
THE NEW EDEN PROJECT

NEW EDEN PROJECT

IRAQ

Executive Summary

2003-2013 Activities

*Italian Ministry for the
Environment, Land and Sea*

&

Nature Iraq

February 2014

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A. Foreward

For over 7,000 years, the Iraqi Marshlands – also known as the Mesopotamian Marshlands – have played an important role in global ecosystems by supporting rare wildlife and rich biodiversity. Located in southern Iraq, the marshlands stretched to over 6,000 square miles and are believed by many to be the location of the Garden of Eden. In the 1990's, however, Saddam drained the marshlands to punish the Marsh Arabs who rebelled against him and turned their green lush wetlands into dusty deserts. It is considered that a population ranging from 300,000 to 500,000 people was displaced.



The dried marshlands

Following the 2003 war in Iraq, which had its own destructive impact on the environment, a unique opportunity emerged to restore the marshlands in what has since been dubbed as “the largest habitat restoration project in the world” by the United Nations Environment Programme. At its peak, the Iraqi Marshlands were considered to be the largest wetland ecosystem in the Middle East but after the devastating draining projects under Saddam, the marshlands shrunk to just ten percent of its original size. The Marsh Arab population dropped from around half a million to just a few thousand.



The New Eden project, launched in 2003 within the framework of the Italian and Iraqi governments cooperation agreement, played a key role in the marshlands' restoration. The project was started under the auspices the Washington DC-based, Free Iraq Foundation and as it grew, Nature Iraq, an Iraq-based NGO took over the mantle of running the project.

Water that was diverted away from the Iraqi Marshlands under Saddam was re-routed to the marshlands enabling the return of reeds on the embankments, bird-life and fishes.



When the water returned, life returned to the marshes

The restoration also encouraged the return of Marsh Arabs to the wetlands who are now able to eke out a subsistence living from the Marshlands through fishing, buffalo breeding and other activities such as making baskets out of reeds to sell in the markets.

The most outstanding results of the New Eden Project include:

- A large part of the Marshlands has been re-flooded and re-naturalized from the initial 7% to around 40% / 60% depending on the climate conditions of the year;
- Structural facilities were erected, such as water regulators, buildings, laboratories, monitoring networks, and fisheries;
- A large part of the native population has come back;
- The Iraqi Council of Ministers approved in principal, on July 23, 2013, the establishment of Iraq's Central Marshes as a National Park;



- Nature Iraq is currently providing assistance to the Iraqi Ministry of Environment for the establishment of an additional 15 Protected Areas and National Parks;
- The Marshes have been officially nominated to become a UNESCO World Heritage site.

Nature Iraq has been awarded several prizes by for its work in the Iraqi Marshland restoration through the New Eden program. In 2011, it received the Takreem Arab Achievement Award, which seeks to recognize Arab excellence and leadership. And in 2013, it received the Goldman Award, which recognizes sustained and significant efforts to protect and enhance the natural environment, and is the largest award in the world for grassroots environmentalists. NI's President Azzam Alwash accepted the Goldman Award on behalf of Nature Iraq, and was received in the Oval Office by the US President Barrack Obama on 23rd April, 2013 (see picture below). More recently, Azzam Alwash was named one of the top one hundred leading global thinkers in 2013 by the Foreign Policy Magazine.



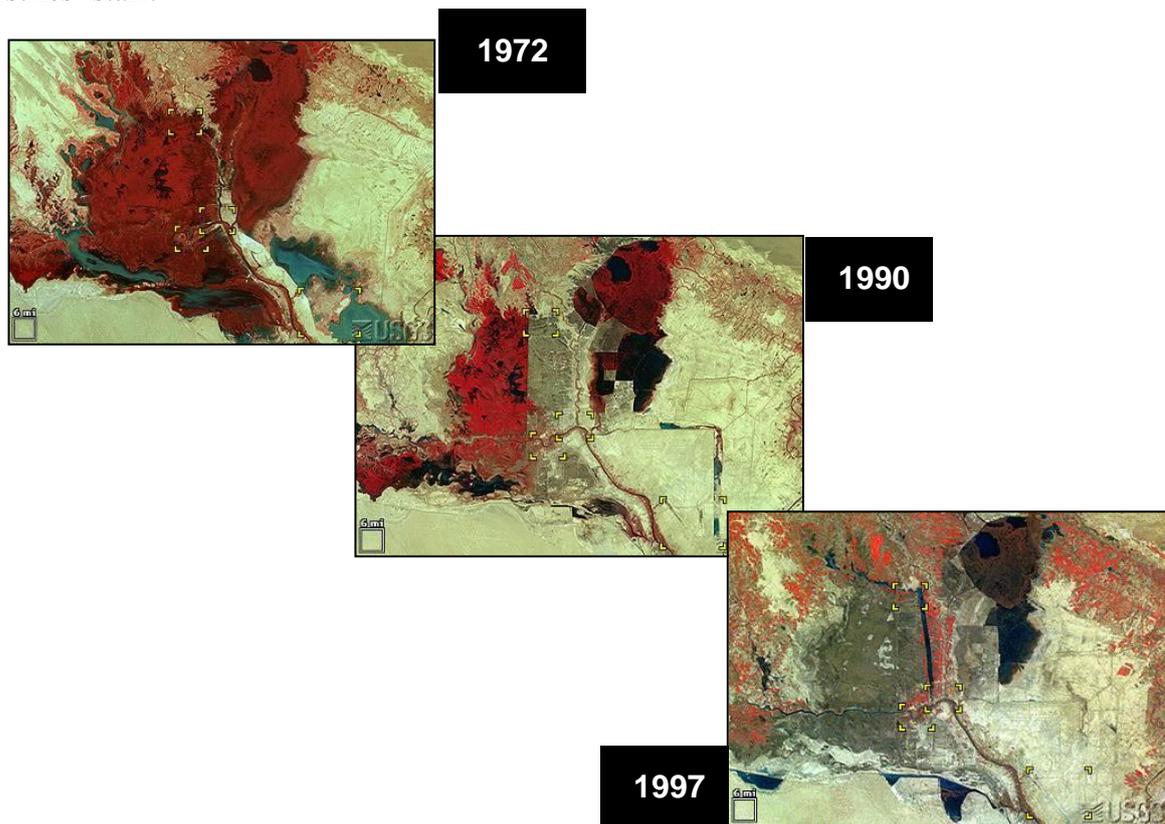
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US President Barack Obama and Azzam Alwash



B. The New Eden Project Overview

Since May 2003, the Italian Ministry for the Environment, Land and Sea (IMELS) together with other international donors – i.e. UNEP, UNDP, UNOPS, USAID, CIDA (Canada), Darwin Initiative (UK), Jensen Foundation (Denmark), US State Department, and JICA (Japan) – have been providing continuous financial and institutional support to the Government of Iraq through Nature Iraq in the difficult endeavor of restoring the marshes of southern Mesopotamia. This work has been coordinated with the Iraqi Ministries of Environment, Water Resources, and Municipalities and Public Works as well as other donor countries. The work has been implemented by the New Eden Team, which is lead by Nature Iraq (NI) and includes many Italian and international experts, in cooperation with the Iraqi Ministries' staff.



The dramatic shrinking of the southern Iraqi marshes between 1972 and 1997



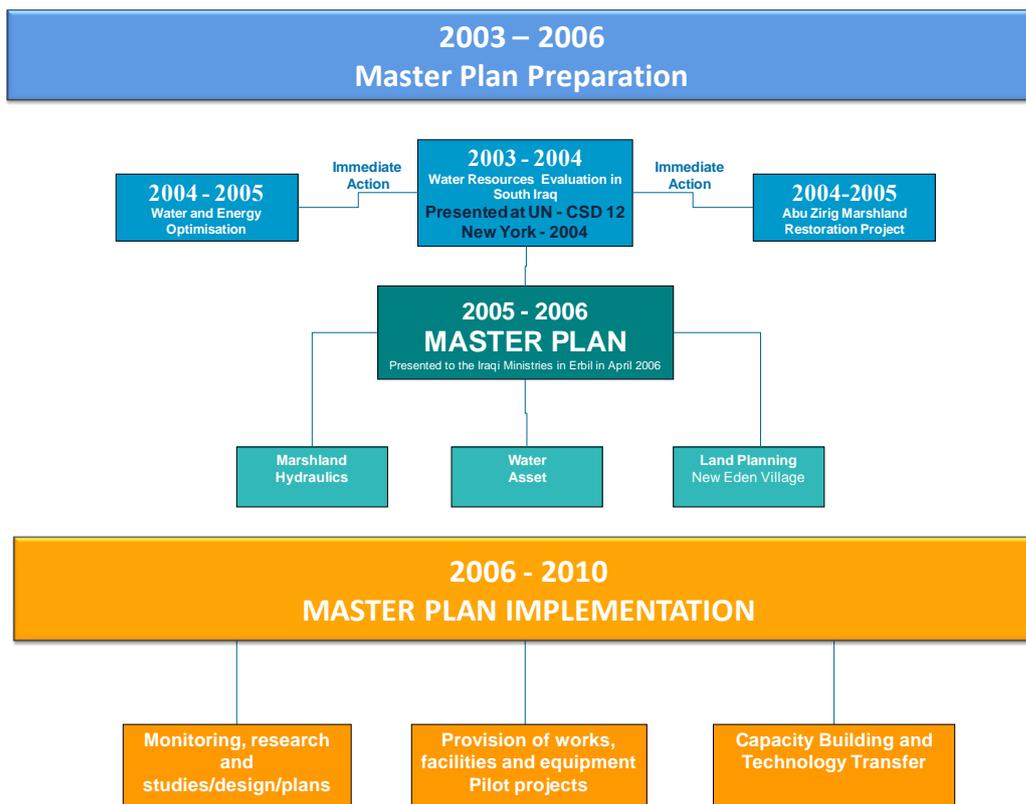
1. Project Stages

This report is intended to provide a broad overview of the work carried out to restore the Mesopotamian marshes and improve the environment in Iraq by the New Eden Team from 2003 to 2013.

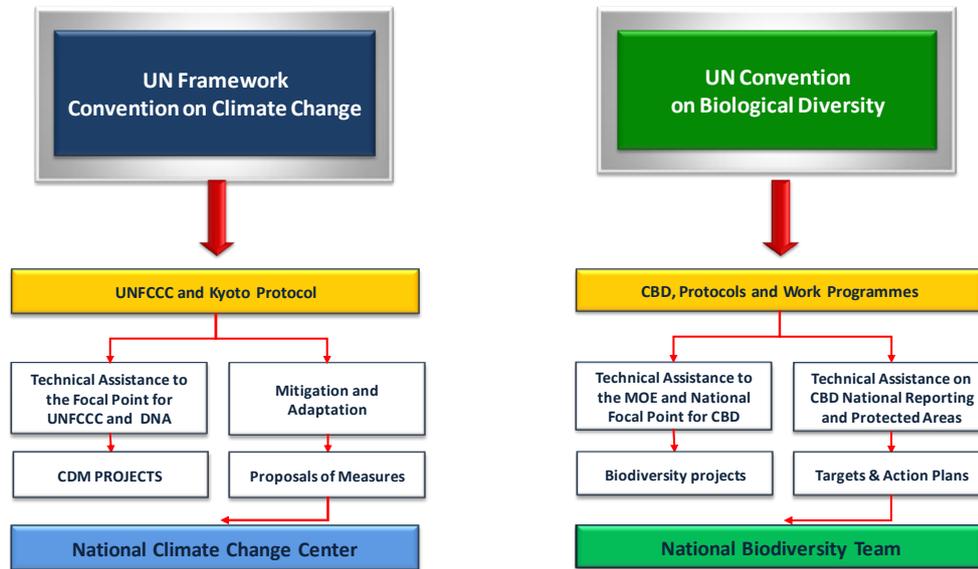
It focuses on the project's three main stages:

- 2003-2006: Drafting the New Eden Master Plan
- 2007-2009: New Eden Master Plan implementation
- 2010-2014: Technical support to Iraqi Ministry of Environment (IMoE) for the implementation of the UN framework convention on Climate Change and UN Convention on Biological Diversity, including the establishment of Protected Areas and National Parks.

The project's milestones are shown in the chart below.



2010 – 2014
International conventions implementation



2003-2006: Drafting the New Eden Master Plan

In June 2003, IMELS signed a Memorandum of Understanding with the Iraq Foundation (IF) to begin a project called “*Water Resources Evaluation in Southern Iraq*”. The purpose of this project was to rapidly identify potential water resource projects that could be undertaken to improve the lives of the people of southern Iraq. During the project, the New Eden Team gathered considerable information on the status of water resources from the perspective of clean water supply and environmental restoration. At the same time, cooperative work was initiated between IF, NI, IMELS, UNEP and the relevant Iraqi Ministries including Ministry of Water Resources (IMoWR), Municipalities and Public Works (MoMPW) and Environment (MoE). Several MOUs have been signed between these parties.

The most significant outcome of this first initiative was the preparation of two deliverables: the “*Abu Zirig Marsh Monitoring Program*” and the “*Water and Energy Optimization Feasibility Study*”. The results of this first initiative were officially presented at the 12th United Nations Sustainable Development Conference (CSD-12) in New York in April 2004.



In 2004, the New Eden Team conducted extensive fieldwork monitoring a newly re-flooded marsh. The Abu Zirig Program essentially represents a large-scale demonstration project as the re-flooding of the marshes was undertaken by local inhabitants and IMoWR. The New Eden Team led the field studies of the recovering marshes to evaluate the progress of restoration and determine whether full-scale restoration of the marshlands was feasible. At the conclusion of the Abu Zirig Program, the New Eden Team provided a detailed structural design for a set of large water flow regulators, as well as a suite of management measures that would be required to keep the marshes thriving.

Still in 2004, the New Eden Team conducted the *Water & Energy Optimization Feasibility Study* that assessed different strategies of providing potable water as well as treating wastewater in the region. The project also assessed the energy potential and needs in the study area and provided a concept design for a 50MW gas-powered plant, which would provide enough energy to fulfill all the proposed water-related activities. Some indications were ultimately provided in order to use this opportunity to gain carbon credits under the Kyoto Protocol. Both projects were presented at the 13th United Nations Sustainable Development Conference (CSD-13) in New York in April 2005.

In June 2004, the Iraq Foundation presented a detailed work plan to support the Iraqi Ministry of Water Resources, Centre for the Restoration of Iraqi Marshes (CRIM), along with the Iraqi Ministries of Environment and Municipalities and Public Works in their endeavor to create a Strategic Plan for sustainable restoration of the marshes of southern Iraq. The proposed study comprised two main areas of activities: Marshlands Hydrology and Water Assets. This study was called the “*Master Plan for Integrated Water Resources Management in the Marshland Areas*”. The scope of work was agreed upon by the relevant Iraqi Ministries as well as the international donor community during the donor’s coordination meeting held in Venice in October 24th 2004, and the New Eden Master Plan was designated as the lead effort in all water-related activities concerning the restoration of the marshes.

In early 2005, the work plan was revised to accommodate specific requests of the Ministry of Municipalities and Public Works of Iraq to expand the scope of the “water assets” component and carry out an urban planning analysis of the rural communities surrounding the marshes. The preparatory activities for the Master Plan were activated in the fall of 2004 and included



the mobilization of a team of Iraqi, Italian and international expert that at the end of the project included a total of 115 people.

The Plan was developed during the period March 2005 – June 2006, when a draft version was submitted to the Iraqi Ministries for comments and observations. The final version of the Plan was published in October 2006.

2. Project Achievements After 10 Years

The achievements of the project for the improvement of the life in the marshland and the Environment in Iraq have been outstanding. A brief overview of the key accomplishments is provided below.

- Design and construction of the 18 Water Control Structures for the regulation of the water level in the Marshes with the Ministry of Water Resources
- Procurement and installation of reference laboratories
- Procurement and installation of the Reverse Osmosis purification plants for the 6 main villages of the Marches with UNEP/ UNOPS
- Implementation of the leakage control system for the water distribution system of the City of Suleimania.
- Procurement and installation of the Hydrometeorological System for the monitoring of water flow and quality in the “Water Control Center “ of the Ministry of Water Resources
- Design, procurement and construction of the Twin River Institute at the American University in Suleimania
- Design procurement and installation of hardware and software for the Marshland Information System
- Design & construction of the Visitor’s center for the Marshland Park (Adobe house and traditional Mudhif)
- Refurbishment of 4 veterinary centers in the Marshland
- Design and installation of fisheries
- Construction of facilities for water-buffalo milk processing.



Twin Rivers Institute eco-building

Technical Assistance to MoE for the implementation of UNFCCC and CBD

After the ratification by the Government of Iraq of the main Environmental International convention Nature Iraq provided and is continuously providing technical assistance to the Iraqi Ministry of Environment for the implementation of the following international conventions:

- UNFCCC The United Nations Framework Convention on Climate Change (ratified in 2009). International convention for the stabilization of greenhouse gas concentration at a level that would prevent dangerous interference with the climate system
- Kyoto Protocol (Ratified in 2009)
- UN Convention on Biological Diversity CBD (ratified in 2009). Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development.
- Convention on Ramsar (ratified in 2008). The Ramsar Convention on Wetlands, which is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

- Cartagena Protocol on Biosafety (2012) is an international agreement on biosafety, as a supplement to the Convention on Biological Diversity. The Biosafety Protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.

NI contributed to the “National Report on Biodiversity in Iraq” which was published in 2010, and to the “National Action Plan for the implementation of the CBD Program of Work on Protected Areas in Iraq”, which was completed in 2012.



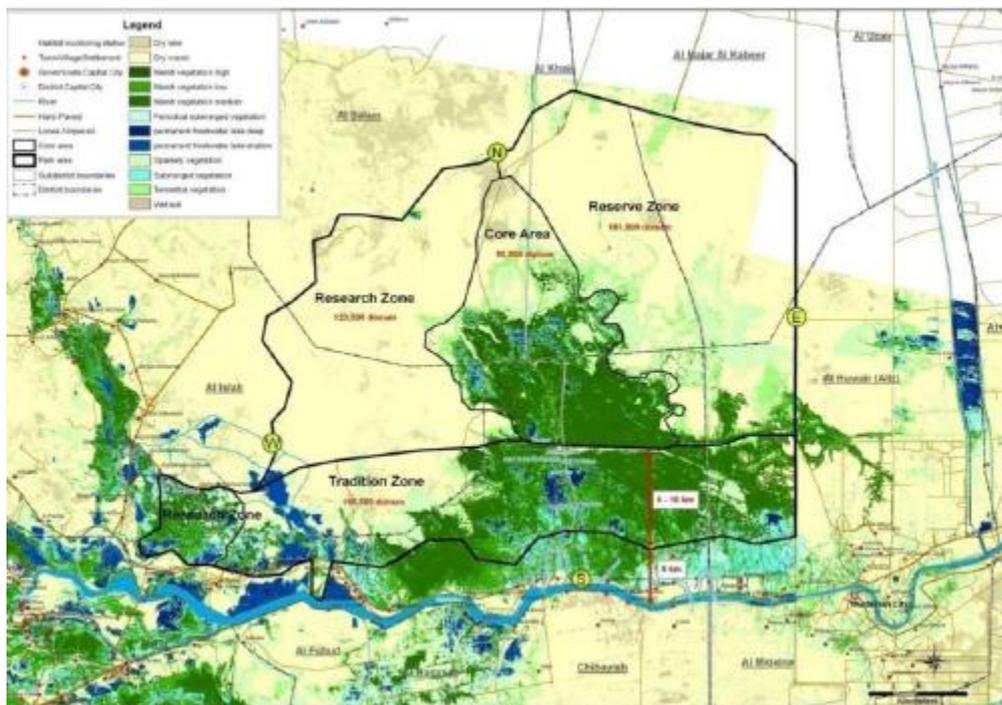
COP 10 Convention on Biology Diversity – Nagoya (Japan) 18-29 October 2010

Assistance for Protected Areas and National Parks

A large part of the New Eden project is dedicated to the restoration and environmental protection of the Marshland of Mesopotamia. Four major tangible achievement of the New Eden project.

- In 2008 Hawizeh Marsh was designated as the first Ramsar site in Iraq and in 2011 it was included in the Montreux Record (register of wetland sites on the List of Wetlands of International Importance where changes in ecological character occur as a result of technological developments, pollution or other human interference).

- The Iraqi Council of Ministers approved in principal on July 23 2013 the establishment of Iraq’s Central Marshes as a National Park;
- The Marshes are presently in the process of being nominated by UNESCO “World Heritage” as a Tool to Enhance Natural and Cultural Management of the Iraqi Marshlands.
- The marshes of Iraq are being included in the strategic planning of the water resources as a result of the efforts of the New Eden Team



Map of the Mesopotamia Marshland National Park

Presentation of New Eden Project at International Conferences

Since 2003 the New Eden Project has been presented in international conferences, we provide here below the list of the main events.

The picture below refers to a side event titled "The Iraqi-Italian cooperation for the Implementation of the UNFCCC in Iraq" at the United Nation Conference on Climate Change UNFCCC COP18 on December 5th 2012 at the presence of HE Mr. Sargon Slewa Minister of Environment of Iraq and HE Mr. Corrado Clini Minister of Environment of Italy.



Doha 2012 UN Conference on Climate Change - Side event : "The Iraqi-Italian cooperation for the Implementation of the UNFCCC in Iraq" attended by the Iraqi and Italian Ministries of Environment
Trainings

In the last 10 years more than 60 trainings have been carried on in Iraq and in Italy, Jordan, Kuwait, Syria, Canada. A detailed description of the trainings is included in the last chapter of this report. All together more than 500 persons have been trained in different topics.





3. The Challenge of Working in Iraq

Working in a country emerging from a conflict is quite a challenging task as transition seldom occurs in a smooth way. Iraq is no exception. It is a high-risk country with poor infrastructure and growing security concern.

When the New Eden team started operating in southern Iraq in 2003 – 2004 the situation was extremely difficult due to global instability and lack of basic facilities. Kidnapping and bomb attacks posed a constant threat to the safety of our experts working on the project. After the Canal Hotel bombing in Baghdad in August 2003, that killed also the United Nations' Special Representative in Iraq, international organizations withdrew their expert from Iraq for security reasons. The Italian experts from the New Eden team were among the few foreigners who took up the challenge and kept working in Iraq.

After ten years, conditions have slightly improved although security is still a major concern and require massive deployment of armed escorts and armored vehicles.

The mobilization of the international experts involved in the New Eden project required huge efforts to put in place adequate logistic arrangements, including professional security service. This has made the operations much more difficult from any point of view but more than that required spending a very large amount of funds to guarantee the security of the Iraq and,



above all, of the many Italian experts which travelled to Iraq during the last 10 years, carrying out dozens of field surveys and visits which exposed them to real threats of robbery and kidnapping.

Nature Iraq (NI), the project implementing agency, has established three main offices across the country: one in the north in Sulaimaniyah, one in Baghdad and one in Basrah which was then closed and reopened in the center of the Mesopotamia marshes in Chibaiysh. All offices are adequately equipped with IT facilities and employ 40 permanent staff in addition to around 20 international experts that on a monthly basis move back and forth between Italy and Iraq.

Nature Iraq adopted a practice of hiring locals from local tribes as logistical experts and security providers. We believe that this strategy was the main reason why our foreign personnel as well as locals were not harmed during ten years of operations. We have had only one single incident where local personnel from ministry of environment and one of Nature Iraq employees were kidnapped at gun point for ransom. That happened as a result of the breach of regular practices of hiring local tribal workers for security and logistic support. A mistake that the families of the employees paid for through ransom to the kidnappers. Nature Iraq refused to cooperate with the kidnappers not to pay ransom as doing so would mean that we have to cease operations in the south as our teams would become legitimate targets for those wanting to make money from kidnap for ransom.

C. Activities from 2003 to 2005

1. Abu Zirig Marsh Monitoring Program (2004-2005)

The Italian Ministry for the Environment, Land and Sea (IMELS) contributed to the successful restoration of the Abu Zirig Marsh, located northwest of Nasiriya on the western side of the former Central Marsh. This marsh was re-flooded in June 2003 as a result of the direct action of the Iraqi Ministry of Water Resources (IMoWR) at the request of the local population. The area stretched over 120 km² and its recovery is progressing very well, with reeds growing higher than 2 meters. The New Eden Project Team has been actively involved in monitoring the marsh since late 2003 by collecting data on physical water properties, water samples as well as information regarding ecological indicators.



As many as 45 different bird species were spotted during field visits. Three of the bird species were listed as endangered and endemic. The area was (and still is) very heavily used for fishing by the people living in villages around the marsh. Water flow into the marsh is regulated by the IMoWR and the marsh remains in a very healthy state.

The study carried out under the project covers six main areas of activities, namely: (1) collection of background information, (2) performance of topographic survey, (3) monitoring activities, (4) capacity building work, (5) numerical modeling and (6) water control structure design. To provide a scientific framework and understanding of the location and nature of the Abu Zirig marsh as well as to thoroughly identify the 3 type of actions necessary to conduct and complete the work a background analysis was carried out prior to commencing the work.

A topographic survey for the Abu Zirig marshland was conducted with the use of IMoWR resources; financial and technical support was given within the framework of the Water and Energy Project. Italian experts provided monitoring equipment and laboratory apparatus as well as developed and delivered training courses to the staff of the Free Iraq Foundation, IMoWR and the Iraqi Ministry of Environment. Training focused on data collection, sample preservation and handling of protocols and analyses.

Both monitoring and survey activities were needed to compile numerical models that were intended to help understand the circulation of water in the marsh and the resulting changes of the physical properties of the water. The model was intended to provide assistance to the design of a marshland management plan for Abu Zirig. Modeling and design activities were performed in close cooperation and consultation with residents of the Abu Zirig marsh area as well as the Centre for the Restoration of the Iraqi Marshlands (CRIM) and the design agencies of the IMoWR.

The background chapter of the technical report provides an exhaustive description of climatological and environmental parameters both at the regional and project site levels. An extensive analysis of the Gharraf irrigation project was performed twice due to the fact that the Abu Zirig marsh receives 100% of the water from this highly regulated channel. Proposed plans for the “East Gharraf Irrigation Project” (GERSAR and Iraqi Ministry of Irrigation) were prepared to implement a system of regulations between Bada’a and Islah which, if constructed according to the original design, would have left little or no water to Abu Zirig.



The survey activities aimed at providing detailed and accurate information for the marshland conditions prior to the re-flooding thus helping to define a baseline for the restoration plan. To this extent, the acquisition of high resolution (accuracy < 1 meter) up-to-date satellite images of the area (dated of April 2003) was of a great value. A soil type classification analysis was performed to define marsh area land-use pattern during dry period. It revealed that most of the land inside the marsh was not utilized for agriculture purposes, however, the images do show what is thought to be desert vegetation. The same soil classification analysis was performed on a second image taken after the re-flooding. The two datasets were ultimately compared, providing valuable information on the lands transformation process. Between February and March 2004, a land survey of the marsh was carried out by the IMoWR's survey department.

The survey plan was financed by the New Eden project and designed in cooperation with the Italian experts. Traditional survey equipment was utilized to provide more than 200 km of highly accurate topographical data, under water, which were analyzed and post-processed in Italy to become the basis for much of the activities carried out in later stages of the project.

Chapter 4 of the final technical report provides details of two training activities, which were conducted in cooperation with the Italian experts. The first training session was held in Iraq at the end of March 2004 and involved 32 representatives of IMoWR's, Iraqi Ministry of the Environment and the Free Iraq Foundation. The second training was held in Italy, between the city of Ravenna, the delta of the Po River, and Venice and involved a total of 6 Iraqi representatives.

The training provided the basis for launching the monitoring activity as it coincided with the delivery of the monitoring equipment (computers, cameras, GPS systems, 4 portable water quality meters, 2 flow meters and other equipment) and, during the second part of the first training, the group moved from Baghdad to Abu Zirig to test the equipment and decide together on the monitoring strategies. Several other smaller training sessions were held also on the use of numerical models and other software utilized to perform various analysis required by the project.

A summary of the results of the monitoring activities initiated at the end of the first training in Iraq, is presented in Chapter 5 of the technical report. Monitoring trips were carried out at Abu Zirig on a monthly basis. The first mission was held in April 2004 and the latest in



March 2005. During these missions, it was possible to collect physical parameters (water and air temperature, water speed and depth, pH, dissolved oxygen, conductivity, and salinity) and water samples (for laboratory testing) at 42 different locations. All such data have gone through in-depth quality control and are organized in a Microsoft Access database.

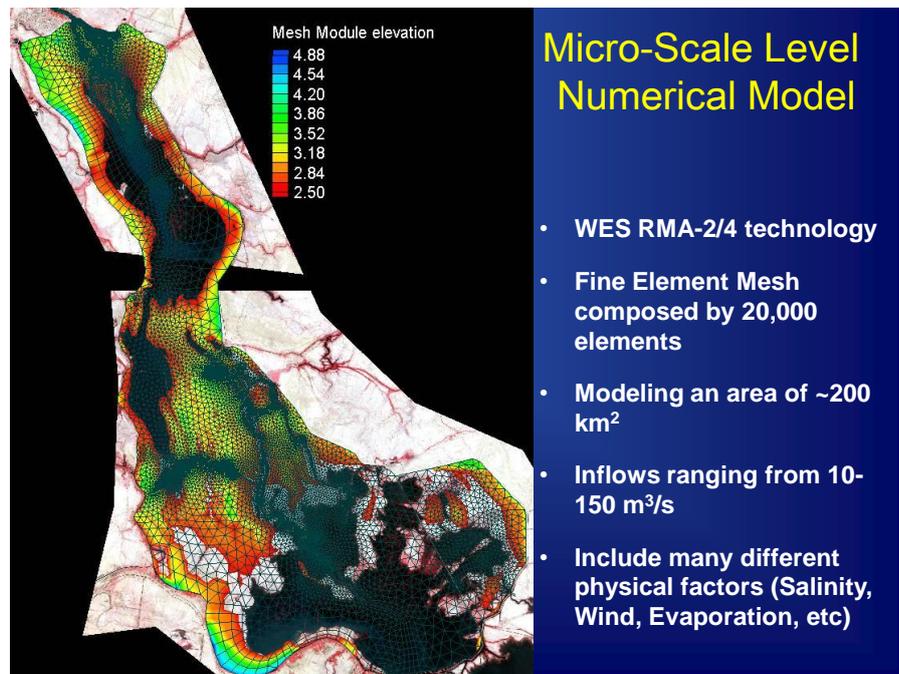
During the same monitoring trips, professors and students from the Baghdad University as well as from Bassrah University carried out extensive ecological monitoring. Statistics on birdlife as well as fisheries, mollusks, plants and soils were made. A summary of the data collected was presented in the technical report, whereas the full mission report is attached as an annex. Ultimately, the monitoring activity was supported by remote sensing type of analysis conducted utilizing high resolution QuickBird images of Abu Zirig. The investigation allowed the team to map, with high accuracy, the regions where vegetation is growing and compare the images to the data from the ground monitoring, allowing to do remote sensing characterization of the vegetal cover, and even aquatic plants. Numerical modeling was utilized to support the water control structures design activities as well as to provide a sophisticated yet vigorous numerical tool for the continuous management of the marshlands. To this extent 4 different types of numerical models were utilized:

The Hydraulic Engineering Center (HEC) Reservoir Evaluation System Model (Res-Sim), originally developed by HEC in cooperation with the IMoWR, was extended to account for the Gharraf irrigation system. At this stage, this model provided continuous flow records at the Bada'a regulator. In the future, once the REs-Sim model will be completed by HEC and IMoWR, it will be possible to use it to plan for water releases at Abu Zirig by a mean of modifying water allocation upstream of the marsh.

