. Monitor the status and trends in global plant diversity and its conservation, and threats to plant diversity, and identify plant species, plant communities, and associated habitats and ecosystems, at risk, including consideration of "red lists";
      iii. Develop an integrated, distributed, interactive information system to manage and make accessible information on plant diversity;
      iv. Promote research on the genetic diversity, systematics, taxonomy, ecology and conservation biology of plants and plant communities, and associated habitats and

ecosystems, and on social, cultural and economic factors that impact biodiversity, so that plant diversity, both in the wild and in the context of human activities, can be well understood and utilized to support conservation action;

b) Conserving plant diversity: Improve long-term conservation, management and restoration of plant diversity, plant communities, and the associated habitats and ecosystems, in situ (both in more natural and in more managed environments) and, where necessary to complement in situ measures, ex situ, preferably in the country of origin. The Strategy will pay special attention to the conservation of the world's important areas of plant diversity, and to the conservation of plant species of direct importance to human societies;.

c) Using plant diversity sustainably:

   i. Strengthen measures to control unsustainable utilization of plant resources;

   ii. Support the development of livelihoods based on sustainable use of plants, and promote the fair and equitable sharing of benefits arising from the use of plant diversity;

d) Promoting education and awareness about plant diversity: Articulate and emphasize the importance of plant diversity, the goods and services that it provides, and the need for its conservation and sustainable use, in order to mobilize necessary popular and political support for its conservation and sustainable use;

e) Building capacity for the conservation of plant diversity:

   i. Enhance the human resources, physical and technological infrastructure necessary, and necessary financial support for plant conservation;

   ii. Link and integrate actors to maximize action and potential synergies in support of plant conservation.

The following are the Global targets for 2010 and information on progress made in Iraq towards achieving these targets:

| # | TARGET | IRAQ STATUS |
|---|---|---|
| **Understanding and documenting plant diversity:** | | |
| **i.** | A widely accessible working list of known plant species, as a step towards a complete world flora | *In 2009. Iraq initiated a Flora of Iraq project to complete and update the published accounts from the 1960s to 1980s* |
| **ii.** | A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels | *The Flora of Iraq project will provide a preliminary assessment on conservation status; the Iraq Key Biodiversity Areas project has collected some information on conservation status for* |

| # | TARGET | IRAQ STATUS |
|---|---|---|
| | | *certain species* |
| **iii.** | Development of models with protocols for plant conservation and sustainable use, based on research and practical experience | *Such models and protocols will result from the Flora of Iraq Project* |
| **Conserving plant diversity** | | |
| **iv.** | At least 10 per cent of each of the world's ecological regions effectively conserved; | *No information* |
| **v.** | Protection of 50 per cent of the most important areas for plant diversity assured; | *No information* |
| **vi.** | At least 30 per cent of production lands managed consistent with the conservation of plant diversity; | *No information* |
| **vii.** | 60 per cent of the world's threatened species conserved in situ; | *No information* |
| **viii.** | 60 per cent of threatened plant species in accessible ex situ collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes; | *No information* |
| **ix.** | 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained; | *No information* |
| **x.** | Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems | *A management plan is in place for controlling Water Hyacinth but no other information is available* |
| **Using plant diversity sustainably** | | |
| **xi.** | No species of wild flora endangered by international trade; | *No information* |
| **xii.** | 30 per cent of plant-based products derived from sources that are sustainably managed; | *No information* |
| **xiii.** | The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted; | *No information* |
| **Promoting education and awareness about plant diversity** | | |
| **xiv.** | The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes; | *No information* |
| **Building capacity for the conservation of plant diversity** | | |
| **xv.** | The number of trained people working with appropriate facilities in plant conservation increased | *No information* |
| **xvi.** | Networks for plant conservation activities established or strengthened at national | *No information* |

These 16 targets provide a framework for policy formulation and a basis for monitoring. National targets developed within this framework may be modified in Iraq, according to national priorities and capacities, and differences in plant diversity.

## *Programme of Work on Protected Areas*

At its seventh meeting in 2004, the COP adopted the "Programme of Work on Protected Areas" with an overall objective to establish and maintain, by 2010 for terrestrial areas and by 2012 for marine areas, "comprehensive, effectively managed and ecologically representative systems of protected areas" that, collectively, will significantly reduce the rate of loss of global biodiversity.

Iraq has not yet developed a list of national or global objectives for terrestrial or marine areas to achieve the targets adopted under the Programme of Work on Protected Areas, yet some individual protected area activities have been initiated within the country (See Protected Areas Indicator in section I.4.6 of the full report).

The follow are the list of targets for the programme of work on protected areas for both terrestrial and marine areas:

| GOAL NO. | TARGETS | IRAQ STATUS |
|---|---|---|
| | **Targets for 2008** | |
| 1.5 | Effective mechanisms for identifying and preventing, and/or mitigating the negative impacts of key threats to protected areas are in place. | *No information* |
| 2.1 | Mechanisms for the equitable sharing of both costs and benefits arising from the establishment and management of protected areas are established. | *No information* |
| 2.2 | Participation of indigenous and local communities is full and effective, in full respect of their rights and recognition of their responsibilities, consistent with national law and applicable international obligations, and the participation of relevant stakeholders, in the management of existing, and the establishment and management of new, protected areas. | *Local councils and NGOs have had participated in the planning of the proposed Mesopotamian NP.* |
| 3.1 | Policies as appropriate, including use of social and economic valuation and incentives, to provide a supportive enabling environment for more effective establishment and management of protected areas and protected areas systems are reviewed and revised as appropriate. | *Socio-economic planning and pilot projects have been part of proposed Mesopotamian NP.* |
| 3.4 | Sufficient financial, technical and other resources to meet the costs to effectively implement and manage national and regional systems of protected areas are secured, including both from national and international sources, particularly to support the needs of developing countries and countries with economies in transition and small island developing States. | No information |
| 3.5 | Public awareness, understanding and appreciation of the importance and benefits of protected areas are significantly increased. | General public awareness and understanding of proposed Mesopotamian NP exists |
| 4.1 | Standards, criteria, and best practices for planning, selecting, establishing, managing and governance of national and regional systems of protected areas are developed and adopted. | Proposed Mesopotamian NP may serve as a model |
| | **Targets for 2010** | |
| 1.1 | Terrestrially, a global network of comprehensive, representative and effectively managed national and regional protected area system is established." | No information |
| 1.3 | Trans-boundary protected areas, other forms of collaboration between neighbouring protected areas across national boundaries and regional networks, to enhance the conservation and sustainable use of biological diversity, implementing the ecosystem approach, and improving international cooperation are established and strengthened. | Hawizeh Ramsar Site is a trans-boundary protected area in Iraq and Hor Al Azim is a related trans-boundary protected area in Iran but significant issues remain and little collaboration exists. |

| GOAL NO. | TARGETS | IRAQ STATUS |
|---|---|---|
| 3.2 | Comprehensive capacity building programmes and initiatives are implemented to develop knowledge and skills at individual, community and institutional levels, and raise professional standards. | Upon implementation, proposed Mesopotamian NP may serve as a model |
| 3.3 | The development, validation, and transfer of appropriate technologies and innovative approaches for the effective management of protected areas is substantially improved, taking into account the decisions of the Conference of the Parties on technology transfer and cooperation. | No Information |
| 4.2 | Frameworks for monitoring, evaluating and reporting protected areas management effectiveness at sites, national and regional systems, and trans-boundary protected area levels are adopted and implemented by Parties. | Upon implementation, proposed Mesopotamian NP and Hawizeh Ramsar site may serve as models |
| 4.3 | National and regional systems are established to enable effective monitoring of protected area coverage, status and trends at national, regional and global scales, and to assist in evaluating progress in meeting global biodiversity targets. | Upon implementation, proposed Mesopotamian NP and Hawizeh Ramsar site may serve as models |
| | **Targets for 2012** | |
| 1.1 | In the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area system is established. | No marine protected areas exist in Iraq |
| 1.4 | All protected areas have effective management in existence, using participatory and science-based site planning processes that incorporate clear biodiversity objectives, targets, management strategies and monitoring programmes, drawing upon existing methodologies and a long-term management plan with active stakeholder involvement. | No marine protected areas exist in Iraq |
| | **Targets to be completed by 2015** | |
| 1.2 | All protected areas and protected area systems are integrated into the wider land- and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity and the concept, where appropriate, of ecological networks. | No Information |

Iraq will need to evaluate these targets to develop activities suitable to its needs and situation. Currently obstacles include:

(a) Jurisdictional disputes over who develops and maintains protected areas in Iraq; (b) lack of regulatory and policy framework; (c) funding for development and maintenance of protected areas; (d) lack of capacity at all levels of protected areas development; and (e) lack of trans-boundary cooperation and collaboration with neighbouring countries.

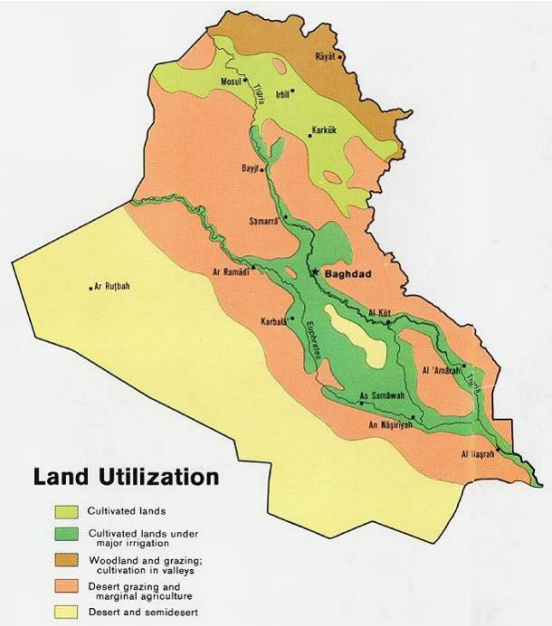
# Appendix 4: National Indicators Used in the Report

## *Indicators of PRESSURE on Biodiversity and Ecosystems*

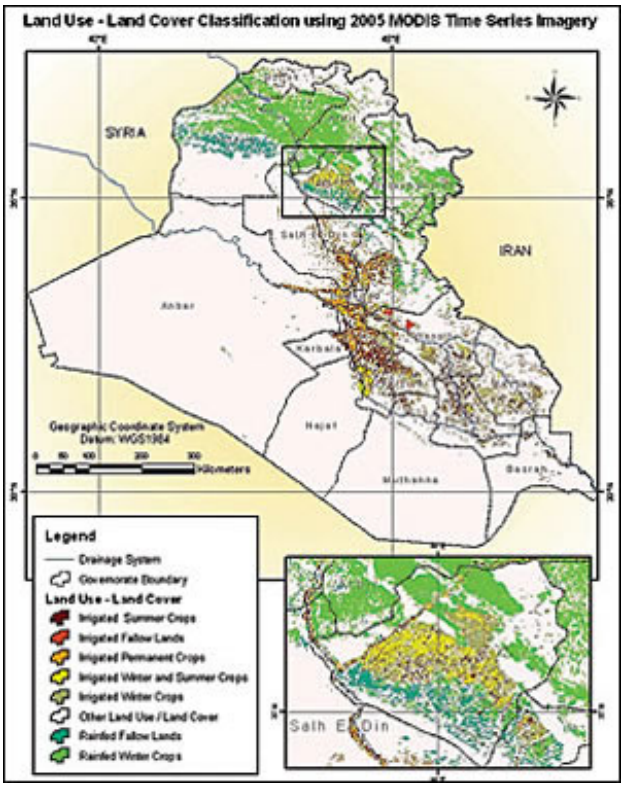
### *Indicator: Land Cover and Use Variables*

The CIA World Factbook (2009) provides basic statistics on land use in Iraq. Estimates from 2005 indicate that 13.12% of Iraq's lands are arable, 0.61% are permanent crops, and 86.27% are other types of land use. Estimates from 2003 indicate that Iraq had 35,250 sq km of irrigated lands. According to Schneider, C. & Martin, T. (winter, 07/08), USAID, at the request of MOA, created a GIS database and maps to support agricultural development. Using Agro-Ecological Zoning (AEZ), a methodology developed by the Food and Agriculture Organization (FAO) of the United Nations, this project used GIS, remote sensing software, and a variety of data sources. A map of land cover classifications for Iraq was developed in 2005, and is shown below with an older map on Iraqi land utilization that dates from 1978.

The Iraqi Central Organization for Statistics and Information Technology maintains information on a variety of environmental sectors in Iraq including the following table representing general land use categories for Iraq.




**1978 Land Utilization (University of Texas**




**Land-cover classification of Iraq in 2005 (Schneider,**

**Library, 2010)** **C. & Martin, T., Winter 07/08).**

**Use of Lands in Iraq (Source: MoE (2006) in Central Org. for Statistics and Information Technology, 2010)**

| TYPE OF USE | AREA (1000) ACRE | % |
|---|---|---|
| Total arable lands | 48000 | 27 |
| Natural pastures | 16000 | 9 |
| Natural forests | 7000 | 3 |
| Barren Mountains | 1700 | 1.5 |
| Desert | 54000 | 33 |
| Surface water and developed lands | 47700 | 26.5 |

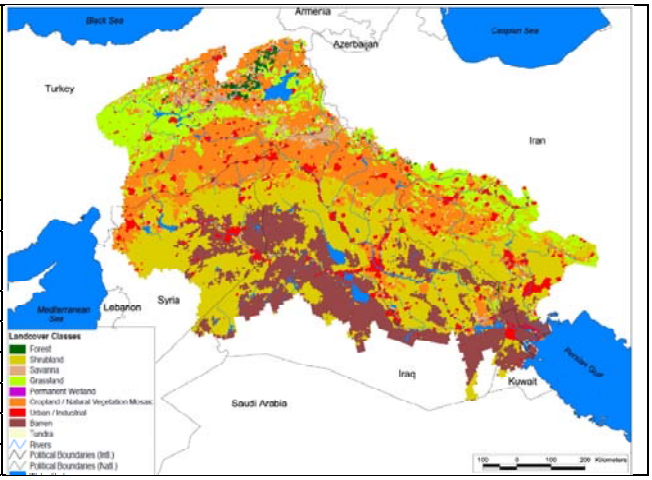
Agricultural land use in Iraq, divided between overall, irrigated, and rain-fed agriculture, is shown in the table below.

**Use of Agricultural Lands in Iraq according to water utilization for the year 2006 (Source: MoA (2006) in Central Org. for Statistics and Information Technology, 2010)**

| | AREA IN DONAMS (HECTARES) |
|---|---|
| 1) Total area divided into: | 22272 (5568) |
| A. Winter crops | 16693 (4173.25) |
| B. Summer crops | 3394 (848.5) |
| C. Evergreen crops | 2185 (545.25) |
| 2) Total irrigated area divided into: | 12028 (3007) |
| A. Winter crops | 8661 (2165.25) |
| B. Summer crops | 3367 (841.75) |
| 3) Total rain-fed agriculture divided into: | 8039.116 (2009.8) |
| A. Winter crops | 8039 (2009.8) |
| B. Summer crops | 0.116 (.03) |

The following data and map from WRI (2009) is available on land cover within the Tigris-Euphrates River Basin.

| TIGRIS EUPHRATES RIVER BASIN LAND COVER AND USE VARIABLES IN THE | |
|---|---|
| Percent Forest Cover | 1.2 |
| Percent Grassland, Savanna and Shrubland | 47.7 |
| Percent Wetlands | 2.9 |
| Percent Cropland | 25.4 |
| Percent Irrigated Cropland | 9.1 |
| Percent Dryland Area | 99.2 |
| Percent Urban and Industrial Area | 6.2 |
| Percent Loss of Original Forest Cover | 99.9 |



| Source: WRI, 2009 | |
|---|---|

Draft land cover maps have been developed for individual sites by New Eden Group and Nature Iraq, such as the Hawizeh Marshes and the proposed Mesopotamian Marshlands National Park Area in southern Iraq.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Habitat Project (2007/2008) – draft Marshland Habitat Classification system, KBA Projects (2008, 2009, 2010) – Habitat and Landscape data of key sites<br>Iraqi Marshlands Observation System (2006)<br>Land-cover classifications of Iraq (2005)<br>Land Utilization Map (1978)<br>Global Land Cover Characterization Database (1999)<br>Global Wetland Distribution (1998)<br>ArcAtlas: Our Earth Database (1997)<br>Tigris-Euphrates River Basin Land Cover (2009) | Nature Iraq<br>Ministry of Agriculture<br>USAID/INMA Project<br>United States Geological Survey (USGS) Earth Resources Observation Systems<br>UNEP-WCMC (United Nations Environment Programme - World Conservation Monitoring Centre).<br>Environmental Systems Research Institute<br>World Resources Institute (WRI)<br>Central Organization for Statistics and Information Technology |

### *Indicator: Change in land use, conversion of forest & steppe lands to other land uses (e.g. deforestation rate)*

The following comes from the 2005 FAO Global Forest Resources Assessment. The forest is 100% sub tropical, with, as of 2000, 100% public ownership. There are 20 native tree species. The following tables present the Iraqi Forest Cover areas as of 2005 and a breakdown of the forest types in Iraq as of 2005.

**Iraq Forest Cover (2005)**

| | |
|---|---|
| Total Land Area (ha) | 43,737,000 |
| Total Forest Area (ha) | 822,000 |
| Percent Forest Cover | 1.88% |
| Other wooded land (ha) | 927,000 |
| Percent Other wooded land | 2.12% |

**Breakdown of Iraq Forest Types (2005)**

| | | |
|---|---|---|
| Primary forest (ha \| %) | - | 0.0% |
| Modified natural (ha \| %) | 809,000 | 98.4% |
| Semi-natural (ha \| %) | - | 0.0% |
| Production plantation (ha \| %) | - | 0.0% |
| Production plantation (ha \| %) | 13,000 | 1.6% |

It should be noted that wide areas of Iraqi Kurdistan were intentionally deforested during the Anfal campaign by the Saddam regime, with many reports of large areas of mature oak stands cut down though little information is available on the extent of these activities.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2007-2010)<br>Global Forest Resources Assessment (2005)<br>Forest Products Production (2003) | Nature Iraq<br>FAO<br>Earth Trends<br>Ministry of Agriculture |

### *Indicator: Fish Catch Assessments*

Studies to characterize the fishing pressures by species, seasons, and by unit effort have not been done in Iraq. Only a very limited fisheries frame survey was conducted under the KBA Project in the summer of 2009 for landing sites within the Central Marshlands proposed National Park area and in East Hammar Marshes. This survey was conducted during a period of drought in which most of the fisheries were not active.

There is an active and expanding aquaculture industry throughout Iraq based mostly on carp species and there are some fish stocking activities.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2009)<br>Fish Species checklist<br>Fish Species Data: Endemics, Diadromous, Introduced, Threatened (1999) | Nature Iraq- MoE<br>Coad, B (in preparation).<br>World Conservation Monitoring Centre |

### *Indicator: Alien & Invasive Species*

The Global Invasive Species Database (2010) lists 13 alien fish, mammal, tree, insect, and micro-organisms species in Iraq and two additional species whose biostatus is not specified. These are listed in the table below. Very little work has been done on alien and invasive species in Iraq and it is likely that renewed research will add species to this list. For example, Water Hyacinth (*Eichhornia* Spp.) is an introduced alien and invasive species. Work needs to be done to identify problematic alien and invasive species and determine their current effect on Iraqi ecosystems and native species. Management mechanisms should be clarified and implemented, trade and border officials should be engaged in both information gathering and management, and in general overall awareness-raising about such species and their effects should be initiated.

**Table 3: Alien Species in Iraq (from Global Invasive Species Database, 2010)**

| ALIEN SPECIES | STATUS | ALIEN SPECIES | STATUS |
|---|---|---|---|
| *Aristichthys nobilis* (fish) | *Aristichthys nobilis* commonly known as bighead carp are carp species native to Asia. They have been introduced around the world for aquaculture purposes and also because they can be used to control excessive growths of phytoplankton in natural waters. These species have | *Oncorhynchus mykiss* (fish) | *Oncorhynchus mykiss* (rainbow trout) are one of the most widely introduced fish species in the world. Native to western North America, from Alaska to the Baja Peninsula, *Oncorhynchus mykiss* have been introduced to numerous countries for sport and commercial |

| ALIEN SPECIES | STATUS | ALIEN SPECIES | STATUS |
|---|---|---|---|
| | the potential to reduce native diversity by competing for and depleting zooplankton populations thus altering the food web. A. nobilis have also been found to carry and transmit various diseases. *A. nobilis* is also known by its synonym *Hypophthalmichthys nobilis*. | | aquaculture. *Oncorhynchus mykiss* is highly valued as a sportfish, with regular stocking occurring in many locations where wild populations cannot support the pressure from anglers. Concerns have been raised about the effects of introduced trout in some areas, as they may affect native fish and invertebrates through predation and competition. This fish is being raised in aquaculture in Iraq |
| *Ctenopharyngodon idella* (fish) | *Grass carp* (Ctenopharyngodon idella) is a large cyprinid introduced worldwide as a biological control of aquatic vegetation as well as a food fish. It is a voracious feeder which is incredibly efficient at removing aquatic weeds. However they can completely eliminate vegetation from water systems, resulting in widespread ecological effects. Grass carp are also known to compete with native fish, carry parasites such as Asian tapeworm (*Bothriocephalus opsarichthydis*), and induce other harmful effects to introduced waters. | | |
| *Cyprinus carpio* (fish) | The common carp (*Cyprinus carpio*) has been introduced as a food and ornamental fish into temperate freshwaters throughout the world. It is considered a pest because of its abundance and its tendency to reduce water clarity and destroy and uproot the aquatic vegetation used as habitat by a variety of species. | *Prosopis* spp. (tree, shrub) | Members of the genus *Prosopis* spp., which are commonly known as mesquite or algarrobo, include at least 44 defined species and many hybrids. This leads to problems with identification. For this reason, information about different species in the Prosopis genus is presented in this genus-level profile. Native to the Americas, *Prosopis* species are fast growing, nitrogen fixing and very salt and drought tolerant shrubs or trees. Most are thorny, although thornless types are known. Animals eat the pods and may spread seeds widely. Trees develop a shrubby growth form if cut or grazed. The four main species that have presented problems as weeds world-wide are *P. glandulosa* and *P. velutina* in more subtropical regions and *P. juliflora* and *P. pallida* in the truly tropical zone. |
| *Dalbergia* | *Dalbergia sissoo* is a perennial tree | *Suncus murinus* | *Suncus murinus* (the Indian musk |

| ALIEN SPECIES | STATUS | ALIEN SPECIES | STATUS |
|---|---|---|---|
| *sissoo* (tree) | that is economically important for its value in forestry, agroforestry, and horticulture. It provides timber, fuelwood, fodder, has medicinal value, used extensively as an ornamental tree as well as for shading, erosion control, and soil fertility. Native to the Indian sub-continent it is a member of the legume family and can fix nitrogen from the atmosphere through bacteria nodules on its root system. It has been introduced in various countries throughout the world, but has known to be invasive in Australia and in Florida (U.S.). | (mammal) | shrew) is a commensal and adaptable mammal. It is a rapid coloniser and threatens many plant and animal species through predation and competition. Through human agency it has a large and expanding range and, to date, very little work has been done on how to effectively manage the species. |
| *Eupatorium cannabinum* (herb) | *Eupatorium cannabinum* is a woody perennial herb that prefers to inhabit and invade moist habitats such as swamps, marshes and stream banks. It forms dense monotypic stands that compete with and eventually crowd out native species. This species also has the ability to alter the nutrient structure of habitats it invades. | *Trogoderma granarium* (insect) | *Trogoderma granarium* are considered a pest of considerable impact to stored foodstuffs. It maintains its presence in food storage in very low numbers and is able to survive long periods of time in an inactive state. |
| *Gambusia affinis* (fish) | *Gambusia affinis* is a small fish native to the fresh waters of the eastern and southern United States. It has become a pest in many waterways around the world following initial introductions early last century as a biological control of mosquito. In general, it is considered to be no more effective than native predators of mosquitoes. The highly predatory mosquito fish eats the eggs of economically desirable fish and preys on and endangers rare indigenous fish and invertebrate species. Mosquito fish are difficult to eliminate once established, so the best way to reduce their effects is to control their further spread. | *Vibrio cholerae* (micro-organism) | *Vibrio cholerae* is the bacteria that causes cholera; a potentially epidemic and life-threatening secretory diarrhea characterised by numerous, voluminous watery stools, often accompanied by vomiting and resulting in hypovolemic shock and acidosis. It can also cause mild or unapparent infections. Vibrio cholerae occurs in both marine and freshwater habitats in mutualistic associations with aquatic animals. Vibrio cholerae is endemic or epidemic in areas with poor sanitation; Iraq has seen several outbreaks of cholera throughout the country. |
| *Gambusia holbrooki* (fish) | *Gambusia holbrooki* (eastern gambusia) is a small, aggressive live-bearing fish that originates from the southern United States. It has been spread worldwide as a mosquito-control agent. *Gambusia holbrooki* has been implicated in damage to native fish, amphibian and invertebrate populations. The usefulness of | *Trogoderma granarium* (insect) | *Trogoderma granarium* are considered a pest of considerable impact to stored foodstuffs. It maintains its presence in food storage in very low numbers and is able to survive long periods of time in an inactive state. |

| ALIEN SPECIES | STATUS | ALIEN SPECIES | STATUS |
|---|---|---|---|
| | *Gambusia holbrooki* as a biological control agent is doubtful, since many species of native fish may be just as effective at controlling mosquitoes while avoiding the negative side-effects on the biota. | | |
| *Hypophthalmichthys molitrix* (fish) | *Hypophthalmichthys molitrix* is a carp, native to Asia. *Hypophthalmichthys molitrix* have been introduced around the world for aquaculture purposes and also for controlling excessive growth of phytoplankton in natural waters. *Hypophthalmichthys molitrix* have the potential to reduce native diversity by competing for and depleting zooplankton populations, altering the food web. Hypophthalmichthys molitrix have also been found to carry and transmit the disease Salmonella typhimurium. | | |
| Biostatus not specified | | | |
| *Ceratophyllum demersum* (aquatic plant) | *Ceratophyllum demersum* is a native of North America. It now has a worldwide distribution, at least in part due to the aquarium and pond trade. It is a submerged aquatic plant which is capable of forming dense monospecific beds, excluding other plant species, causing problems to recreational activities on waterways and in some cases causing blockages at hydroelectric power stations. *C. demersum* can spread rapidly, and grows in a large range of aquatic habitats. | *Xanthomonas axonopodis pv.citri* (micro-organism) | *Xanthomonas axonopodis* pv.citri is a bacteria affecting citrus trees that thrives in areas with high temperatures, heavy rainfall, and high winds. In areas with these characteristics, *X. axonopodis pv.citri* causes citrus canker, which imparts heavy economic losses on citrus industries. It is spread through the inadvertent translocation of infected citrus fruits and seedlings to uninfected areas. Locally, *X. axonopodis pv.citri* is spread with the help of the Asian citrus leaf miner, which exposes the bacteria for spread by wind and rainfall. |

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Global Invasive Species Database, 2010 | Invasive Species Specialist Group (ISSG), IUCN<br>Nature Iraq |

### *Indicator: Hunting Pressure*

All information on hunting in Iraq is largely anecdotal through reports from field teams in the NI KBA project. Several incidents of large scale hunting and falconry parties entering Iraq with high security from the Gulf and Arab Peninsula have been reported in the winters of 2009/2010 by NI, other NGOs

and the MOE. Hunting is illegal throughout Kurdistan in northern Iraq but reports from the KBA Project indicate that these rules go largely unenforced. Wild species, some of them endangered and threatened species, have been documented in the animal markets of Baghdad and Baquba. In Kurdistan, the 2010 KBA survey reports that local zoos import wild exotic species animals via Syria. Other reports have shown active hunting of important species such as Houbara (McQueens) Bustard for live capture and trade to Gulf Countries.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005-2010) - Anacdotal information on hunting and self reporting information from hunters; informal surveys of animal markets and zoos | Nature Iraq-MoE |

### *Indicator: Unsustainable Fishing Practices*

Fishing gear and methods has been examined in the KBA Project. There is wide-spread use of electro-fishing, using home-made systems, throughout the country as well as occasional use of poison. There have even been examples of fishing using explosives, although there are local tribal prohibitions on such activities in certain areas (e.g. Abu Zirig Marsh in the Central Marshes). Nets are used in most deepwater lake and river ecosystems but mesh sizes remain unregulated. Although there are fishing moratoriums in the spring in Kurdistan that are at least partially enforced, much of the country issues or enforces no rules on fishing periods.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005-2010)<br>KBA Frame Survey – Summer 2009 | Nature Iraq-MoE |

### *Indicator: Desertification*

According to Dregne (1986), "Desertification in the arid regions of Asia is characterized by overgrazing of the rangelands of the Middle East and Central Asia, water erosion of cultivated lands from eastern China to the Mediterranean Sea, and salinization and waterlogging on a large scale in Iraq, Pakistan, China, and the Soviet Union." According to Dougrameji and Clor (in Dregne 1986), "Deep fine-textured soils and almost flat topography make it hard to provide drainage that is adequate to maintain a deep water table and prevent salt accumulation. Techniques of soil and water management that are suitable for conditions in Iraq have been developed and tested successfully, but the technical problems are less difficult to resolve than the social ones." Soil salinization remains one of Iraq's top problems, with an estimated 3 million tons a year of salt sedimentation.

The UNEP Desk Study (2003a), states that desertification is exacerbated by unsustainable agricultural practices, overgrazing, and land degradation from military movements and use of munitions. It also noted the potential for damage to the desert crust due to the movement of military vehicles and

indicated that major drought conditions (experienced in 1999 and in 2008/2009) can result in extensive damage to land quality and productivity.

Iraq enacted Desertification legislation (Law No. 2) in 1983.

Desertification can also increase the number of dust storms. There are two types of dust storm events in Iraq. Haboobs are dramatic, short events that occur during the late fall to spring seasons. Shamal dust events are caused by persistent northwest winds blowing over and picking up dust from a source region (such as the lower Tigris Euphrates Basin) into the atmosphere. These events are not as sudden as the haboob, but can last up to 4 to 5 days (Moses, 2010).

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Case Study on Desertification, Greater Mussayeb Project. Iraq (1977) | Dougrameji, J.S. and Clor, M.A. United Nations Conference on Desertification<br>Ministry of Water Resources<br>Ministry of Agriculture |

### *Indicator: Road Building Impacts*

Road-building activities for main and secondary roads are provided in the table below. Less information is known about paved rural roads. Some information is also presented on the length of railways, which have remained largely unchanged in the country for at least the last five years. Additionally, non-paved roads and road-building activities are quite extensive throughout the country and destructive road-building methods have been anecdotally reported as a threat to biodiversity (Nature Iraq, 2008-2010). Few if any studies have been conducted on this issue and little information is available.

**Length of paved external roads for the years 1993 to 2006 (km) (Central Org. for Statistics and Information Technology, 2010)**

| YEAR | MAIN | SECONDARY | RURAL | TOTAL |
|---|---|---|---|---|
| *1993 | 10955 | 28780 | – | 39735 |
| 1994 | 10964 | 28803 | – | 39767 |
| 1995 | 10990 | 28803 | – | 39793 |
| 1996 | 10990 | 28805 | – | 39795 |
| 1997 | 11032 | 28837 | – | 39869 |
| 1998 | 11032 | 28886.5 | – | 39918.5 |
| 1999 | 11032 | 28905 | – | 39937 |
| 2000 | 11032 | 28920 | – | 39952 |
| 2001 | 11034 | 28933.5 | – | 39967.5 |
| 2002 | 11034 | 28974.5 | – | 40008.5 |
| 2003 | 11034 | 29122.5 | – | 40156.5 |
| 2004 | 11034 | 29267.5 | – | 40301.5 |
| 2005 | 11053 | 29368.5 | 42 | 40463.5 |
| 2006 | 11133 | 29368.5 | 254 | 40755.5 |
| **LENGTH OF RAILWAY LINES** | | | | |

| | | | | |
|---|---|---|---|---|
| 2006 | 1910 | 362 | | 2272 |

*Lengths of express ways up to 1993 is (1071 Km.)

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Possible information on construction methods may exist as well as planning documents. New development projects may have environmental impact assessment documents. | Ministry of Planning<br>Ministry of Transportation |

### *Indicator: Mining & Resource Extraction*

Mining and resource extraction impacts in Iraq include in-stream and riparian area gravel mining, oil exploration and drilling, open pit mining, and other excavations and erosion impacts. Few if any studies have been conducted and little information is available.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Possible information on sites may exist as well as planning documents. New development projects may have environmental impact assessment documents. | Ministry of Planning<br>Ministry of Industry & Minerals<br>Ministry of Oil |

### *Indicator: Polluted & Hazardous sites*

The inventory of existing polluted sites and hot spots is important to determine threats to biodiversity and identify the need for remediation and proper management strategies. This indicator would display the extent of polluted and hazardous sites (expressed as a percentage of the total land or, if punctual, number of occurrences).

Hot Spots Sites and Oil Polluted sites throughout Iraq were both visited in 2004 with support from UNEP. Individual directorates may have visited some of these sites subsequently but from 2005 to 2009, there has been no consistent program for monitoring these sites. In 2008, MOE established a contaminated site and chemical management department, to begin monthly monitoring and oversee, in cooperation with other government ministries and the private sector, the clean-up of these sites.

MOE/UNEP evaluated about 300 polluted locations throughout Iraq and UNEP produced a report on Hot Spots in Iraq in 2005 that reviewed a short list of these sites within the following industries:

| TYPE | NO. OF SITES | TYPE | NO. OF SITES |
|---|---|---|---|
| Conventional Arms Industry | 38 | Agriculture/pesticides | 1 |
| Oil production and export | 15 | Steel | 1 |
| Oil & Chemical refining | 6 | Cement | 16 |
| Mining | 2 | Chemicals (excluding arms-related) | 6 |
| Conflict-related issues, activities & incidents | | | |

| TYPE | NO. OF SITES | TYPE | NO. OF SITES |
|---|---|---|---|
| Major sites | 1 | | |
| Large sites | 2-4 | | |
| Confirmed disposal sites | 6 | | |
| Other ad hoc sites | hundreds | | |

A priority assessment activity was done resulting in five top priority sites:

- Al Qadissiya – A destroyed small arms metal plating and annealing (metal treatment) works

  One of the Military Industry establishments, it manufactured light weapons and after 2003 it was destroyed. Sample analysis indicated pollution by Cyanide, Sodium Hydroxide, Chromium, Choleric compounds, Hydrocarbons.