The FLO-2D (O'Bryan, 2004) model was then utilized to study the complex dynamics of the marsh in the presence of the proposed water control structure. The model was designed to test the water dynamics in the marsh, test induced hydroperiod changes and artificial flooding. The model accounts for water losses due to evaporation, seepage and infiltration.

The Waterways Experiment Station (WES) RMA-2 and RMA4 models were ultimately prepared to investigate the diffusion of constituents such as salinity, dissolved oxygen and temperature changes in the marsh depending on possible modification of the topography. These models have been chosen because they are analytical tools accepted worldwide and

they are available free of charge (public domain) along with the programming code thus making them ideal to be distributed at academic level in Iraq to continue the work initiated in this project and similar projects.



Numerical Model of Abu Zirig Marsh

Based on the results of the modeling work and the information gathered during the monitoring program, a preliminary design for a number of civil works was compiled by the Italian experts. The designs were then reviewed in detail by the design department of the IMoWR and CRIM. The review process was essential to the project and resulted in major changes to the preliminary designs in view of the experience of the Iraqi engineers who are more familiar with local conditions and construction as well operational practices. The revised plans were then forwarded to the design department in Iraq to finalize the structural design and to conduct geotechnical investigations and detailed site topographic surveys in cooperation with the Italian experts.

There were three main areas of intervention proposed: one in and around the inlet area, just south of the city of Islah, the second along the road embankment crossing the middle part of Abu Zirig and the third along the southernmost embankment of the marsh next to the city of Fuhud. The proposed work targets the inlets and outlets point of the marsh as well as the road

crossing the marsh. The idea behind the design is to create water control structures capable of regulating the water flow and stage in the marsh to mimic the natural hydrological fluctuation that was lost due to the construction of upstream irrigation and water control structures. The proposal suggest to build two or three large control structures along the road embankment in the middle of the marsh (the road effectively bisects the marsh into a north and south parts), and to repair the road and build bridges across the connecting channels). At the same time, a preliminary design is provided for the construction of two more regulators to be placed along the south part of the marsh. A number of small civil interventions have been analyzed as well, to optimize the water control and water distribution systems.



Figura 1 – Locals destroyed dyke to re-flood the Abu Zurig marsh

2. Water & Energy Optimization Feasibility Study (2004-2005)

This study aimed at analyzing, both from a technical and financial point of view, interventions to be implemented to supply potable desalinated water to an area where the sources of water supply are abundant, but have a high salt content. Since a desalination treatment would require significant quantities of power, this study also examines the possibility of providing the area with a system that would use locally available energy resources. The intervention would improve the quality of life of people in southern Iraq by providing a reliable water supply. It would also create new employment opportunities for the scattered communities of the south.



The study area is located on the Hammar Marsh, in the triangle between Nasiriyah, Basrah and Qurna; near the Rumailah oil fields. It is important to highlight that the demand for high quality potable water (like water that can be obtained with a desalination and re-carbonation plant) concerns a much wider region than the abovementioned site and includes bordering areas on the territory of Kuwait; these areas (obviously too distant to be connected to a water supply network) are highly interested in receiving bottled water.

Water has been diverted from the Tigris to supply Nasiriyah, Basrah and various scattered communities around the former Hammar Marsh with water that is less saline than that from the Euphrates River. In addition to the above, this project investigated the possibility to acquire, at limited costs, significant amounts of the methane produced in the neighboring Rumailah petrol fields that as a result of the military conflicts are currently not exploited.

Summary

In order to carry out the analysis a great amount of information had to be gathered, including:

- The resident and the commuter population of the area; special attention was paid to large consumers such as factories, commercial users, etc.;
- Water infrastructures, particularly: water supply infrastructures, water treatment plants and distribution infrastructures;
- Quality of the available brackish water;
- Characteristics of the area climate data;
- Characteristics of the available natural gas;
- Characteristics and dimensions of the energy production plants.

Data were collected from various sources, including:

- Coalition Provisional Authority – Baghdad;
- Coalition Provisional Authority – Basrah;
- Coalition Provisional Authority – Nasiriyah;
- Ministry of Municipalities and Public Works – Basrah Water and Sewerage Department;
- Ministry of Municipalities and Public Works – Nasiriyah Water and Sewerage Department;



-
- Ministry of Water Resources – Directorate of Planning;
 - Ministry of Planning – Central Statistical Office;
 - Ministry of Electricity; and
 - National Meteorological Institute of Baghdad.

Information was available in different formats and a big effort was made to harmonize the extent and quality of the existing records.

Population Data

The working team gathered information on population mainly from the Ministry of Municipalities and Public Works and from the Ministry of Planning – Central Statistical Office. The data refers to actual situation and future forecasts. Information on rural and urban population distribution was also required, especially for scattered small villages. The final objective of the analysis was to obtain information on the population of each built-up area. For each district of the two provinces information on the existing urban and rural population in the main towns was available.

Water Sources and Consumption

The study area is fed by the Tigris and Euphrates. Both rivers are characterized by extremely high seasonal and multi-annual flow variations and high seasonal variations in the volume of water carried. Peak flow is in spring and early summer, while low flow conditions occur between July and October.

Both rivers have very high total dissolved solids (TDS). The Tigris TDS varies between 280 mg/litre where the river crosses the border with Turkey and 1.500 mg/litre at Amara in the south. For the Euphrates, TDS variations are even greater, ranging from 600 mg/litre at the border with Syria to 3.000 mg/litre at Nasiriyah. Currently, the water level in the rivers is dwindling and the salinity of the two rivers has increased, especially in the southern parts.

During the time of the study, the government as well as private suppliers provided potable water to communities around the Hammar Lake and Basrah City through a complex network of canals that transport water from distributaries of the Tigris River, which has a lower salinity level than the Euphrates water. Approximately 21 m³/sec (about 1.820.000 m³/day,



year average flow) is transported from the tail end of the Gharaf River, through siphons under the Euphrates, to the cities of the southern area and Nasiriyah, Suk Al Shoiukh and Basrah.

For assessing the current and near future water consumption different water usages had to be considered, in particular consumption for domestic and drinking uses, industrial consumption as well as the water demand for populated areas, towns and villages. The calculated potable water demand has been utilized to determine the water needs of the area.

Energy Sources Data

Iraqi oil reserves vary widely in quality, with API gravities in the 22° to 35° range. Iraq's main export crudes come from the country's two largest active fields: Rumailah in the southern region and Kirkuk in the northern region. The southern Rumailah field, which extends a short distance into Kuwaiti territory has around 663 wells and produces three streams: Basrah regular, Basrah medium and Basrah heavy. Approximately 2 million bbl/d of Iraq's production pre-war capacity came from oil fields in the southern part of the country, particularly North Rumailah, South Rumailah, West Qurna and Az Zubair. The development of the natural gas is going to create still more large scale projects, including gas processing, pipelines and gas distribution.

Electric Power Infrastructure

As of late July 2003, indications were that Iraq had no more than 3.600 MW of power generating capacity, well below the amount needed to satisfy peak summer demand. Around 85% - 90% of Iraq's national power grid (and 20 power stations) was damaged or destroyed in the Gulf War. Existing generating capacity of 9.000 megawatts (MW) in December 1990 was reduced to only 340 MW by March 1991, transmission and distribution infrastructure was also destroyed, including the 10 substations serving Baghdad and around 30% of the country's 400 kilovolt (kV) transmission network. During the period between the end of the Gulf War (1991) and the last war (2003) part of the generating capacity was rebuilt or renewed, in particular power plant in southern area, in the Al Basrah province (Southern Heat and Power plant in Najibia). Moreover, after the end of the last war CPA carried out refurbishment activities, especially in the substations and power distribution network rehabilitation project.

Existing Water Infrastructure



The study carried out under the project aims at identifying and quantifying the water supply systems needed to supply water (not only potable but also desalinated one) to the population that still complains about shortages in water supply or that has no water supply at all as well as realizing new plants where there are none or enlarging the existing ones, providing them – where necessary – with desalinating units.

Due to the fact that the construction of the abovementioned new water treatment plants (WTPs) will lead to an increase in energy needs, the analysis took into consideration and quantified also the extent of these requirements and the possibility of meeting them by using the methane gas from the oil fields located in the triangle An Nasiriyah, Al Qurna and Al Zubayr (linked to the Abu Zareg Marsh and the most southern marshland areas).

All these interventions are indispensable and should be investigated under another study. Based on experience with similar projects costs of such systems can be estimated at minimum 1,200 – 1,500 million euros.

Potable Water Characteristics

The analysis carried out under the study adopts the potable water standards applied in the European Union countries. In particular, the desalination unit of each new and/or existing plant shall be assessed on the basis of its compliance with European Community regulations. This means that, irrespectively from the water source (Marshes, Euphrates, Sweet Water Channel, etc.), the water shall have less salinity (TDS) than the maximum admissible concentration (MAC), equal to 200 mg/l.

Because of this TDS limit, even the water taken from the Sweet Water Channel needs to undergo a desalination treatment. Therefore the study suggests for the new plants to be completed with desalination units and for the existing plants (that at the present time have none) not only to be overhauled, restructured and, where necessary, expanded but also equipped with a desalination unit.

Water Treatment Plant Structures

The analysis carried out under the project took into consideration only membrane plants. The technology used in evaporation plants, even if very good from the point of view of efficiency, does not suit the territory because it is more complicated than membrane technology, needs



more protection against corrosion, is not easy to adapt water production to real demand and, in more general terms, needs highly skilled staff nearly all the time.

In order to facilitate the presentation of the existing and new plants the following numbering system will be adopted:

- Existing water treatment plant, WTP or CU, with sufficient water production to supply year 2012 demand; the following interventions shall be considered: implementation of the desalination unit, recarbonatisation section included, restructuring of the existing plant (if necessary) and installation of the electrical generators needed for the desalination process.
- Existing water treatment plant, WTP or CU, with insufficient water production to supply year 2012 demand; the following interventions shall be considered: plant development, implementation of the desalination unit recarbonatisation section included, restructuring of the existing plant (if necessary) and installation of the electrical generators needed for the desalination process.
- New reverse osmosis plant for desalination and potabilisation; the plant configuration includes: implementation of the water supply point, laying of the pipe feeding system from the source to the water treatment plant and from the water treatment plant to the distribution network, construction of the desalination and water treatment plants, recarbonatisation section included, implementation of the supply systems (tanks, electromechanical equipment, etc.) and installation of the electrical generators needed for the desalination process.

Due to specific situation of the Iraqi national electric grid, it has been assumed that in both new and existing plants (where a desalination system is to be added) a generator will need to be installed. Because of the presence of numerous oil fields with unutilized large quantities of gas close to the study area, part of the study examines the possibility of using this source of energy for the production of electricity instead of the various generators.

Effectiveness of the Investment

The effectiveness of the works can be represented by the ratio between the number of people using the works and each 10,000 euros of the expense sustained for the implementation of the works. For all the existing plants producing potable but brackish water, the financial



requirement in order to supply potable desalinated water shows an average effectiveness for the whole territory of 90 inhabitants per 10,000 euros of expense.

For the new plants producing potable and desalinated water, the financial requirement in order to supply potable desalinated water shows an average effectiveness for the whole territory of 30 inhabitants per 10,000 euros of expense. These values are in line with the indicators usually found in similar situations. Taking into consideration the effectiveness of each individual plant, a list can be drawn up showing the ratio between the effectiveness of the individual plant versus the average effectiveness, as shown in the following tables. This analysis indicates that many plants show an effectiveness equal to or higher than 80% of the average effectiveness.

Energy Production Requirements

Producing desalinated water involves considerable power consumption; in view of the unreliability of the Iraqi national grid, the project dealt with the problem by supplying each plant with an electrical generator suitable to meet the power requirements of the desalination process: the solution proposed provides for each desalination plant to have its own electrical generator for a total of 160 plants.

As mentioned before, in the project study area (i.e. the triangle linked to the Abu Zireg Marsh and to the most southern marshland areas which has its apexes in the triangle of An Nasiriyah – Al Qurna – Al Zubayr) there are important oil fields producing a considerable quantity of gas that is wasted at the moment. Therefore the study investigates the power requirements for the desalination process and assesses the possibility of meeting such requirements by using the gas produced by the oil fields.

The total cost of the electrical generators is quite high (about 17 million Euro), even if not considerable in view of the total investment of over 335 million Euro. It is therefore important to compare it with a solution based on the centralized production of the power required. In fact, the cost of a 20 MW thermal power station can be estimated at about 12 million Euro, which would be a considerable saving. The construction of a centralized power station would also mean significant savings in operational costs which would be even higher if the gas produced in the nearby oil fields was to be used.



Taking into account the above, as well as keeping in mind that the proposed water system's (i.e. potable water supply, treatment and distribution services and wastewater collection and treatment) total energy requirement is some additional 30 MW, an analysis was developed to investigate the possibility of implementing a 50 MW thermal power station. This was done noting the following points:

- The cost of such facility would lead to an increase of required funds by some 25 – 28 million Euro (i.e. not higher than 7 – 8% of the overall total investment of 335 million Euro);
- The amount of gas produced by oil field located in the areas is much greater than the amount actually needed for producing 50 MW; and
- It would be very useful to understand and assess the qualitative and quantitative aspects of gas production to better determine the capacity of such type of source for electric power generation.

As mentioned above the natural gas in the oil fields of Rumalia and Zubair, located in the South of Iraq, is not exploited. A demand for the use and possible storage of this gas can contribute to the creation of a local gas market and will have important consequences both for the international investors and for the southern part of Iraq from an environmental, labour (i.e. social), economic and energy point of view.

Based on the experience from similar projects implemented in other countries and specific data provided by the Iraqi Department of Environment, it was possible to estimate for the crude oil fields of Rumalia and Zubair a production of approximately 19 million m³/day, i.e. 6,9 billion m³/year of natural gas flaring or emitted to the atmosphere.

Taking into account a prudential approach, the content of gas methane in the natural gas can be estimated at 90%. Based on that methane daily theoretical availability of $(19 \times 0,9) = 17$ * million m³/d can be calculated. In addition, considering local specifics and difficulties in supply and transport, in a short term this availability should be estimated at about 50% of theoretical availability, i.e. $(17 \times 0,5) = 8,5$ million m³/d of gas methane. Finally, it should be also assumed that the system for the above first and second phase will suffer some losses, e.g.

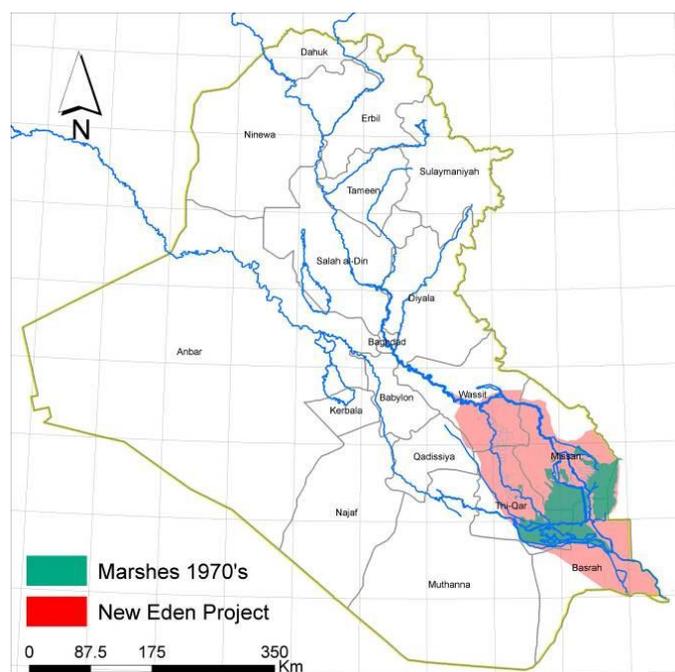
due to bad functioning or seize of services, that can be assessed at up to 15% of its theoretical potential. This means that daily availability of gas methane is $(8,5 \times 0,85) = 7.2$ million m^3/d .

As for the energy content it is known that the lower heat content for the methane is 8.485 kcal/Standard per m^3 ; omitting the passage between Nmc and Smc it is possible to obtain a theoretical available energy of $(7,2 \times 8.485) =$ over 60 billion kcal/d, i.e. in terms of kWh $(0,001163$ kW per kcal) $= (60 \times 0,001163) =$ about 70 million kWh/d theoretically or a power station of 1.500 MW. If it is possible to have the exploitation of 1.500 MW using flared gas, it could theoretically lead, under the UNFCCC, to a carbon dioxide (CO_2) reduction equivalent of approximately 30 million tons/year, equivalent on the Certificate of Emission Reduction (CER) market (6 €/ton of CO_2) to $(6 \times 30) = 180$ million €. It should be noted that none of the recommendations presented in this study were undertaken by the Iraqi government because the strategic decision of decentralizing has been slow to implement.

3. New Eden Master Plan for Integrated Water Resources Management in the Marshlands (2004-2007)

The purpose of the “*New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area*” (hereafter the Plan) is to assist Iraqi policy makers by providing sound information and analytical tools with which to make reasoned choices regarding water resource allocation and environmental management decisions. Accordingly, the Plan pursues a holistic and integrated approach to address multiple issues simultaneously. The issues addressed include improvement in water utilization efficiency, environmental restoration, economic enhancement, flood control, and community building for returning peoples.

The plan covers an area of





approximately 40,000 km² which include the three southern Governorates of Thi Qar, Missan and Basrah as well as the southern portion of the Governorate of Wassit.

This Plan, which was sponsored by the Italian Ministry for the Environment, Land and Sea (IMELS), is a joint venture pursuant to a memorandum of understanding (MOU) with IMELS, Iraqi Ministry of Environment (MoE), Iraqi Ministry of Water Resources (MoWR), Iraqi Ministry of Municipalities and Public Works (MoMPW), and the Free Iraq Foundation (IF)/ Nature Iraq (NI). The project team was headed by Nature Iraq and carried out by a group of Iraqi, Italian and international experts referred to as the New Eden Group. The project team received technical assistance from a variety of other organizations and local Iraqi consulting firms. Some data from projects sponsored by UNEP and the University of Waterloo/Canadian International Development Agency (CIDA) were also used to create the inputs needed for the hydrological and ecological aspects of the plan.

The goal of the New Eden Team was to develop quantitative models and descriptive analyses that will help policy makers manage the complex hydrologic systems of the southern Mesopotamian region. Reliance on models is in keeping with the mission of this project to provide the Iraqi government with methods of data interpretation that are transparent and that will provide reliable, fair, and consistent data so as to improve the quality of predictions whilst reducing the fiscal costs of implementation.

All models were generated using proven statistical approaches that are commonly accepted by the professional and academic communities in the appropriate disciplines of engineering, economics, and ecology. In order to assure ease of use, project members used “off the shelf” technologies that are widely available. As a result, Iraqi officials and scholars can collect additional data and use the analyses described to create new results under changing conditions without difficulty. The Master Plan is structured into 3 volumes for a total of 8 different books which deal with the various thematic areas that were studied while developing the project. Many inserts, plates and annexes are also an integral part of this work. The list of the various documents which are part of the Master Plan follows.



Executive Summary

Volume I – Overview of present conditions and current use of the water in the marshlands area

Book 1 – Water Resources. Review on climatology, geology and hydrology of the lower course of the Tigris, Euphrates and Kharkeh watersheds.

Book 2 – Water and Sanitation Assets. Description of the present state of Water and urban/rural assets for the villages within the governorates of Thi Qar, Basrah, and Missan.

Book 3 – Agriculture. Evaluation of the water demand for agriculture based on both the past-planned and present conditions in the four governorates of Thi-Qar, Wassit, Missan and Basrah.

Book 4 – The “marshlands” environment. Description of the former marshlands before their draining in the 90’s. Description of the present state of the marshes and their fauna and flora.

Volume II – Future water resources requirements in the marshlands area

Book 5 – Modeling tools for the analysis of the “Marshlands”. Description of: the methodology, datasets, numerical tools (water balance, water management, hydrodynamic and socio-economic models), boundary conditions, calibration and verification.

Book 6 – Planning scenarios. Evaluation of the benefits associated to marshlands restoration. Description of a set number of water allocation strategies for marshlands restoration in Southern Iraq. Presentation of exemplificative test cases and follow up steps.

Volume III – Implementation plans

Book 7 – Water and Sanitation Assets. Describe the proposed projects and the financial plans for project implementation in the upgrading of the water & sanitation infrastructures.

Book 8 – “Marshlands”. Feasibility studies for the implementation of a number of infrastructural changes required to best manage water for marshlands restoration. Feasibility study for the implementation of the New Eden Villages conceptual models.

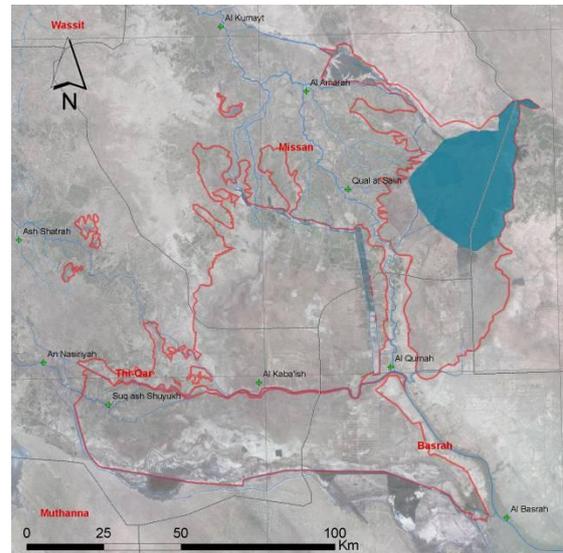


The Master Plan proposes a sustainable marshlands restoration plan within short- (one-year), medium- (5-year), and long-term (25-year) strategies. Possible restoration levels are classified into four recovery scenarios:

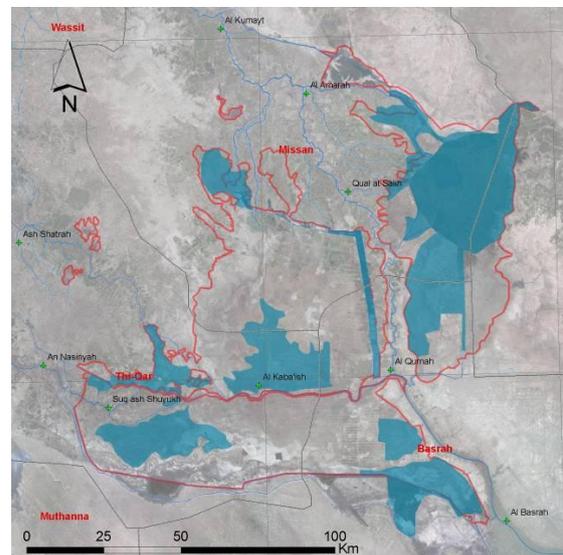
- 0% -25% recoveries – the marshes will remain at the 2002-level, implying that no effort will be made by the Iraqi government to sustain the marshes and that marshes will disappear in the medium-long term.
- 25-50% recovery – the marshes will remain at the current level, and efforts from the Iraqi government will be required to maintain the current water allocation for future levels in the marshes. During wet years, a minimal improvement might be achieved with a small effort in term of water management at the national level.
- 50-75% recovery – the marshes will remain at the early 1990s-level, with efforts of the Iraqi government required to improve the irrigation system at the national level, and with best management of agriculture practiced at the local level. (Note: The upper limit of the recovery under 50-75% recovery plan might be achieved through an agreement with Turkey, Syria and Iran.)
- 75-100% recovery – reinstates the marshes at the 1970s-level, with the bulk of additional water required for this scenario provided by agreements with other countries.

New Eden’s Master Plan provides recommendations for the achievement of each level of restoration, from infrastructural (new regulators, new canals, etc.) to socio-economical (retaining culture, providing income). New Eden’s scenarios are designed to deliver tools for MoWR, MoE and MoMPW of Iraq to make informed decisions for the re-development of the Marshlands. A number of salient conclusions can be drawn from the results found in the reports contained in the Plan. These findings include the following:

- Marsh restoration is technically feasible and economically viable* (the figures below show the recovery of the former marshes that was accomplished in just two years). Several options for marsh restoration are available and can be tailored to meet changing societal demands. Restored marshes produce a host of socio-economic values that are a significant benefit to the entire Iraqi population and are vital to the local marsh area residents, many of whom are returning refugees.
- A robust program of effective marsh restoration can be implemented utilizing significantly less water than previously anticipated.* Thus, restoration efforts can be achieved concurrently with efforts to improve agriculture and foster other economic expansion.
- Present agricultural practices are highly unproductive and water-consuming.* Agricultural projects planned in the past should be rethought with the sustainable utilization of the available natural resources playing a central role in the new plan. Both marshes and agriculture in the region could be considerably enhanced if Water Use Efficiency (WUE) strategies are implemented.
- The needs of the returning refugees can be met in *a method that is culturally appropriate, economically sustainable, and is sensitive to the natural environment.*



Marshes in 2003 (red line indicates the 1973 extension)



Marshes in 2005 (red line indicates the 1973 extension)



-
- A centralized system for drinking water supply provides the long-term optimum capital investment return to the 1,500 communities in the study area: as for wastewater treatment, a decentralized option should be preferred;
 - *Navigation along the lower reach of the Euphrates River* is highly desirable but can be sustained in the future *only if long-term investments are made*.
 - Efforts at marsh restoration over the past several years have been only partially successful due to *lack of planning*. Marsh restoration and continued improvement and stability of biodiversity require direct human manipulation and cannot be expected without active and deliberate management.

The Plan contains many important tools for policy makers. Chief among these are:

- Hydrologic models predicting water flows and allocations to marshes and the various control structures necessary to achieve the goals of sustainable environmental restoration within the marshes;
- An agricultural model that predicts the necessary water allocation to obtain production targets;
- An economic model that predicts optimal benefits from various water allocation scenarios (among navigation needs, marsh restoration goals, and agricultural production);
- Analyses for water delivery systems and wastewater treatment to meet human health requirements;
- A detailed descriptive analysis of the ecological condition of the marshes; and

A description of a conceptual plan concerning a community development strategy that is simultaneously economically viable, ecologically sustainable, and culturally appropriate, called the “New Eden Village” initiative.

The utilization of these tools allowed the preliminary definition of the area of the former marshlands that could be fully recovered considering the current limitations in terms of water availability and the activities already established/planned for future establishment in the area occupied by the southern marshes in the past.

The results of the Master Plan show the areas that are preliminary proposed for the restoration of the former marshes according to the results of the Master Plan. The final decision on the actual extension of the former marshes to be proposed for recovery should come from a coordinate effort from the various Iraqi Ministries, which are involved, with different competencies, in the planning/management of the area.

As a matter of fact with the Master Plan tools, the Iraqi government is empowered to strategically target restoration efforts where the impacts will be realized for the maximum public benefit, with the greatest likelihood of success, and with the most efficient use of water and fiscal resources. The New Eden Group has included within the plan a set of restoration scenarios to illustrate the utility of the models contained herein. The results of running the various scenarios are intended to serve as a starting point for public policy discussion and do not constitute recommendations for implementation.

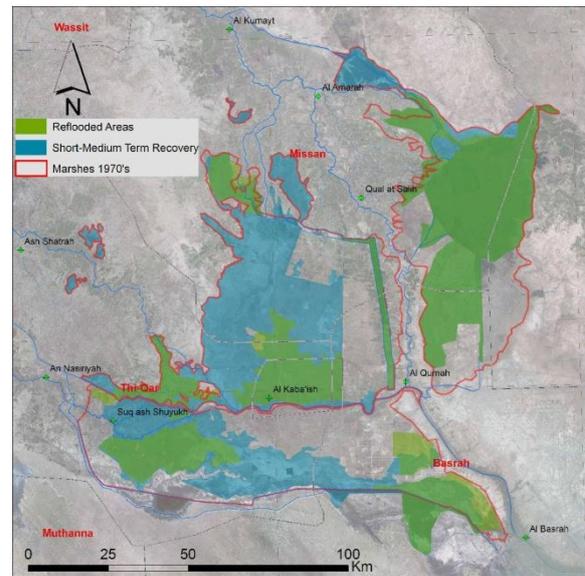


Figure C-1 - Areas proposed for marshlands restoration



4. Field Surveys, Feasibility Study, and Design of Pilot “New Eden Village” (2005-2009)

The New Eden Villages system, which was studied while the Master Plan was being developed, is located between the Central Marsh and the Euphrates river, in the Province of Thi Qar, District of Nasiriya. The area that was studied, starting from July 2005, measures 4,500 metres in the West-East direction (along the Euphrates) and 700 metres in the North-South direction. The villages devised by the New Eden villages Feasibility Study which was included in the Master Plan are meant to fit the territorial organization, scaling up to design a system of settlements, the single types of villages and the house.

The project’s structure for the system of villages was derived by thoroughly studying and understanding the territory and its functioning rules, picking out the existing resources and structuring them in different systems, with an interdisciplinary approach mixing tradition and innovation and aimed at defining new sustainable development routes for the South of Iraq.

The drained marshes reveal a harsh, barren ground resulting from a shrunken wetland. Stripped of water, its generating element, the ground has revealed, through the study of satellite imagery, the organization of settlements and built-up areas, as it was before the drainage. The settlements, nodes of a highly structured territory, had adjusted their shape to “strong” elements of the surrounding environment.

Suggesting through the project to implement the organizing rules “found” on the territory, and making this a founding assumption of the project, the Feasibility Study named the villages according to their position and role. Water Villages, Waterfront Villages and Land Villages, organized from north to south, from the Central Marsh to the Euphrates, comprise a basic module, that can be iterated throughout the strip. Each type of village is characterized by varying characteristics, roles and running costs. As any ideal model, this scheme was devised to be modified and applied elsewhere in the restored marshes, beyond the strip originally selected for the first feasibility study, in particular on the areas located around the course of the Euphrates River.

The idea of designing a pilot village was discussed with the relevant Iraqi Ministries and authorities in Amman, Tokio and Paris throughout 2005 and at the meetings of 2006 held in Erbil, where an agreement for the implementation of the first actions from the New Eden

Master Plan was signed by all involved stakeholders. The design of the first pilot village has gone through the following steps:

- Choice of the type of village to be designed, developed in agreement with the relevant Iraqi authorities;
- Identification of the site location in agreement with the relevant Iraqi authorities, who chose the site;
- Topographic survey;
- Concept design of the pilot village;
- Detailed design of the pilot village

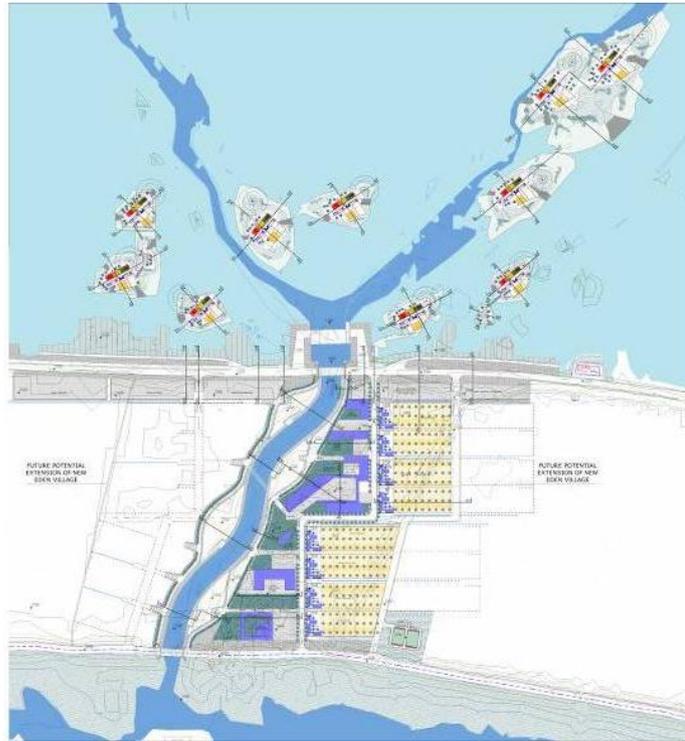
First, the site and the type of village, a combination of a Land Village and a Waterfront Village, has been selected: the geographical location of the village is shown in the figure below. A location was identified in the area of Abu Al Narsy. The site, close to the city of Al Chibayish, is comprised in the strip between the Euphrates river and the road and the settlements system that had been studied on a large scale in the Feasibility Study.



Location of Abu Narsy village

After the selection of the site and the type of village, a Waterfront Village, a site-specific concept design has been developed as the first step after the completion of the topographic survey and the soil investigations, then the project was finalized through the development of

the detailed design. As shown by the figure below, the village is built partly in the area between the main road Basrah-Nasiriyah and the Euphrates river (Land village) and partly on the islands which are in the immediate surroundings of the southern edge of the Central marsh, very close to the main road.

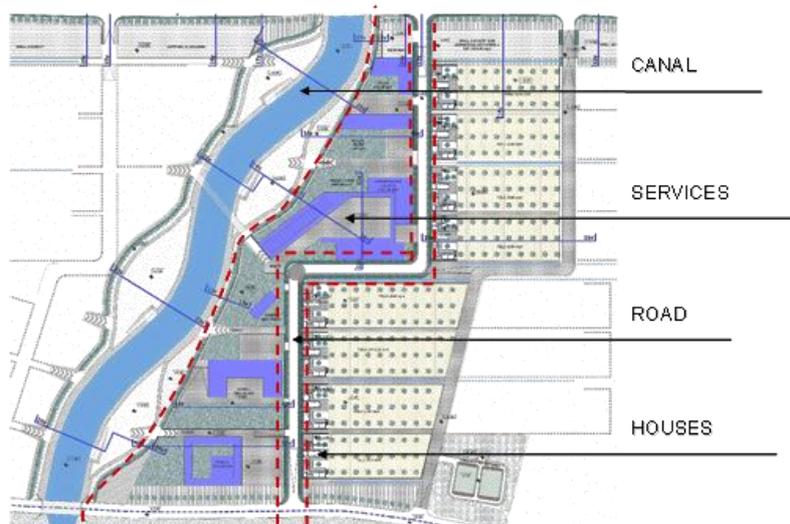


General Layout of the village, islands and land plots

The first lot of the village can be considered the core of a much larger settlement, which can be developed in the following phases of the project just adding new housing units and private allotments. As a matter of fact the detailed design has foreseen the construction of all the facilities and services that are needed for a fully developed village, like:

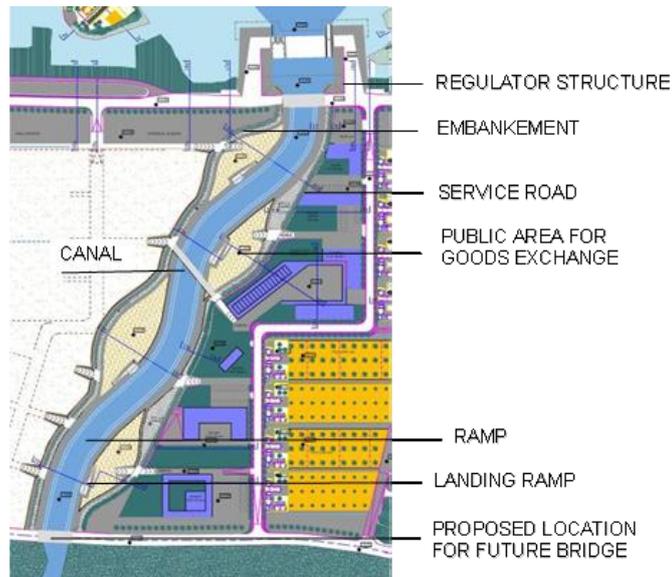
- the administrative building
- the school
- the medical centre
- the mosque
- the market area
- areas dedicated to commercial activities and small industry.

The basic services (water, electricity, sewage etc.) has been designed taking into the consideration the future expansion of the village and, as for the water supply system, the need to supply water also the exiting villages in the area which for the time being lack reliable potable water production systems. The organization of the land plot is shown in the figure below.



Organization of land plots: Canal, road, public services and houses

The landscape feature characterising the New Eden Village Land includes a navigable channel that divides into two symmetrical banks, destined to house jetties or “port-type,” to carry out the function of landing goods from and to the innermost marshes. Bank maintenance includes an easily sustainable system to maintain a constant state of cleared vegetation to permit easy docking. The “serpentine” like shape of the main canal imitates the meandering form of natural canals of the marshland. For this reason, it integrates itself with the environment, reducing the impact of the embankments on the surrounding landscape. From an engineering point of view, the meandering of the canal is a suitable solution since the entrance point and the exit point are more or less the same. The layout of the canal is shown in the figure below.



Canal layout

The design considered also the many functions, which can be played by the vegetation in a similar environment, namely:

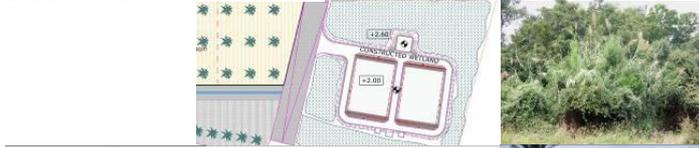
- shading of the housing units (palms);
- masking some of the constructions (like for example the constructed wetland), with Giant reed;
- anti-erosion function for the embankments, with sedge, reedmace and rusches;
- production of fruits (date palms).

A choice has been made to work with vegetable species easy to find on the spot that serve as starters for the settlement of all the others that are linked to an initial preparation of the habitat. Furthermore the choice of the species to include is determined not just by environmental factors but also by social and economic factors. Preference has been given to those which have always been used by the Marsh. The different important roles played by the vegetation are described in the figure below.

COVERING VEGETATION
Vegetal cover to strengthen the embankments



MASKING VEGETATION
Vegetal curtain to hide technical devices



SHADING VEGETATION
Palm trees on islands and public roads



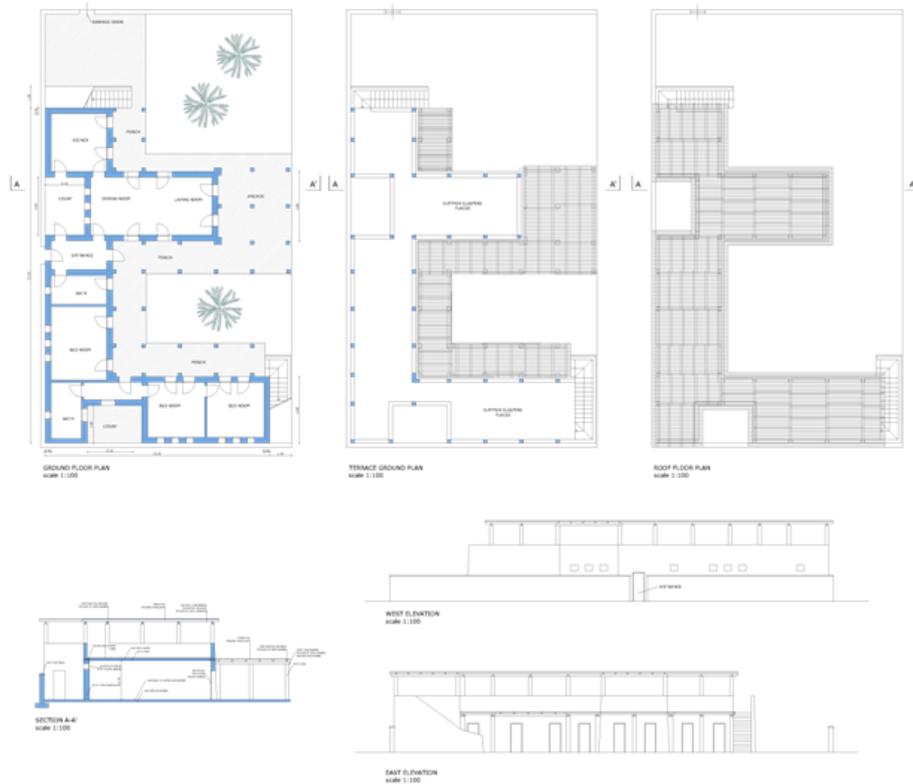
FRUIT GROWING
Date palm plantation



Landscaping

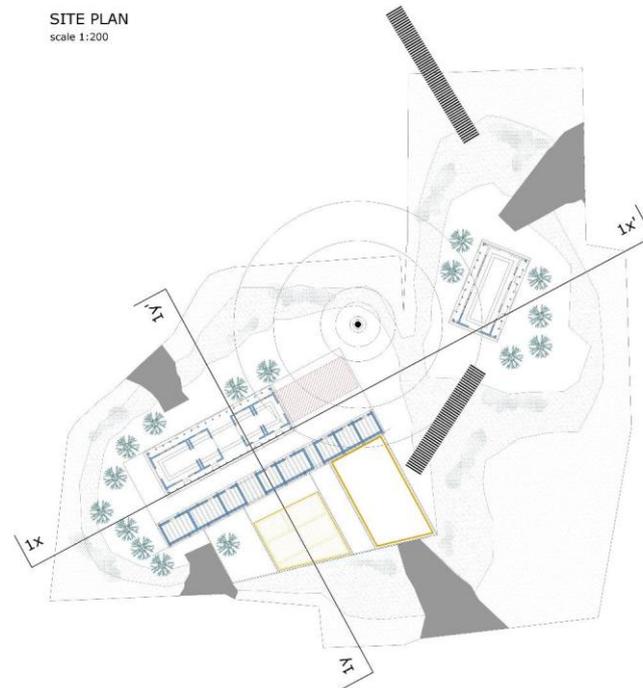
As shown in the figures below, two different types of housing units were designed for the part of the village located on the mainland and for the islands.

The land house has a plot functional to the urban structure in which it's enclosed, namely, it has the entrance on the main road and a service door on the secondary road. The house is surrounded by a wall, dividing it from the road. The house develops around a court, on which all the rooms open, the court is open to the field, so to allow an easy connection between the two area. The construction materials are brick for the walls, concrete for the slabs, and reed bundles for the roof.



Land House

In the islands, one platform will house two structures: the house and a service block linked by an open-air path sheltered by roofing that virtually subdivides the island into three portions, as shown below.



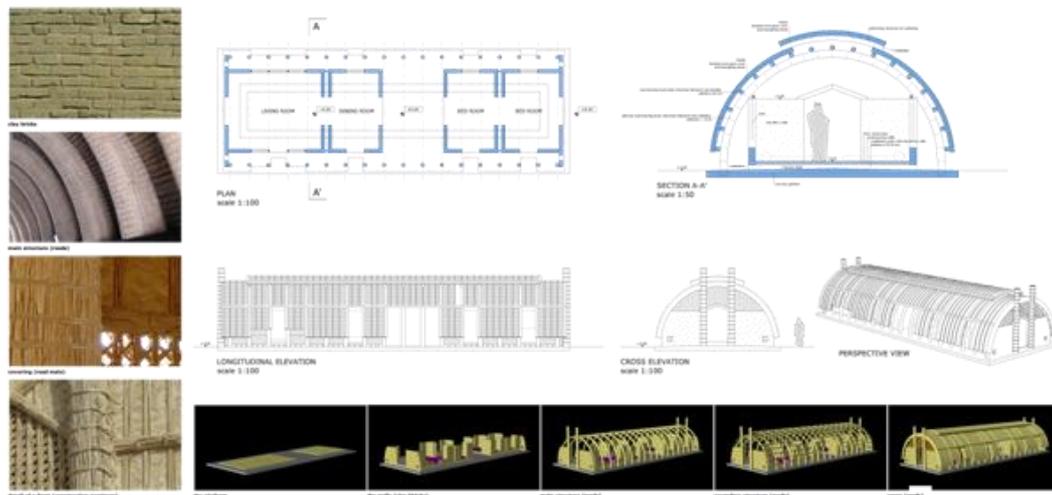
Islands layout

Amid and all around the premises, open space for family and animals used for various activities include outdoor sleeping for the hottest period of the year. In particular, the house and service block encompass a type of courtyard as a true extension of the dwelling, open at the ends and of great value for household activities taking into account that daytime is spent in a wide range of outdoor occupations. This open space is meant for women, in particular, whose lives predominantly revolve around the island and who, with children's help, are responsible for much of the daily work and the chores.

The house includes a sequence of spaces covered by an arched structure with a living room, dining room and two bedrooms; all communicating spaces are open at both ends that make up the basic core of the lodge. All rooms include openings and windows on the long sides of the building. There is a correspondence between such openings or windows and mats in the roofing that may be rolled up as curtains, so that the rooms may be lit both by direct or indirect light.

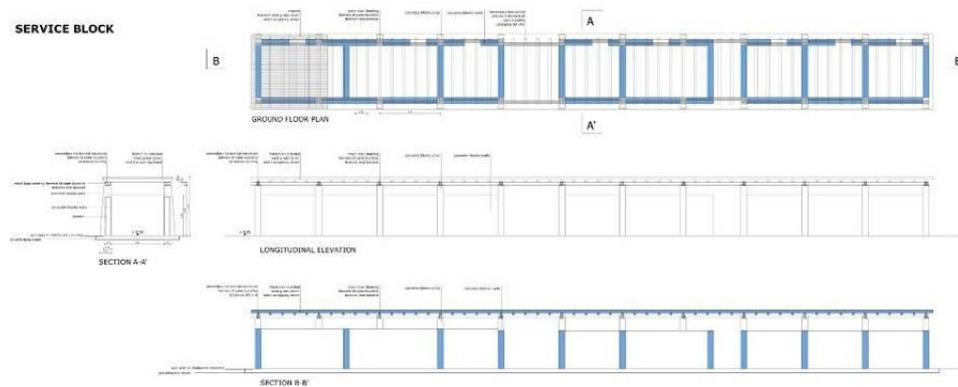
The house is built with a mixture of traditional and modern materials and techniques, and is constructed of an outer shell containing inner separate spaces with rooms designed as freestanding boxes around which air can thoroughly circulate. Mosquito nets can be drawn, in

the fashion of a roof, from the top of the walls in order to protect dwellers from various types of insects. Reed is the main building material, rendering the house both light and resistant. Service rooms and spaces have been gathered inside one block independent from the housing structure. Such layout takes into consideration an age-old building tradition and resumes the lifestyle held by returning dwellers without introducing solutions that might pervert the nature of traditional dwelling. The typological asset of the house is shown below.



Island Houses

The service block, a central structure that is the true backbone of the island, is connected to the housing structure by a sheltered access corridor. Housing premises include bathrooms, kitchens, water tanks, working areas and storage spaces. An example of service block plot is displayed in the picture below.



Islands service blocks

D. Activities from 2006 to 2008

1. Procurement Laboratory Equipment and Capacity Building for Iraqi Authorities (2006-2007)

The Italian Ministry for Environment and Territory and Nature Iraq set up a new reference environmental laboratory carrying out specific tasks focusing on water quality and on the procurement of additional equipment to be installed in other laboratories. The activities include:

- Identification of current availability of laboratories facilities as for water quality analysis and definition of most urgent needs and priorities;
- Assessment of required analysis for water quality, in co-ordination with employees from the MoE and with Iraqi experts;
- Market analysis for the identification of most appropriate equipment for the analysis required for water resources management in the start-up phase of the New Eden project;
- Cost analysis;
- Development of detailed data sheets for the equipment to be supplied;
- Joint development of the terms of reference for the procurement of laboratories' equipment;



-
- Training of MoE and other Iraqi environmental authorities employees and of Iraqi experts on water quality analysis;
 - Provision and installation for the most urgently needed equipment.

During the first technical meeting in Dohuk (April 21st, 2006) the Ministry of Environment was required to supply a “wish list” of the laboratory equipment to be procured within the 2006-2007 New Eden project activities. A first list was delivered to the New Eden team during the following technical meeting of Amman (May 31st). In the following weeks discussions were activated between the MoE and the New Eden team on the development of a final list of the equipment to be supplied and the prioritization of the equipment included in the list. The complete set of the equipment to be supplied was then finalized in the following technical meeting that was held in Suleimaniya on July 22nd – 23rd.

The procedure for the procurement for the laboratory equipment was started by Nature Iraq by the publication on two major Italian newspapers (*“Corriere della Sera”* and *“Il Sole 24 Ore”*, both on the June 29th edition) of the request for the expression of interests (see figure 1). The request was addressed to specialized Italian companies, which were encouraged to associate with Iraqi companies for the execution of the work.

All the five (5) companies that sent the EoI were considered to respect the basic requirements for the participation to the tender procedure and were therefore pre-qualified. In the meanwhile, the New Eden experts developed the Terms of Reference (TOR) to be sent to the pre-qualified companies for the preparation of the proposal. The invitations to tender are to be sent to the pre-qualified companies in September 2006: the contract was awarded in the first months of 2007.

Starting from the fall of 2007, the following actions were carried out for the project:

- November 2007: Equipment was delivered by the supplier company and received in Suleimania by NI officials with the presence of the AUIS representative. The installation process in the laboratory in Sulaymaniya was started immediately.
- January 2008: Start up of the training process for NI lab staff who were selected to be the future trainers for the Iraqi authorities on the usage of the new equipment. Furthermore,



the selection and testing process of standard procedures for water quality and sediment was started.

- March 2008: The first official test for the lab equipment and procedures was conducted for water and sediment samples of the Tanjero Environmental Impact Assessment project.

The first stage of the training activity was finished in Sualymaniya lab immediately after the completion of the installation. The second stage consisted of an advanced training for the lab staff in Italy at the Multiservizi Laboratory in Ancona (lab management skills) and Amman (advanced operation skills).

The procedures were approved for most of the tests based on the “*Standard Methods of the Investigation of Water and Waste Water*”, 2005.

The first practical test for the operations in the lab was the measurement of chemical parameters for Tanjero River Environmental Impact Assessment Project, which was conducted during the period from March 26th to April 2nd, 2008. The tests performed for the project were: BOD, TP, PO₄, NO₂, NO₃, NH₃, TSS, TDS, Fecal Coliforms, E.coli for water samples and heavy metals for sediment samples. The consultant’s opinion was the quality of results was good and that there was consistency among the results of these different parameters.

Six personnel from Nature Iraq were sent for a month of training in Italy to operate and claiberate the equipment and to earn proper processing of the samples and logging of information, etc. The trainers were selected for their abilities to be able to teach others upon returning back to Iraq. Severl training were held for Iraqi ministry of environment staff to learn proper handling techniques, calibration and interpretation fo the data and trouble shooting the equipment.

It should be noted that once the training was compelted, the equipment were not delivered to Baghdad at the request of the minister of environment at the time, Narmeen Othman as well as Barham Salih, the Deputy Prime minister of Iraq to encourage cooperation between Baghdad and the region though joint work programs.



2. Feasibility Study for Mesopotamian Marshland National Park (2006-2007)

The study's objective is to assess the possibility of creating a National Park in the marshlands area providing for:

- Sustainable use of resources from natural ecosystems;
- Preservation of species and genetic diversity;
- Preservation of cultural and traditional attributes;
- Protection of specific natural and cultural features;
- Education, training;
- Scientific research;
- Tourism and recreation;
- Archeological sites exploitation.

The study is aimed at ranking priorities in order to identify the exact site, size, boundaries of the Park and type of protected area which best meets local population and environment requirements. In parallel with all phases of the feasibility study a capacity building program was carried out. Its aim is to transfer intervention methodology to Iraqi experts who will be in charge of managing the park in the future. The setting up of a protected area is, in fact, a process which is carried out in many phases. During each phase specialists from different fields participated. They had to examine both the scientific data and the needs and problems of the stakeholders who, in different ways, are interested in the area subjected to the intervention. Therefore, during each phase, both workshops and opportunities for meetings and verifications were carried out in order to obtain certain information. The Iraqi authorities and other stakeholders appointed by them, provided the indications and the necessary choices for the continuation of the study.

The three-year program for the establishment of the Mesopotamia Marshlands National Park started in April 2006. The process of re-watering the drained Iraqi Southern Marshes had started since 2003, with the breaching of canals and dams by the locals and the work of the Ministry of Water Resources, and it was determining a slow but progressive reestablishment of the native environment. Therefore, the broad scope was to provide the region with a plan to guarantee the ongoing restoration and protection of both the environment and the cultural



heritage while ensuring a sustainable development of the territory and increasing the values of its unique features.

The comprehension of the main tasks that are being carried out to design a final scenario results clearer if it is related to the succession of the contents, proposals and decisions dealt during the technical meetings between the Iraqi authorities involved in the project and the New Eden team.

Dohuk Meeting - April 2006

As for the National Park project, the meeting was mainly aimed at giving a first proposal by the New Eden experts of the planning process that could be applied for the development of the feasibility study for the Marshland National Park and at discussing it in order to plan the activities of the first phase. The process identifies three different kinds of tasks:

Main task, consisting in 6 steps comprehensive of all the activities of gathering, analyzing, assessing data necessary to identify and describe the study area and to allow the consequent design of the most coherent scenario with the Iraqi authorities objectives.

Second task, consisting in four steps to be developed in parallel with the main one. This includes:

The capacity building program including:

- Italian Protected Areas Study tour for the Iraqi Authorities;
- Training on Park and Protected areas management;
- Training on stakeholders and local communities involvement.

The actions necessary to organize the Twinning Program with the Delta Po Park in Italy.

The documentation to be prepared for the meeting between Iraqi authorities, stakeholders and local communities that to be organized when the National Park scenario was defined

The third task is related to the contact with UNESCO in order to prepare the possible future insertion of the Marshland National Park into the UNESCO World Heritage Program or other similar international program.



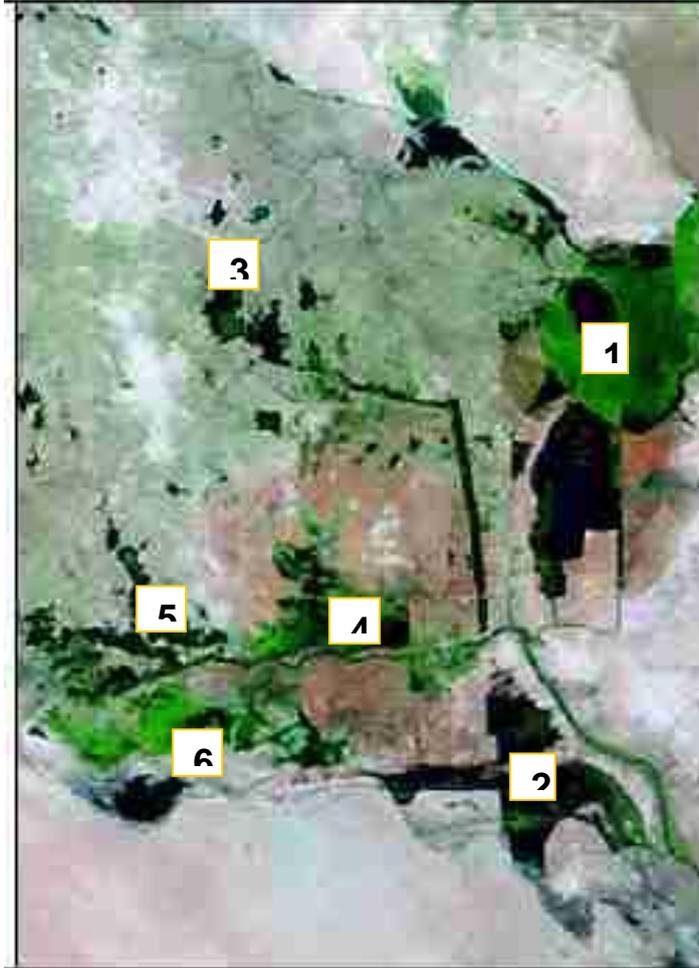
Each task was discussed with the MoE and MMPW and obtained their approval. The two Ministries decided to provide additional comments within one month. It has been also proposed that the specifications of the “Nomination Format”, annexed to the “UNESCO - Operational Guidelines for the Implementation of the World Heritage Convention”, could be used as guidelines for the development of the feasibility study. It should be noted that following the declaration of intention, studies were conducted and many meetings were held, with the help and/or participation of Nature Iraq personnel. As of this writing, the files are almost completed by UNESCO and the Iraqi government and within a few months, the marshes may very well be declared as a world heritage site.

Identification of the study area

The New Eden Team presented a Marshlands regional map where six areas permanently flooded were identified and classified in order to promote the process of the definition of the location and extension of the study area. Detailed data collected by the Italian and Iraqi experts in the field through specific and extensive site visits (extension of the flooded area, demographic data, environmental and socio-economic data) and an initial assessment of each of the following 6 sites were provided during the meeting:

- Huweizah Marsh
- Hammar Lake – (East)
- Al Owdeh Marsh
- Qurnah (Central) Marsh
- Abu Zirig Marsh
- Hammar Lake (West)

The New Eden team activated and supported discussions between the Iraqi Ministries (Ministry of Environment, Ministry of Municipalities and Public Works, Ministry of Water Resources) and other stakeholders attending the meeting to reach a final agreement on the area to be chosen for the establishment of the first National Park of Iraq.



Location of the proposed sites for the Mesopotamia Marshlands National Park

International Conventions Relevant to the Project

To highlight the possibility offered by the three most important international agreements relevant for the project:

- WHC - World Heritage Convention (UNESCO)
- MaB – Man and Biosphere UNESCO Program
- Ramsar Convention

A synthetic report about the Mission, the Procedure for Accession, the Contracting Parties commitments and information about Funds was illustrated by New Eden Team.



Presentation of Case Studies

Presentation of four case studies featured by the presence of wetlands:

- Coto Donana National Park - Spain
- Hortobagy National Park - Hungary
- Everglades National Park – U.S.A.
- Delta Po Regional Park – Italy

The analysis of the cases allowed New Eden Team to illustrate the multiple aspects and different types of management that a protected area can assume.

Identification of the site to be proposed for the establishment of the National Park

The meeting started with the presentation of a first set of maps, scale 1:400.000, which included the results of the second round of field surveys carried out by Italians and Iraqi experts in the two areas preliminary selected in the Amman meeting. The maps included the following: 6 maps describing specific features of the current status of the marshlands region:

- Archeological sites/Wetland Types;
- Mobility System;
- Resident Population;
- Socio Economic Data;
- Mines Uxo;
- Pipelines and refineries.

4 maps displaying water quality parameters measured in different monitoring stations throughout the Marshlands:

- Biological Oxygen Demand (BOD);
- Phosphates;
- Salinity;
- Dissolved Oxygen.

Settlements (1958) - first draft of a map describing the location of the settlements before the drainage process was started. The map will be completed with the name of all the tribes and with other information related to their tradition and socio- economic features. Reference map



that summarizes four single maps (Mobility System – Resident population – Marshlands types – Archaeological sites) and constitutes an example of how the display of information can be useful to introduce the next phase of data assessment.

“Marshlands System Draft Scheme” useful to introduce the concepts of the possibility to plan multiple protected area, to protect the environment with choices based on sites features and needs of local communities.