- Al Suwaira - A pesticides warehouse complex

  Stores at this facility contain 76 tons of Mercury-based pesticides. Sample analysis indicated high levels of pollution by Zinc phosphate, Calcium Cyanide, and Mercury Chlorophenol.

- Khan Dhari – A refinery chemicals warehouse;

  After 2003, 130 tons of Quadratic Ethyl lead was spilled at this location. Sample analysis indicated pollution by Quadratic Ethyl lead and Methyl Ethyl Ketone and Furfural.

- Al Mishraq – A sulphur mining and acid complex;

  Pollution in this area resulted by burning the sulphur at the Mushraq complex. Sample analysis indicated high levels of pollution by pure Sulphur, Sulphuric, Sulphuretted Hydrogen, and Ammonium Sulphate.

- Ouireej – A scrap yard containing conflict damaged military and civilian vehicles.

  This location was used to collect destroyed military and civil vehicles. Sample analysis indicated pollution by Depleted Uranium, Asbestos, Halogen components, PCBs, and Non-organic oils.

Some remediation activities have been done at two of these five high-priority sites (Al Qadissiya & Al Suwaira). Additional information from MOE on these and other polluted sites includes:

**Polluted Industrial and Military Locations in Iraq**

| NAME OF MORE POLLUTED LOCATIONS | SECTORS | NUMBER OF MOST POLLUTED LOCATIONS | TOTAL NUMBER OF LOCATIONS |
|---|---|---|---|
| Al Sha'aba Refinery | Oil Refinery Sector | 8 | 12 |
| Thermal Electricity Station<br>In the southern part of Baghdad | Electricity stations sector | 12 | 17 |
| All factories consider highly polluted | Oil's chemicals industries sector | 7 | 7 |
| All factories consider highly polluted | Pesticides sector | 3 | 3 |
| All Bricks and cement factories consider highly polluted<br>There is no sufficient information about Glasses factories | Cement and Constructional materials sector | 79 | Cement 13<br>Bricks 84<br>Glasses 1 |

| NAME OF MORE POLLUTED LOCATIONS | SECTORS | NUMBER OF MOST POLLUTED LOCATIONS | TOTAL NUMBER OF LOCATIONS |
|---|---|---|---|
| All factories consider highly polluted | Plant oil sector | 5 | 5 |
| There is no sufficient information | Nutrition sector | * | 13 |
| All factories consider highly polluted | Tanning Skins Sector | 14 | 14 |
| There is no sufficient information | Mechanical industries sector | * | 4 |
| All factories consider highly polluted | Chemicals industries sector | 7 | 7 |
| There is no sufficient information | Tissues industries sector | * | 6 |
| There is no sufficient information | Electricity industries sector | 1 | 1 |
| There is no sufficient information | Dyes sector | * | * |
| All factories consider highly polluted | Rubbery industries sector | 5 | 5 |
| There is no sufficient information | Plastics industries sector | * | 9 |
| Al Rasheed company<br>Al Ka'aka'a company<br>Al Kadisia company | Military industries sector | 30 | 63 |
| | Total | 170 | 264 |

MOE initiated a new project in 2006 to plan to assess the military industries sector and other related company sites. A total of 63 sites were involved in producing different products for the military. Unfortunately, due to poor security only 20 sites were assessed. The next step in this project was to remediate one of the contaminated sites. The site (7 Nissan, Al-Nakheel \ Baghdad – Al Nahrawan) was remediatated in 2008. Hamoraby – Al Muataz and Al Muntaser / Babil Governorate) will be remediated in 2010, and there are plans to clean up several other sites in the next few years.

With the establishment of the Contaminated Sites Assessment and Chemical Management Department one of the first steps was to build a database of contaminated sites in Iraq and collect data in three steps: desk study; visual assessment; and sample collection and analysis. The data presented here represents information from the desk study.

**Oil pollution**

A MOE field team in cooperation with the Ministries of Oil, Agriculture, and Municipalities and Public Works, first visited polluted oil sites in 2004, with support from UNEP. Areas with significate oil pollution include:

***Baiji Region, Salah Ad Din Governorate:***

- Pipelines: There is a pipe network in the region that transports oil back and forth from the Northern Oil Company to the Northern Refinery Company. This area includes the main oil pipe between Iraq and Turkey (the Turkish Mediterranean port of Ceyhan, which is the main outlet for Iraq's northern oil exports). The MOE field team indicated the presence of oil pollution (from

pipeline oil spills) to the Tigris River in the Makhol Mount Series; in this region there are 16 oil pipes connected between the Northern Oil Company and Northern Refinery Company through Tigris River. The MOE field team found a break on the main pipeline that transports the oil to Turkey.

- Oil Refining: The MOE field team indicates a lack of efficiency in waste treatment in the Northern Refinery Company (Baiji Refinery).

***Missan Governorate:***

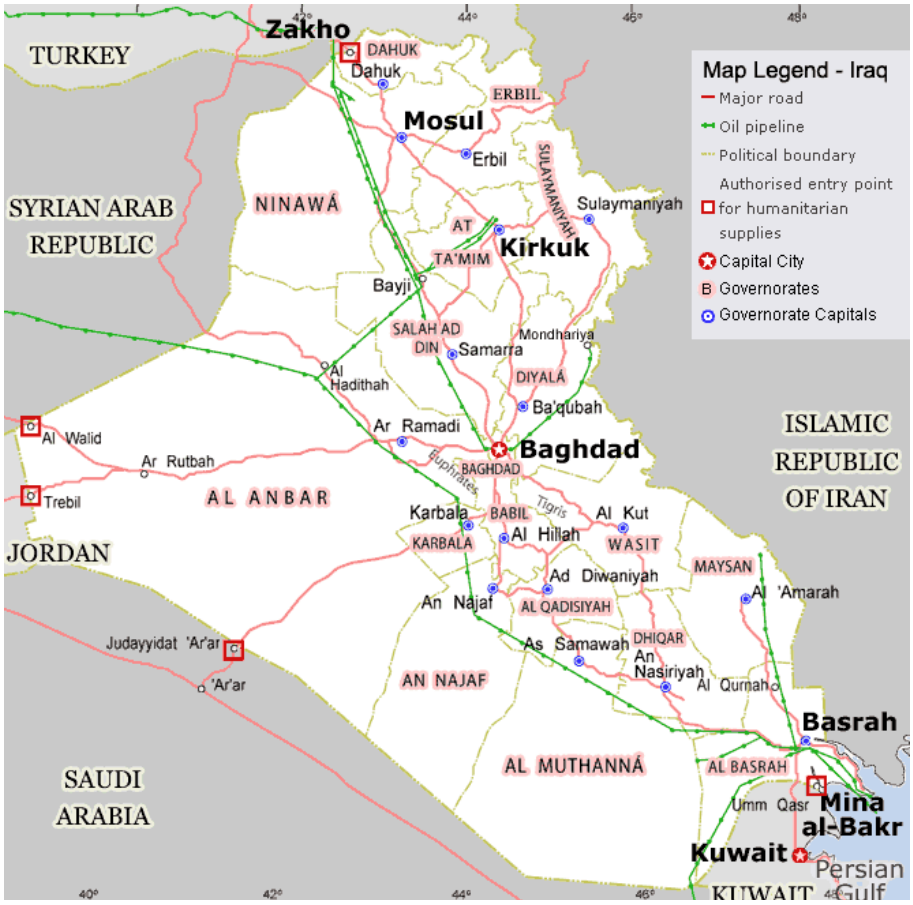
Problems exist at the locations of oil drilling and oil wells:

- There are 13 oil fields in Missan Governorate, three of them located in the east boundaries (Hawizeh, Faka, and Abu Garab).
- Hor Al Hilfaia is a larger oil field in Missan Governorate, located in the Southeastern part of Hawizeh Marsh. There are six wells in this field.

***Basrah Governorate:***

- There are many oil pipelines transporting oil from Al Shua'aba Refinery to the Khor Az Zubayr Port. The MOE field team indicated there are several oil spills along these pipelines.
- Sunken Ships & Ship accidents: The MOE field team indicated there is significant pollution caused by sunken and sinking ships in the Shatt Al Arab.
- Oil Refining: The MOE field team indicated lack of efficiency of waste treatment in the Basrah Refinery (Al Shua'aba).

Pipelines that travel long distances through Iraq are subject to attacks by insurgents but individuals from local tribes and villages often break or drill into the pipes to take oil. Though not associated with catastrophic releases, these breaks can cause more persistent releases to the surrounding environments. The map below from the United Nations provides an overview of the pipeline routes in Iraq.




The MOE Contaminated Sites Assessment and Chemical Management Department maintains a separate section that focuses on oil pollution and addresses these issues in four sectors:

1. Oil and gas survey and productions
2. Oil and gas refinery industries
3. Oil and gas and products transport
4. Oil and gas and products storage

Each of the above sectors involves sites that are suspected as contaminated and of critical importance.

Another section of the the MOE Contaminated Sites Assessment and Chemical Management Department looks at chemical management from "birth to death" (i.e. importing, exporting, production, transporting, release, storate, use, disposal, trading and treatment). This is a new field for MOE and was launched with the development of databases on different types of chemicals that take into account issues such as: governmental and non-governmental sectors chemical uses; hazardous and toxic materials; dual use materials; pesticides; Persistent Organic Pollutants (POPs); heavy metals; carcinogens; chemical stores; hazardous waste management, and others.

Lastly, a potential new section of the department may be formed to deal with chemical emergencies and disaster response.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Assessments of Environmental "Hot Spots" in Iraq (2005)<br>Additional MoE Assessments (2004, 2006, 2009) | UNEP<br>Municipalities<br>Ministry of Environment (Contaminated Sites Assessment and Chemical Management Department & Oil Pollution Department)<br>Ministry of Oil<br>Ministry of Industry & Minerals |

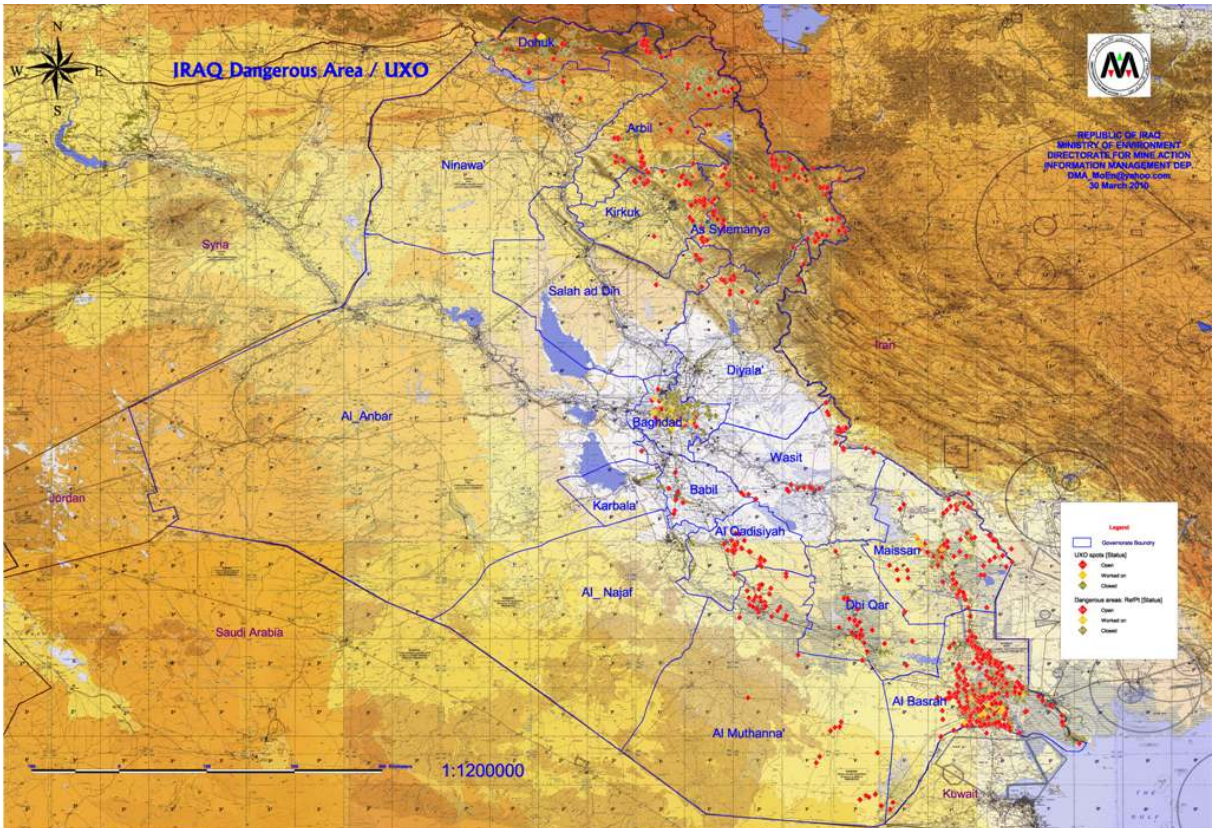
### *Indicator: Land mines*

NI was given a film by the Forestry Police of Darbendikhan showing a Leopard (*Panthera pardus*) that was killed in October 2008 by a landmine near the village of Mortka on the east side of Darbendikhan Lake, near the border with Iran. Landmines cover most of the border region between Iraq and Iran and Iraq and Turkey, which will take many years to clear (there are reports of new land mine fields that have been laid on the Iraq/Turkish border in 2008).

In addition, regular bombardments of border villages in Iraq by both Iran and Turkey have been occurring throughout much of the last two years, creating a hazardous situation in the border regions. These bombardments and mine fields are dangerous to both humans and many large species such as near threatened leopards.

While mine fields limit human access (and thus decrease human-caused threats to biodiversity), they also lock up areas from potential biodiversity studies and make it difficult to fully characterize the species diversity of some areas.

The MOE Mines Directorate maintains a list of all minefields in Iraq with their status. The following map provides an overview of the types and locations of minefields in the country.




| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Maps of Mine Fields | Ministry of Environment Mine Directorate<br>Mines Advisory Group and other international and national mine action groups |

## *Indicators of STATUS of Biodiversity and Ecosystems*

### *Indicator: Ecoregions in Iraq*

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Terrestrial, Freshwater and Marine Ecoregion data and maps | World Wildlife Fund |

### *Indicator: Water Resources in the Tigris-Euphrates River Basins*

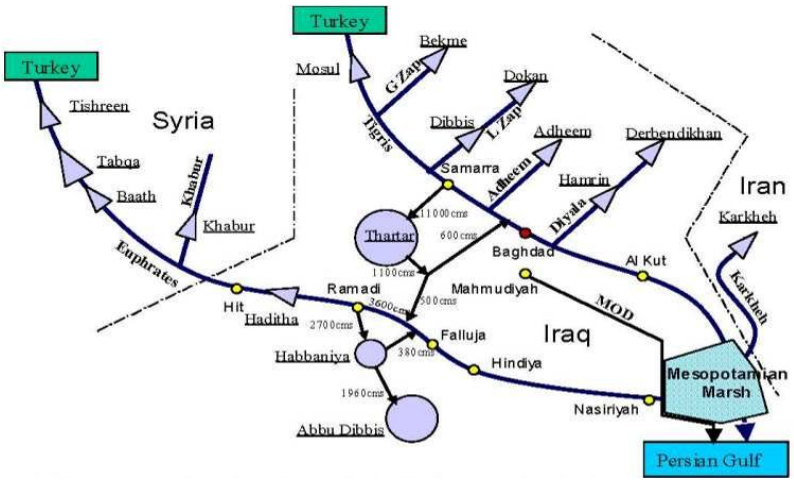
Much of the following information is taken from the New Eden Master Plan for Integrated Water Resource Management in the Marshlands areas.

**Groundwater** –The main aquifers of the country, in descending order of importance, include: Recent and Pleistocene Alluvium, the Bakhtiari formations, Paleocene to Eocene limestones of the desert,

possibly the Euphrates limestone, the Upper Fars formation, and the Dibdibba formation (Holwerda in New Eden, 2006). Groundwater recharge is from rainfall and snow during the winter as well as from waters of the Tigris-Euphrates were influent (rivers recharging groundwater) and their levels exceed that of the water table. During low flow periods of summer, the rivers become effluent (groundwater discharging to the river). There are also a number of important springs throughout the country such as Ahmed Awa, Jundyan and Bakhal in the north and along the base of the western plateau west of the marshlands and south of the Euphrates River.

**Surface water**- Iraqi surface water resources are centered around the Tigris and Euphrates Rivers and their tributaries. The Tigris is one of the largest rivers of the Middle East stretching over 1,900 km, of which 1,415 km are within Iraq with a catchment area of 235,000 km$^2$. The river emerges from south-western Turkey (from Lake Hazar) and is joined by the Khabour, Big (Greater or Upper) Zab, the Little (Lesser or Lower) Zab, the Adhaim, the Diyala, and the Karun as well as several other lesser or seasonal flows.