Analyses of Ecological Data Developed for the Feasibility Study

The systematization of Marshlands ecological data started from the data collected with the Summer 2005-Winter 2006 Key Biodiversity Surveys conducted in the Marshlands. These data were integrated with the ones obtained from previous surveys starting from year 2003, which are being progressively verified, validated and entered into the system, and with the latest data collected by the Italian/Iraqi teams that visited the sites in the previous months. Data were collected from 60 monitoring stations (shown in the following map) all around the Marshlands area and cover the following environmental components:

- Fishes
- Macrophytes
- Macrobenthos
- Phytoplankton & Zooplankton
- Water Quality
- Birds

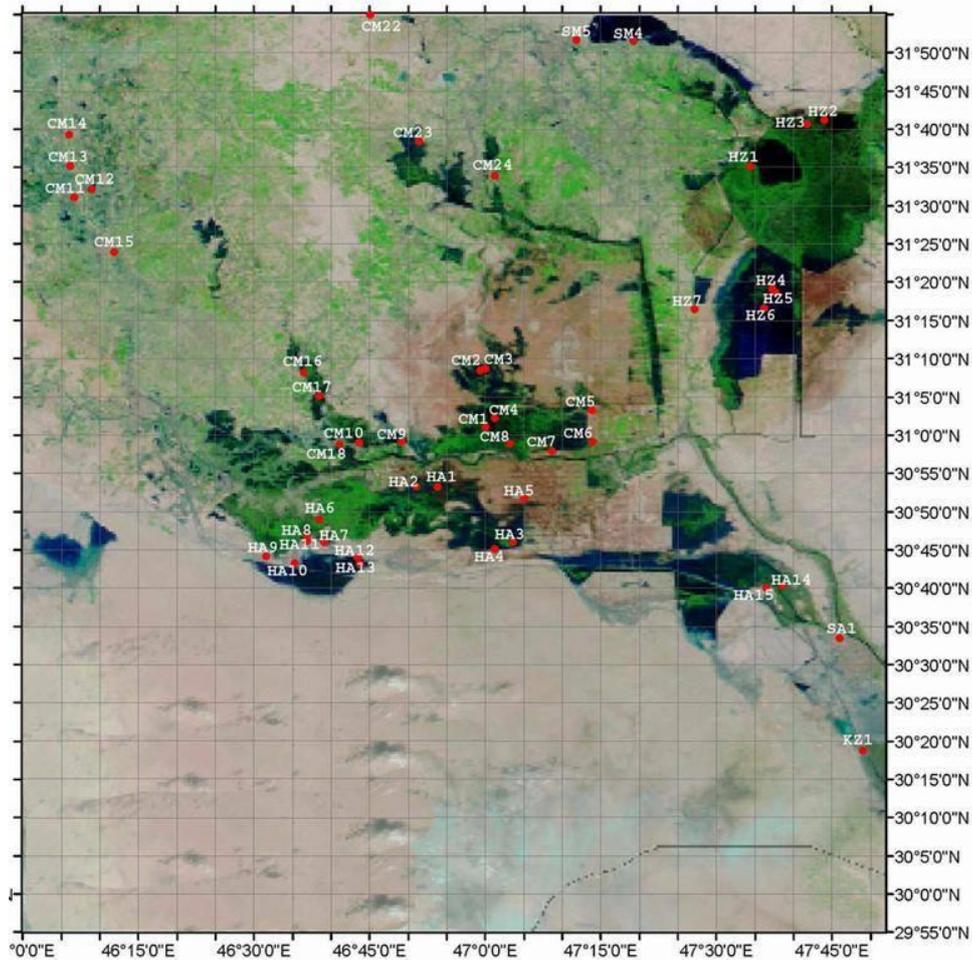


Figure 2: Map of Marshlands monitoring stations.

These data – originating from different sources – constitute the underpinning of a Geographic Data Base, which collects and systematizes data regarding many water quality and ecological aspects in the marshlands area: data focused on different aspects are linked together through the same monitoring station code. The following figure shows the structure of the geodatabase. Additional data come from Marshlands water budget calculations at the inlet and outlet channels of Abu Zirig Marsh, Central Marsh, Huweizah Marsh etc.

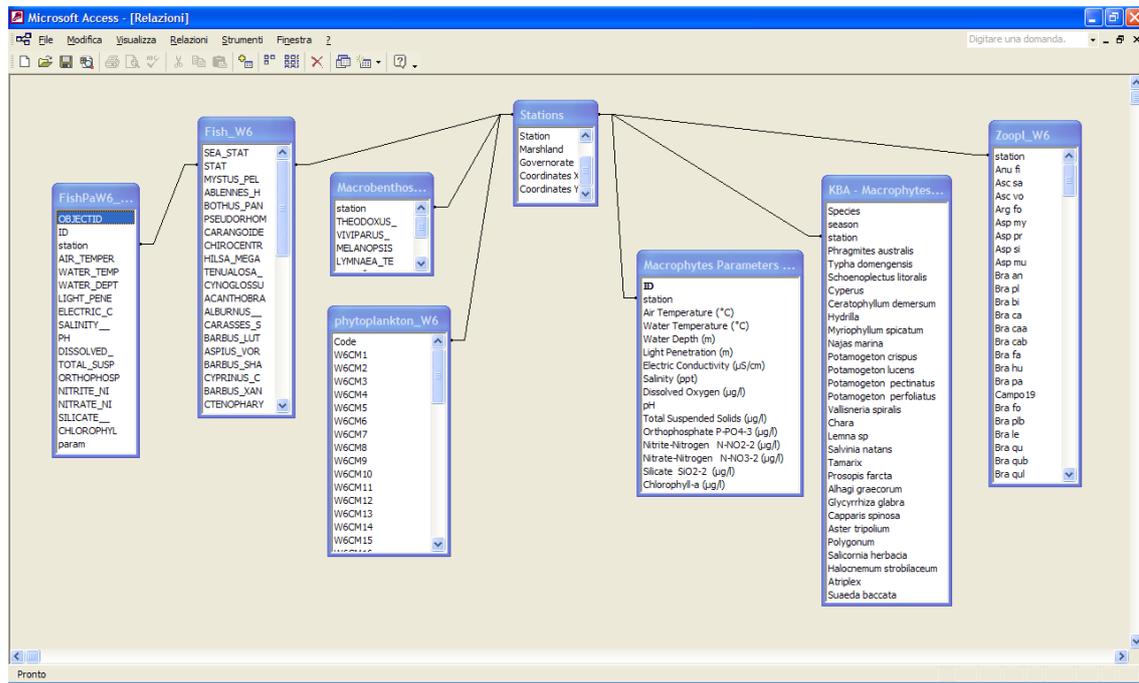


Figure 3: Structure of the data: Access Geo-DB tables & relationships.

A summary of the environmental analysis that were included in the final version of the Feasibility Study, subdivided according to the specific environmental component being considered, is given below.

Fish

- Analysis and mapping of fish species distribution in the marshlands area: native and exotic fish species (an example is shown in **Figure 4**);
- Site-specific analysis of the ratio native/exotic species (an example is shown in **Figure 5**);
- Analysis of Communities at the monitoring site scale;
- Analysis of Biodiversity at the monitoring site scale;
- Final report on populations state.

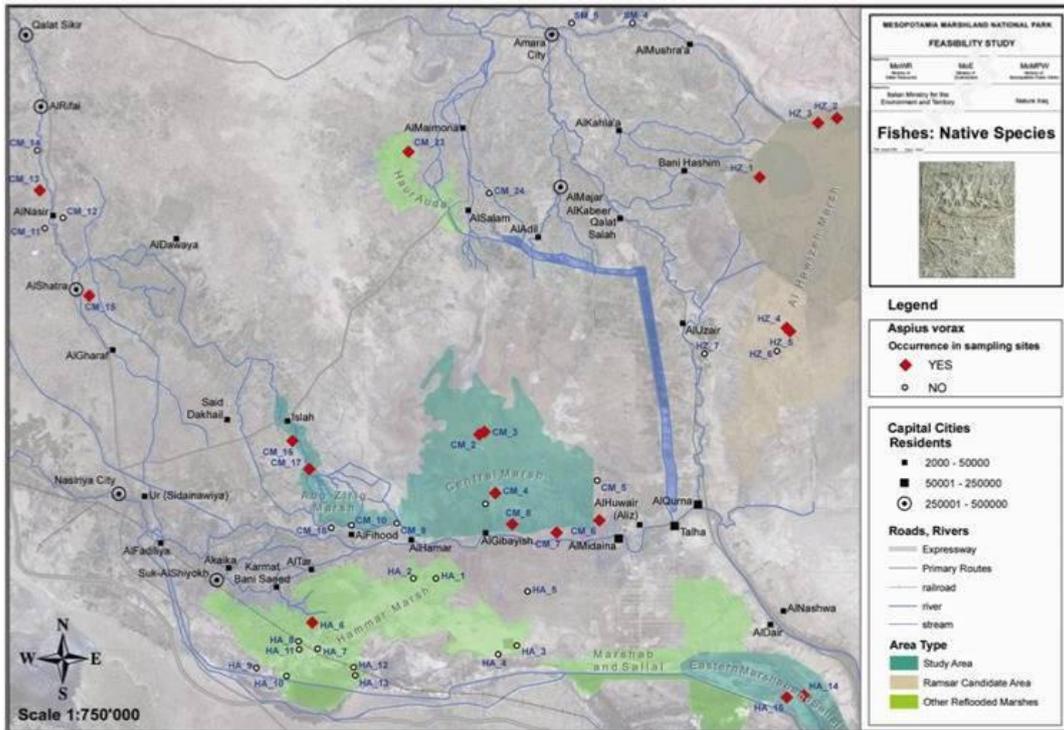


Figure 4: Example of a native fish species distribution in the study area: *Aspius vorax*.

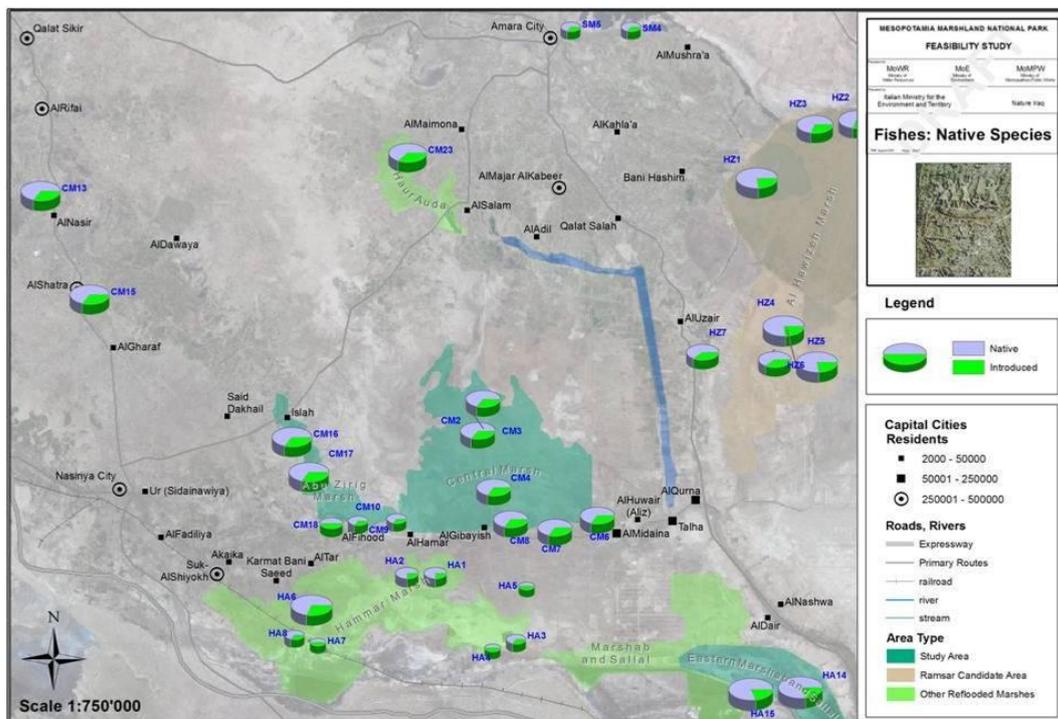
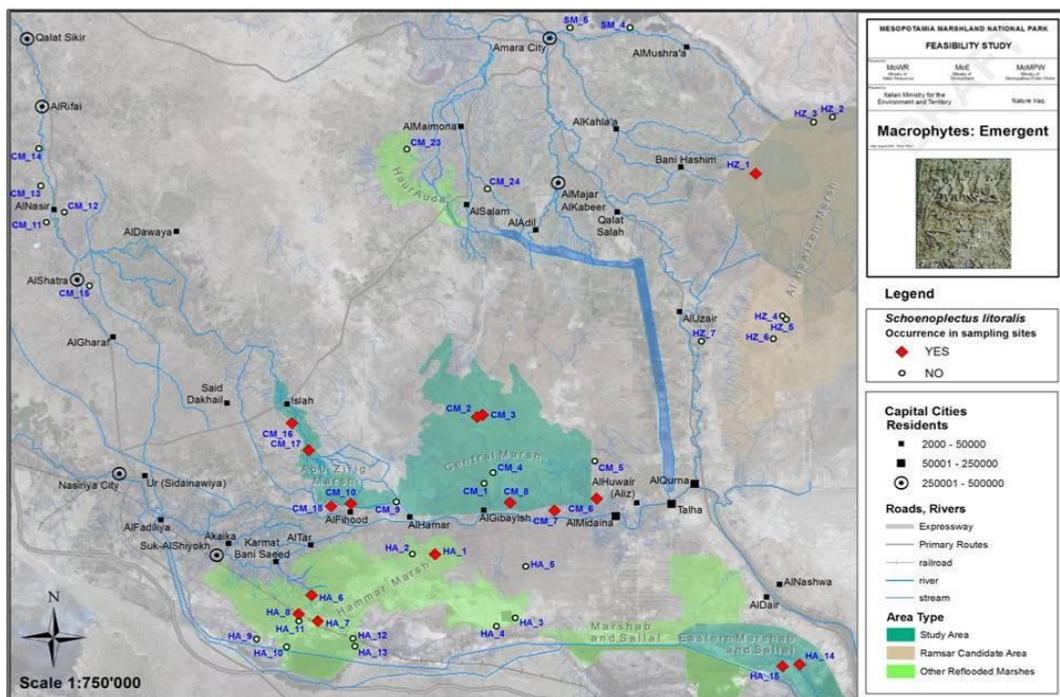


Figure 5: Fish species abundance and native/exotic species ratio in the study area.

Macrophytes

- Maps of Macrophytes species distribution
- Evaluation and comparison of applicable environmental quality indexes (e.g. M.I.S, T.I.M., G.I.S, I.B.M.R);
- Analysis of Environmental Quality by means of selected indexes;
- Final report on Macrophytes distribution and biological water quality evaluation.



Macrophytes species presence/absence in the study area: *Schoenoplectus litoralis*.

Macrobenthos

Currently available data are not suitable for geo-statistical analysis and further investigations, therefore the final analysis were be mostly based on descriptive reports.

Phyto- and Zoo-plankton

- Analysis of the Community structure at a monitoring site scale;
- Calculation of Diversity indexes;
- Evaluation of the Trophic level at different sites;
- Final report on planktonic communities state.



Water quality

- Physical-chemical water quality indexes calculation (e.g. L.I.M.);
- Calculation of different water quality indexes at the site scale;
- Salinity trend evaluation on different sites;
- Final report on water quality.

Birds

- Extraction from the National Iraqi Birds Checklist of a subset comprising the Birds of Lower Mesopotamia (cfr. Scott, *Wetland International*; Evans, *Important Bird Areas in the Middle East*);
- Earlier distribution of Iraqi- and Marshland Area bird species;
- Analysis of Iraqi bird populations dimensions in relationship with the global, Nearctic/Palaearctic and possibly Ethiopic Areas populations;
- Analysis of Marshlands Birds data in reference to IUCN categories;
- Check of Ramsar criteria (e.g. presence of 1% of the whole Palaearctic population);
- CITES species (Washington Convention);
- Bern Convention Species;
- Species cited in other international Conventions.

Presentation and Approval of the National Park Feasibility Study

The final version of the Feasibility Study was presented in April 2007 and finalized the preparatory phase of the entire National Park program. Its main deliverables were the documentation to assess the real possibility for creating a protected area in the Marshlands, the site location identification, the extent and boundaries of the selected area and the first classification of environmental and socio - economic features. To better explain the possible development of the Park, three scenarios were drawn up as final recommendation of the report. Every stage of the study was developed with the active participation of the experts of the Iraqi Ministries of Environment, of Water Resources and of Municipalities/Public Works. The report was approved in July 2007.



3. Development of the Urban Plan for Al Chibaiysh (2006-2007)

Integrating part of the work on the marshes, the Preliminary Urban Plan - UP for Al-Chibaiysh is aimed at providing the tools for the re-evaluation and development of the town, placed at the heart of the Marshland region, in order to spur the area's economy as foreseen also in the plan for the New Eden Villages to fledge the whole settlements' system. Developed throughout 2006, the UP defines the policies for the preservation and transformation of the town, envisaging different-term scenarios aimed at making the town, in the long distance, a regional magnet capable of bringing about social and economic regeneration in a large area.

The decision-making and planning project have been discussed and shared during several meetings with the relevant Iraqi authorities who provided support throughout all the phases of the process. As a result, the Plan was developed in close conjunction with local authorities and technicians to ensure capacity building and a shared vision on the city's development.

A Planning Methodology

The planning methodology proposed by the New Eden Team is double-fold, so to provide the Iraqi authorities with an interpretable and sensitive map of the territory. In fact, the plan's structure is organized by eight strategic territorial ambits as well as by three different time scenarios, for short, medium and long term strategies. This combination of possibilities has been devised with the aim of making the relevant authorities as free and independent as possible in decision-making processes or in the allocation of resources.

The creation of a GIS system specifically tailored for this urban plan allowed management of unprecedented data gathering and information about the town and the transfer and teaching of the related database. This is perfectly in line with the idea of providing local authorities with an improved and multipurpose tool, rather than with a pre-determined or "closed" project.

Organization of the Planning Process

The plan was drafted based on five subsequent phases of work, each one of the first four representing a necessary introduction for the following one.

Phase 1 - Urban Survey

The first approach with the territory was a reconnaissance via satellite imagery to ascertain the status quo comparing the situation before and after 2003.

Using the most recent available satellite image (June 2006) as a base it has been possible to organize all the survey activities on the ground. All the main elements of the territory has been identified and connected with the database in order to develop the GIS system. The main tasks of Phase 1 have been:

- P1.A Mapping of the territory with satellite images
- P1.B Definition of standard survey forms
- P1.C Training course: data gathering and data imputing
- P1.D Field survey
- P1.E Data imputing in the GIS database





In order to train the team of surveyors about the work on the field and the following phase of data entering in the prepared GIS system database a training course was given by New Eden specialists in Amman, from the 8th to the 12th of July 2006. The course was attended by the team of surveyors selected by the MMPW as well as by the two supervisors (one from Nature Iraq and one nominated by the MMPW).

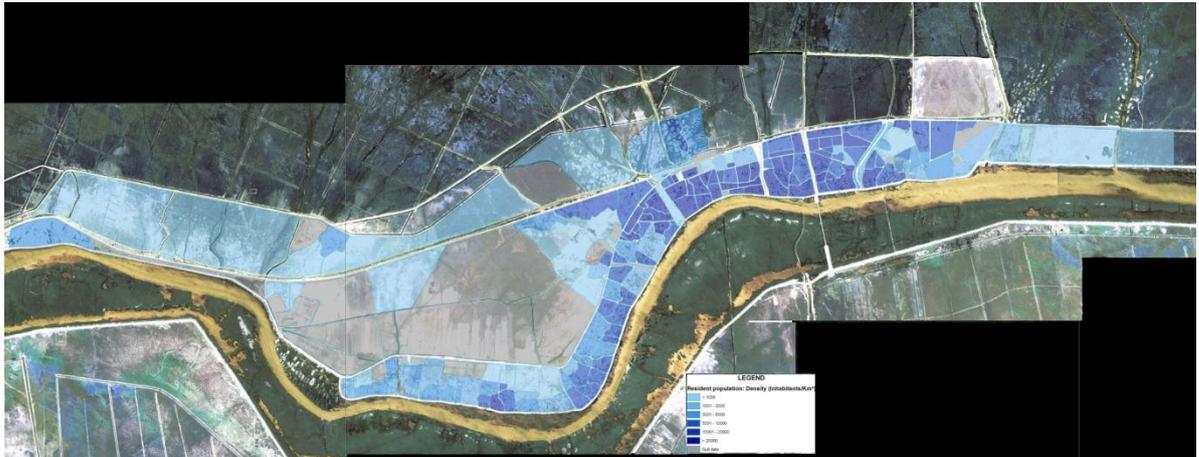
After a smattering of methodology of survey and data inputting, the course went through operational topics such as explanation of the survey forms, overview of Geographic Information Systems (GIS), practical exercise in paper survey form-filling, practical exercise in GIS system and database for data inputting.



Figure 6: Participants to the training course on the Chibaiysh Urban survey held in Amman

Phase 2 – Data validation and analysis

This was the phase during which the survey data were processed and topics and contents (types of data and representative shapes) defined in order to produce Thematic Maps helping understand how the town and its surroundings work.



Phase 2A - Example of Thematic map: Density (subdivision into 210 quarters).



Phase 2B - Example of Thematic map: Density (subdivision into 12 macro-quarters).

Phase 3 - Description of the city and surrounding areas

During this phase specific portions of the city territory are highlighted for the way they distinguish themselves for particular physical and functional features contributing to the construction of the image of the city and for possible project themes.

Phase 4 - Definition of the project proposals and drafting of specific Functional Plans



Once the physical and functional interpretations of the city have allowed to understand the way its organization works, the planning process gets deep inside the definition of specific project themes and functional plans with the purpose of envisaging strategies and priorities for the transformation, re-evaluation and development of the town. The eight strategic territorial ambits of the plan's structure organization are:

A. Axis along the Euphrates

Project for the construction of an urban curtain along the river).

B. New urban axis

Project for the construction of a new urban axis a new urban curtains with function of hinge between the urbanized part lying to the South and the areas for future development.

C. Transversal axes linking the Euphrates to the Marshlands



Project for the transformation of such areas (canals and abandoned open spaces) into service axes linking the “residential islands”.

D. Road axis Nasiriya – Basra

Project for the settlement of region-wide facilities serving the Marshlands area settlements: Waterfront Village, Water Village and Land Village.

and Land Village.



E. The historical centre

Project for the historical centre the UP defines interventions mainly aimed at the re-evaluation of the existing urban tissue.

F. Areas for new development

Project for the expansion of the Nasiryia – Basrah main road and the axis bordering the urban tissue up North.

G. The right bank of the Euphrates

This area represents the true ambit for an expansion of the ancient part of the city, driven by the forecast of new facilities for water, railway and air transport.

H. The existing city

It includes the parts of the existing city not included in other strategic ambits.

Phase 5 - Time Strategies for Development

The UP has been defined and must be used as a tool for the programming of interventions on the city territory by the City's governing bodies. It has been organized as a framework that it is possible to take to parts into the single actions tied to specific goals for the territory.

The UP sets three different time scenarios where the actions are organized according to an implementation priority:



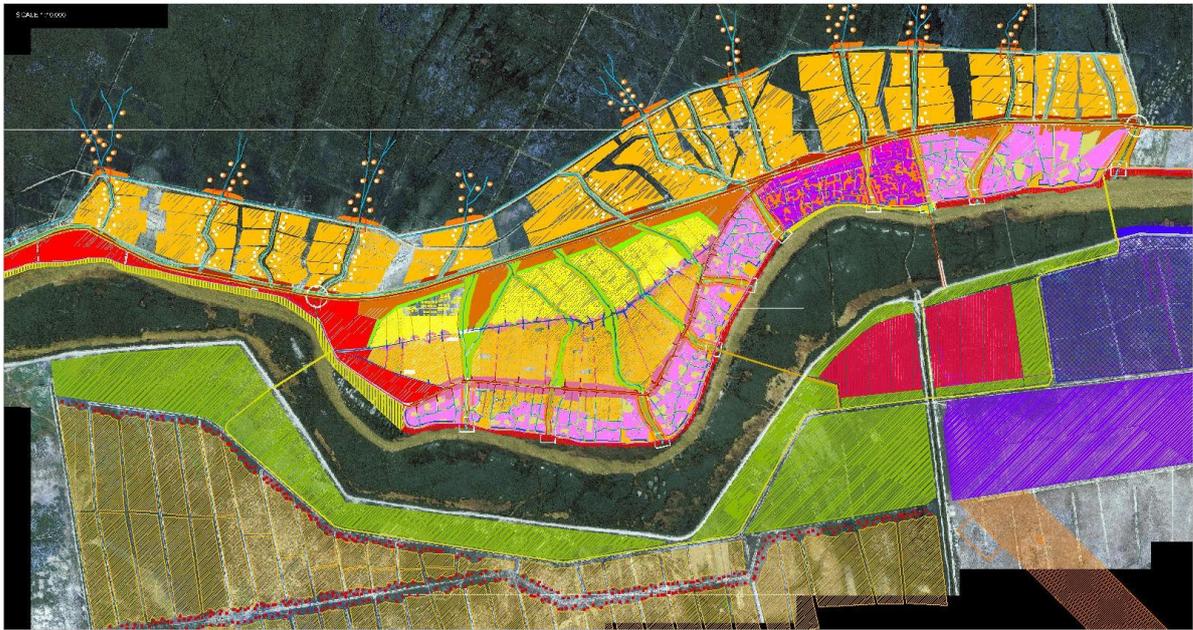
Scenario 1: Re-evaluation and adjustment project (short term).

This scenario envisions demographic and economic conditions (public and private investments) akin to those presently existing. The project aims at realizing the basic interventions for attaining satisfactory living conditions and the rationalization of the existing settlement phenomena.



Scenario 2: Urban development project (medium term).

This scenario envisions a significant demographic increase, such economic conditions that may realistically prompt an adequate plan for public works and private investments.



Scenario 3: Urban development project – regional magnet (long term).

This scenario envisions a new role for Al Chibayish as a conveyer (for public services, economic and tourist facilities) of flows coming from the entire region.

4. Surveys, Design, Procurement and Installation of RO Units for Villages in Marshes Area (2006-2008)

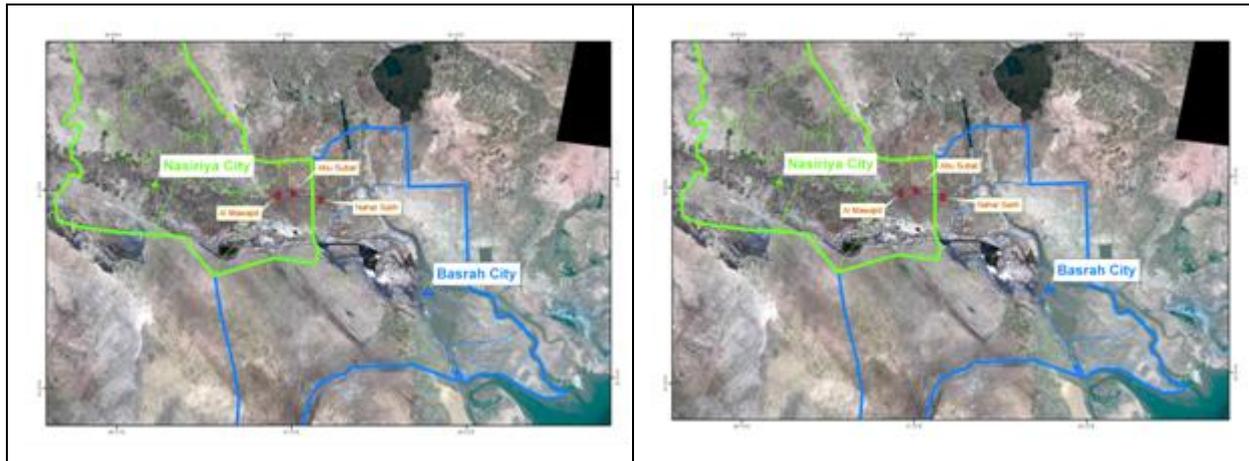
In the framework of the New Eden project, the MMPW and Nature Iraq agreed to activate a project for the provision of reverse osmosis units in selected villages located in the areas where the existing water sources cannot provide water with salinity levels suitable for drinking purposes (mainly along the Euphrates river in the southern part of the Thi Qar governorate/north-western part of the governorate of Basrah).

The villages served by the new RO units, which were selected according to the indications of the Water Directorate of the MMPW, are:

- Al Mwajd (Thi Qar – Chibayish) with a population of more than 1.000 people;
- Albosubat (Thi Qar – Chibayish) with a population of about 750 people

- Nahar Salih (Basrah – Al Midaina) with a total population of about 1.000 people.

For each site a desalination unit with the capacity of 100,000 liters/d was foreseen, so that the units could be used also to supply water to the surrounding villages. The figures below show the location of the three (3) villages where the reverse osmosis units have been installed.



Location of the three RO units

The works concerned the construction of three (3) drinking water treatment plants, each with a production capacity of 100,000 liters/d of potable water, with a maximum salinity of 500 mg/l, with surface raw water (from rivers, canals, marshes, etc) which has an average salinity of 2,000 mg/l and a maximum salinity of 2,800 mg/l. Each plant consists of the following sections:

Water Treatment Plant

The supply of this section consists in the following sub-sections:

Pre-treatment line

- Sodium hypochlorite metering station
- Mechanical quartzite filtration station with automatic back-washing
- Sodium meta-bisulphite metering station
- Micro-filtration system for filtration up to 3 mm particles

Desalination process



- Reverse osmosis section
- Cleaning station for periodical membranes washing

Post-treatment line

- Sodium hypochlorite metering station

Control panel

- Electric Panel with plant protection system, PLC (Programmable Logic Controller), motor starters, process instrumentation, etc.

Electric Generator

The supply of this section consists in the following sub-sections:

Electric generator driven by a diesel engine, having sufficient power for the electrical requirements of the entire plant.

Diesel fuel tank with a sufficient capacity for at least one week of operation at full power.

Control panel and electric power connections for all users.

Drinking Water Distribution System

This section consists in the following sub-sections:

Pump distribution station with electric panel;

Storage Tank (capacity 15,000 liters minimum);

HDPE water distribution pipe, outside diameter 110 mm, PN 16, total length 1,000 m, including eight (8) fountains for the supply of potable water, per each site. Each plant is placed in shipping containers capable of being used as a definitive lodging, positioned on a reinforced concrete platform, surrounded by a wall suitable to protect the plant from attacks by vandals or sabotage.

The civil works for the three RO units were started in mid March and have been completed by the end of May 2007. The supply of the equipment to be installed were completed by the end of September 2007, when the works for the installation and start-up of the three facilities was accomplished.



Civil works at three sites

The three plants were started-up in October/November 2007 and were in operation supplying the potable water to the three villages and to the surrounding areas. More recently (about five years since the installation) it appears that the local governments have stopped supporting the

operations of the RO units and they sit idle unfortunately. Nature Iraq has approached the local governments about taking over the plants and maintaining them and operating in conjunction with the locals to provide potable water, however, the local governments appear reluctant to proceed on such an unconventional process.

The following pictures show the final phases of the installation of the units in the three villages.



Final preparatory works in Al Mawajid (top left), Abu Subat (top right) and Nahar Salih (bottom)

5. Procurement and Installation of a Hydrological Monitoring Network (2006-2008)

As Iraq moves forward, it must efficiently manage its natural resources, including one of its most valuable resources: water. For decades, the Iraqi Ministry of Water Resources (MoWR), previously known as the Ministry of Irrigation, operated an extensive hydrologic monitoring network that reliably quantified the volumes, timing, and quality of water moving through Iraq. The network's infrastructure deteriorated significantly over the past 30 years. During



that same period, stream gauging and telemetry instrumentation and practices advanced significantly. As a result, Iraq needs to renovate its existing hydrologic monitoring network to provide timely access to critical data needed by resource managers and policy makers.

During the year 2006, Nature Iraq started a project for the updating of the stream gauging network in Iraq. The bulk of the procurements were provided during the year 2007 whereas assistance programs are currently ongoing.

The project was a cooperative effort between the Iraqi Ministry of Water Resources in Baghdad, the Iraqi Ministry of Water Resources in Kurdistan, Nature Iraq the United States Geological Survey (USGS) and the US Army Hydrological Engineering Center (HEC).

During Phase II of the New Eden Project, Nature Iraq was able to achieve the following results:

- Procure and installation of 7 remote gauging stations (3 located in the south and 4 in the north of Iraq);
- Procure and delivery of 3 ADCP (Acoustic Doppler Current Profiler);
- Procure additional 23 complete remote gauging stations;
- Procure of 15 multi-parameter water quality units to be mounted on the remote gauging stations and measure Water Temperature, Dissolved Oxygen, Water Turbidity, Salinity and pH;
- Procurement of 5 ADVN (Acoustic Doppler Velocity Meter) units to be installed at 5 tidally-effected sites in southern Iraq;
- Procurement of a complete Master Station for automated satellite- and radio-based hydrological data assimilation; The Master Station includes one downlink server, one database server, one web server and one application server as well as all necessary hardware and software for the implementation of a secure network to be installed inside the Ministry of Water Resources existing network.
- Delivery of two training sections in Italy (6 people trained for a total of 3 weeks) on the installation and management of the Master Station as well as one training



in Suleymani including financial support of the team of 6 people engaged during the installation of the Master Station in Suleymani

- Provision of support to the MoWR in utilizing and post-processing ADCP measurements as well as on the installation of the 4 stations in Kurdistan and management of the data collected by the Master Station.
- Host and attend several coordination meetings with the MoWR in the Kurdish-Region of Iraq.
- Support on the updating of the rating curves at several selected sites in the Kurdish-Region of Iraq.

The objectives of the overall project were to build the capacity of the MoWR staff and to upgrade their capability and ability for the new technology measurements and installation, create a cohesive mechanism inside the ministry and establish a core cadre who can independently install , operate and maintain the hydrologic network system.

Trainings were provided in the operation and maintenance of modern stream gauging equipment, including ADCPs for measuring river discharge and an automated stream gauging station with satellite telemetry, and training in data management, archival, and quality assurance, and the computation of stream flow records. Because the first objective was aimed at field engineers and technicians, and the second objective was aimed at engineers and scientists, the training program was split into two tracks. Although some topics would overlap, the team placed trainees into one of the two tracks according to their responsibilities within the MoWR to provide more appropriate training focused on individual needs.

6. Procurement and Installation of Hardware and Software for Marshland Information System and Capacity Building on Database/GIS implementation (2006-2008)

The main objective of the project was the development of an Information System that allows data sharing between the master station and the local stations. It will be housed in the central offices and the local branches of the relevant Ministries (Ministry of Environment, Ministry of Water Resources and Ministry of Municipality and Public Works) and local Governorates (Thi-Qar, Basrah and Missan).

The system structure was developed following the main objective of delivering to the Iraqi authorities a system, which will easily allow to storage, manage, analyze and consult geographic data through a Web-GIS system. The new information system is intended as a comprehensive tool aimed at storing and analyzing all the data related to activities performed by the Iraqi authorities within the Marshlands areas and specifically for management and planning purposes, mainly concerning the following aspects:

- Environment;
- Water resources;
- Land use;
- Urban and rural development;
- Water and sanitation.

The following image represents the logical scheme of the New Eden Marshlands Information System (NEMIS).

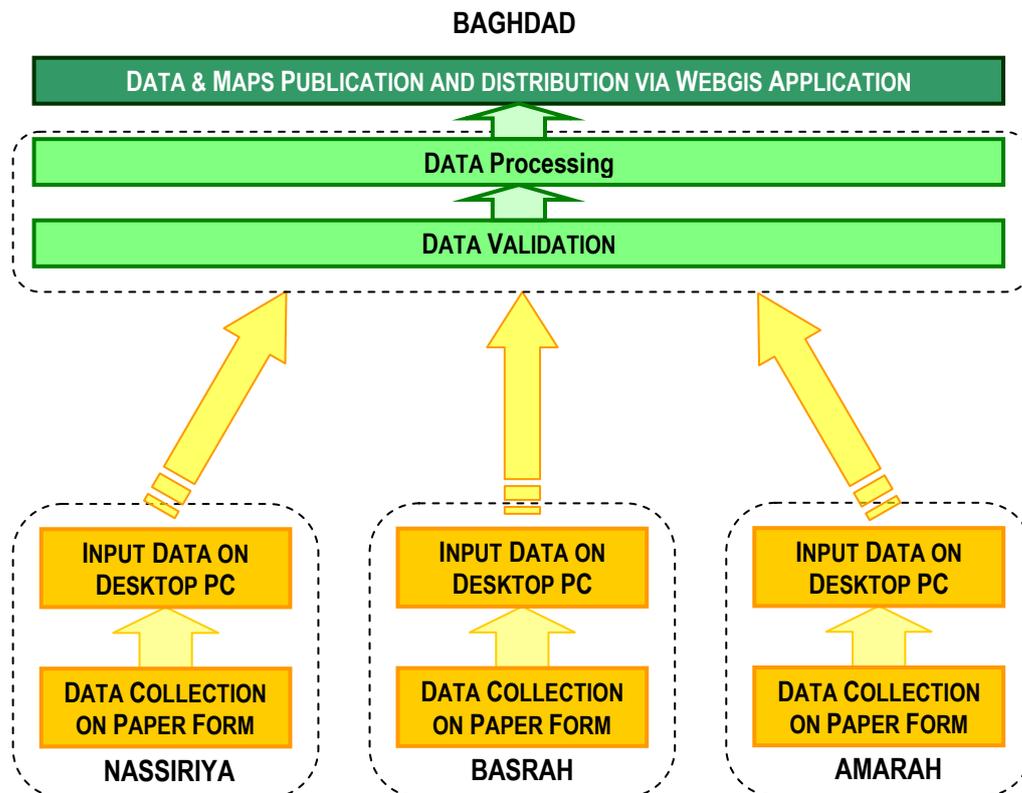


Figure 37- New Eden Marshlands Information System (NEMIS)

The web-GIS was developed through the following ESRI software packages:



Arc-Editor: ArcEditor is the complete GIS desktop system for editing and managing geographic data. ArcEditor supports single-user editing as well as a collaborative process between many editors. A set of tools is included for simple data cleanup and input as well as for sophisticated design and versioning.

ArcSDE: ArcSDE is a server software product used to access massively large multiuser geographic databases stored in relational database management systems (RDBMSs). It is an integrated part of ArcGIS and a core element of any enterprise GIS solution. Its primary role is to act as the GIS gateway to spatial data stored in a RDBMS.

ArcSDE provides a suite of services that enhance data management performance, extend the range of data types that can be stored in a RDBMS, enable schema portability between RDBMSs, and offer configuration flexibility.

ArcIMS: ArcIMS is the tool for delivering dynamic maps and GIS data and services via the Web. It provides a scalable framework for GIS Web publishing that meets the needs of corporate Intranets and demands of worldwide Internet access. ArcIMS services can be used by a wide range of users including custom Web applications, the ArcGIS Desktop, and mobile and wireless devices.

7. Environmental Monitoring Program (2006-2010)

The New Eden team since the beginning of the project carried out extensive environmental field survey and monitoring activities, which initially (2003-2006) covered the southern portion of the country and were subsequently extended to the rest of the country starting from 2007, following a request coming from the Ministry of Environment. The environmental data and information collected within the New Eden project have constituted for many years the most valuable dataset available in the country, which was largely used by several Iraqi Ministries (Environment, Water Resources, Municipalities/Public Works, Agriculture etc.) as well as different UN Agencies and International Cooperation Agencies. The data collected by Nature Iraq have been included in many national and international publications on the environmental and biodiversity values of Iraq. The field activities have been widely carried out through joint survey teams with the Iraqi Ministries (mostly Environment and Water Resources) and provide the Iraqi Ministries staff a great opportunity for increasing the capacity and skills of their staff.



Following is a description of the various action items carried out in the period 2006-2010:

Key Biodiversity Areas Program

In 1994, Birdlife International, a well-known ornithological society established in the United Kingdom asked M.I. Evans to evaluate areas in Iraq with broad biodiversity variation especially in terms of birds. Evans listed 42 sites covering 2.2 million hectares of Iraq's territory. As a result of that expedition, in 1995 the International Waterfowl and Wetlands Researches Bureau in the United Kingdom sent D.A. Scott to continue Evans' work in Iraq. Scott listed 31 of these sites covering 2.0 million hectares of Iraq as Important Wetlands based on the RAMSAR Convention and other criteria.

The IBA surveys were forgotten by the Saddam regime and they stayed in the shadow until 2003 when the Mesopotamian marshlands of southern Iraq, almost completely dried in the 1990s by the regime to control a restive population, were flooded again and life returned to the marshes. The biodiversity project was adopted by the newly formed Canada – Iraq Marshland Initiative (CIMI), of which the Iraqi Ministry of Environment and Nature Iraq were partners. Members of these two latter institutions made up the members of the field team. The Italian Ministry of Environment, Land & Sea (IMELS) later became the primary supporter of the project and eventually led the project.

The project, called the Key Biodiversity Areas (KBA) Survey, included the training of many biologists in modern survey techniques and the initiation of new surveys and research in the winter of 2005 to document wildlife and biodiversity indicators in the Marshlands. Despite the many social and security issues occurring in Iraq at this time, it is vitally important for Iraqis to assess and address the many environmental problems that face the country. As Iraq has joined the International Convention on Biological Diversity, an important step in this process will be the completion of comprehensive surveys of all of Iraq's biological diversity.

The project focused the efforts of Iraq's environmental agencies on restoring the damaged ecosystems in Iraq with an initial focus on avian habitats supported by BirdLife International and the Important Bird Areas (IBA) Program. The project was then widened to encompass the general flora and fauna of the country with the primary objectives being to identify areas of key biological diversity of global and regional significance within Iraq and focus efforts for



conservation actions at priority sites. An additional goal was to monitor the restoration process of the marshland ecosystem.

In doing so, Nature Iraq and the Iraqi Ministry of Environment have reinvigorated wildlife and botanical research in the country by introducing new methodology and scientific field procedures to Iraqi scientists, with the intent to profile Iraq's relatively unknown plant and animal populations.

Though the KBA project was started in southern Iraq, it was extended to Kurdistan, northern Iraq in the winter of 2007 and in the winter of 2009, it was extended again to include sites in central and western Iraq. Thus the KBA Surveys have become some of the largest and most comprehensive environmental survey expeditions to be conducted in Iraq since 1991. The KBA team was able to document the many organisms that were returning to the marshes of southern Iraq as the water returned.

The surveys are conducted in winter and summer to ensure that they includes migratory and breeding bird populations. Many birds, mammals, fish and plants have been recorded and photographed since the beginning of the KBA survey effort and a library of high quality, professional images has been created as a result of the project. In addition, water quality monitoring has been an important component of the KBA.

Southern Iraq - 2006 to 2010

Since 2005, the team has covered over 100 survey points located in the south of Iraq including many of the IBA sites that were listed in the original surveys by Evans and Scott.

The field activities carried out included:

- Identifying Key Biodiversity areas within southern Iraq that have been re-flooded and have become important bird areas again.
- Visiting 108 sites in the winter and summer seasons of 2006 and making field measurements, recorded the most dominant ecological systems in each area as well as collected water and biological samples for further analyses. Water quality measurements included salinity, pH, dissolved oxygen and temperature. Water, sediments, plants, phytoplankton, zooplankton, benthos and fish samples were collected.



-
- Collecting extensive and detailed data on the type and number of birds, mammals and plants present in each site.

The following lists the KBA sites in southern Iraq:



Site Name	Sub-Site Name	Site Code	Site Name	Sub-Site Name	Site Code
<i>Msandag Marsh</i>	Msandag Marsh, South	CM19	Hammar (West)	Abu Hedeeda	HA22
<i>Msandag Marsh</i>	Msandag	CM20	Hammar (West)	Abu-'Ajaj	HA23
<i>Hammar Marsh</i>	Haffaar Opening 3	HA20	Hammar (West)	Nuwashi	HA24
<i>Suweibaat Wetlands</i>	Suweibaat Wetlands	MT2	Hammar (West)	Rashid Lake	HA25
<i>Shatt Al-Arab</i>	Euphrates & Tigris Junction	SA1	Hammar (West)	Abu-Ajaj, East	HA27
<i>Shatt Al-Arab</i>	Umm Ar-Risaas	SA2	Hammar (West)	Buhaira Al-Hilwa	HA3
<i>Shatt Al-Arab</i>	Sayhan	SA3	Hammar (West)	Umm At Tiyaar near Al-Buhaira	HA4
<i>Shatt Al-Arab</i>	Chabbaasi	SA5	Hammar (West)	5th Irrigation Channel/Al-Irwaai' Al-Khaamis	HA5
Auda Marsh	Auda Marsh	CM23	Hammar (West)	Umm Nakhla	HA6
Central Marsh	Baghdadiya, South	CM1	Hammar (West)	Khwaysa Area in Al-Kermaashiya Marsh	HA7
Central Marsh	Fuhood, North	CM10	Hammar (West)	Kermashiya Marsh	HA8
Central Marsh	Abu Zirig	CM16	Hammar (West)	Hammar Marshes, Southern	HA9
Central Marsh	Muwayjid Area	CM17	Hammar (West)	Ghabishiya	HA28
Central Marsh	Abu Zirig, South near Al-Fuhood	CM18	Hawizeh	Umm An-Ni'aaj	HZ1
Central Marsh	Hmaara Al-Kabira	CM2	Hawizeh	Udheim	HZ2
Central Marsh	Hmaara Al-Kabira, East	CM3	Hawizeh	Sewaalif	HZ3
Central Marsh	Baghdadiya, West	CM4	Hawizeh	E'jayrda	HZ4
Central Marsh	Zichri	CM5	Hawizeh	E'jayrda, East	HZ5
Central Marsh	Subaytiya	CM6	Hawizeh	E'jayrda Border Station	HZ6
Central Marsh	Khnayziiri	CM7	Hawizeh	E'jayrda, North	HZ7



Site Name	Sub-Site Name	Site Code	Site Name	Sub-Site Name	Site Code
Central Marsh	Abu An-Narsi	CM8	Hawizeh	Majnoon	HZ8
Central Marsh	Hammaar Town Area	CM9	Hawizeh	Umm Al-Ward Bushes	HZ9
Dalmaj	Dalmaj Marsh, South	ME10	Hindiya Barrage	Hindiya Barrage	ME7
Dalmaj	Dalmaj Marsh, East	ME11	Hoshiya & Saaroot	Hoshiya	SM1
Dalmaj	Dalmaj Marsh, North	ME12	Hoshiya & Saaroot	Saaroot	SM2
Dalmaj	Basroogiya	ME13	Hoshiya & Saaroot	Saaroot, Northern	SM3
Dalmaj	Dalmaj Marsh, South B	ME2	Ibn Najm	Ibn Najm	ME4
Dalmaj	Dalmaj Marsh, West	ME3	Jabal Senam	Jabal Senam	BR1
<i>Kteibaan</i>	Kteibaan	BR2	Jazman (Zurbatia)	Jazman (Zurbatia)	WT1
<i>Hor Uwaina</i>	Hor Uwaina	CM15	Khor Az-Zubayr	Khuwaysaat	KZ1
<i>Hor Sadiya</i>	Hor Sadiya	CM21	Khor Az-Zubayr	Khor Az-Zubayr Canal	KZ2
<i>Saniya</i>	Saniya	CM22	Khor Az-Zubayr	Khor Az-Zubayr Canal-100 meters east	KZ3
<i>Rayan</i>	Rayan	CM24	Khor Az-Zubayr	Hachaam Area	KZ4
<i>Lafta Marsh</i>	Lafta Marsh	ME1	Khor Az-Zubayr	Khor Az-Zubayr, West	KZ5
<i>Shubaicha Marsh</i>	Shubaicha Marsh	SM6	Khor Az-Zubayr	Umm Qasr Port	KZ6
<i>Tell Al-Lahm</i>	Tell Al-Lahm	TQ2	Lehais	Lehais	BR4
Fao	Ras Al-Beesha	SA4	Musayab	Musayab	ME6
Gharraf	Gharraf East, near An-Nassir	CM11	North Ibn Najm	North Ibn Najm	ME8
Gharraf	Gharraf West, near An-Nassir	CM12	Razzaza	Al-Rahaliya	AN10
Gharraf	Gharraf, Rifaa'ii Area	CM14	Razzaza	Al-Taar	KR1
Gharraf??	Gharraf, between An-Nassir & Ar-Rifaa'ii	CM13	Razzaza	Ein Al-Tamr	KR2
Hammar (East)	Al-Mas'hab	HA14	Razzaza	Razzaza, East	ME5



Site Name	Sub-Site Name	Site Code	Site Name	Sub-Site Name	Site Code
Hammar (East)	Al-Sallal	HA1 5	Salman	Salman	MT3
Hammar (East)	Al-Nagarah	HA1 6	Sawa Lake	Sawa Lake	MT1
Hammar (East)	Al-Shileichiya	HA1 7	Shuweicha Marsh	Shuweicha Marsh	SM7
Hammar (East)	Slein (Ghatra)	HA2 1	Sinnaf	Sinnaf Area, Eastern	SM0
Hammar (East)	Shaafi	HA2 6	Sinnaf	Sinnaf area, Central-south	SM4
Hammar (West)	Teena, Northern	HA1	Sinnaf	Sinnaaf Area, Western	SM5
Hammar (West)	Sinaaf Marsh, Western	HA1 0	Suwaibaaf (or Sleibaaf)	Suwaibaaf (or Sleibaaf)	TQ1
Hammar (West)	Shuwaya'riya Area	HA1 1	Teeb Oasis & Zubaidaaf	Teeb oasis	MN1
Hammar (West)	Sinaaf Marsh, Eastern	HA1 2	Teeb Oasis & Zubaidaaf	Zubaidaaf	MN2
Hammar (West)	Ibn Maajid Lake	HA1 3	Teeb Seasonal Wetlands	Teeb Seasonal Wetlands	SM8
Hammar (West)	Haffaar Opening 1	HA1 8	Wadi Al-W'eir	Wadi Al-W'eir	NJ1
Hammar (West)	Haffaar Opening 2	HA1 9	Wadi Al-W'eir	Sh'eeb Abu-Talha	NJ2
Hammar (West)	Teena, Southern	HA2			

Northern Iraq: 2007 to 2010

In the winter of 2007, at the request of the Iraqi Minister of Environment, the project was extended to Northern Iraq. A training conducted by Birdlife International and CIMI with Italian support, was conducted in Syria in November of 2006 to review progress from the previous survey work and prepare for the northern survey. Eight Trainees from the Ministry of Environment, Nature Iraq and the University of Sulaymania participated.

The KBA Team with support from Kurdish scientists from the universities and Ministry of Environment in Kurdistan traveled for the first time together to expand the biodiversity surveys to Kurdistan, Northern Iraq, extending the survey to over seventy sites in the governorates of Sulaymania, Erbil & Dohuk. With this expansion, the Key Biodiversity Areas survey represents the most comprehensive environmental survey to have taken place in Iraq in



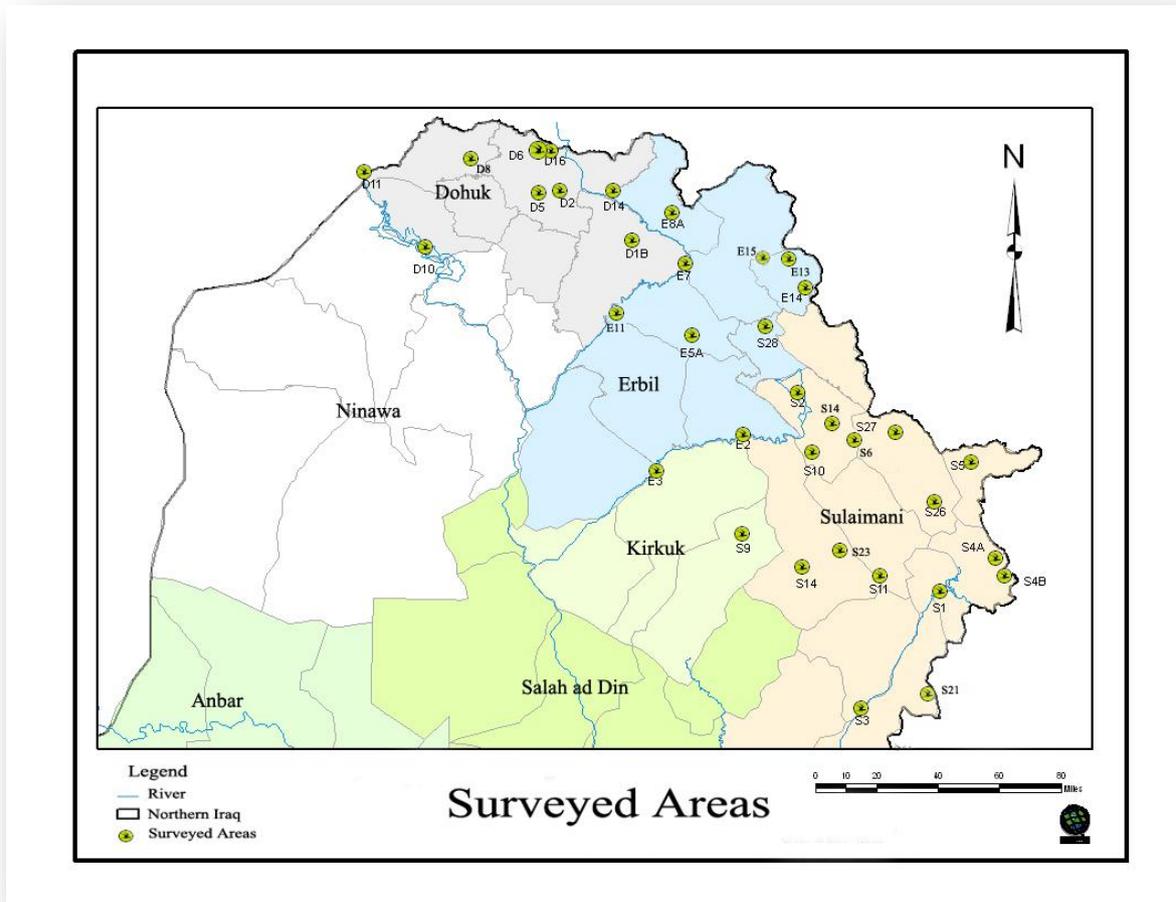
over twenty years. It may, to our knowledge, also represent the first project that brought together Ministry of Environment officials from the central Iraqi government with their colleagues from the Kurdish Regional Government. This cooperation was accomplished through the support of Nature Iraq staff.

In addition to the sites for southern Iraq, an additional 73 sites in Kurdistan were surveyed. The following table and figure show the KBA sites included in the Kurdistan survey:

Site Name	Sub-Site Name	Site Code	Site Name	Sub-Site Name	Site Code
Ahmed Awa	Ahmed Awa	S4A	Halgurd Mountain	Halgurd Mountain	E13
Altun Kopri Marsh	Altun Kopri Marsh	E3	Hazardmerd	Hazardmerd	S34
Aski-Kalak & Safea	Aski-Kalak & Safea	E10	Kalar	Kalar A	S3
Assos Mounta	Assos Mountain, north face	S32A	Kalar	Kalar B	S3C
Assos Mounta	Assos Mountain, south face	S32B	Khazar & Kalakchi	Kalakchi	D12A
Atrush & Bania Area	Atrush A	D3A	Khazar & Kalakchi	Khazar	D12B
Atrush & Bania Area	Atrush B	D3B	Kherazook	Kherazook	E9
Atrush & Bania Area	Bania Area	D3C	Maidan Area	Maidan Area	S22
Awesar	Awesar	S4B	Mangeesh	Mangeesh	D8
Bahrka	Bahrka	E11	Mangeesh	Mangeesh Area	D8B
Bakhma & Bradost Mountain	Bakhma	E7	Mangeesh	Mangeesh Valley	D8A
Bakhma & Bradost Mountain	Bradost	E18	Mawat	Mawat	S36
Barzan Area	Barzan	E8	Mawat	Mawat	S8
Barzan Area	Shanidar Cave	E8B	Mosul Lake	Mosul Lake	D10
Barzan Area	Gali Balnda	D14	Mosul Lake	Mosul Lake A	D10A
Benavi	Benavi	D6	Mosul Lake	Mosul Lake B	D10B
Benavi	Sararu	D1	Mosul Lake	Steppe Area north of	D1



Site Name	Sub-Site Name	Site Code	Site Name	Sub-Site Name	Site Code
		3		Mosul Lake	7
Chamchamal Area	Chamchamal Area	S9	Parazan	Parazan	S26
Chami Razan	Chami Razan Area A	S10A	Penjween	Penjween	S5
Chami Razan	Chami Razan Area B	S10B	Peramagroon	Homer Qowm & Shadala Valley	S24
Darbandikhan Lake	Darbandikhan Lake	S1	Peramagroon	Peramagroon	S6
De Lezha	De Lezha	S23	Qara Dagh	Qara Dagh Area	S11
<i>Doesn't meet KBA Criteria</i>	Turaq Steppe	E4	Raw&uz	Gali Ali Beg	E12
Dohuk Lake	Dohuk Lake	D9	Raw&uz Gorge	Jundyhan	E6
Doli Plngan	Doli Plngan	S28	Sakran Mountain	Sakran Mountain	E14
Doli Smaquli & Ashab	Ashab Valley	E5B	Sangaw	Sangaw	S14
Doli Smaquli & Ashab	Doli Smaquli	E5A	Sargalu	Sargalu	S7
Dukan Lake	Dukan Lake	S2	Sari Hassan Bag Mountain	Sari Hassan Bag Mountain	E15
Dure	Dure	D16	Ser Amadiya & Sulav	Ser Amadiya	D2A
Fishkhaboor	Fishkhaboor - Syrian Border	D11A	Ser Amadiya & Sulav	Sulav Resort	D2B
Fishkhaboor	Fishkhaboor - Turkish Border	D11B	Sharbazher Area	Sharbazher Area	S13
Gali Zanta & Garbeesh	Gali Zanta	D1A	Taq Taq	Taq Taq	E2
Gali Zanta & Garbeesh	Garbeesh Mountain	D1B	Waraz & Kuradawe	Kuradawe	S27
Gara Mountain & Garagu	Gara Mountain	D4	Waraz & Kuradawe	Waraz	S25
Gara Mountain & Garagu	Garagu	D5	Zalm	Zalm	S12
Gmo Mountain	Gmo Mountain	S33	Zawita	Zawita	D7
Hagi Omran	Hagi Omran	E1			



Map of the surveyed KBA sites Kurdistan in 2007

Under the Key Biodiversity Areas Project, the year 2008 saw the completion of winter surveys in southern Iraq and Kurdistan, Northern Iraq for birds, fisheries, botany/habitats, and water quality with a focus as well on sediment, plankton and macrobenthos analysis. A second summer survey was conducted during the breeding and growing seasons in southern Iraq and Kurdistan, Northern Iraq. A team meeting was held for all partners participating in the project at the end of the summer survey in August 2008.

Also during the spring of 2008, Nature Iraq organized a cross-training program for field and lab staff and invited members of the Ministry of Environment and the Ministry of Water Resources to participate. This training program visited five sample sites on the Tanjero River to conduct comprehensive Water Quality, Fisheries, Sediment, Plankton, and Benthic



Macroinvertebrates sampling. The Tanjero Cross-Training was very successful and was repeated in September of 2008.

An additional habitat survey took place at the end of the KBA survey in summer within the Central Marshes in the area designated for the National Park. This survey collected more information needed for the development of the National Park Management Plan. A meeting was held between survey members in early October to discuss results and develop the report for the project.

After the KBA and Habitat Summer Surveys were completed, a large fish kill occurred on Darbandikhan Lake in northern Iraq and Nature Iraq sent a team to investigate and take samples. A second sampling effort was done in September 2008 in coordination with the Ministry of Environment and a third series of sampling was done at the original sites with an added industry survey component that was accomplished in October of 2008. A series of draft reports were issued and eventually a larger report entitled “State of the Environment–Darbandikhan Lake Basin” was released later in 2009 that outlined and a road map forward for addressing problems in the region using a basin-wide approach.

Members of the KBA and Habitat teams participated and made presentation at the International Symposium on Documenting, Analysing and Managing Biological Diversity in the Middle East held in Aqaba, Jordan from 20-23 October, 2008. This Symposium was sponsored by the Senckenberg Research Institute, University of Jordan, Yarmouk University, Marine Science Station of Aqaba, American University of Beirut, Johann Wolfgang Goethe University (Frankfurt), University of Sana’a, University of Tehran and the German-Arab/Iranian University Dialogue. Papers based on these presentations were published in the conference proceedings the following year.

Additional presentations and papers on the environmental monitoring work of the New Eden Project were made at the 5th Scientific Conference on Fisheries sponsored by the University of Basrah on 3rd & 4th March and the Baghdad Science Conference sponsored by the University of Baghdad on 26th-28th March. Other activities of 2008 include a training that was conducted in December 2008 in Sulaimani, Kurdistan Iraq for the field and laboratory staff of Nature Iraq and the Ministries of Environment (Baghdad & Kurdistan) on follow up activities to field work and report writing.



The fall 2008 season was spent developing and completing the 2008 KBA Site Reviews for North & South, the Water Quality Report for Kurdistan, Northern Iraq, and the Habitat Report for the Central Marsh sites. In addition, preparations for the winter 2009 KBA Survey efforts including the development of work plans, selection of new sites (including new sites in Central Iraq), the development of a new bird database for data entry in the field, and team selection took place in the final months of 2008.