The Euphrates is the largest river in the Middle East in terms of catchment areas (388,000 km$^2$) and length (2,940 km, 1,159 km in Iraq) and the second largest in terms of water volume. It originates in the mountains of Turkey on the Armenian plateau where the Karasy and Murad Rivers join. It runs through Turkey and Syria travelling through several large dams until it enters Iraq near the Husaiba Village. At Qurna it joins the Tigris River to form the Shatt al Arab, which carries both waters to the Gulf. Numerous wadis flow into the Euphrates Rivers, mostly providing water during periods of prolonged rain.




**Major Reservoir systems in the Tigris-Euphrates Watershed (Levent Kavvas et al. 2006)**

| TIGRIS EUPHRATES RIVER BASIN<br>BASIN INFORMATION AND INDICATORS | |
|---|---|
| Basin Area (sq. km) | 765,742 |
| Av. Population Density (people per km²) | 57 |
| Number of Large Cities (>100,000 people) | 28 |
| Water Supply per Person (1995) (m³/year) | 2,189 |
| Degree of River Fragmentation | --- |
| Number of Dams (>15m high) in Basin | 31 |
| Number of Dams (>150m high) in Basin | 3 |
| Number of Dams (>60m high) under Construction | 19 |
| Number of Dams (>15m high) on Main Stem of River | 14 |
| Number of Dams (>150m high) on Main Stem of River | 3 |
| Source: WRI, 2009 | |

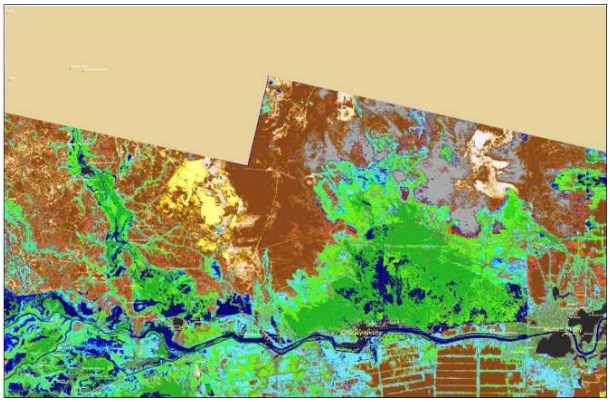
Tigris and Euphrates Dams Map (2000-11) (UNEP-GRID)

As mentioned in the body Report above, one of the most significant impacts on water resources and biodiversity in Iraq was the drainage of the Mesopotamian Marshlands that occurred in the 1990s and the partial reflooding that occurred after 2003.

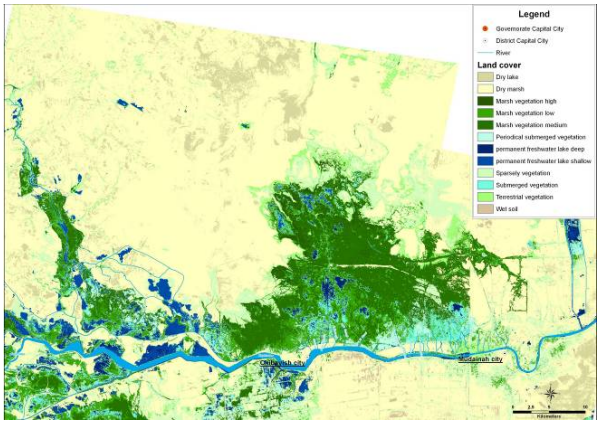
| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| New Eden Master Plan for Integrated Water Resource Management in the Marshlands Area<br>Hydrological survey of Iraq.<br>Water Gauging Station Project<br>Iraqi Shared Waters Report (in preparation) | New Eden Group<br>Nature Iraq<br>Ministry of Water Resources – Baghdad & Kurdistan Regional Government<br>Ministry of Agriculture |

### *Indicator: Change in habitat boundaries*

Additional remote sensing data on the Central Marshes (proposed National Park area) is provided below.



**Extension of Central Marshes in 2006**




**Extension of Central Marshes in 2008**

Additional information is available from the Iraqi Marshlands Observation System (UNEP) website at: http://imos.grid.unep.ch/

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| IMOS<br>Mesopotamian Marshlands Habitat Project | UNEP-GRID/New Eden Group<br>Nature Iraq |

### *Indicator: Biodiversity in terrestrial ecosystems*

**Flora** – The Flora diversity of Iraq was partially treated in a series of publications published by the MOA with support from the Kew Botantical Gardens. The publication of the Flora of Iraq was to be comprised of nine volumes between 1966 and 1988 by Guest and Townsend covering over 3000 species. Only six volumes were ever completed (on 1783 species), several of which are now out of print.

- Flora of Iraq, Volume 1
- Flora of Iraq, Volume 2- Introductory Taxonomic Material
- Flora of Iraq, Volume 3: Leguminales
- Flora of Iraq, Volume 4 Part 1: Cornaceae - Resedaceae
- Flora of Iraq, Volume 4 Part 2: Cornaceae - Resedaceae
- Flora of Iraq, Volume 8: Monocotyledones
- Flora of Iraq, Volume 9: Gramineae

The remaining volumes exist as partially completed manuscripts within the Kew Botanical Gardens. In a presentation prepared in 2008, Kew stated that the three remaining volumes contained a total of 1520 species and ranged between 24% and 97% complete.

**Iraqi Plant Families included and missing from the existing Flora of Iraq.**

| FAMILY NAME | FAMILY NAME | MISSING FAMILIES |
|---|---|---|
| Aceraceae | Loranthaceae | Amaranthaceae (Amaranth) |
| Alismataceae | Malvaceae | Apiaceae (Parsley Family--Umbelliferaceae) |
| Amaryllidaceae | Meliaceae | Asteraceae (Composites) |
| Anacardiaceae | Moraceae | Boraginaceae (Borage) |
| Angiosperms | Muscaeae | Campanulaceae (Harebell) |
| Apocynaceae | Myrtaceae | Caryophyllaceae (Pink) |
| Araceae | Najadaceae | Convulvulaceae (Morningglory) |
| Araliaceae | Nyctaginaceae (9 O'clock) | Crassulaceae (Stonecrop) |
| Aristolochiaceae | Nymphaeaceae | Chenopodiaceae (Goosefoot) |
| Asclepiadaceae | Oleaceae | Dipsacaceae (Teasel) |
| Balanophoraceae | Orchidaceae | Eleagnaceae (Olive) |
| Berberidfaceae | Paeoniaceae | Ephedraceae (Ephedra) |
| Betulaceae | Palmaceae | Ericaceae (Heather) |
| Bignoniaceae | Papaveriaceae | Geraniaceae (Geranium) |
| Bombacaceae | Passifloraceae | Onagraceae (Evening Primrose) |
| Butomaceae | Pedaliaceae | Orobanchaceae (Broomrape) |
| Cactaceae | Periplocaceae | Polygonaceae (Buckwheat) |
| Cannabaceae | Pittosporaceae | Portulacaceae (Purslane) |
| Cannaceae | Plantanaceae | Primulaceae (Primrose) |
| Capparidaceae (Caper) | Poaceae (Graminae) | Scrophulariaceae (Figwort) |
| Caprifoliaceae | Polygalaceae | Solanaceae (Nightshade) |
| Casuarinaceae | Potamogetonaceae | Valarianiaceae (Valarian) |
| Ceratophyllaceae | Proteaceae | |
| Cistaceae | Pteridophyta | |
| Cleomaceae | Punicaceae | |
| Combretaceae | Rafflesiaceae | |
| Cornaceae | Ranunculaceae | |
| Corylaceae | Resedaceae | |
| Cruciferae | Rhamnaceae | |
| Curcurbitaceae (Squash) | Rosaceae | |
| Cyperaceae | Rubiaceae | |
| Datiscaceae | Ruppiaceae | |
| Dioscoreaceae | Ruscaceae | |
| Ebenaceae | Rutaceae | |
| Ehretiaceae | Salicac eae (Willow) | |
| Elaeagnaceae | Santalaceae | |
| Euphorbiaceae | Sapindaceae | |
| Fabaceae | Simaroubaceae | |
| Fagaceae (Oak) | Sparganiaceae | |
| Frankeniaceae | Sphenophyta | |
| Gymnosperms | Sterculiaceae | |
| Helleboraceae | Tamaricaceae (Tamarisk) | |
| Hydrocharitaceae | Thymelaeaceae | |
| Hypericaceae | Tiliaceae | |
| Iridaceae | Typhaceae | |

| FAMILY NAME | FAMILY NAME | MISSING FAMILIES |
|---|---|---|
| Juglandaceae (Walnut) | Ulmaceae | |
| Juncaceae | Urticaceae | |
| Juncaginaceae | Verbenaceae | |
| Lemnaceae | Violaceae (Violet) | |
| Leonticaceae | Vitaceae | |
| Liliaceae | Zannichelliaceae | |
| Linaceae | Zygophyllaceae | |

In 2009, the Royal Botanic Garden Edinburgh conducted a review of the Flora of Iraq and the Flora Iranica to develop a preliminary flora checklist for Iraq that consisted of over 4500 plants. This list has been used as part of the KBA Plant Database. Currently there are plans by the MOA to complete the old volumes with Kew but there are considerable challenges given the significant taxonomic changes since the Flora of Iraq was first published and the access to new technology that allows for the creation of more modern, interactive floras. TRI and the MOE are involved with several international institutions in a project to create a new modern Flora of Iraq.

**Habitats** - The mapping of Iraqi habitats and development of an Iraqi habitat classification system were initiated under the Mesopotamian Marshlands Habitat Project of NI with a focus on developing a classification system for the proposed Mesopotamian Marshlands National Park in the Central Marshes. This project took place between 2007 and 2008, and although not completed, a provisional habitat classification system was created. In terms of the terrestrial habitat, the classification system was not well elaborated (see table below).

**Provisional Iraqi Marshlands Habitat Classification System**

| TERRESTRIAL HABITATS |
|---|
| 1. Desert<br>1.1 Desert shrub<br>1.2 Unvegetated desert<br>1.3 Unvegetated saline lands |
| 2. Woodlands<br>2.1 Woodland, forest and other wooded area<br>2.2 Shrub |
| 3. Herbaceous vegetation<br>3.1 Grassland<br>3.2 Steppe<br>3.3 Sparsely vegetated land |

**Fauna –** The IUCN Red List provides a list of terrestrial species that have been assessed on the basis of their conservation status. The numbers of assessed species are listed below by class.

| CLASS | NO. OF ASSESSED SPECIES | CLASS | NO. OF ASSESSED SPECIES |
|---|---|---|---|
| AMPHIBIA | 6 | MAMMALIA | 75 |
| AVES | 293 | REPTILIA | 23 |
| INSECTA | 18 | | |

Little is known about Iraqi insects, amphibian, and reptile species, and no comprehensive check list has been done for these species. But NI has prepared an up-to-date checklist of all Iraqi bird species

based on the KBA Project surveys (2005-2010), which will be published later this year as a provisional list. The list contains 414 species and provides referenced information on conservation status, breeding status, and Iraqi status. Conservation concern species are shown in the table below.

| CONSERVATION CONCERN SPECIES | BREEDING STATUS | IRAQ STATUS |
|---|---|---|
| 78 Conservation Concern Species | 179 confirmed breeding bird species | Approximately 123 resident species |
| | 6 probable breeding bird species | Approximately 232 migrant and/or visiting species |
| | 30 possible breeding bird species | 35 vagrant or rare visitors |
| | 199 species with unknown breeding status | |

A review of the literature for Iraq was released by NI, which provided a list of 10 amphibian species or species groups, 98 reptile species and 74 mammal species found throughout all habitats of Iraq (Amr, 2009a, b). The World Wildlife Fund maintains a species list for all ecoregions, but to date, little work has been done to evaluate these species categories and develop habitat ranges within their related ecoregion based on species-habitat relationships.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005-2010) & Bird, Mammal, and Reptile Checklists<br>Mesopotamian Marshlands Habitat Project (2007/2008)<br>IUCN Red List<br>Wildfinder Database<br>Herbariums & other collections holding Iraqi flora and fauna<br>Encylopedia of Life Project | Nature Iraq<br>World Conservation Union (IUCN)<br>World Wildlife Fund<br>MoA & International Herbariums<br>Iraqi & International Museums of Natural History |

### *Indicator: List of threatened species by group in terrestrial ecosystems*

The World Conservation Union (IUCN) conducts periodic assessments of species and provides information on them on its on-line Red List (www.iucnredlist.org). There is almost no information on threatened flora species but a variety of fauna classes are included. The following is a list of the total number of Iraqi species that have been assessed by species group and the total number of species that have been assessed with the status of Critically Endangered, Endangered, Vulnerable, Near-threatened or Extinct.

**IUCN Red List of Critically Endangered, Endangered, Vulnerable, Near-threatened & Extinct Terrestrial Species of Iraq**

| | |
|---|---|
| **Insects** | |
| total species | 19 |
| Conservation concern species | 4 |
| **Birds** | |
| total species | 293 |
| Conservation concern species | 21 |
| **Mammals** | |
| total species | 75 |
| Conservation concern species | 15 |

| Reptiles | |
|---|---|
| total species | 23 |
| Conservation concern species | 3 |
| Source: IUCN, 2010 Red List of Threatened Species | |

NI has done extensive birds survey work and has developed a provisional list of the birds of Iraq as well has updated information on each bird's conservation status, breeding, and local status in Iraq. A list of conservation concern species is provided below and an additional list of endemic or endemic race species follows (please note these may contain freshwater and marine species).

**Conservation Concern Bird Species of Iraq (Includes Terrestrial, Freshwater & Marine Species)**

| COMMON NAME | LATIN NAME | CONSERVATION STATUS | IRAQ STATUS | BREEDING STATUS |
|---|---|---|---|---|
| Caspian Snowcock | *Tetraogallus caspius* | Conservation Concern (CC) | Status uncertain: Apparently Resident | |
| Lesser White-fronted Goose | *Anser erythropus* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor | |
| Red-breasted Goose | *Branta ruficollis* | Globally Threatened (GT), Conservation Concern (CC) | Rare winter visitor | |
| Falcated Duck | *Anas falcata* | Globally Threatened (GT), Conservation Concern (CC) | Vagrant | |
| Marbled Duck | *Marmaronetta angustirostris* | Conservation Concern (CC) | Resident; Winter visitor | Confirmed |
| Red-crested Pochard | *Netta rufina* | Conservation Concern (CC) | Resident; Winter visitor & Passage migrant | Confirmed |
| Ferruginous Duck | *Aythya nyroca* | Globally Threatened (GT), Conservation Concern (CC) | Resident; Winter visitor & passage migrant | Confirmed |
| White-headed Duck | *Oxyura leucocephala* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor | |
| Little Grebe | *Tachybaptus ruficollis* | Conservation Concern (CC), Endemic Race (EndR) | Resident (only endemic race); Winter visitor. | Confirmed |
| Greater Flamingo | *Phoenicopterus roseus* | Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Black Stork | *Ciconia nigra* | Conservation Concern (CC) | Passage migrant | |
| African Sacred Ibis | *Threskiornis aethiopicus* | Conservation Concern (CC) | Resident | Confirmed |
| Northern Bald Ibis | *Geronticus eremita* | Globally Threatened (GT), Conservation Concern (CC) | Former passage migrant; no records since 1920s | |
| Eurasian Spoonbill | *Platalea leucorodia* | Conservation Concern (CC) | Resident; Breeding summer visitor; Passage Migrant | Confirmed |
| Eurasian Bittern | *Botaurus stellaris* | Conservation Concern (CC) | Resident; Winter vistor & Passage migrant | Confirmed |
| Dalmatian Pelican | *Pelecanus crispus* | Globally Threatened (GT), Conservation Concern (CC) | Uncommon winter visitor | |
| Pygmy Cormorant | *Phalacrocorax pygmeus* | Conservation Concern (CC) | Resident; Winter visitor | Confirmed |
| African Darter | *Anhinga rufa* | Conservation Concern (CC) | Resident | Confirmed |

| COMMON NAME | LATIN NAME | CONSERVATION STATUS | IRAQ STATUS | BREEDING STATUS |
|---|---|---|---|---|
| Red Kite | *Milvus milvus* | Globally Threatened (GT), Conservation Concern (CC) | Vagrant | |
| Pallas's Fish Eagle | *Haliaeetus leucoryphus* | Globally Threatened (GT), Conservation Concern (CC) | Former winter visitor, not recorded since 1940s | |
| Lammergeier | *Gypaetus barbatus* | Conservation Concern (CC) | Winter visitor; may breed | Possible |
| Egyptian Vulture | *Neophron percnopterus* | Globally Threatened (GT), Conservation Concern (CC) | Resident; Breeding summer visitor; Passage migrant. | Confirmed |
| Cinereous Vulture | *Aegypius monachus* | Globally Threatened (GT), Conservation Concern (CC) | Rare winter visitor | |
| Bateleur | *Terathopius ecaudatus* | globally Threatened (GT), Conservation Concern (CC) | Vagrant | |
| Pallid Harrier | *Circus macrourus* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Levant Sparrowhawk | *Accipiter brevipes* | Conservation Concern (CC) | Breeding summer visitor; Passage migrant | Confirmed |
| Greater Spotted Eagle | *Aquila clanga* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Steppe Eagle | *Aquila nipalensis* | Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Eastern Imperial Eagle | *Aquila heliaca* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Golden Eagle | *Aquila chrysaetos* | Conservation Concern (CC) | Resident; Winter visitor | Confirmed |
| Lesser Kestrel | *Falco naumanni* | Globally Threatened (GT), Conservation Concern (CC) | Breeding summer visitor; Passage migrant. | Confirmed |
| Lanner Falcon | *Falco biarmicus* | Conservation Concern (CC) | Vagrant | |
| Saker Falcon | *Falco cherrug* | Globally Threatened (GT), Conservation Concern (CC) | Rare resident; rare winter visitor; formerly commoner. | |
| Red-footed Falcon | *Falco vespertinus* | Globally Threatened (GT), Conservation Concern (CC) | | |
| Lesser Spotted Eagle | *Aquila pomarina* | Globally Threatened (GT), Conservation Concern (CC) | | |
| Great Bustard | *Otis tarda* | Globally Threatened (GT), Conservation Concern (CC) | Status uncertain; may be resident (old breeding records); Winter visitor | |
| Macqueen's Bustard | *Chlamydotis macqueenii* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor; may breed (bred formerly) | Possible |
| Little Bustard | *Tetrax tetrax* | Globally Threatened (GT), Conservation Concern (CC) | Status uncertain; flocks reported in 1940s but none before or since. | |
| Corncrake | *Crex crex* | Globally Threatened (GT), Conservation Concern (CC) | Passage migrant | |
| Purple Swamphen | *Porphyrio porphyrio* | Conservation Concern (CC) | Resident | Confirmed |
| Common Crane | *Grus grus* | Conservation Concern (CC) | Winter visitor & | |