Central Iraq: 2009 to 2010

In 2009, surveys were modified and expanded, though water quality work (including sediment analysis, benthos and plankton survey work was restricted to northern Iraq) and primarily bird, fish and plant/habitat surveys occurred in the rest of the country. But for the first time, the survey work was conducted in Central and Western Iraq in areas that had previously suffered from security problems. The following table lists the 26 KBA survey sites visited by the New Eden Team in these areas:

Site Name	Sub-Site Code	Site Name	Sub-Site Code
Anah & Rawa	AN3	Himreen lake	DY1
Sabkhat Abu Garis	AN11	Jabal Makhool	SD7
Augla	AN5	Jadriyah & Umm Al Khanazeer Isl&	BG1
Gasr Muhaiwir	AN6	Jallet Abu Ageel	SD5
Abu Habba	BG2	Mahzam & Al-Alam Area	SD3
Baquba Wetl&s	DY2	M&li	DY4
Attariya Plains	DY3	Al Qadissiya or Haditha Dam	AN7
Huweija Marshes & Beagi	KK1	Rutba & Al Massad Gazelle Reserve	AN12
Abu Dalaf & Shari Depression	SD4	Samarra dam & Wetl&s	SD1
Ga'ara	AN17	Shayat Wetl&s	SD10
Habbaniya Lake	AN1	The Western Edge of Al Tharthar Lake	AN9
Haditha Wetl&s & Baghdadi	AN2	Tharthaar Lake & Dhebaeji Field	SD2
Hawijat Abu Dheab & Al Ramadi Marshes	AN8	Wadi Horan & Al-Hussayniyah	AN4



Several new findings were made and many new species range extensions were determined based on the 2009 bird survey work. In addition a fisheries frame survey was conducted in specific areas of central Iraq as well as sites within the proposed Mesopotamian Marshlands National Park and East Hammar Marshes.

New Microsoft Access Field databases were developed for collecting and collating field data from the bird and plant survey work, which has greatly speeded up data analysis for many sites. In addition, for the first time, several key sites were given rough delineations and all sites were assessed for threats based on IUCN Threat Categories and BirdLife Threat Assessment methodology. For 2009, water quality surveys concentrated on the upper watersheds of the Diyala and Lesser Zap basins.

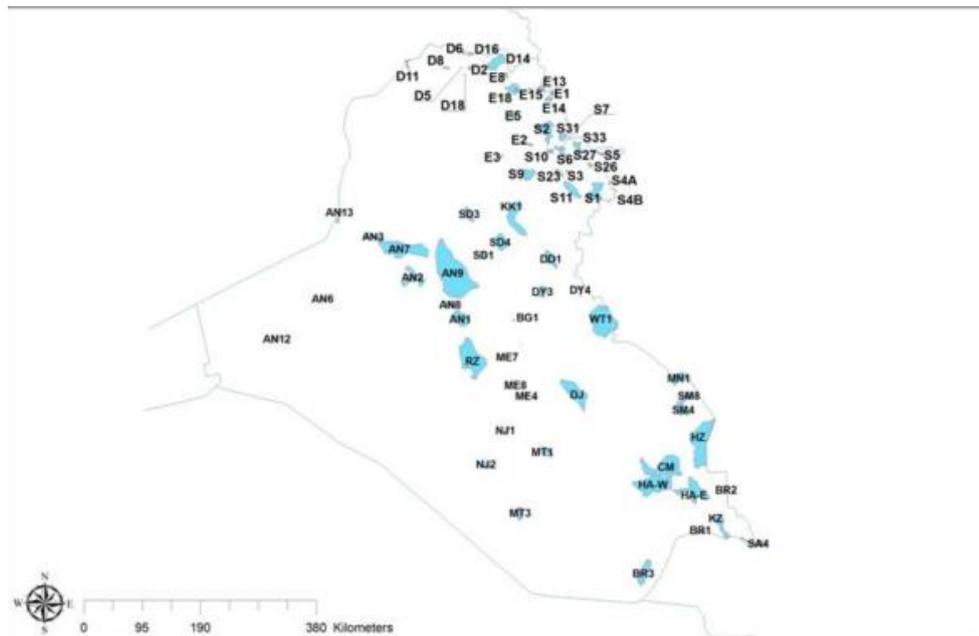
The environmental training program included a Fisheries and Aquaculture training conducted in March of 2009 through the Twin Rivers Institute with an Italian consultant from Sterling University in Scotland and a Bird/Botany Training in April of 2009 with trainers from BirdLife International and the Royal Botanic Gardens Edinburgh's Center for Middle Eastern Plants. Lastly a meeting in early January 2010 was held between staff from Nature Iraq and a researcher from Plan for the Land, a conservation organization based in Tehran, Iran to discuss future cooperation on mammal research.

Final Year of the KBA Survey Effort: 2010

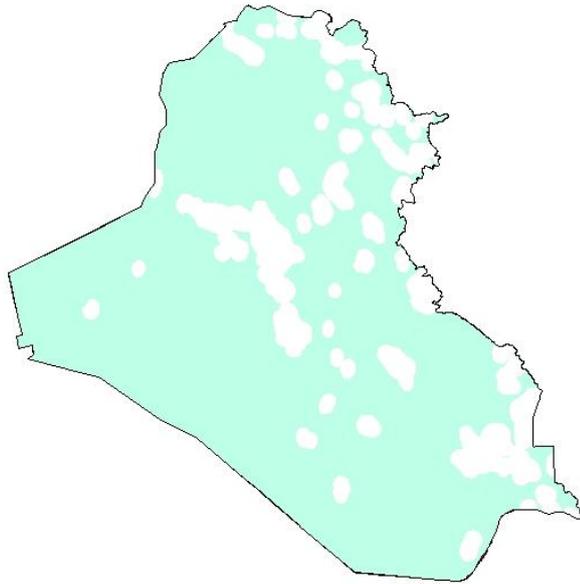
The Key Biodiversity Areas (KBA) surveys conducted in 2010 covered all of the governorates of Iraq except for Nineva. These surveys continued to involve, in addition to Nature Iraq, partners from the Iraq Ministry of Environment (IMOE) central and directorate offices, the Kurdish Environmental Protection and Improvement Commission (KEPIC), the Kurdistan Regional Government Environmental Police, and the Universities of Sulaimani and Baghdad. In 2010, the final year of the survey effort the focus was on birds, mammals and other fauna, and flora. The 2010 KBA surveys represent the 7th and 8th seasonal surveys conducted in Kurdistan, northern Iraq, since the start of the project there in February 2007. They represent the 3rd and 4th seasonal surveys for Central and Western Iraq since the project was initiated there in January 2009, and they represent the 11th and 12th seasonal surveys for many of the southern sites since the start of fieldwork in the Mesopotamian Marshland areas in the winter of 2005.



Overall throughout the country-wide Key Biodiversity Areas program, 108 sites were visited in 2010 (29 in Kurdistan, 22 in Central/Western Iraq and 57 in Southern Iraq) with over 451,104 individual bird observations (412,052 for winter and 39,052 during summer). In winter, there were 154 species seen in the south, 143 species seen in central Iraq and 125 seen in Kurdistan, Northern Iraq. In summer there were 133 species seen in the south, 150 seen in central Iraq and 138 species seen in Kurdistan Iraq. The figure below shows a map of the surveyed sites just visited in 2010.



Map of the surveyed KBA sites surveyed in 2010



Areas surveyed (including a 10 km buffer) under the KBA Program (in white)

For the spring botany survey in southern Iraq, there were 648 individual plant records obtained from 38 waypoints within 32 sites. In the summer survey of Iraqi Kurdistan, 2297 individual plant records were obtained and 25 waypoints were documented within 20 sites.

Additional information was also obtained on other fauna such as mammals and reptiles. The quality of information being obtained from locals on other fauna at sites was also improved. A secondary report was released that provides more details on animal trade and hunting in Iraq.

A full list of the birds, plants, mammals etc. seen both the winter and summer 2010 surveys throughout Southern, Central/Western and Northern (Kurdistan) Iraq is provided in a detailed survey report published by Nature Iraq in 2011. As for plants, 197 species were identified in the south and 519 species were identified in Kurdistan, northern Iraq.

Site Threat Assessments

In winter and summer of 2010, the survey team conducted a site threat assessment using the Pressure-State-Response (PSR) Model as outlined by the BirdLife International (2006) report on Monitoring Important Bird Areas. The PSR Model relies on three types of indicators:

- Pressure - Pressure indicators identify and track the major threats to important bird populations at IBAs. Examples include rates of agricultural expansion, over-exploitation and pollution.

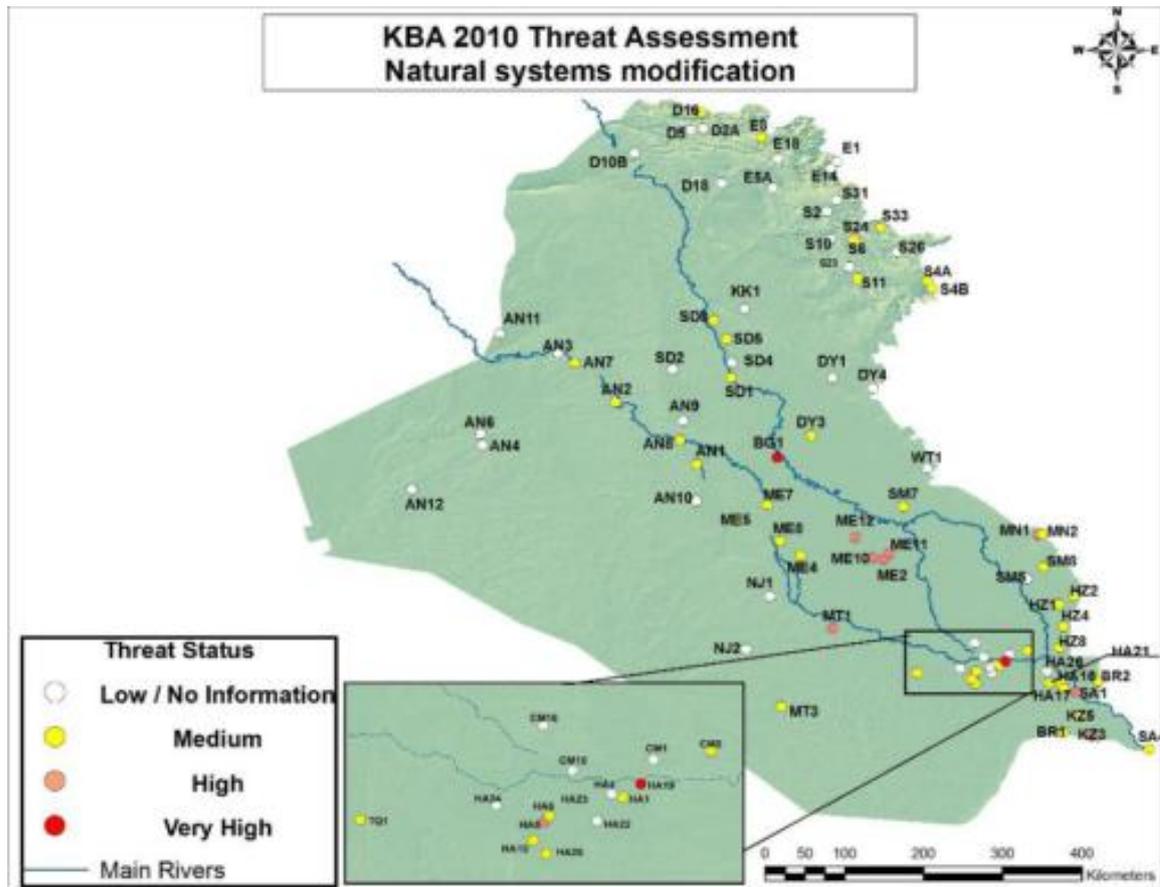


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- State - State indicators refer to the condition of the site, with respect to its important bird populations. State indicators might be population counts of the birds themselves. They might also be measures of the extent and quality of the habitat required by these birds.
 - Response - Response indicators identify and track conservation actions: for example, changes in conservation, designation, implementation of conservation projects and establishment of Local Conservation Groups (LCGs).

Pressure Indicators consist of the following eleven threat types, most of which were assessed for all sites in the 2010 survey:

- Agricultural expansion & intensification
- Residential & commercial development
- Energy production & mining
- Transportation & service corridors
- Over-exploitation, persecution & control
- Human intrusions & disturbance
- Natural system modifications
- Invasive & other problematic species & genes
- Pollution
- Geological events
- Climate change & severe weather

Each threat class was rated based on its Timing, Scope and Severity to provide an integrated threat assessment score that would classify the particular threat classification as Low, Medium, High or Very High. The following figure shows an example of the final classification of each site for one of the Pressure indicators listed above (Natural System Modification):



Sites classification for “Natural systems modification” threats (dams and changes water mgmt, filling in wetlands, drainage, dredging, & canalizations)

Continuous Monitoring for Nutrients

The New Eden team engaged in a new experiment never carried out in the marshes before. The field survey teams monitored a single point in the Hawizeh Marsh for 25 continuous hours, collecting data every hour for analyses of various parameters to study the variation in the water column with time over a period of one day. The experiment was carried out on two different occasions (spring and summer of 2006) to reduce uncertainty of the level of variation in the various parameters being monitored.

The experiment was then repeated in the fall and winter to collect information on the diurnal variation of the nutrient levels during those seasons. The results of the experiment have created new understanding of phenomenon not observed previously.



Shatt al-Arab Survey

The New Eden teams have executed in 2006-2007 three trips to monitor over 10 different sites along the Shatt al-Arab. Ecological and physical water parameters were collected. These data will be used to calibrate computer flow models for Shatt al-Arab. The data has already proven important for MWR in their ongoing negotiations with Iran.

Water, sediment and biota have been collected on a monthly basis from 9 stations: 7 stations in the Shatt al-Arab, and 2 in the Gulf. Phytoplankton, zooplankton and benthic communities were sampled and studied. Total Organic Carbon (TOC) in both sediment and particulate samples were determined. Field measurements were recorded in each station.

Initial data reflect the enrichment of the Shatt al-Arab water by both organic matter and nutrients as a result of re-flooding of the marshes. The effort will continue on a monthly basis until the end of this project and will be continued under future funding extension as it is important not only for MoWR but also for scientific research in the northern Gulf area and Kuwait.

Water Buffalo Survey

The New Eden Team undertook in 2006-2008 a survey of water buffalo in the marshes of Thi-Qar Governorate (Al Hammar Marsh). The purpose of the survey was to determine the total number of water buffalo, their overall status and health, and the production of dairy products in order to quantify the need for veterinary clinics in the area of the marshlands. The total number of buffalos resulting from the first survey of 2006 was 19,252 heads. The number of males was 3,028 while the number of females was 16,224. The number of farmers was 859. The number of lactating cows was 4,424 (27.3%) while the remaining were either dry or still calves or heifers. The total milk produced from this population was 17,794 litres/day.

Oil Spill Survey

During one of the KBA surveys of 2006, the New Eden teams noticed the presence of birds that had been contaminated and the incident had not been reported in the press. Our teams collected the information and presented a detailed report to the MoE for follow up with the National Emergency Response Committee. Further meetings with the MoE indicated that they



are in need of technical support to organize the Iraqi national emergency response. It was agreed that our teams would provide assistance as needed.

Water Budget Survey

The New Eden field survey teams have executed during 2006-2007 six monthly trips to collect specific information on water flow parameters as well as physical water properties in those key flow areas. Water inflows are measured utilizing electromagnetic current meter at 0.2 and 0.8 of the water column depth. Water quality measurements have included salinity, pH, dissolved oxygen and temperature. This activity has been ongoing for over two years, however, the location of the monitoring has been modified (added to/ moved, etc.) over the life of the project. These data are essential for determining the hydrological model for the marshlands.

In addition, the New Eden Team initiated a monitoring program to determine the nutrient budget of the marshlands. Water samples have been collected on a monthly basis from 21 stations: stations in the tributary rivers; 2 stations in each of the outlets, and 13 stations within Hewizah Marsh proper. Total Organic Carbon (TOC) Total Phosphorus and Total Nitrogen in both sediment and particulate samples were determined and field measurements are recorded in each station. Initial data reflect the fact that the marshes are indeed a sink for nutrients, the extent of nutrients exhausted via photosynthesis and sedimentation are yet to be estimated.

Raptors Trading Survey and Study

Iraq is considered one of the main pathways for migratory raptors passing through to wintering grounds in Arabia and Africa. It also has a remarkable number of resident and breeding birds of prey. Every year the local animal markets (Suq singular) in Iraq exhibit thousands of captured wild birds from small passerines to large birds of prey.

Four main animal markets in four different Iraqi provinces were surveyed. Suq Al-Ghazel in Baghdad, Suq Ba'aquba in Diyala, Suq Al Qa'la in Kirkuk, and Suq Al-Ramadi in Anbar. Thirty-six raptors species (including seven owl species) with a total count of 885 birds of prey were recorded during a two-year period between December 2008 and December 2010. Suq Al-Ghazel and Suq Ba'aquba were visited, when possible on a weekly basis. Suq Al Qa'la and Suq Al-Ramadi were visited on a monthly or bi-monthly basis.



Raptors were brought to the Suq to be sold for prices ranging from 10 to 300 USD depending on their age and state of health. These were, either sold locally, smuggled to neighbouring countries, or died in captivity. Raptors are often presented in poor health with injuries usually caused by careless trapping or handling. Detailed information about the trapping and traffic of falcon species such as saker falcons (*Falco cherrug*), lanner falcons (*Falco biarmicus*), and peregrine falcons (*Falco peregrinus*) was collected. Iraq has some laws that restrict hunting, but these are not enforced and there is extensive illegal hunting/trapping of many IUCN Red-listed species.

During Nature Iraq Key Biodiversity Area surveys, large numbers of passage migrant raptors were recorded at one site (east of Tharthaar Lake) consisting of a mixed flock of 437 black kites (*Milvus migrans*) and black-eared kites (*Milvus lineatus*), and a flock of up to 450 lesser kestrels (*Falco naumanni*) were found in another site in the western desert of Iraq.

Falconry hunting parties from different Arabian countries have been visiting Iraq in order to trap falcons particularly saker, lanner, peregrine and barbary falcons (*Falco pelegrinoides*) or to hunt houbara (Macqueen's) bustard (*Chlamydotis macqueenii*), great bustard (*Otis tarda*), and little bustard (*Tetrax tetrax*). It has been locally reported that both these falcon and bustard species are becoming increasingly rare in Iraq because of hunting and trapping.

During the first visit to the Suq Al Ghazel in Baghdad in December 2008, four raptor species were present. In 2009 and 2010 more detailed surveys were carried out in order to cover the main raptor species present at the Suqs. During a total of 97 regular visits to all four Suqs, 885 birds of prey belonging to 36 species were recorded. Seven of these species were listed on the International Union of Conservation of Nature (IUCN) Red List for endangered species and were frequently present at the Suqs.

Extensive information was also gained from hunters/trappers, falconry associations, and animal shop owners about the main targeted species and counts of birds of prey that have been trapped and sold during the years of 2009 and 2010. In order to develop future conservation efforts to protect falcon species, one goal of these surveys was to determine which species was the most popular and prized for capture and sale. Through interviews, as well as data gathered from visits to the Iraqi Suqs, saker falcons are the most popular species and dominate the international falcon trade. According to one hunter in 2010, he was involved



in the trapping of seventeen saker, nine peregrine, and 11 barbary falcons in Anbar and smuggled them to a neighbouring country via Iraq's western and southern borders.

Provide Support to IMoE for Biodiversity

During a series of meetings held in 2006 with the Minister of the Environment, it was agreed that the New Eden Team would provide support to the MoE for their Biodiversity section. As part of that training, Nature Iraq, through the capacity building program component, undertook the effort to train four MoE personnel at the University of Waterloo, in Canada over a two months period. This training was later followed by yearly capacity-building activities conducted under the KBA Program that have already been described above.

8. Field Surveys, Design and Technical Assistance During Construction of 18 Hydraulic Regulators (2006-2010)

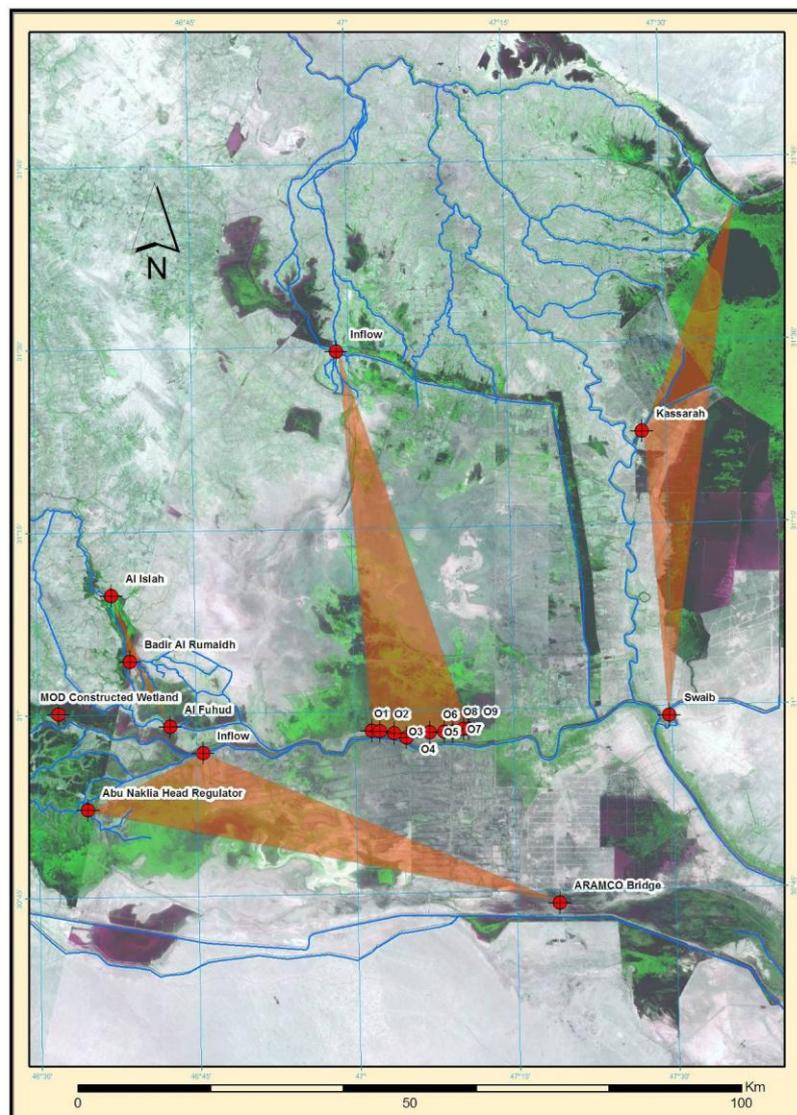
Based on the findings of the New Eden Master Plan (September, 2006), a set number of water control structures was identified as necessary for the implementation of a control management of the marshlands of southern Iraq. The scope of the structures is to manage the water flowing in and out of the wetlands in order to reproduce the natural behaviour of the marshlands with amounts of water lower than in the past, when natural flows were not regulated by all the reservoirs now existing in the Tigris – Euphrates catchment. In fact naturally the extension of the flooded areas is subject to variability during the year, according to the hydrological regime; dry years imply a reduction of the flooded areas, while wet years contribute to an increase in extent of the marshlands. Given that natural inflow and outflow management is no longer possible under the current hydrological conditions, the feasible alternative is to control the water flowing in and out of the marshlands with a set of water control structures.

Based on the request of the Ministry of Water Resources, the final design of 18 hydraulic structures, ready for the tender procedures, was carried out. A complete list of the water control structures, which were designed is provided as follows:

- Abu Zirig Central Marsh regulators (2 structures)
- Abu Zirig Southern Marsh regulators (2 structures)
- Hammar Marshes inlet (1 structure)

- Hammar Marshes outlet (1 structure)
- Central Marshes Inlet regulator along the Buteira River (1 structure)
- Central Marshes Outlet regulator (9 structures located along the outlet main outlet canals).
- Hawizhe Marshes Outlet regulators (2 structures, one located at the Kassara and one at the Swaib site).

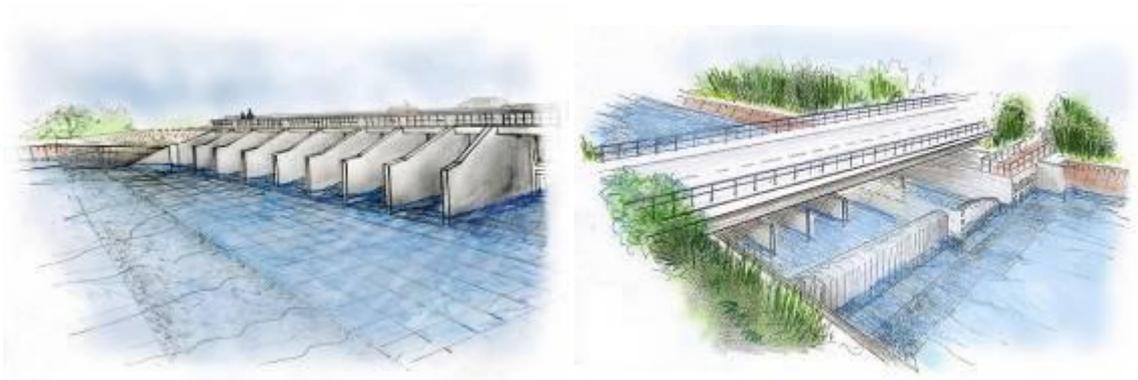
The following is a summary drawing depicting the location of each proposed intervention.



Location of the 18 hydraulic structures designed by the New Eden team

During the preparation of the final design, a detailed topographical and geotechnical survey was carried on at each control structure site, in the period 2006 - 2007. The new survey, in conjunction with newly acquired high resolution satellite images of the project's sites, greatly helped in understanding the general conditions in which water would flow towards the proposed water control structure. The design of the structures requires that they can manage both low flows and flood event flows; for this reason all the designed structures have a gated part used for the low flow management and a weir part for the flood flow passage.

For each water control structure a hydraulic technical report was prepared to provide a detailed description of the hydrological conditions of the project area, and provide justification to the selected design. Every project site has a peculiar hydrological setting that was accurately analyzed according to the available observed flow data, and to the existing studies. Then, according to the topographical survey and to the satellite image investigations, a numerical model was developed in order to precisely define the hydrodynamic conditions (velocity, water level and conveyance) of the hydrological network around the project's site; particular attention was paid on the boundary conditions, such as flow hydrograph entering the network and the water surface level downstream the structure: several layouts were analyzed, taking into account normal and flood conditions. The results of the model were used to identify the necessary dimensions of the structures for the management of the marsh inflow/outflow. Moreover, the report provides a summary of the supervision guidelines, which should be adopted once the structure will be put into place.



Hydraulic structures sketches



Other than the hydrological technical report, a geotechnical report, a structural design report, a detailed bill of quantities and a set of plates were prepared to enable the MoWR to immediately tender the construction of each structure.

The overall investment package for marshlands management was estimated in the range of 210 million Euros. During 2008-2009 all the designs were reviewed according to the comments provided by the staff of the MoWR which, after the final approval of the projects, requested also to provide technical assistance to the Ministry of Water Resources for the tender procedure, necessary for the implementation of the hydraulic structures.

A tender document was prepared and after that a set of construction companies were invited to the tender. The selection of the most appropriate company was done according to the curriculum, the already done similar activities, the references, and the presence or capability of accessing the marshlands area. After the assignment of the tender the company reviewed the final design of the structures and provided a construction design, which was checked and reviewed by the New Eden team and then approved by the Ministry of Water Resources.

The selection of the most appropriate companies for the construction of the first 10 water regulators was completed by the Ministry of Water Resources at the beginning of 2010 and the works have been executed between 2010 and 2012. Throughout this period Nature Iraq and the New Eden team provided technical assistance to the Ministry of Water Resources in terms of:

- Periodical (monthly) meetings with the Client and the Contractors
- Review of the design according to the issues/variations discussed and agreed with the Client/Contractor
- Field assistance support through local engineers

The first 10 hydraulic structures that have been constructed by the Ministry of Water Resources, for which the New Eden team provided assistance, are the following (see also pictures below):

- Abu - Al-Narsi Canal structure
- Abu-Chiwalanah Canal structure
- Abu-Jithaa Canal structure
- Abu-Sobat Canal structure

- Al-Badriyah Canal structure
- Al-Kanziri Canal structure
- Al-Sabbaqiyah Canal structure
- Chihalah Canal structure
- Nahar Al-Sabaa Canal structure
- Buteira river structure.



Abu Al Nirsy structure



Abu-Chiwalanah Canal structure



Abu-Jithaa Canal structure



Abu-Sobat Canal structure



Al-Badriyah Canal structure



Al-Kanziri Canal structure



Al-Sabbaqiyah Canal structure



Chihalah Canal structure



Nahar Al-Sabaa Canal structure



Buteira river structure



9. Field Surveys, Preliminary/Detailed Design & Construction of the Twin Rivers Institute at the American University in Suleimania (2006-2012)

The cooperation between IMELS and Nature Iraq activated a program for the establishment of an academic centre of excellence for research in the environmental and water protection fields. The new research centre, which has been named Twin Rivers Institute, was built inside the area of the American University of Iraq in Suleimania taking into consideration the most suitable technological solutions applicable for the local situation in terms of environmental sustainability for the construction and operation of the new facilities.

The American University of Iraq – Sulaimani (AUI-S) is a not for profit institute and is focused on recruiting the best and brightest students, not only in Iraq, but in the region for the purpose of training the future leaders of the area and to have them live together and experience the cultural and sectarian differences so that it can have in its student body a replication of the mosaic of the region.

The University was founded in 2004, registered in 2006, and began instruction in October 2007 with a cohort of 45 students matriculating in Business Administration (B.Sc.). In November 2007, instruction for Masters in Business Administration (MBA) was also started with a cohort of 18 students. Further, the Twin Rivers Institute for Environmental Studies (TRI) was established: it is focused on graduate studies in the sciences needed in the environmental challenges facing Iraq, from the management of marshes, to the studying of the contaminated industrial sites, to the creation of natural habitats and the protection of the biodiversity, etc.