| COMMON NAME | LATIN NAME | CONSERVATION STATUS | IRAQ STATUS | BREEDING STATUS |
|---|---|---|---|---|
| | | | Passage migrant | |
| Crab-Plover | *Dromas ardeola* | Conservation Concern (CC) | Resident | Confirmed |
| Spur-winged Lapwing | *Vanellus spinosus* | Conservation Concern (CC) | Resident; Passage migrant. | Confirmed |
| Sociable Lapwing | *Vanellus gregarius* | Globally Threatened (GT), Conservation Concern (CC) | Rare passage migrant; some may winter; formerly very common | |
| White-tailed Lapwing | *Vanellus leucurus* | Conservation Concern (CC) | Resident; probably winter visitor | Confirmed |
| Great Snipe | *Gallinago media* | Globally Threatened (GT), Conservation Concern (CC) | Rare passage migrant | |
| Black-tailed Godwit | *Limosa limosa* | Globally Threatened (GT), Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Slender-billed Curlew | *Numenius tenuirostris* | Globally Threatened (GT), Conservation Concern (CC) | Last recorded in 1979. May be extinct. | |
| Broad-billed Sandpiper | *Limicola falcinellus* | Conservation Concern (CC) | Winter visitor & Passage migrant | |
| Cream-coloured Courser | *Cursorius cursor* | Conservation Concern (CC) | Resident or migrant breeder | Confirmed |
| Collared Pratincole | *Glareola pratincola* | Conservation Concern (CC) | Breeding summer visitor; Passage migrant | Confirmed |
| Black-winged Pratincole | *Glareola nordmanni* | Globally Threatened (GT), Conservation Concern (CC) | Status uncertain; Passage migrant but apparantly has bred in 1920s. | Possible |
| Slender-billed Gull | *Chroicocephalus genei* | Conservation Concern (CC) | Resident; Breeding summer visitor; Winter visitor & passage migrant. | Confirmed |
| Armenian Gull | *Larus armenicus* | Conservation Concern (CC) | Winter visitor | |
| Caspian Tern | *Hydroprogne caspia* | Conservation Concern (CC) | Winter visitor & Passage migrant; may breed | |
| Pin-tailed Sandgrouse | *Pterocles alchata* | Conservation Concern (CC) | Resident. | Confirmed |
| Spotted Sandgrouse | *Pterocles senegallus* | Conservation Concern (CC) | Resident. | Confirmed |
| European Turtle Dove | *Streptopelia turtur* | Conservation Concern (CC) | Breeding summer visitor; passage migrant. | Confirmed |
| European Roller | *Coracias garrulus* | Globally Threatened (GT), Conservation Concern (CC) | Breeding summer visitor; Passage migrant | Confirmed |
| Masked Shrike | *Lanius nubicus* | Conservation Concern (CC) | Breeding summer visitor; Passage migrant. | Confirmed |
| Mesopotamian Crow | *Corvus capellanus* | Conservation Concern (CC), Endemic Race (EndR) | Resident | Confirmed |
| Hypocolius | *Hypocolius ampelinus* | Conservation Concern (CC), Endemic (End) | Breeding summer visitor | Confirmed |
| Sombre Tit | *Poecile lugubris* | Conservation Concern (CC) | Resident | Confirmed |

| COMMON NAME | LATIN NAME | CONSERVATION STATUS | IRAQ STATUS | BREEDING STATUS |
|---|---|---|---|---|
| Temminck's Lark | *Eremophila bilopha* | Conservation Concern (CC) | Resident | Confirmed |
| White-eared Bulbul | *Pycnonotus leucotis* | Conservation Concern (CC) | Resident | Confirmed |
| Basra Reed Warbler | *Acrocephalus griseldis* | Globally Threatened (GT), Conservation Concern (CC), Endemic | Breeding summer visitor | Confirmed |
| Iraq Babbler | *Turdoides altirostris* | Conservation Concern (CC), Endemic (End) | Resident | Confirmed |
| Western Rock Nuthatch | *Sitta neumayer* | Conservation Concern (CC) | Resident | Confirmed |
| Eastern Rock Nuthatch | *Sitta tephronota* | Conservation Concern (CC) | Resident | Confirmed |
| White-throated Robin | *Irania gutturalis* | Conservation Concern (CC) | Breeding summer visitor; Passage migrant. | Confirmed |
| Red-tailed Wheatear | *Oenanthe chrysopygia* | Conservation Concern (CC) | Passage migrant; may breed | Possible |
| Finsch's Wheatear | *Oenanthe finschii* | Conservation Concern (CC) | Resident; Winter visitor | Confirmed |
| Hume's Wheatear | *Oenanthe albonigra* | Conservation Concern (CC) | Rare resident; probably breeds | Probable |
| Semi-collared Flycatcher | *Ficedula semitorquata* | Globally Threatened (GT), Conservation Concern (CC) | Passage migrant; may breed. | Possible |
| Dead Sea Sparrow | *Passer moabiticus* | Conservation Concern (CC) | Resident; Breeding summer visitor. | Confirmed |
| Pale Rockfinch | *Carpospiza brachydactyla* | Conservation Concern (CC) | Breeding summer visitor; Passage migrant | Confirmed |
| Yellow-throated Sparrow | *Gymnoris xanthocollis* | Conservation Concern (CC) | Breeding summer visitor; Passaage migrant. | Confirmed |
| Radde's Accentor | *Prunella ocularis* | Conservation Concern (CC) | Rare breeding summer visitor; may winter | Confirmed |
| Smyrna Bunting | *Emberiza semenowi* | Globally Threatened (GT), Conservation Concern (CC) | Breeding summer visitor; Passage migrant | Confirmed |

**Endemic & Endemic race bird species of Iraq (Includes Terrestrial & Freshwater Species)**

| COMMON NAME | LATIN NAME | CONSERVATION STATUS | IRAQ STATUS | BREEDING STATUS |
|---|---|---|---|---|
| Little Grebe | *Tachybaptus ruficollis* | Conservation Concern (CC), Endemic Race (EndR) | Resident (only endemic race); Winter visitor. | Confirmed |
| Mesopotamian Crow | *Corvus capellanus* | Conservation Concern (CC), Endemic Race (EndR) | Resident | Confirmed |
| Hypocolius | *Hypocolius ampelinus* | Conservation Concern (CC), Endemic (End) | Breeding summer visitor | Confirmed |
| Basra Reed Warbler | *Acrocephalus griseldis* | Globally Threatened (GT), Conservation Concern (CC), Endemic | Breeding summer visitor | Confirmed |

| | | | | |
|---|---|---|---|---|
| Iraq Babbler | *Turdoides altirostris* | Conservation Concern (CC), Endemic (End) | Resident | Confirmed |

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005-2010) and other studies<br><br>IUCN Red List<br>Wildfinder Database<br>Flora of Iraq Project | Nature Iraq, Ministry of Environment & Iraqi Universities<br>World Conservation Union (IUCN)<br>World Wildlife Fund |

### *Indicator: Biodiversity in freshwater ecosystems*

**Flora** - The biological diversity of flora in Iraqi freshwater ecosystems is, as noted for the Biodiversity of Terrestrial Ecosystems indictor above, partially treated in the original Flora of Iraq. NI has a provisional checklist of 49 wetland flora seen in the Mesopotamian Marshlands and riparian areas between 2005 and 2007 (see table below), but survey work was usually conducted in mid-summer and more frequent survey work would be required to fully characterize the wetland plants of the area.

| SPECIES | SPECIES | SPECIES |
|---|---|---|
| *Aeluropus lagopoides* | *Halocnemum strobilaceum* | *Prosopis farcta* |
| *Alhagi graecorum* | *Hydrilla verticillata* | *Prosopis juliflora* |
| *Aster tripolium* | *Inula graveolens* | *Rumex* sp. |
| *Atriplex* sp. | *Juncus* sp. | *Salicornia herbacea (Linnaeus)* |
| *Bacopa monnieri* | *Lemna* sp. | *Salvinia natans* |
| *Capparis spinosa* | *Lycium barbarum* | *Schismus barbatus* |
| *Carthamus oxyacanthus* | *Myriophyllum* sp. | *Schoenoplectus litoralis* |
| *Ceratophyllum demersum* | *Myriophyllum spicatus* | *Seidlitzia rosmarinus* |
| *Chara* sp. | *Najas marina* | *Silybum marianum* |
| *Cladium mariscus* | *Najas minor* | *Suaeda* sp. |
| *Cressa cretica* | *Nymphoides indica* | *Tamarix* sp. |
| *Cynanchum acutum* | *Phragmites australis* | *Typha domingensis* |
| *Cyperus laevigatus* | *Polygonum* sp. | *Utricularia australis* |
| *Cyperus michelianus* | *Potamogeton crispus* | *Vallisneria* sp. |
| *Cyperus* sp. | *Potamogeton lucens* | *Xanthium* sp. |
| *Emex spinosa* | *Potamogeton pectinatus* | |
| *Glycyrrhiza glabra* | *Potamogeton perfoliatus* | |

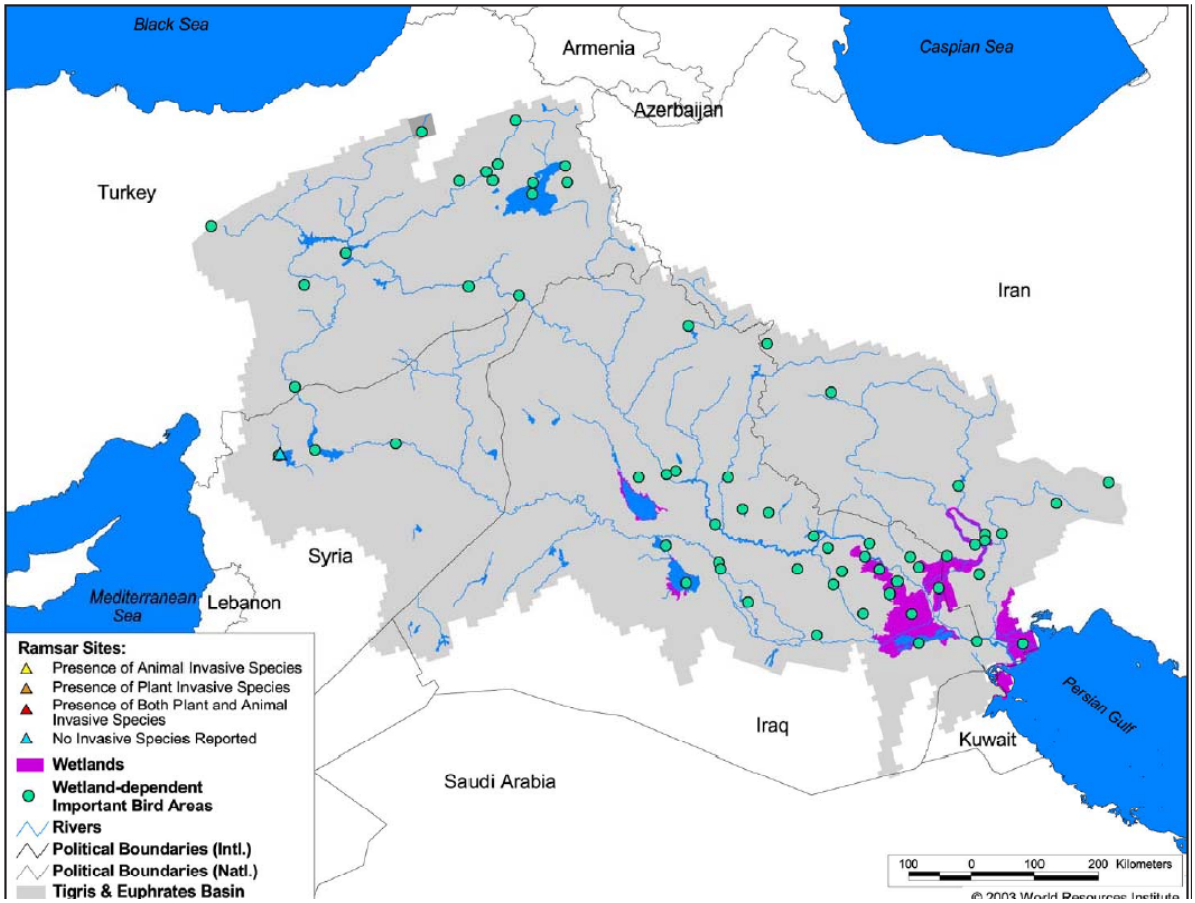
**Habitats** – As in the Biodiversity of Terrestrial Ecosystem Indictor, the main source of information on freshwater habitats comes from the Mesopotamian Marshlands Habitat Project of NI, which focused on developing a classification system for the proposed Mesopotamian Marshlands National Park in the Central Marshes. This project took place between 2007 and 2008, and although not completed, a provisional habitat classification system was created, which was elaborated primarily for water and marsh habitats (see table below).

**Provisional Iraqi Marshlands Habitat Classification System**

| **WATER** |
|---|
| 1. Inland running water, river or canal<br>1.1Unvegetated rivers and canals<br>1.2 Submerged river and canal vegetation<br>1.3 Riparian vegetation |
| 2. Inland standing water<br>2.1 Pond or lake – Unvegetated standing water<br>2.2 Unvegetated mudflat – Unvegetated mud, temporarily submerged and subject to water level fluctuations<br>2.3 Flooded communities – Periodically or occasionally flooded land with phanerogamic communities adapted to aquatic environments that are subjected to water level fluctuations and temporary desiccation (*Cyperus difformis, C. michelianus, C. laevigatus*)<br>2.4 Aquatic communities – With aquatic vegetation communities formed by free floating vegetation, rooted submerged vegetation or rooted floating vegetation<br>2.4.1 Free-floating vegetation –– With floating vegetation communities (*Lemna* sp. pl., *Salvinia natans, Spirodela polyrhiza)* and *Ceratophyllum demersum* and *Hydrocharis morsus-ranae* communities.<br>2.4.2 Rooted, submerged vegetation – Rooted submerged communities (*Potamogeton* sp. pl., *Vallisneria spiralis, Myriophyllum* sp., *Najas* sp. pl., *Hydrilla verticillata*)<br>2.4.3 Rooted, floating vegetation – Rooted formations with floating leaves (*Nymphaea* sp. pl., *Nuphar luteum, Nymphoides indica*)<br>2.5 Salt water – – Saline ponds and lakes with phanerogamic communities |
| **MARSH** |
| 3. Marsh Vegetation<br>3.1 Permanent Marsh<br>3.1.1 Helophytic vegetation<br>3.1.1.1 Reed bed (*Phragmites australis* beds)<br>3.1.1.2 Reed mace bed (*Typha domingensis* beds)<br>3.1.1.3 *Schoenoplectus litoralis* bed<br>3.1.1.4 *Cladium mariscus* vegetation –*Cladium mariscus* bed<br>3.1.2 Woody vegetation – Tree size formations with willow (*Salix* sp.) and poplars (*Populus* sp.) within the marsh, excluding riparian treed formations having a linear structure<br>3.1.2.1 Riparian willow – Dominated by willow formations (*Salix* sp.)<br>3.1.2.2 Riparian poplar – Dominated by poplar formations (*Populus* sp.)<br>3.2 Brackish or saltwater marsh vegetation – Brackish or saline marshes with halophytic vegetation<br>3.2.1 Salt pioneer swards – Pioneer communities growing on salt or brackish mudflat (*Salicornia* sp. pl. community) |

Freshwater habitats are not limited to the Mesopotamian marshlands but are common throughout the extensive Tigris-Euphrates River Basin as shown in the plate below. There are likely pockets of valuable habitat throughout the upper and lower basin, particularly on isolated river islands but these are poorly studied in Iraq.

**Tigris Euphrates Basin showing wetlands and Important Bird Areas (Source: WRI, 2003)**




**Fauna**- The IUCN Red List provides a list of freshwater species that have been assessed on the basis of their conservation status. The numbers of assessed species are listed below by class.

| CLASS | NO. OF ASSESSED SPECIES | CLASS | NO. OF ASSESSED SPECIES |
|---|---|---|---|
| ACTINOPTERYGII | 3 | INSECTA | 17 |
| AMPHIBIA | 6 | LILIOPSIDA | 2 |
| AVES | 73 | MAMMALIA | 6 |
| CHONDRICHTHYES | 1 | REPTILIA | 1 |
| CRUSTACEA | 2 | | |

The characterization of marine and freshwater fisheries and other aquatic organisms has been subject to study under the KBA project. Local studies have also been conducted particularly at the Marine Science Center, Basrah University as well as other research institutions in Iraq but little information is available on these for this report.

There is a list of Iraqi phytoplankton/algae that is comprised of about 2500 species, which is updated on a yearly basis. There is no comprehensive zooplankton list but the KBA Project has maintained a list of approximately 240 species. A list of 277 freshwater benthic macroinvertebrates species have been identified within the KBA Project (in surveys from 2005 to 2009). The Baghdad Natural History Museum and NI maintain a list of amphibians but each includes only ten species.

As was stated for the Biodiversity of Terrestrial Ecosystem Indicator, NI has developed more comprehensive information on birds. In addition, through the water quality program of the KBA Project, additional work was done on plankton species and benthic macroinvertebrates that have generated partial species lists. The most comprehensive work to develop a comprehensive checklist is currently underway for benthic species through an agreement between NI and the Smithsonian Natural History Museum in the U.S.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005-2010) & other studies<br>Mesopotamian Marshlands Habitat Project (2007/2008)<br>Partial checklists of Iraqi benthic macroinvertebrates and plankton species<br>IUCN Red List<br><br>Wildfinder Database<br>Iraq Amphibian Checklist<br><br>Encylopedia of Life Project | Nature Iraq, Ministry of Environment, Iraqi Universities, Twin Rivers Institute for Scientific Research-AUIS<br>World Conservation Union (IUCN)<br>World Wildlife Fund<br>Baghdad Natural History Museum |

### *Indicator: List and total number of threatened species by group in freshwater ecosystems.*

As mentioned above, the World Conservation Union (IUCN) conducts periodic assessments of species and provides information on them on its on-line Red List (www.iucnredlist.org). The following is a list of the total number of Iraqi freshwater species that have been assessed by species group and the total number of species that have been assessed with the status of Critically Endangered, Endangered, Vulnerable, Near-threatened or Extinct.

**IUCN Red List of Critically Endangered, Endangered, Vulnerable, Near-threatened & Extinct Freshwater Species of Iraq**

| **Amphibians** | |
|---|---|
| total species | 6 |
| Conservation concern species | 2 |
| **Fish** | |
| total species | 3 |
| Conservation concern species | 2 |
| **Birds** | |
| total species | 73 |
| Conservation concern species | 10 |
| **Mammals** | |
| total species | 6 |
| Conservation concern species | 5 |
| Source: IUCN, 2010 Red List of Threatened Species | |

A checklist of fish "Species of Special Concern" exists (see table below), which includes several marine-related species that can be found in freshwater habitats in Iraq. A full list of freshwater fish of Iraq has recently been published by Coal (2010). NI maintains a provisional list of fish species seen in the Iraqi marshlands. The table below provides information and the economic importance and proposed priorities for conservation action for sixteen fish species.

**Importance and potential conservation priority for 16 Iraqi freshwater & marine fish "Species of Special Concern" (Sources: Abd, Rubec & Coad, 2009).**

| SPECIES | COMMON NAMES IN ARABIC AND IN ENGLISH [IN SQUARE BRACKETS] | ECONOMIC IMPORTANCE | PROPOSED PRIORITY FOR CONSERVATION ACTION |
|---|---|---|---|
| *Tenualosa ilisha* | Sbour; zoboor; soboor; sobour. [hilsa, Indian shad or river shad] | High | High (freshwater; brackish; marine fish) |
| *Alburnoides bipunctatus* | None [spirlin, riffle minnow or riffle bleak] | Moderate | High possibly; rare in Europe. (freshwater; brackish) |
| *Barbus barbulus* | Abu-barattum; abu baratem; abu bratum; nabbash. | High | High possibly. (Freshwater) |
| *Barbus esocinus* | Bizz; farkh; farch; farkh-el-biz; mangar. [Tigris "salmon", Euphrates "salmon", pike barb]. | High | High, possibly; under severe threat in the Syrian Euphrates; part of a world survey to assess the status of large freshwater fish species by the World Wildlife Fund and the National Geographic Society. (Freshwater) |
| *Barbus grypus* | Shabout; shabbout; hamrawi. [large-scaled barb] | High | High in some regions of Iraq; it is in need of conservation in some parts of its range (Freshwater) |
| *Barbus subquincunciatus* | Abu khazzama; a'djzan; agzan; adzan. [black spot barb, leopard barbel] | Low | Unknown, possibly High; it is now very rare in Iran and "critically endangered". Syrian populations in the Euphrates River and parts of its tributaries are also in a perilous state. (Freshwater) |
| *Barbus xanthopterus* | Gattan; ghattan; kattan; khattan; nobbash; thekar | High | High; this species is now relatively rare. (Freshwater) |
| *Caecocypris basimi* | None. | None | High; listed as Vulnerable (D2) in the *2004 IUCN Red List of Threatened Species*. (Freshwater) |
| *Cyprinion kais* | Bunni saghir; bnaini; kais | None | Moderate; this species appears to be rare. (Freshwater) |
| *Typhlogarra widdowsoni* | Samak aa'ama. [Iraq blind barb] | None | High, listed as Vulnerable (D2) on the *2004 IUCN Red List of Threatened Species*. (Freshwater) |
| *Cobitis taenia* | Lakh mukhattat. [spined or spiny loach, stone loach, weatherfish, spotted weatherfish, Siberian loach] | Low-Moderate | Unknown, possibly High; this species is classified as rare in Europe. (Freshwater) |

| SPECIES | COMMON NAMES IN ARABIC AND IN ENGLISH [IN SQUARE BRACKETS] | ECONOMIC IMPORTANCE | PROPOSED PRIORITY FOR CONSERVATION ACTION |
|---|---|---|---|
| *Glyptothorax kurdistanicus* | None | None | Moderate-High, possibly; poorly known in Iraq and may be rare enough to warrant conservation efforts. (Freshwater) |
| *Glyptothorax steindachneri* | None | None | High, possibly; this species is poorly known in Iraq and may be rare enough to warrant conservation efforts should it prove to be a valid taxon. (Freshwater) |
| *Liza abu* | Khishni; hishni; hosoon or hashsoun; maid; abu-khraiza; abu sukkanejn [abu mullet, freshwater mullet]. | High | Moderate; a ban on fishing from mid-January to mid-May has been recommended. (Freshwater) |
| *Liza klunzingeri* | Maid; biah; biah zahbee; beyah zhabee. [Klunzinger's mullet (keeled mullet and back keeled mullet]. | Moderate | Moderate; this species needs to be carefully monitored as it is part of a fishery. (Marine) |
| *Acanthopagrus latus* | Shanak; shagoom; shaam; sha'm; shaem; sheim; sha-om. [yellow-finned porgy or seabream, yellow-finned black porgy, Japanese silver bream]. | High | Moderate; the status of natural freshwater populations is unclear as they appear quite rare. (Freshwater; brackish; marine) |

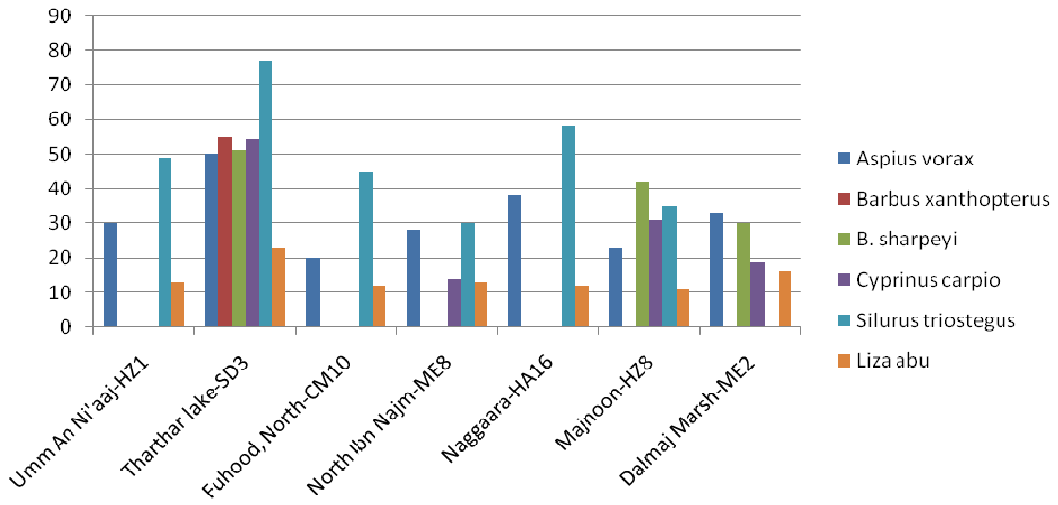
**Fish species and number of sites where they have been observed and/or reported for major Mesopotamian Marshland areas**

| FISH SPECIES AND COMMON ARABIC NAME* | SAMPLING AREAS | | | | |
|---|---|---|---|---|---|
| | Central Marsh | Hammar Marsh-Northwest | Hammar Marsh- South | Hammar Marsh-East | Hawizeh Marsh |
| *Acanthobrama marmid (Semnan arez)* | 2 sites | 1 site | | 3 sites | 7 sites |
| *Alburnus mossulensis (Semnan tuyel)* | 2 sites | 1 site | | 3 sites | 7 sites |
| *Aspius vorax (Shillik)* | 1 site | | | 3 sites | 7 sites |
| *Aphanius dispar (Batrikh)* | 1 site | | | 3 sites | |
| *Barbus grypus (Shabout)* | 1 site | | | | 1 site |
| *Barbus luteus (Himri)* | 3 sites | 2 sites | | 3 sites | 7 sites |
| *Barbus sharpeyi (Bunni)* | | | | 3 sites | 5 sites |
| *Barbus xanthopterus (Gattan)* | 1 site | | | | 1 site |

| FISH SPECIES AND COMMON ARABIC NAME* | SAMPLING AREAS | | | | |
|---|---|---|---|---|---|
| | Central Marsh | Hammar Marsh-Northwest | Hammar Marsh- South | Hammar Marsh-East | Hawizeh Marsh |
| *Carassius auratus (Buj-Buj)* | 3 sites | 4 sites | 4 sites | 3 sites | 1 site |
| *Cobitis sp. (Loach)* | | | | | 1 site |
| *Ctenopharyngodon idella (Carp Eshaby)* | 1 site | 1 site | | | |
| *Cyprinus carpio (Samti)* | 3 sites | 2 sites | | 3 sites | 4 sites |
| *Liza abu (Khishni)* | 4 sites | 3 sites | 4 sites | 3 sites | 7 sites |
| *Mastacembelus mastacembelus (Abu Salambah)* | 2 sites | 1 site | | 3 sites | 5 sites |
| *Mystus pelusius (Abu-Al-Zummiar)* | 3 sites | | | 3 sites | 3 sites |
| *Silurus triostegus (Jirri)* | 3 sites | 1 site | | 3 sites | 5 sites |
| ***Total No. of Fish Species Observed*** | **14** | **9** | **2** | **12** | **15** |

* Species here are listed alphabetically versus taxonomically.

KBA surveys in 2007 and 2008 found that commercial fishing was taking place at the three large lake sites in the north (Darbandikhan, Dukan and Mosul Lakes), and are key sites for economically important fish (*Barbus esocinus, B.xanthopterus, B.grypus, Capoeta damascina, Cyprinus carpio* and *Carassius auratus)*. There are some occasional smaller scale fisheries along major rivers (e.g. Altun Kopri Marsh along the Lesser/Little Zab River). KBA surveys in the south have documented extensive fisheries in the Mesopotamian marshlands. In 2009, NI researchers looked at fish in key sites in central and southern Iraq and found that Tharthar Lake was important both in terms of number of fish species and fish weights and lengths (see figure below).




**The total length (cm) of the sampled fish by fish species for some selected sites (Nature Iraq, 2009).**

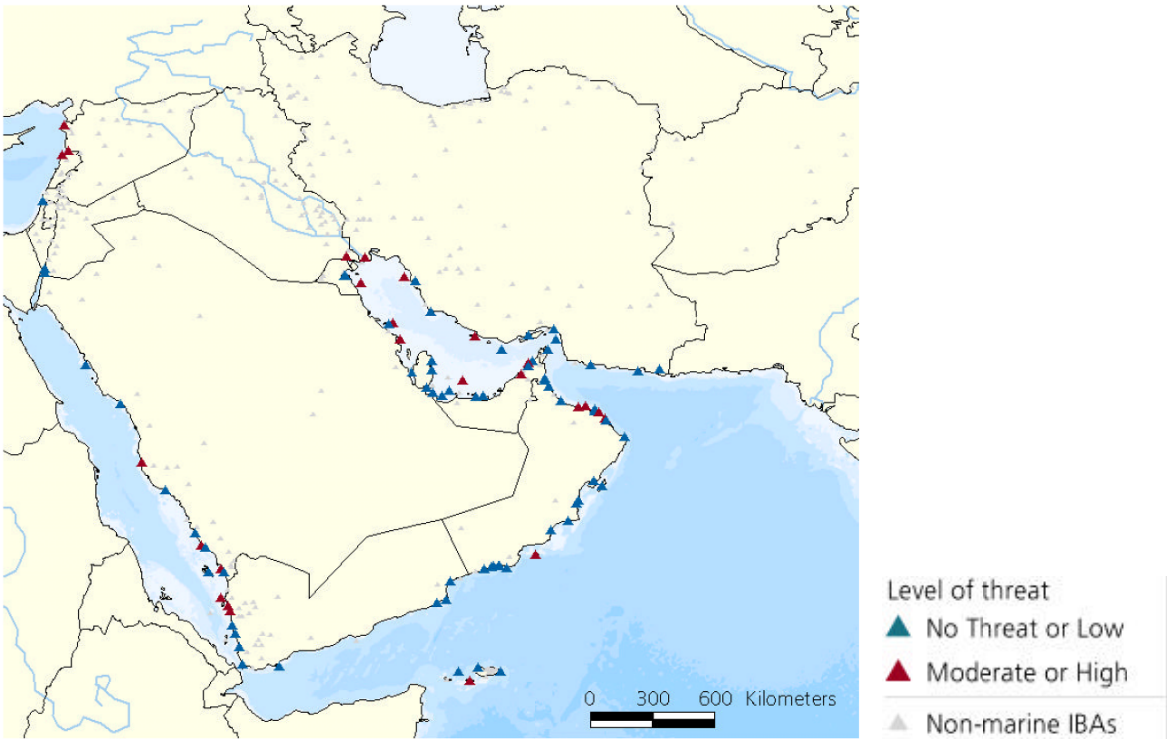
| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005- 2010)<br>Mesopotamian Marshlands Habitat Project (2007/2008)<br>IUCN Red List<br>Wildfinder Database | Nature Iraq<br><br>World Conservation Union (IUCN)<br>World Wildlife Fund |

### *Indicator: Biodiversity in marine ecosystems*

Very little information exists on marine flora, habitat, and fauna in Iraqi coastal and marine areas. The IUCN Red List provides a list of marine species that have been assessed on the basis of their conservation status. The numbers of assessed species are listed below by class.

| CLASS | NO. OF ASSESSED SPECIES | CLASS | NO. OF ASSESSED SPECIES |
|---|---|---|---|
| ACTINOPTERYGII | 7 | CHONDRICHTHYES | 15 |
| ANTHOZOA | 103 | HYDROZOA | 2 |
| AVES | 11 | MAMMALIA | 7 |

Two marine related Important Bird Areas/Key Biodiversity Areas in Iraq are Khor Az Zubayr/Khor Abdullah. These have been partially assessed under the KBA Project for Birds but other marine species have not been surveyed.



**Threatened Marine Important Bird Areas in the Middle East (source: World Resources Institute - PAGE, 2000)**

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005- 2010) for selected sites and potentially other survey projects<br>Mesopotamian Marshlands Habitat Project (2007/2008)<br>IUCN Red List<br><br>Wildfinder Database<br>Encylopedia of Life Project | Nature Iraq, Ministry of Environment, Iraqi Universities and Research organizations<br>World Conservation Union (IUCN)<br>World Wildlife Fund |

## *Indicator: List and total number of threatened species by group in marine ecosystems.*

The IUCN Red List lists the following Iraqi marine species that have been assessed by species group and the total number of species that have been assessed with the status of Critically Endangered, Endangered, Vulnerable, Near-threatened or Extinct.

**IUCN Red List of Critically Endangered, Endangered, Vulnerable, Near-threatened & Extinct Marine Species of Iraq**

| **Cnidaria** | |
|---|---|
| total species | 105 |
| Conservation concern species | 41 |
| **Sharks & Rays** | |
| total species | 15 |
| Conservation concern species | 14 |
| **Fish** | |
| total species | 7 |
| Conservation concern species | 4 |
| **Birds** | |
| total species | 11 |
| Conservation concern species | 0 |
| **Mammals** | |
| total species | 7 |
| Conservation concern species | 5 |
| Source: IUCN, 2010 Red List of Threatened Species | |

The table below provides information on three marine fish "Species of Special Concern" but there are likely several other important fish species that use Iraqi territorial waters and coastal regions.