TRI's building on the campus of AUI-S was developed on a three years based program, including the design, the bidding process and the construction activities. The technical activities for the preparation of all the technical documents needed for starting the tender phase were the following:

- Selection of the optimal location for the Twin Rivers Institute, in consultation with the AUIS management/staff and with the consultants hired for the development of the Master Plan of the university campus and of the detailed design of the first presidency building;



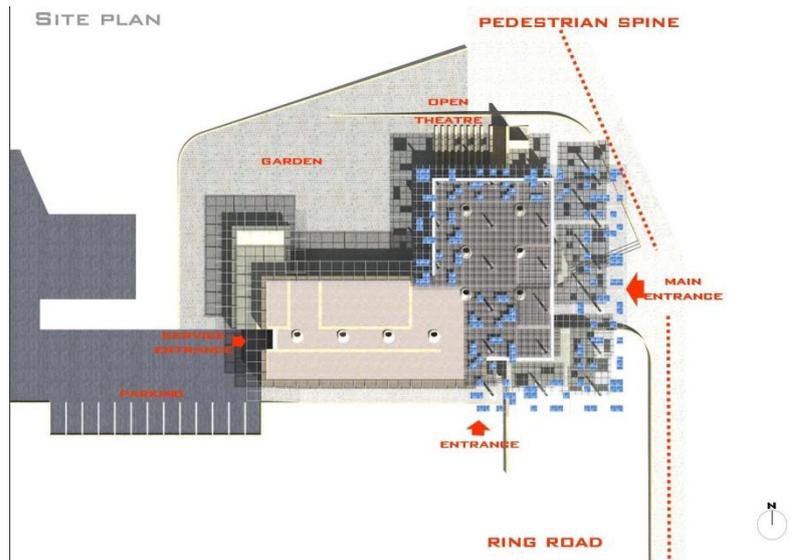
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- Topographic survey of the areas where the building will be built;
 - Soil investigation tests in the construction area;
 - Collection from the central and local relevant authorities of all the data and information needed for the development of the design, including the regulations to be applied for the design and construction of the building;
 - Development of the preliminary design of the building: the design was then submitted and discussed with the management of the AUIS in January 2008 and subsequently revised according to the comments and observations provided by the AUIS;
 - Development of the detailed design: the design was verified and approved by the AUIS, after the New Eden team submitted a new revision, which incorporated all the comments received from the beneficiary.

The building, designed to be a sustainable energy building worthy of being an environmental research laboratory, is organized on two floors which house respectively:

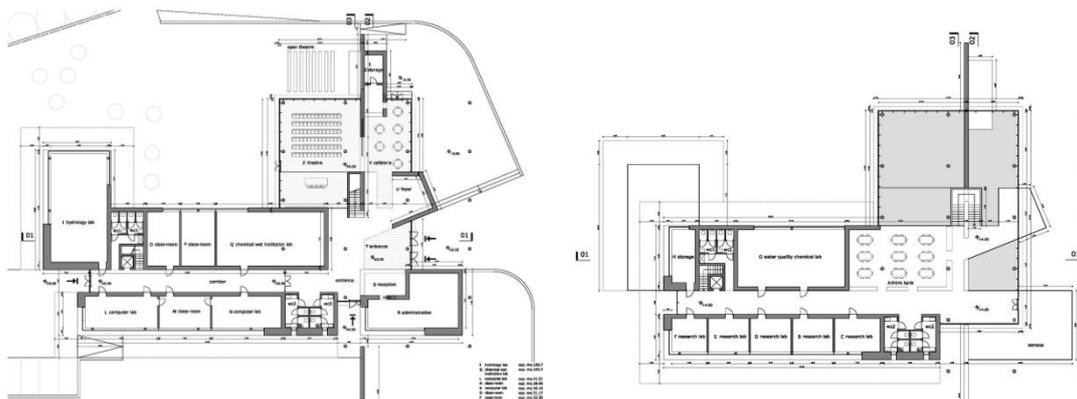
Ground floor: Entrance/reception, Administration offices, Cafeteria, Theatre/Convention centre including foyer, Computer labs, Hydrology lab, Chemical wet institution lab, Class-rooms.

First floor: Research labs, Terrace, Water quality chemical lab, “Think tank”

The following figures show the plan of the new building and the lay-out of the ground and first floor.



Site plan of the TRI building



Lay-out of the ground and of the first floors of the TRI building

The following figures, taken from the detailed design, show some exterior views of the Twin Rivers Building as well as the interior view of the theatre/convention centre.



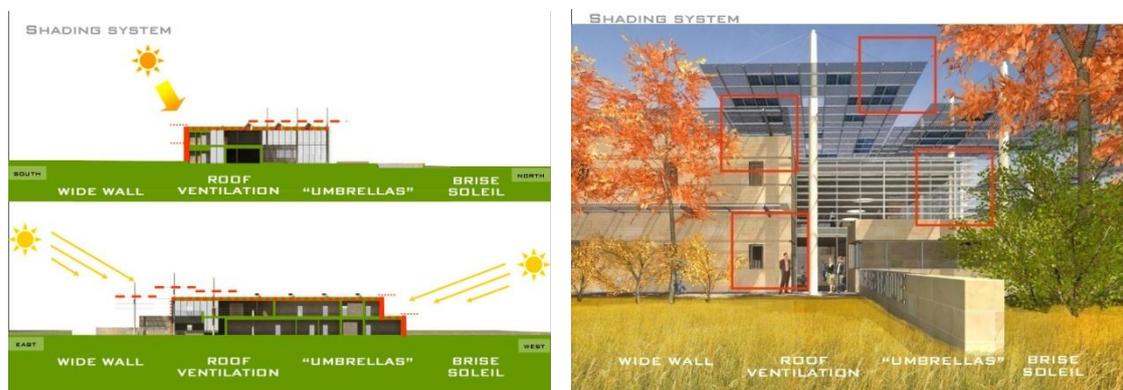


The Twin Rivers Institute: aerial and exterior views



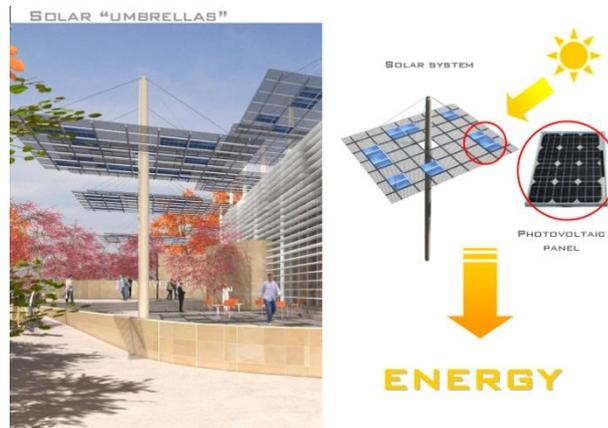
The Twin Rivers Institute: view of the theatre/convention centre

Considering the extreme climatic conditions of the Suleimania area, where during the summer period temperatures above 45 degrees are commonly registered, the design aimed to define the best solution to guarantee appropriate shading to the building. The shading systems that are being considered (wide walls, roof ventilation, “umbrellas” and brise soleil) are shown in the following figure.



Schematic and exterior views of the shading systems

Furthermore, the building maximizes the application of modern technologies for improving its sustainability in terms of energy consumption. As an example, in the following figure the installation of photovoltaic panels on the upper level of the roof and of the “umbrellas” is shown.



Utilization of photovoltaic panels for the production of energy

Starting from January 2010, the New Eden team provided support to the AUI-S for the tender procedure. As a matter of fact, after a first procedure started on March 2009, which did not allow the University to find a suitable contractor, the AUI-S decided to reopen the pre-qualification procedure and selected 5 new contractors for the new tender procedure, which was launched in January 2010.

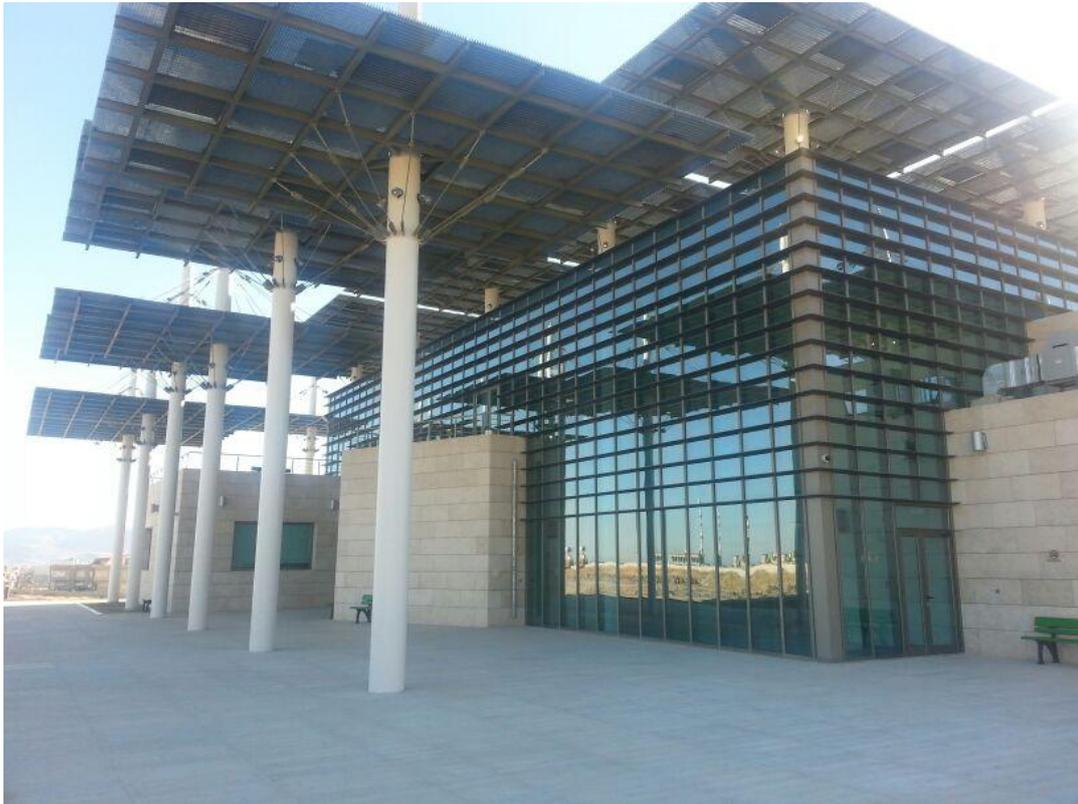
Out of the 5 companies invited for the third tender procedure, only 3 Contractors submitted their offer. The three offers received by the AUI-S received a positive evaluation from the Tender Commission. The AUI-S has completed its negotiations and selected the final contractor for the construction of the TRI. The works have started in the second half of 2010 and were completed at the beginning of 2013 (the following figure shows the completed building).



Throughout the construction period, Nature Iraq and the New Eden team have been providing technical support to the AUI-S through the following activities:

- Periodical (bi-monthly) meetings with the AUI-S and the Contractor
- Review of the design according to the issues/variations discussed and agreed with the Contractor
- Field assistance through local engineers.

Several amendments to the original design were agreed with the AUI-S and the Contractor due to the difficulty in finding some specific materials on the local/regional market and the request of the SUI-S Board to change some of the exterior elements of the building to make it more compatible with the other buildings which were being constructed in the adjacent area.



10. Pilot Project on Water Buffalos (2007-2008)

Southern Iraqi marshes have been and are still considered a natural habitat for water buffalo and at the same time buffalos are considered an icon of the Southern Iraqi marshes. Large numbers of these animals make use of marshes to avoid the very hot climate and eating the marsh plants as a main source of their food. There is a great controversy about whether buffalos should be kept or eliminated from these habitats. One opinion argues that buffalo, with its large size and high nutritional needs may cause serious damages to the fauna and water quality in the wetlands. Another opinion argues that these effects are not so serious, especially when taking into account the broad area of the marshes and the ability of plants to regenerate within a short period.



Water buffalos in the southern marshes

At the time of the study, the establishment of a National Park was one of the ambitious strategic projects that are planned for the marshes with the help of Nature Iraq and the final decision was still not made as to the status of the area. The suggested National Park site is located in the Central Marshes to the north of Chubayish City in Thi Qar province. The area is known to have extensive economic activities at the present time, a great deal of which depends on water buffalo as a source for milk, milk products, and meat. Large numbers of buffalo are observed in this area, especially in and around the proposed core area of the National Park. Thus the suggested adverse impacts that buffalo can have on the environment may be adversely affecting this area. But at the time of the study very little data are available either on the exact numbers or on the ecological effects of buffalo in the Central Marsh including the proposed area of the national park.

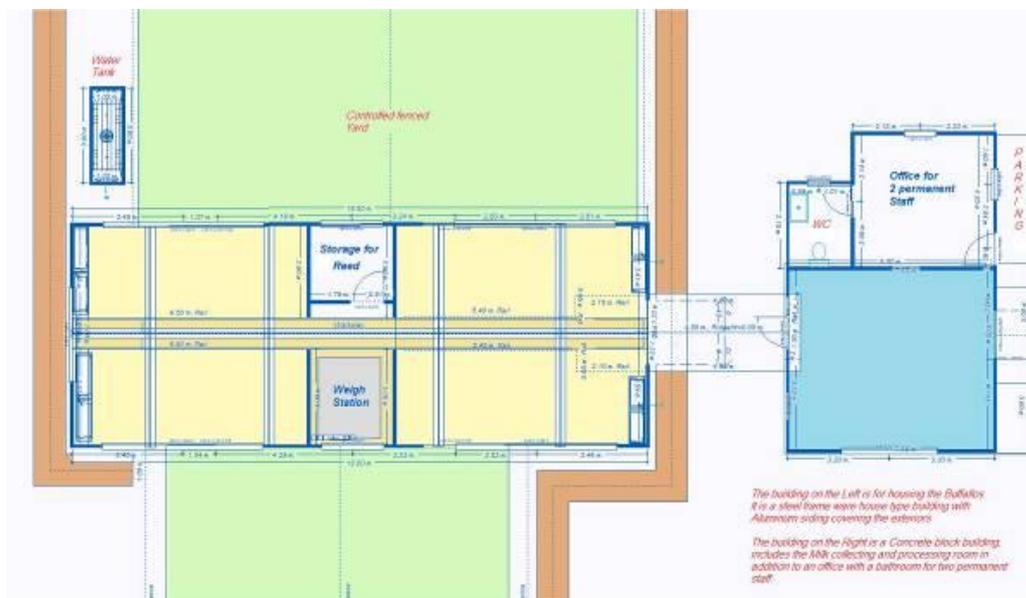
This pilot project aimed at describing buffalo distribution as well as its possible impacts on the National Park "core area". It also studied the economic potentials of buffalo husbandry in the NP area where a large population of buffaloes currently exist upon which the local people depend for their everyday living. As a first step, a field trip was started in March 2007 from Chubayish into the Central Marsh. The target was to locate points within the core zone where buffaloes exist and to take coordinates as well as photographs to describe these sites. These sites were planned to be further studied to compare them with sites without observed buffalo impacts.

As a result of this exploratory trip, a proposal for more targeted research was prepared and submitted in October 2007. The overall goal of the research was to identify constraints and opportunities for a sustainable integrated development approach to improve the smallholders' product quality and volume and increase the profitability and the efficiency in the marketing chain. The project foresees the implementation of a pilot farm where research will be performed in parallel with monitoring of the production and health of the buffalo. This will produce a set of data that will allow identifying the best practice to be disseminated among local smallholders.

The objectives of developing a pilot project on water buffalo farming are:

- To teach the locals how to manage their farm buffalos.
- To teach the locals the right way to collect, storage and sale the milk.
- To teach the locals the right way to improve the health of the buffalos.
- To implement scientific researches related with the buffalos.

The design of the buffalo farm has been carried out as presented in the following picture.



Buffalo Farm layout



The design is in two separate compartments, one to house the buffalos and the second to collect, weigh and sell the milk. The two are separated by a short covered pathway. Both with large sliding metal doors (like those that can be found in stores)

The Buffalo quarters are separated into four dens, each can hold up to 5 animals, the dens are separated by a reed storage and a weigh station. All four lead to an outdoor space for the animal to walk and feed. The two dens in the back have access to the marshes, where the animals can roam freely in the marsh and feed, bathe or drink as they wish, when they come back, one group will only have more reed and marsh water to feed and drink from, the other group have the same except they will also have some access to concentrated food.

The other two groups are not allowed to go to the marsh, they both drink and bathe (they have showers) in tank water, one group will have reed and concentrate food for feeding the other will only have concentrated food. The adobe techniques are to be used to build the structure dedicated to the buffalos, when the location and the needed plot of land will be individuated with the support of the local authorities.

11. Habitat Mapping Project (2007-2008)

The New Eden team developed a method to classify the natural habitats existing in the southern Iraqi Marshlands. The above mentioned classification of habitats may be of interest in order to implement the Mesopotamian Marshlands National Park project, as a prerequisite to create a sound management plan both for the National Park area and for the surrounding transition areas. The identification and mapping of Habitats allow for the application of different management approaches in relation to the phytocenotic diversity of the land.

Habitat classification scheme for the southern Iraqi marshes

The project started in July 2007, with the creation of a multidisciplinary team composed of Italian and Iraqi experts in various environmental sectors (water quality, sediments, fish, birds and terrestrial fauna, vegetation and natural habitats). The developed classification of habitats follows a hierarchically structured scheme of habitats, which is tiered into four levels. This proposed classification scheme derived from a comparative analysis between internationally adopted methods, and particularly the European CORINE Biotopes and MEDWET Habitat



description systems. These international methods needed to be revised and adapted to the peculiar features of the southern Iraqi Marshlands.

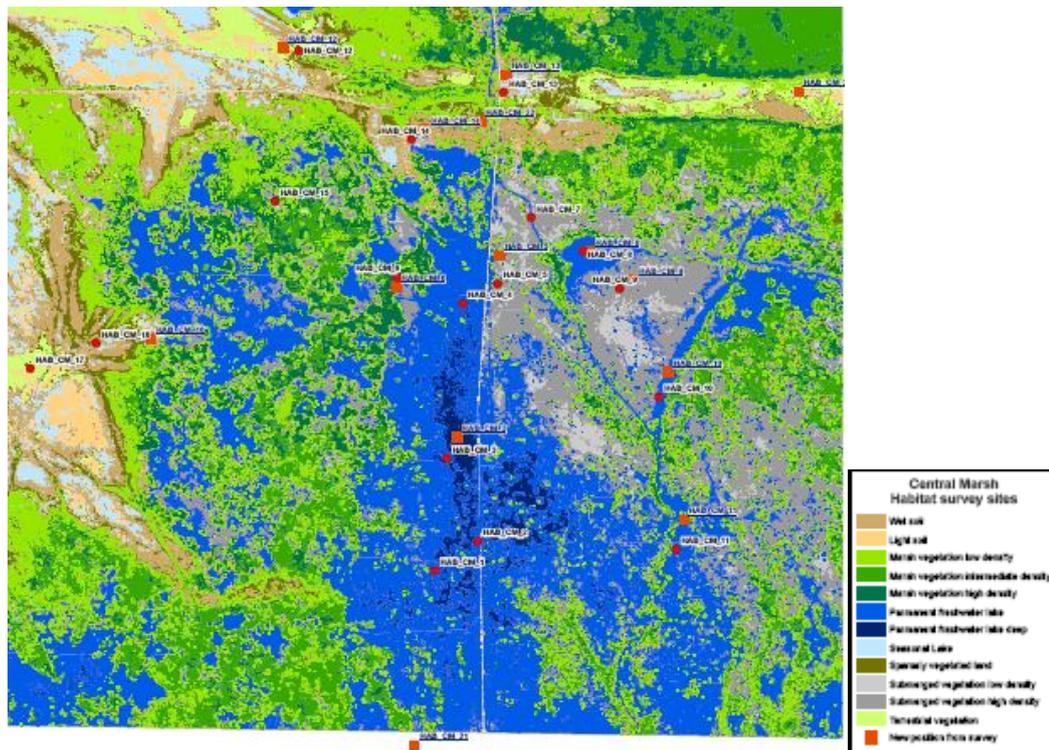
Three major activities were developed in order to build up a tool for the identification and classification the marshlands habitats. The first is the use of Remote Sensing applications (see also the specific chapter): this activity is aimed at mapping the land cover classes covering the territory on the basis of multi-spectral satellite imagery. From the analysis of the indexes, calculated starting from the multi-spectral images, several classes of land cover can be identified. Additional on site monitoring (ground-truthing) was needed to validate the classification of the land features. Maps at 1:10.000 scale were realized within two pilot areas in the Central Marshes and in Abu Zirig marshes, and a final map at 1:50.000 scale was elaborated for the entire National Park area.

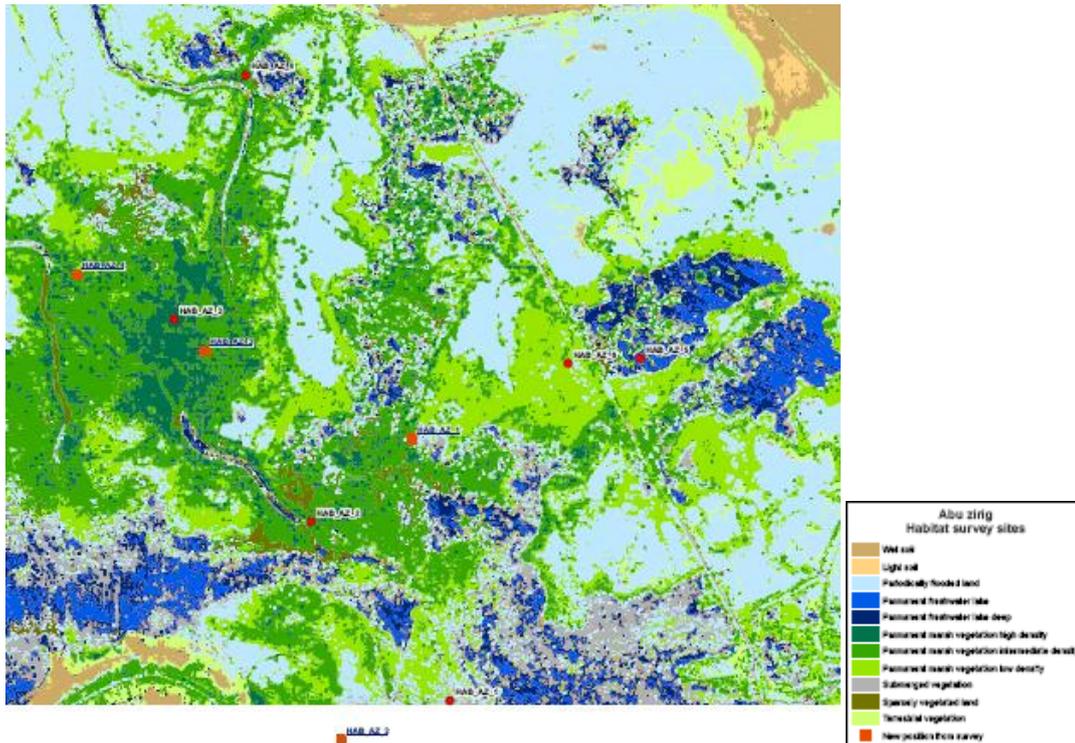
The second activity was performing of specific Field Habitats Surveys: this field monitoring activity had the objective of gathering all the necessary parameters and related information, in order to further define the habitat classification scheme. The proposed National Park Monitoring plan was focused on the characterization of a selected series of representative monitoring sites in the Central Marshes and in Abu Zirig marshes. At the base of the habitats mapping work there is a typologic study of vegetation communities that is fundamental for the recognition of different habitat features occurring in the marshes. The basic knowledge of the vegetational complexity determines the representativeness of the resulting characterization of habitats features.



Field surveys for the Habitat Project

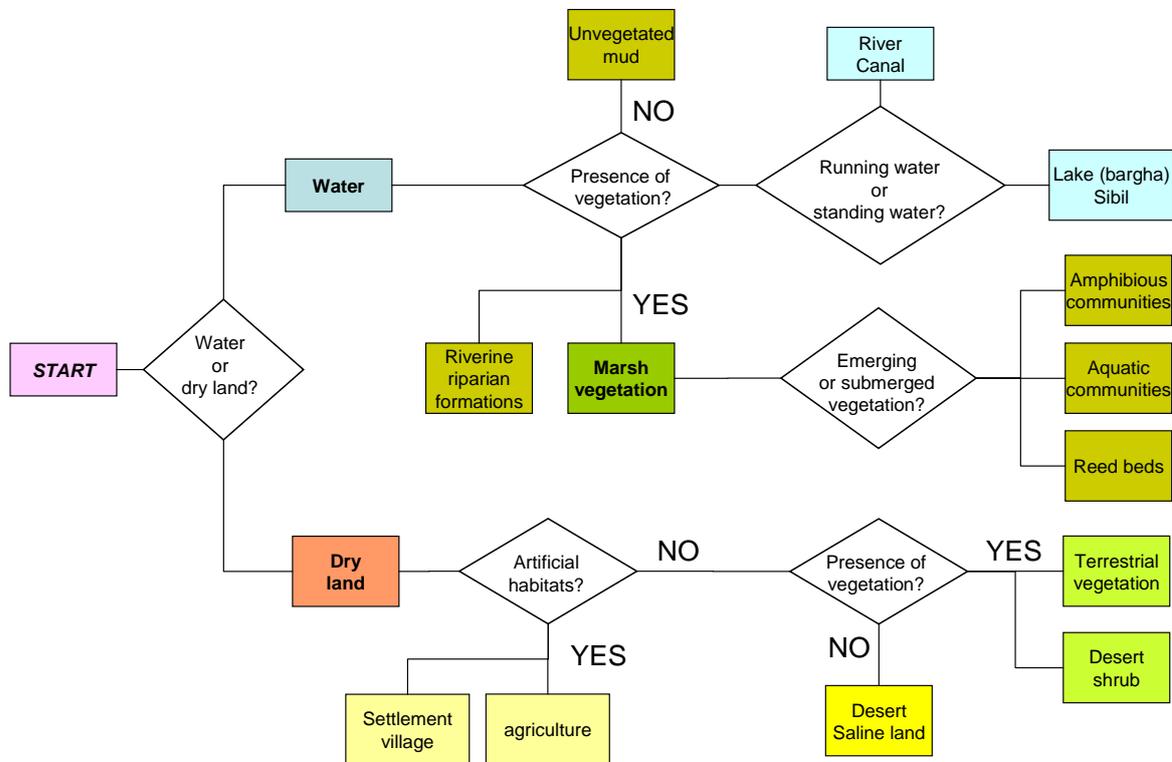
The first habitats survey was performed in the National Park area in October 2007. The following figure shows the location of the habitats survey sites in the Central Marshes and in Abu Zirig marsh.





Monitoring sites for the Habitats survey in the Central Marshes and Abu Zirig marshes (October 2007)

The third activity of the Habitat Mapping project is the integration of the results of the monitoring activities into the proposed Habitat classification scheme: the definition of the habitats classification scheme for the southern Iraqi Marshlands proceeds from the Land Cover elaboration, by integrating the results of the field surveys, the information derived from scientific literature, the experience of the surveyors, the interviews with locals, the results of other ongoing monitoring programs, such as KBAs monitoring. The proposed habitats classification scheme is represented in the following figure.



Marshland habitat classification scheme

The habitat classification activity is an ongoing process that requires further refinement of the collected information particularly on the phytosociological aspect, in order to achieve a better definition of the vegetational characteristics that are at the basis of the ecological structure of the marshes, and on the terrestrial environment surrounding the marshes. In April 2008, the habitat survey team received a specialized training on vegetation.