**Importance and potential conservation priority for 3 Iraqi marine fish "Species of Special Concern" (Sources: Coad et al. in preparation, Rubec and Coad 2007).**

| SPECIES | COMMON NAMES IN ARABIC AND IN ENGLISH [IN SQUARE BRACKETS] | ECONOMIC IMPORTANCE | PROPOSED PRIORITY FOR CONSERVATION ACTION |
|---|---|---|---|
| *Tenualosa ilisha* | Sbour; zoboor; soboor; sobour. [hilsa, Indian shad or river shad] | High | High (freshwater; brackish; marine fish) |
| *Liza klunzingeri* | Maid; biah; biah zahbee; beyah zhabee. [Klunzinger's mullet (keeled mullet and back keeled mullet]. | Moderate | Moderate; this species needs to be carefully monitored as it is part of a fishery. (Marine) |
| *Acanthopagrus latus* | Shanak; shagoom; shaam; sha'm; shaem; sheim; sha-om. [yellow-finned porgy or seabream, yellow-finned black porgy, Japanese silver bream]. | High | Moderate; the status of natural freshwater populations is unclear as they appear quite rare. (Freshwater; brackish; marine) |

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| KBA Project (2005, 2006, 2007, 2009)<br>Fish Species checklist | Nature Iraq<br>Coad, B (in preparation). |

### *Indicator: Water Quality- Nutrients, Physical & Chemical Parameters, BOD, heavy metals, and other pollutants*

For the water quality work in the KBA Project, several benthic macroinvertebrate community indices were used as recommended by Miller (2008):

- Taxa Richness– A reduction in taxa richness typically indicates pollution.
- Taxa Evenness – How balanced is the community? A healthy community is characterized by a diverse number of taxa that have abundances somewhat proportional to each other.
- EPT% – How abundant are the mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera)?

Biological conditions described in Miller (2008) were determined as follows:

*Non-impaired site:* A non-impaired site has a benthic community comparable to other undisturbed streams within the region.

- High Richness (high number of species/taxa).
- High Evenness (individuals are evenly distributed among the taxa).
- Sensitive species are well represented.

*Moderately Impaired site:* Moderately impaired sites are characterized by reduced taxa richness, in particular the EPT taxa.

- Less EPT% (less sensitive species are more dominant)

*Severely Impaired site:* A severely impaired site is one in which the benthic community has undergone a dramatic change.

- Low Richness (low number of species/taxa)

- Low Evenness (numbers can be high "dominance" or low "paucity of organisms")
- Low EPT% (community is dominated by pollution tolerant species)

Diversity, richness, and evenness have been calculated by using CANOCO 4.5 Package. (Ter Braak and Šmilauer, 2002).

Additional water quality tools used in the KBA surveys in Iraqi Kurdistan were the Pollution Tolerance Index (PTI) (Mitchell and Stapp, 2000) and Pollution Index (PI) (Waterwatch South Australia, 2004). These indices were modified based on the species observed in Kurdistan-Iraq waters. Tolerance values of benthic macroinvertebrates, which are obtained by determining the tolerance values of organisms to various types of stressors and calculating an average value (range from 0 which is very sensitive to 10 which is very tolerant), were extracted from many sources such as: Stribling, Jessup, White, Boward, and Hurd (1998); Barbour Gerrisen, Snyder, and Stribling (1999); Davis, Minshall, Robinson, and Landres (2001); Bode, Novak, Abele, Heitzman, and Smith (2002); Klemm, Blacksom, Thoeny, Fulk, Herlihy, Kaufman and Cormier (2002); Mandaville (2002); Chessman (2003); Ode (2003), and Wilton (2004).

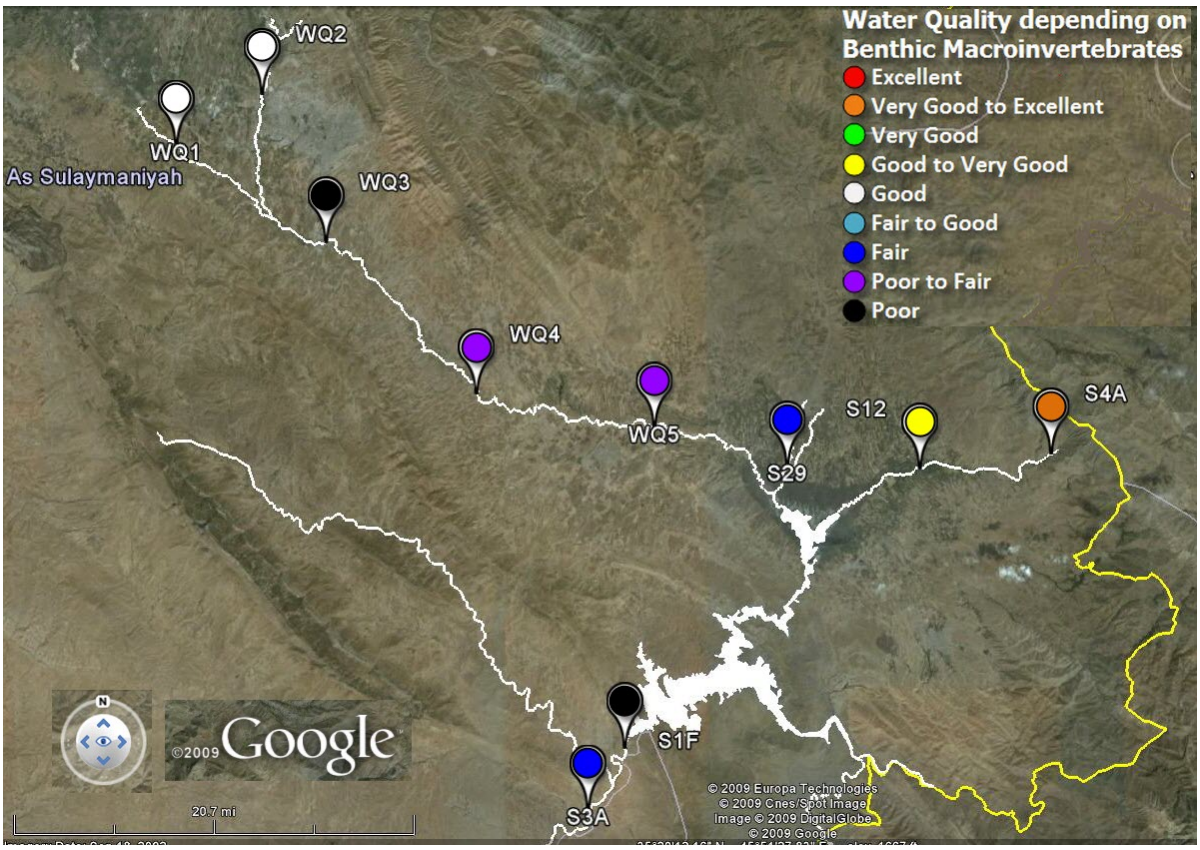
Individuals were then classified according to their tolerance values into four main categories (NSW Water Bug Survey, 2003):

- Very sensitive; sensitivity values ≈ 10 & 9; tolerance values ≈ 1 & 2
- Sensitive; sensitivity values ≈ 8, 7, & 6; tolerance values ≈ 3, 4 & 5
- Tolerant; sensitivity values ≈ 5, 4, & 3; tolerance values ≈ 6, 7 & 8
- Very tolerant; sensitivity values ≈ 2 & 1; tolerance values ≈ 9 & 10

Finally, water quality was determined according to the following five grades:

| **Modified Pollution Tolerance Index (Modified PTI) grades:** | **Modified Pollution Index (Modified PI) grades:** |
|---|---|
| Excellent water quality (29+) | Excellent water quality (111+) |
| Very good water quality (23 – 28) | Very good water quality (74 – 110) |
| Good water quality (17 – 22) | Good water quality (56 – 73) |
| Fair water quality (11 – 16) | Fair water quality (45 – 55) |
| Poor water quality (0 – 10) | Poor water quality (0 – 44) |

Included below is an example of benthic macroinvertebrate biotic indicators results in the upper Diyala (Darbandikhan Lake) Basin for the summer of 2009.




**Water quality ranks in Diyala River Watershed (Darbandikhan Basin) sites during Kurdistan KBA - summer surveys 2009, depending on benthic macroinvertebrates' results.**

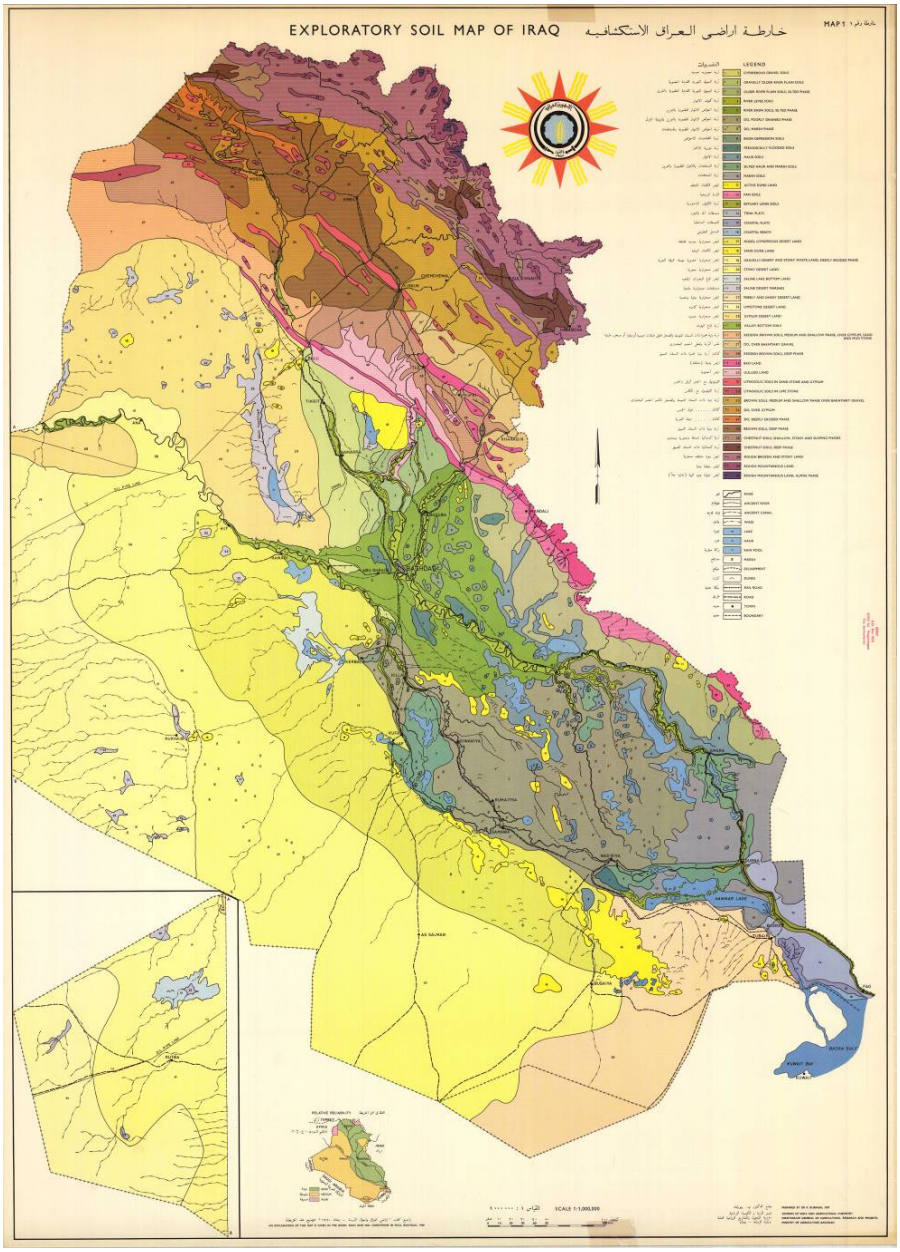
| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Some information about surface runoff at basin scale and water consumption are available<br>KBA Project (2005-2009) WQ data for selected areas<br>Physical parameters available from water gauging stations<br>There are likely individual studies at localized sites | Nature Iraq<br>Iraqi Ministry of Water Resources – Water Control Data Center<br>Water Mini Master Plans<br>Ministry of Environment<br>Ministry of Health<br>Iraqi Universities, Colleges of Science |

## *Indicator: Soil Quality*

According to the USDA Natural Resources Conservation Service (1998), soil biodiversity is the mix of living organisms that interact with one another, plants, and other small animals to form "a web of biological activity" that make up "the most biologically diverse part of Earth." Soil quality can be an important tool to determine land use management policy, limit pollution, and decrease loss of soils (top soil, erosion, and/or desertification). Iraqi lands can be classified into eight soil types based on the American classification system (USDA, 1975, 1994 & 1998):

A. Agricultural kinds:
    - Type 1: Excellent agricultural lands - 0.6%.
    - Type2: Good agricultural lands - 38.7%.
    - Type 3: Fair for agricultural lands - 43%.
    - Type 4: Limited land ability for agriculture - 7.7%.
B. Non agricultural lands:
    - Type 5: Non agricultural lands in the present - 6.5%
    - Type 6: Seasonally grazing lands - 83.4
    - Type 7: Limited grazing lands - 3.4%.
    - Type 8: High lands out of agricultural uses - 6.7%.

Not a great deal of information exists on Iraqi soils. The following MOA 1957 map provides the only available comprehensive overview.




**Exploratory Soil Map of Iraq. Map 1 (Buringh, 1957)**

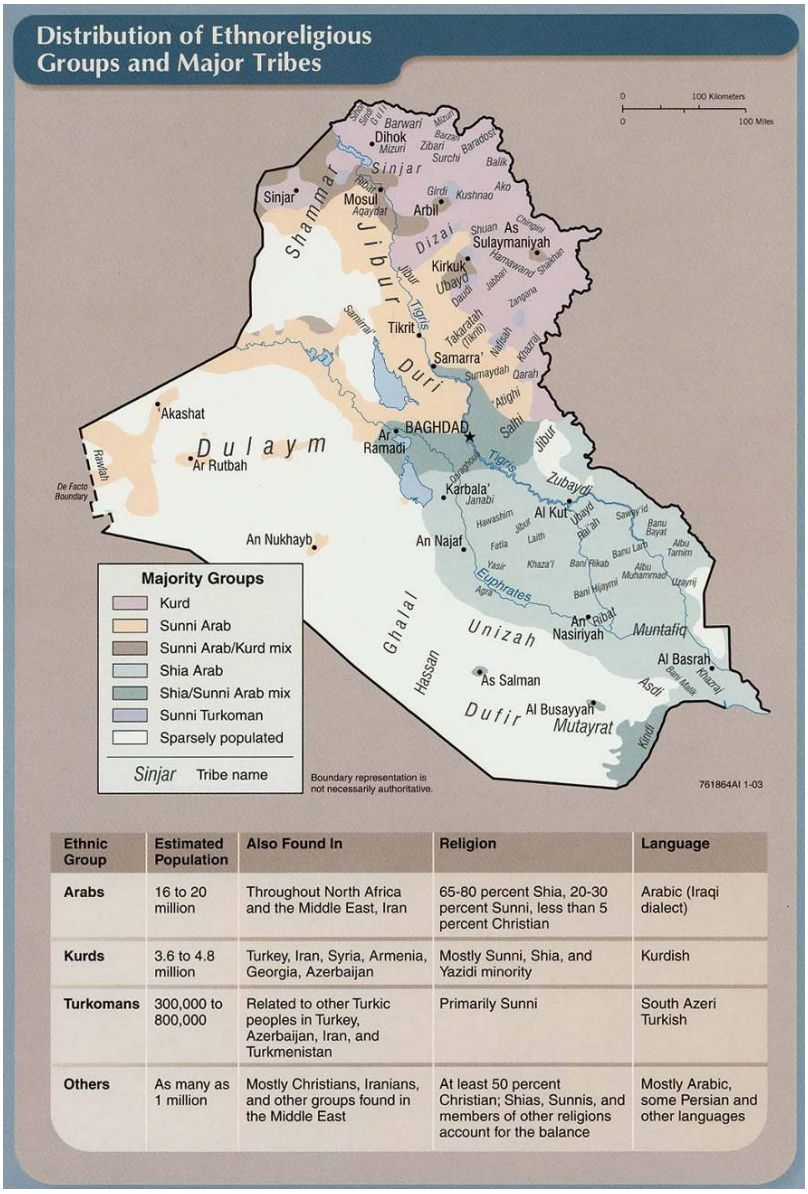
| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Global Assessment of Soil Degradation (GLASOD). | UNEP - ISRIC (International Soil Reference and Information Centre). |

### *Indicator: Ethnic & Language Groups*

Diversity in Iraq is reflected in Iraq's people, religions, and communities. The country is made up of several ethic and language groups. According to the CIA Factbook (2010), Iraqis are 75%-80% Arab, 15%-20% Kurdish, Turkoman, Assyrian, and 5% other. Arabic, Kurdish (the official language in the Kurdistan region), Turkoman (a Turkish dialect), Assyrian (Neo-Aramaic), and Armenian are the main languages.

There can be additional divisions within one language group. Kurdish has two main dialects, Kurmanji, which is spoken in Turkey, Syria, and the most northern areas of Iraq and Iran, and Sorani, which is spoken in western Iraq and other areas of Iraqi Kurdistan, which have been labeled 'Northern' and 'Central'. And there are extensive influences on Iraqi language from Iran and Turkey and other language groups.

The following map provides an overview of the enthno-religious groups and major tribes of Iraq. There are several nomadic or Bedouin tribes in Iraq that are not well documented. All these groups have differing attitudes and customs regarding the importance of and uses for the biological diversity of the country.



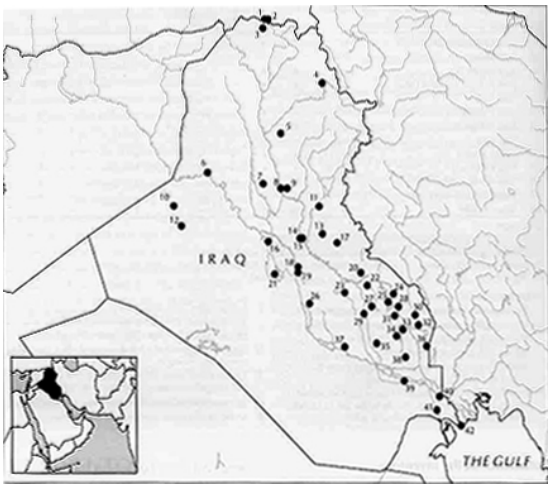

| Ethnic Group | Estimated Population | Also Found In | Religion | Language |
|---|---|---|---|---|
| Arabs | 16 to 20 million | Throughout North Africa and the Middle East, Iran | 65-80 percent Shia, 20-30 percent Sunni, less than 5 percent Christian | Arabic (Iraqi dialect) |
| Kurds | 3.6 to 4.8 million | Turkey, Iran, Syria, Armenia, Georgia, Azerbaijan | Mostly Sunni, Shia, and Yazidi minority | Kurdish |
| Turkomans | 300,000 to 800,000 | Related to other Turkic peoples in Turkey, Azerbaijan, Iran, and Turkmenistan | Primarily Sunni | South Azeri Turkish |
| Others | As many as 1 million | Mostly Christians, Iranians, and other groups found in the Middle East | At least 50 percent Christian; Shias, Sunnis, and members of other religions account for the balance | Mostly Arabic, some Persian and other languages |

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Annual Abstract of Statistics (2006 – 2007)<br>Census Information (2009) | Central Organization of Statistics and Information Technology (COSIT)<br>CIA World Factbook |

## *RESPONSE Indicators for the Management of Biodiversity*

### *Indicator: Protected Areas*

The KBA Program of NI originally started surveying Important Bird Areas and Wetland sites in the Middle East. These had been defined in Iraq based on the work of Evans (1994) & Scott (1995) and resulted in an initial list of 43 potential sites. The left-hand map depicts Important Bird Areas of Iraq as defined by Evans (1994). Other important cultural and heritage sites exist in the country as well that currently have limited or no protected area status (See right-hand map).




**Important Bird Areas of Iraq (Evans, 1994)**

**Cultural & Heritage Sites in Iraq**

The MOA maintains a number of agricultural protected areas and reserves, some for wildlife and plant preservation. These are listed in the table below.

| | PROTECTED AREA NAME | GOVERNORATE | PROPERTY OF | TYPE | AREA KM² | QUALIFICATION LEVEL |
|---|---|---|---|---|---|---|
| 1 | Gsaiba | Baghdad | State Company of Forests and Orchards | Wild animals and rare birds | 0.15 | Qualified |
| 2 | Safia | Basra | Basrah Agriculture | Water body | 17.5 | Qualified |
| 3 | Dibis | Kirkok | State Company of Forests and Orchards | Wild animals | 0.4 | Qualified |
| 4 | Mandili | Diala | Diala Agriculture | Wild animals | 0.4 | Qualified |
| 5 | Sawa | Muthana | Muthana Agriculture | Wild animals | 0.5 | Under Qualification |
| 6 | Karbala | Karbala | Karbala Agriculture | Wild animals | 0.5 | Under Qualification |
| 7 | Najaf | Najaf | Najaf Agriculture | Wild animals | 0.5 | Under Qualification |
| 8 | Chibayish | Thi Qar | ThiQar Agriculture | Waterbody | 7.2 | Under Qualification |
| 9 | Reem | Maisan | Maisan Agriculture | Wild animals | 0.5 | Under |

| | PROTECTED AREA NAME | GOVERNORATE | PROPERTY OF | TYPE | AREA KM² | QUALIFICATION LEVEL |
|---|---|---|---|---|---|---|
| | | | | | | Qualification |
| 10 | Massad | Anbar | State Company of Animal Wealth | Wild animals (Gazelle) | 1.6 | Qualified |
| 11 | Dhab'a | Anbar | State Company of Animal Wealth | Wild animals | 0.4 | Qualified |
| 12 | Sinjar | Mosul | General commission of seed testing and approval | Plants | 1.2 | Unqualified (violated) |
| 13 | Rawdhat-l-maha | Baghdad | State Company of Forests and Orchards | Wild animals | 0.5 | Unqualified (violated) |
| 14 | Nainawa | Mosul | Mosul Agriculture | Plants | 0.5 | Unqualified (violated) |
| **Total Area** | | | | | **31.8** | |

The World Database on Protected Areas (WDPA) lists several protected area sites within Iraq, which are in need of updates at the time of this writing.

Several areas may be receiving informal protected area status on a local basis. For example, the Barzan area of Erbil Governorate in Kurdistan has received tribal protection from hunting for many decades due to an edict issued by a Barzan tribal leader that is still in force. Though not achieved through official action, this site and possibly others like it are currently the only natural sites holding at least partial protection status.

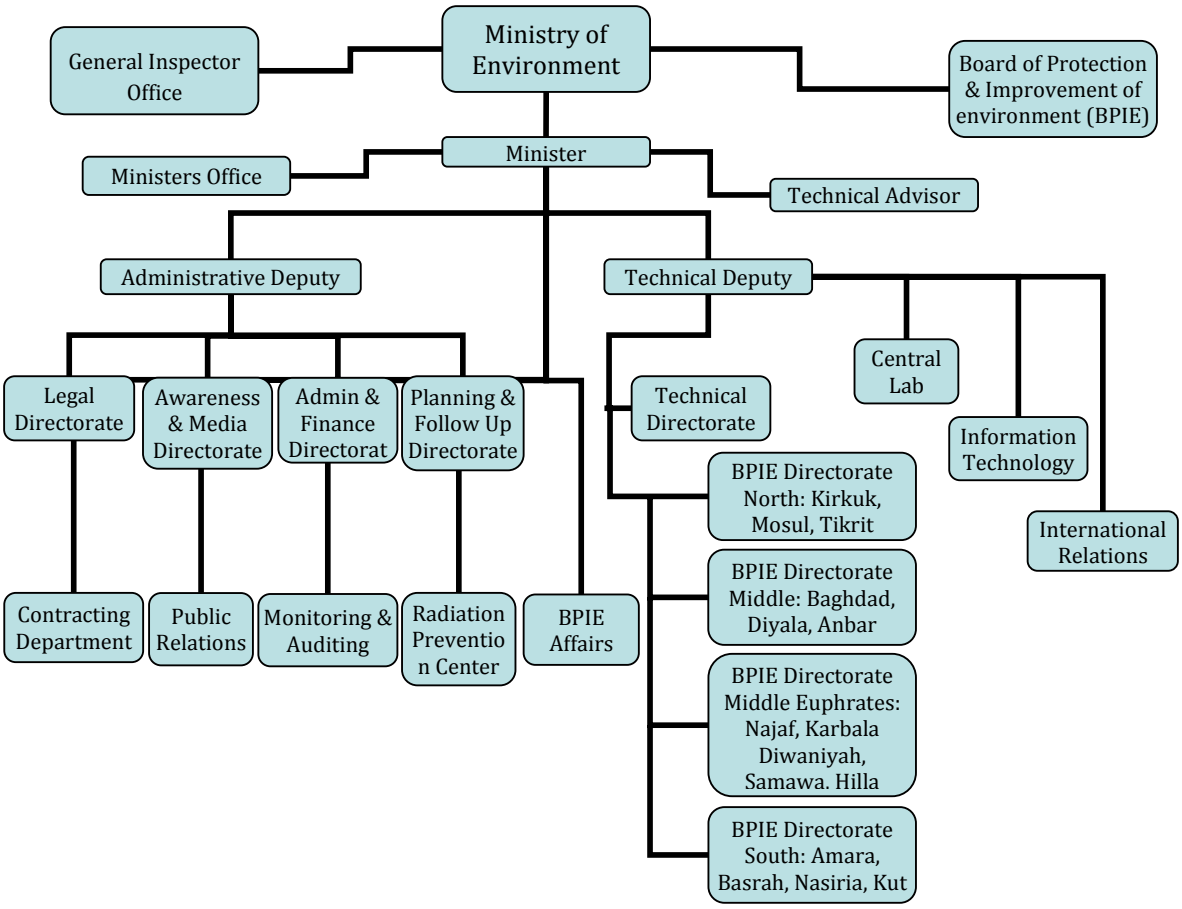
| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Draft Hawizeh Ramsar Management Plan<br>Protected Areas Database.<br>Nature Iraq Database of Proposed and existing protected areas and other areas of biodiversity concern<br>Important Bird Areas of the Middle East<br>Scott book<br>List of all datasets | Iraqi & Regional Ministries of Environment and Agriculture, National & Regional Parks Board (National & Regional Park proposals)<br>Iraqi State Board of Antiquities & Heritage, UNESCO Secretariat (Iraq World Heritage Sites)<br>Iraqi Ramsar National Committee, Ramsar Secretariat (Hawizeh Ramsar Site)<br>UNEP-WDBP, World Conservation Monitoring Centre.<br>International Coordination Committee for the Safeguarding of the Cultural Heritage of Iraq<br>BirdLife International<br>Wetlands International |

### *Indicator: Institutional Capacity, Policy & Regulatory Framework*

A comprehensive overview of the institutional structure of the MOE is presented below. There are approximately 150 ministry staff under the Technical Directorate in Wazirea/Baghdad but there are additional district offices and staff of the MOE throughout the country.

### *Institutional Structure of the MOE*

The structure of the MOE was approved in October 2008, as follows:




- **Related MoE organizations and directorates**
  - Central Environment Laboratory (Baghdad)
  - Protection and Improvement Directorate – South Region (Basrah)
  - Protection and Improvement Directorate – Middle Euphrates Region (Babil)
  - Protection and Improvement Directorate – Central Region (Baghdad)
  - Protection and Improvement Directorate – Northern Region (Kirkuk)
- **Regional Directorates and Local Units of MoE**

Within the MOE, the structure of the Technical Directorates within each governorate consists generally of the following units:

- Air Quality Monitoring Unit
- Water (Natural Sources and Drinking) Monitoring Unit
- Solid Waste and Chemical Hazardous Management Unit

- Biodiversity Unit
- Marshlands Unit
- EIA Unit
- Desertification and Land Use Unit
- Industrial Activities Monitoring Unit

Governorate Directorates covered all environmental directories in 14 Governorates, except Baghdad and the Kurdistan Region (including the three Governorates of Erbil, Sulaimaniya and Dohuk),

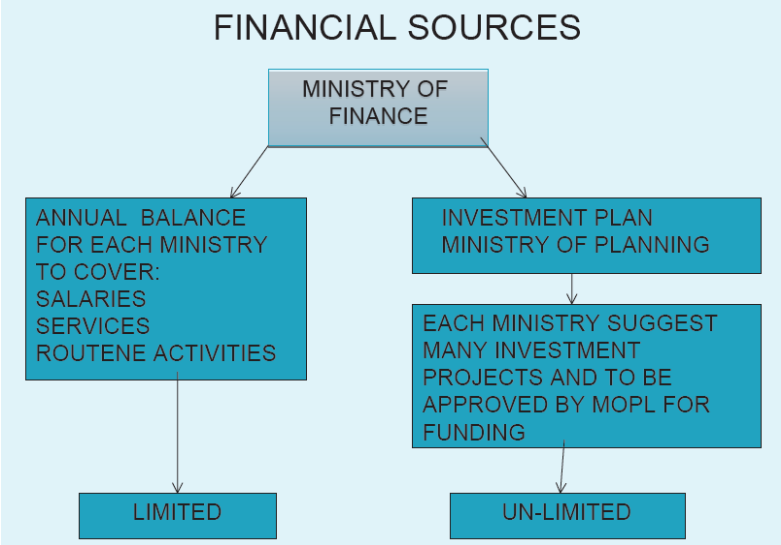
Each Directorate in the Governorate contain the above units, and special units connected with the deputy minister:

- Sustainable Development,
- Clean and Alternative Energy,
- New and Environmentally Friendly Technologies Unit.

The former the MOE of the Kurdistan Region had three main Governorate Directorates (Dohuk, Erbil and Sulaimaniya). The status of these offices is not known.

Six national committees are managed by the MOE:

- National Committee for Protected Areas
- National Committee for Biological Diversity
- National Committee for Ozone
- National Committee for Ramsar
- National Committee for Climate change
- National Committee for RERAG




**Investment Projects**

1. Designing and construction of 11 buildings for Environmental Directorates in Governorates (2006 – on-going) - $10m USD
2. Assessment of pollution with Depleted Uranium (DU) (2008- on-going) - $1m USD
3. Air quality monitoring programme (2007- on-going) - $2.5m USD
4. Environmental Assessment of polluted military sites (2005-on-going) - $2m USD
5. Early Alarm (for radiation) project (2006-on-going) - $1m USD
6. Monitoring of radon (2006-2009) - $1m USD
7. The biological impact of radiation (2005-2008) - $1m USD
8. Digital map for Baghdad (2007- on-going) - $1m USD
9. Environmental Database system (2005-on-going) -$0.75m USD
10. Water quality and biodiversity in marshlands – (2005-2006) - $0.1USD
11. Natural water resources monitoring programme (2005-2009) - $2m USD
12. Natural water resources monitoring stations (2006 – 2008) - $47k USD

**International Cooperation Projects & Initiatives**

In addition to funds provided under the Ministry of Finance, additional funds are made available from international sources for environmental projects in Iraq, such as:

1. UNEP Marshlands project (2005-2009) - $11m USD
2. UNEP Environmental Hot Spots Site Assessment in Iraq (2004-2005) - $4.7m USD
3. UNEP Hazardous Waste and Chemicals Collection and Storage for two sites (Al Qadassiya & Al Suwaira (2008-on-going) - $0.9m USD

4. WHO-UNICEF Water Quality Control and Surveillance in Iraq – Phase I, II, & III (2007- Phase III on-going) - $4.3m USD
5. WB Emergency Environmental Management (2006- on-going) - $5m USD
6. WHO Radiation Pollution Assessment (2003-2005) - $25k USD
7. UNEP Capacity Building (2002-2007) –Stage 1 - $6m USD; Stage 2 - $4.3m USD
8. WHO Environmental Strategy for Iraq (2009- on-going) - $ unknown
9. UNEP-UNESCO Mesopotamian Marshlands World Heritage Site (2009 – on-going) - $3.11m USD

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Biodiversity Unit exists within the MoE<br>Center for Research in the Iraqi Marshlands (CRIM, MOWR)<br>Some Iraqi expertise exists in the area of birds, plants, fish, benthic invertebrates, and other areas with the skills to conduct initial assessments. | Ministry of Environment<br>Ministry of Agriculture<br>Ministry of Water Resources<br>Ministry of Higher Education<br>Ministry of Science & Technology<br>Ministry of Industry and Minerals<br>Ministry of Municipalities and Public Works<br>Kurdistan Regional Government Supervisory Committee for the environment<br>Iraqi Universities<br>Iraqi NGOs |

### *Indicator: Stakeholder Capacity*

Iraqi non-governmental organizations (and related associations and interest groups) can play a significant part in biodiversity protection and enhancement. Hunting clubs can curtail the hunting of endangered species and self-enforce hunting limitations and seasons. Fisherman associations are important partners in conducting fishery catch assessments and can self-enforce fishing restrictions that benefit the viability of the fisheries. Industry groups can assist with reporting on industry trends effecting biodiversity and educate members on new pollution prevention requirements and/or support. Farmers are key players in the actions to protect the biodiversity of soils and limit threats such as erosion, overgrazing, agricultural chemical runoff, unsustainable water use, and desertification. Environmental organizations can do extensive education and advocacy work on specific targeted issues, often having the ability to act quickly and work at the local community level.

Such organizations, if they existed under the former regime (which often they did not), were usually Baath party-affiliated organizations that were often the causes of biodiversity loss (e.g. The Baghdad Hunting Club was, under the Saddam regime, known for its trafficing in endangered species).

Today these organizations sometimes struggle with lack of funds, information and other resources, poor security, as well as distrust from government officials. They often are not consulted in major management decisions, which may result in opposition to such decisions. Building their institutional

capacity and strengthing their communication and working relationship with related government sectors should be viewed as vital to successful biodiversity protection.

| AVAILABLE INFORMATION &/OR DATASETS: | INFORMATION/DATA SOURCES: |
|---|---|
| Stakeholder/NGO Contact List (partial) | Nature Iraq<br>Ministry of Environment |