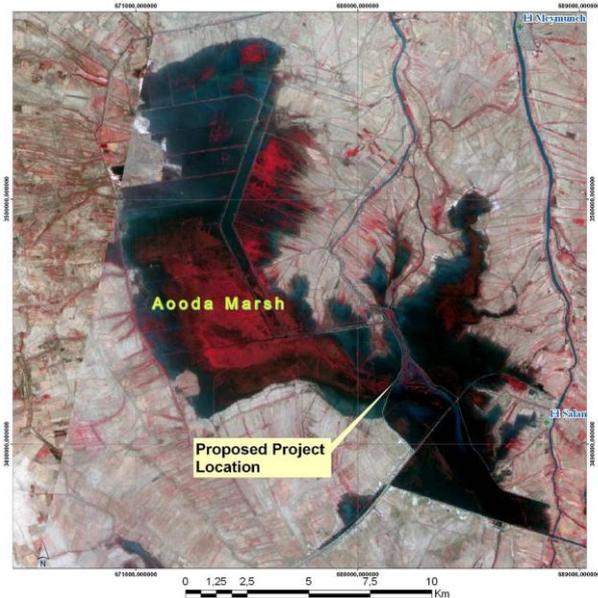
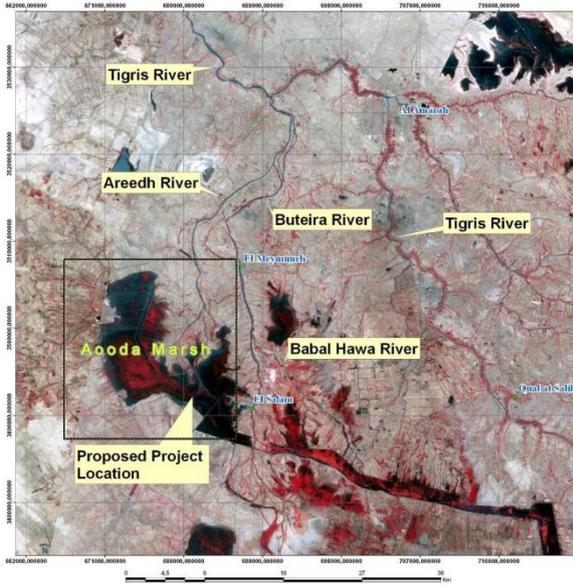
WATER										
1	standing freshwaters	1.1	freshwaters	Unvegetated standing freshwater habitats (free floating vegetation, rooted submerged vegetation, rooted floated vegetation)						
		1.2	unvegetated muds	Unvegetated mudflats, temporarily submerged and subjected to water level fluctuations						
		1.3	amphibious communities	Periodically or occasionally submerged habitats with phanerogamic communities adapted to aquatic environments that are subjected to water level fluctuations and even temporary desiccation (<i>Cyperus difformis</i> , <i>C. michelianus</i> , <i>C. laevigatus</i>)						
		1.4	aquatic communities		1.4.1	free floating vegetation	Floating communities (<i>Lemna sp. pl.</i> , <i>Salvinia natans</i> , <i>Spirodela polyrhiza</i>) including also <i>Ceratophyllum demersum</i> e <i>Hydrocharis morsus-ranae</i> communities			
					1.4.2	rooted submerged vegetation	Submerged rooted communities (<i>Potamogeton sp. pl.</i> , <i>Vallisneria spiralis</i> , <i>Myriophyllum sp.</i> , <i>Najas sp. pl.</i>)			
					1.4.3	rooted floating vegetation	Rooted formations with floating leaves (<i>Nymphaea sp. pl.</i> , <i>Nuphar luteum</i>)			
2	standing brackish and salt waters	2.1	brackish and salt water	Unvegetated salt or brackish ponds and lakes						
		2.2	brackish and salt water vegetation	Salt or brackish ponds and lakes with phanerogamic communities						
3	running freshwater	3.1	river	Unvegetated running freshwater rivers and canals						
		3.2	submerged river vegetation	freshwater submerged rooted vegetation (Question: can we discriminate between standing waters and running waters?).						
4	marshes	4.1	permanent freshwater marsh		4.1.1	helophitic vegetation		4.1.1.1	reed beds <i>Phragmites australis</i> beds	



		vegetation							
							4.1.1.2	reedmace beds	<i>Typha domingensis</i> beds
							4.1.1.3	vegetation a <i>Cladium mariscus</i>	<i>Cladium mariscus</i> beds
			4.1.2	woody vegetation	tree formations of willows and poplars within the marshes (NOTE: not the tree riparian formations having a linear structure)		4.1.2.1	riparian willow formation	Willow formation (<i>Salix</i> sp.)
							4.1.2.2	riparian poplar formation	Poplar formation (<i>Populus</i> sp.)
	4.2	brackish and salt water marsh vegetation	Brackish od salt marshes with helophitic vegetation	4.2.1	salt pioneer swards	Pioneer communities growing on salt or brackish muds (<i>Salicornia</i> sp. pl. community)			
DRYLANDS									
5	desert	7.1	desert shrub						
		7.2	unvegetated desert						
6	agricultural land	5.1	crops	5.1.1	flooded crops (rice)				
		5.2	orchards and tree plantation	5.2.1	Orchards				
				5.2.2	tree, palm plantation				
		5.3	rangelands						
7	aquaculture								
8	towns, villages and industrial sites								

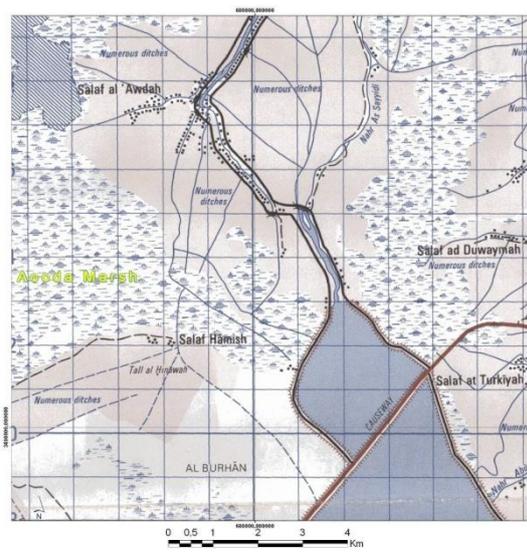
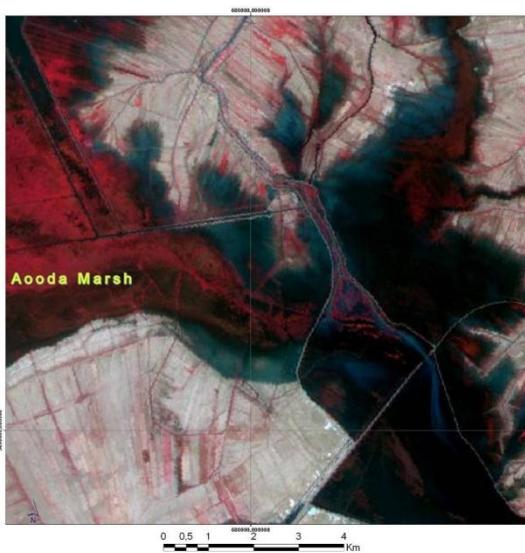
12. Aooda Marsh project (2007-2008)

Aooda Marshes (see the following figures) are currently fed by water flowing from the Tigris River into the Areedh River.



Aooda Marsh, general location and Drainage canals built inside the marshes

During the drying of the marshes, a number of irrigation canals were built in order to feed agriculture land built in place of Aooda marshes (see the previous figures). A large drainage canal was also built inside the former marsh to carry water from north to south inside the area.



Main obstacles for water flowing inside Aooda marshes (SAT image and NIMA map)

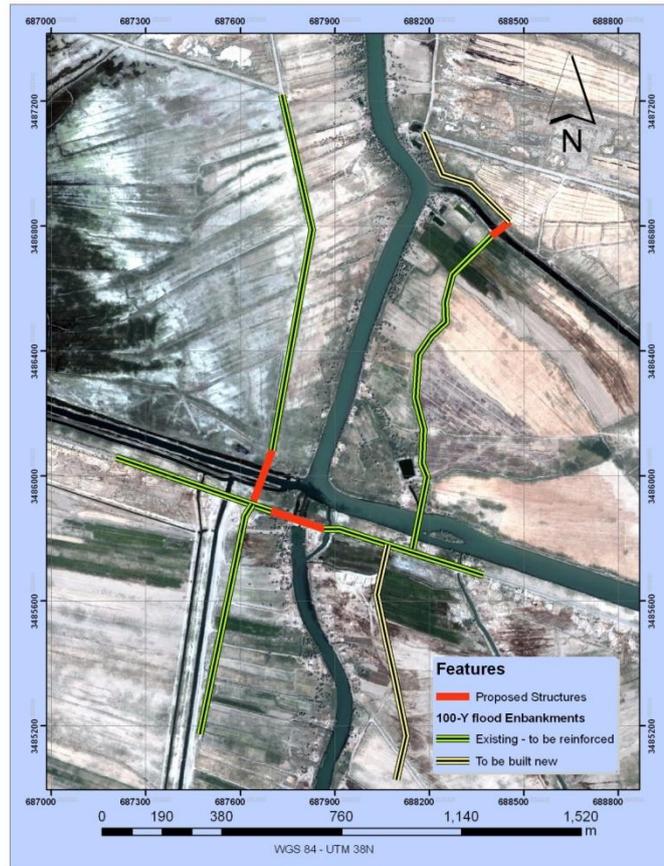


The causeway (which can be clearly identified in the previous figure) was completed with the construction of a bridge and the completion of a number of embankments to confine the flow of the Areedh River. The presence of all these structures is now creating a permanent obstacle for water to flow across the Aooda Marshes toward the Glory River and the Central Marshes.

On the request of the MoWR of Iraq, the New Eden team has provided assistance to CRIM (Center for the Restoration of Iraqi Marshlands) to precisely define remediation measures for the restoration of Aooda Marshes. Namely, the hydrology team has performed various tasks for numerical modeling analyses in order to correctly size and place a number of culverts which might water passage across the existing causeways and embankments.

A technical memorandum was delivered to the MoWR during the summer of 2007 in order to provide guidelines for the selection of the hydraulic characteristics of a set of intervention which must be provided, in order to allow for water circulation inside Aooda Marshes in Southern Iraq. The overall intervention encompasses four proposed actions.

- *Implementation of the water control located at the inlet of the Central Marshes along the Buteira River* (detailed designs have now been completed and reviewed by the MoWR). The following figure shows the area of intervention, the proposed layout of the embankments and the water control structure, as designed by the New Eden team. The proposed system of structures will be the solely responsible for the combined management of water entering the Central Marshes as well exiting the Aooda Marshes. As such, water levels inside Aooda marshes must be controlled by the proposed structures.



Plan view of the proposed area of intervention.

- *Clean and enlarge the existing irrigation canals, currently feeding Aooda Marshes from the north, by a mean of diverting water from the Areedh River. Such irrigation canals should be able to carry a combined flow equal to 15 m³/s.*
- Dismantle any existing embankments, currently blocking the southernmost part of the large north to south drain, located inside Aooda marshes and place 5 culverts of 1.5 meter diameter each along the existing embankment, currently dividing the Aooda marshes from the Areedh River (see the figure below). This action (see Figure 13 6) will allow for more water to re-enter the natural area of the marsh and not be constrained inside the irrigation channel. Based on the results of the hydrological evaluation, New Eden Group has estimated that a design flow equal to 15 m³/s must be able to travel across the structure;



Proposed location for the new 1.5 m Culverts

- Verify that the existing bridge along the causeway, bounding the east to west portion of the Glory River, is clean and water is able to flow through.

Most of the assumptions, made while preparing the technical report, are based on the detailed hydrological report provided for the design of the water control structures located along the Buteira River. The preliminary memorandum submitted to the MWR was then reviewed at the beginning of 2008 to incorporate the comments received by the beneficiary.

13. Study on Impact of Dams on Water Quality (2007-2008)

The Tigris and Euphrates Rivers are the principal sources of fresh water to Turkey, Syria and Iraq. The Tigris River flows through east Turkey, and then flows southeast through northeastern Iraq to join the Euphrates River in southeast Iraq. The Euphrates River flows south through Turkey into Syria, and then southeast through Iraq, joining with the Tigris River. The two rivers form the Shatt al Arab, which then flows into the Persian Gulf.

Much has been written about the problem of water sharing between Iraq, Syria and Turkey. Over the past decade, Turkey has embarked on a large-scale irrigation project that includes the construction of numerous dams in the Euphrates River. This threatens to cause problems for downstream users such as Syria and Iraq. The problem could be further aggravated if the Kurdish populations in northern Iraq claim rights to the Tigris River waters.



To alleviate some of the water rights issues, over the past three years the Iraqi Ministry of Water Resources, aided by Italian and American scientists, has collected and organized an extensive array of hydrological information and updated its long-term water utilization strategies. The results achieved thus far are encouraging; although a truly effective strategy for the sustainable utilization of the Mesopotamian water resources will not be completed until Syria and Turkey join the effort. Nevertheless, recent political developments, fueled by the determination of the Iraqi government in developing best practices in water utilization and care for the environment (e.g. the case of the marshlands of southern Iraq), has proven that Turkey and Iraq are willing to resume the talks and find common ground.

The objectives of the proposed project are the following:

- Data sharing: gather and share available water resources information on the hydrology of the rivers and reservoirs management strategies;
- Integrated and sustainable water management: define the strategies for a joint river basin water resources utilization with a special attention to the needs of sharing water to sustain environmental resources such as the marshlands of southern Iraq tackling issues such as the land degradation and improving biodiversity;
- Strengthen the framework for cooperation in water resources utilization: provide additional support to existing organizations currently working on the water sharing issues (such as ETIC).

As concerns Data gathering and related activities, much effort was spent in re-analyzing historical and most recent data to estimate water quantity and quality currently entering Iraq along the Euphrates River. Analysis of the other major rivers entering Iraq (i.e. Tigris River and tributaries), will be completed during the second phase of the project.

The overall watershed taken into consideration during the evaluation of water quantity entering Iraq along the Euphrates River. A technical evaluation was prepared to provide a comprehensive analysis of all available sources of hydrological data and attempt to compare them.

More specifically, it was possible to evaluate the following sources:

- The “General Scheme of Water Resources” (SELKHOZPROMEXPORT, USSR – Moscow, 1982) which provided the background for the hydrological regime under



which Haditha dam was designed. Furthermore, the study provided a forecast for water availability at the Haditha site up to the year 2000.

- The “Technical Design of the Haditha project on the Euphrates River, 1978” which mostly confirmed the information provided by the General Scheme report.
- The feasibility design report provided for Al Baghdadi dam.
- Almost seamless daily water level and water flow record measured by the Iraqi Ministry of Water Resources between 1933 and 2006 at Hit, as well as daily records measured upstream and downstream of Haditha dam since the day it went into operation in 1985 up to 2006 and daily records measured at Husaibha (at the border between Syria and Iraq) between 1991/1992 and 2005/2006.

Each one of these four sources of information provided a different perspective of the hydrological regime under which water will ultimately flow into Iraq and downstream Haditha Dam.

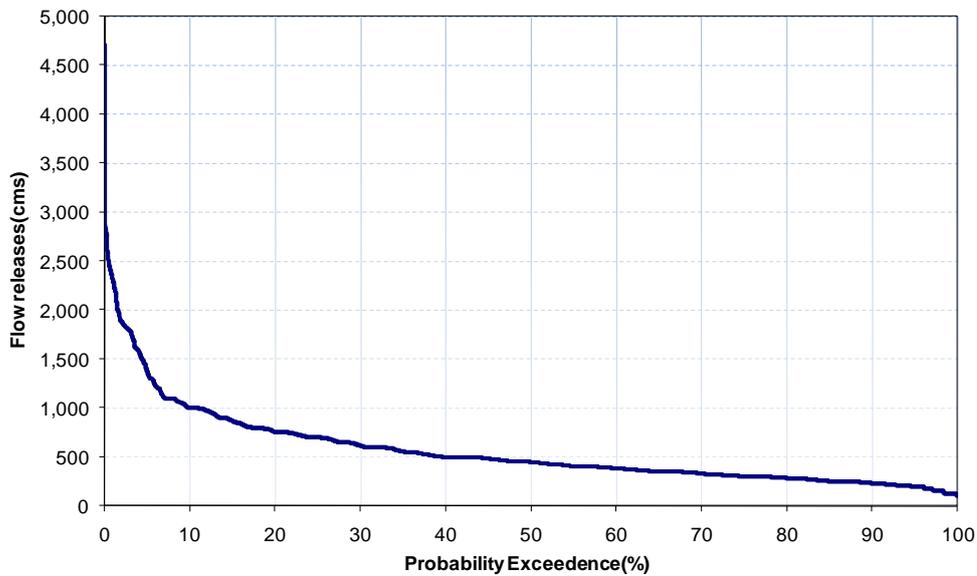
The General Scheme forecasted the flow availability up to the year 2000 based on the knowledge of water consumption and dam operation made by main water control structures located outside Iraq. The following table presents the average yearly volumes (BCM) and flows (m^3/s) for the period of observation (1930-1972) and a forecast for the year 2000.

Flow	Observed flow at Hit (1930 –1972)	Forecast up to the year 2000
Max	60.2 (1909)	44.2 (1402)
Average	29.9 (948)	18.4 (582)
80% prob.	23.8 (755)	13.2 (419)
Min	11.2 (355)	8.2 (261)

The average flow estimated by the General Scheme for the year 2000 is impressively close to the average flow (18.2 BCM) measured during the period 1991-2006 at Husaibah site (located at the border between Iraq and Syria along the Euphrates) thus giving a great level of confidence to the estimate under which the Al Baghdadi dam and hydropower Project was originally designed.

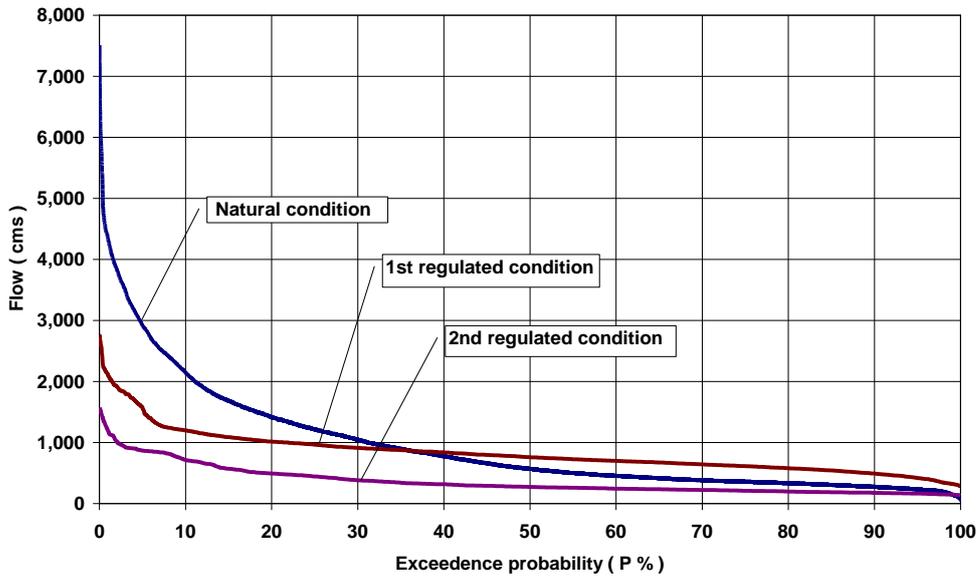


For the purpose of estimating water resources availability for hydropower production, the following flow duration curve was developed based on the daily discharge recorded at the Haditha dam outlet from 1985 to 2006. The duration curve displays the probability that a given flow [m³/s] is provided during an average year.



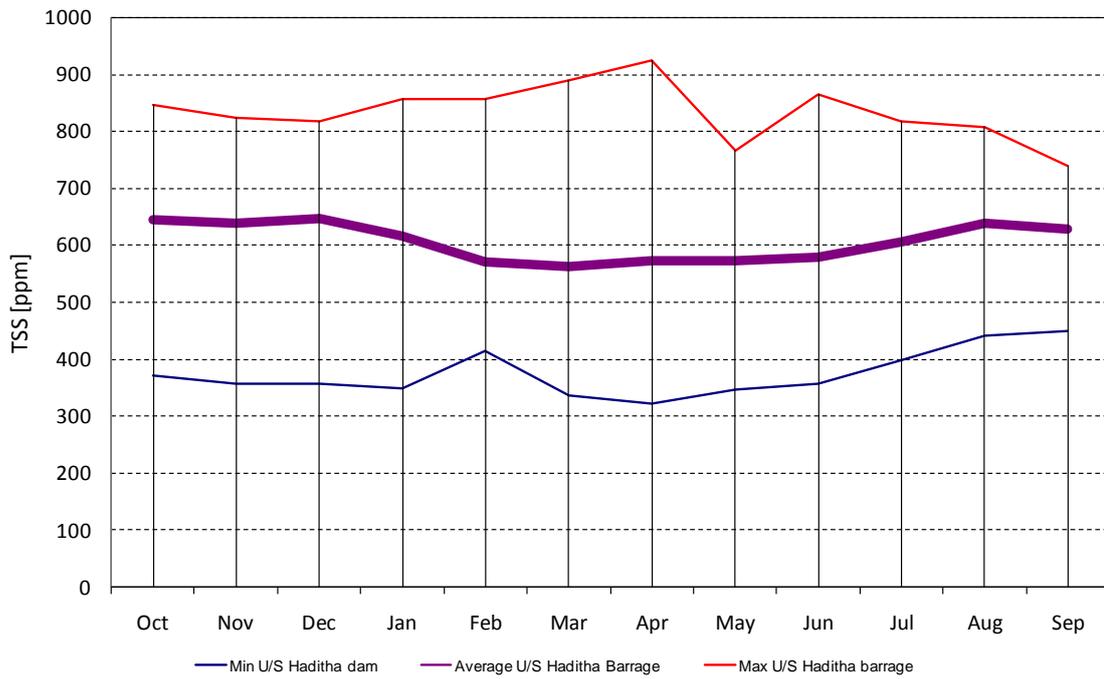
Flow duration curve for water bypassing Haditha dam

Similar flow duration curves were also computed for the Natural Conditions (i.e. for the flow conditions measured at Hit prior to 1973), the 1st regulated conditions (i.e. for the flow measured at Hit between 1976 and 1985) and the 2nd regulated conditions (i.e. for the flow measured at Hit after 1991).

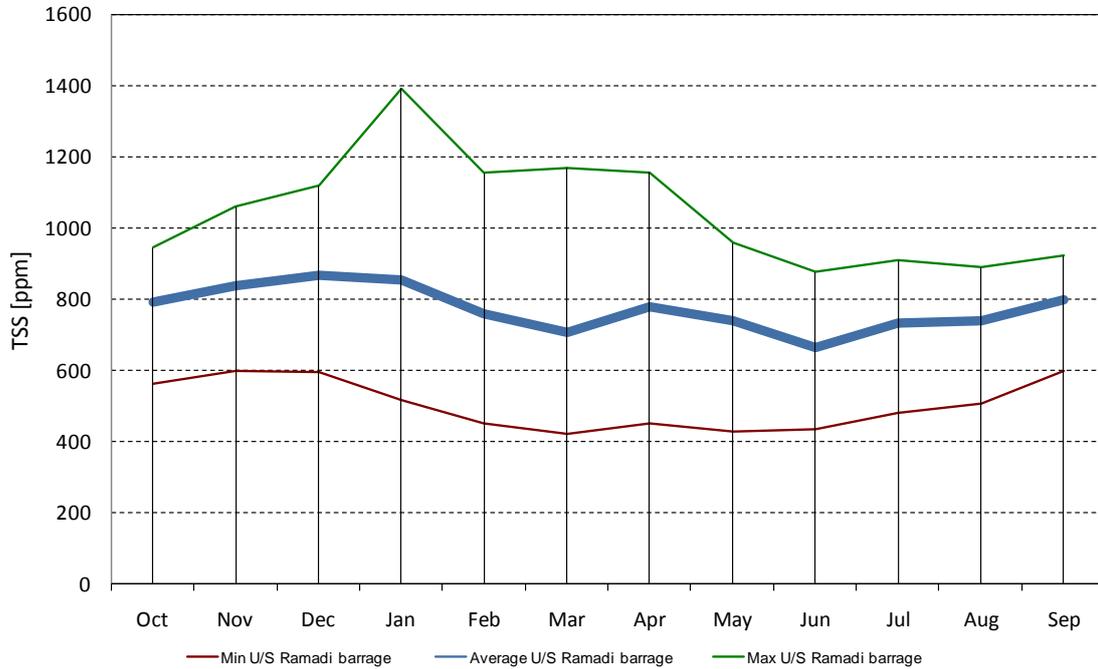


Flow duration curves estimated for different hydrological periods

Mean monthly values of the total soluble salts (T.S.S.) measured in parts per million [ppm] at two stations, upstream Haditha dam and upstream Ramadi Barrage for the water years 1991/1992-2003/2004 (as provided by the Ministry of Water Resources Water Control Center annual reports) are considered in this phase for primary evaluation of the water quality in the study reach. The minimum, average and maximum monthly long term values of the total soluble salts at the site (upstream Haditha dam) are 592, 719, and 850 ppm respectively. While these values at the site (upstream Ramadi barrage) amount 505, 756, and 1012 ppm. The following Figure 9 and Figure 10 show the long term monthly variations at the two sites.



Long term monthly variations of the T.S.S at Haditha dam



Long term monthly variations of the T.S.S at Ramadi barrage

The activities carried out to achieve the goal of strengthening cooperation are mainly focused on participating at a conferences and stimulating talk among the riparian countries. At this



point in time, the New Eden team has participated in several events during the course of 2007. For example, in September 2007, the New Eden team has provided active support to a conference held in Istanbul and organized by the ETIC initiative (Euphrates Tigris Initiative for Cooperation). During the conference, it was possible to interact with various professors and consultants from Iraq, Syria and Turkey, as well as organizations such USAID and UNDP and accredited NGOs active in the region. Further, a site visit was organized after the conference to visit Ataturk dam and the GAP project in Turkey.



Participants from various organizations during the visit to Ataturk Dam.

14. Socio-Economic Surveys Program (2007-2009)

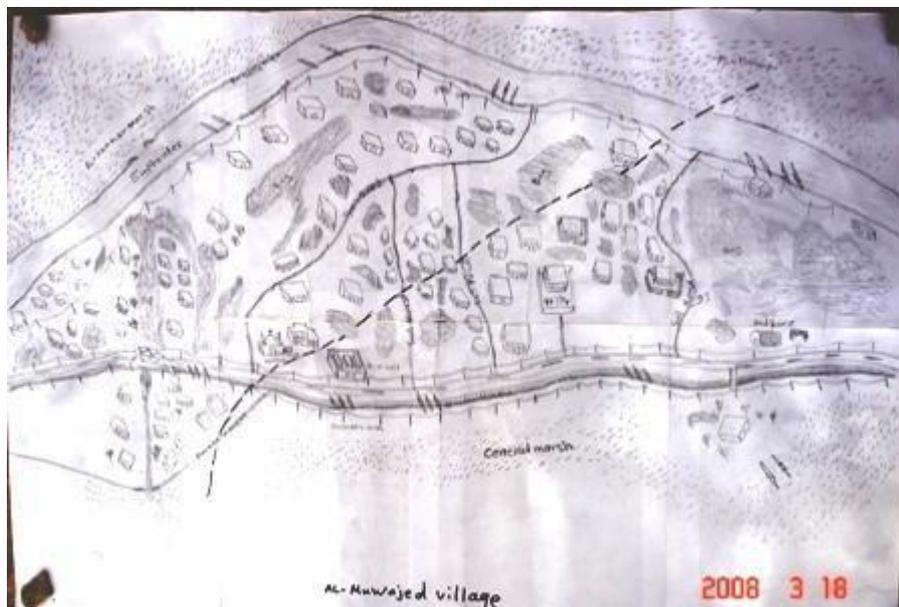
The socio economic survey is a fundamental tool to gain firsthand experience to understand the importance of natural resources to local livelihoods and identify opportunities and priority for improving the quality of life among the village's inhabitants. The focus is not on learning everything, but on learning what is necessary for deciding on future actions for sustainable development giving the occasion to the inhabitants of describing how they do things, what they know and what they think about their future.

Therefore, the main objective is to anticipate which changes the establishment of the National Park will determine to the local inhabitants way of life in order to develop proposals and actions able to compensate the negative impacts and highlight and foster the positive ones. The program involved the Nature Iraq staff, two females and six males, as it is necessary the

participation of a researchers expert of the territory and able to relate with the local tribes and their tradition,

The use, when necessary, of the Participatory Rural Appraisal (PRA) method enables the team to gather information employing international approved tools that consent to collect different kind of data with a direct participation of the local communities. The selected tools to be applied were:

- Semi structured interview to key individuals and focused groups
- Village resource Map
- Seasonal calendar
- Transect walk
- Daily activities clock
- Activities gender analysis
- Village history profile



Map of Al-Muwajid village drawn by the team and some villagers

The entire program has been developed in three phases:

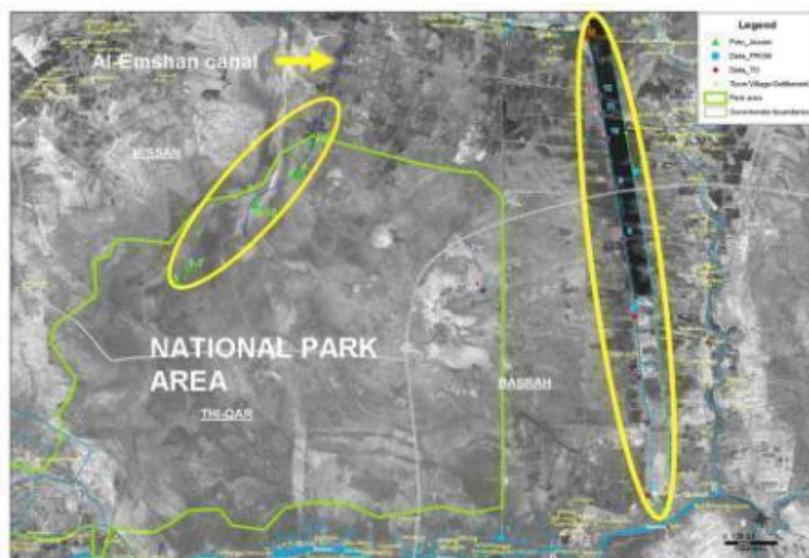
1. Preparatory Phase to plan the program organization with the following activities:

- Composition and training of the multi-disciplinary team;
- Selection of the area and villages to visit;
- Review and share of available secondary information about the study area ;
- Design the timetable of the surveys;

2. Conducting the first set of surveys on three villages in Central Marsh: Abu Subat village, Nahar Saleh - Al-Mua'aber villages, Al-Moajed village and drawing up of the related report;

3. Conducting the second set of surveys on the villages, constructed after the 2006, in the area of Basrah and Missan Governorates, along the Prosperity river, and near the north border of the Park.

The preparatory phase was completed in February 2008 while the first set of surveys was conducted in March 2008 while the second set of socio-economic survey was conducted during the month of January 2010. The primary objective of the second set of socio-economic survey was to collect basic information on livelihood activities and living conditions of the numerous villages situated along the west bank of the Glory river. Informal interviews with key individuals have been conducted to gather basic data and create the contacts for a further, more structured survey.



Location of surveyed areas

Twelve villages were visited, 4 in Basrah and 8 in Missan governorate, with a total population of 23,690 people. The primary schools were 8, and there were two health care centers under construction, and electricity was provided but not reliably while access to drinking water was completely absent.

The presence and quantity of water determines the types of activity. As long as it is possible, the livelihood was based primarily on traditional activities related to the marshlands environment, such as fishing and buffalo breeding, while agriculture and breeding of other species is still marginal. It is evident that people are not able to use techniques based on water scarcity, due to the lack of knowledge of practices related to semi -arid land management.



Al-Nasser Allah village along the Glory river



Al Emshan canal



A family of buffalo breeders



The second objective was controlling the area along the Al-Emshan canal that branches from the Glory river and flows into the north part of the Park. The survey was based on contact with 10 families, about 150 people, belonging to the AlFrajat tribe.

Families used to live near the right embankment of the Glory river but, starting from 2006, they move within the zone near the canal, to exploit the water for their herds, for fishing and for the cultivation of grain, adopting a semi-nomadic lifestyle, based on natural resources exploitation.

The surveys' findings will be useful to identify the topics that the Park's authorities should encourage and support, such as:

- Sustainable Development Program for surrounding areas;
- Educational and public awareness program on wetlands conservation, wise use of water, water harvesting, rangelands management, cultivation in semi arid land.

15. Archaeological Sites Research (2007-2009)

The Mesopotamian Marshlands were inhabited by for millennia. Their current dwellers are considered the inheritors of the Sumerian civilisation, with a unique culture based on the balanced exploitation of natural resources. The vast area is an alluvial basin fed by the waters of the Euphrates and the Tigris Rivers, rich in biodiversity. Therefore the natural values of the territory are enriched by the presence of several archaeological sites, some of them known only by the local inhabitants and by few Iraqi experts.

The broad scope of the study was to identify the location, current status and potential value of the archaeological resources within and around the National Park boundaries. The research findings are fundamental for different purposes:

- Management Plan project: to set priorities, type of policies and actions needed for the conservation of the archaeological sites and for their exploitation as tourist attractions;
- Stakeholders involvement: to share with all the categories involved in the development of the project the issues related to the archaeological sites ;



- International Endorsements: to provide necessary information for the professional archaeological community and to prepare the application of the park for the UNESCO World Heritage or/and to the UNESCO MAB programme;
- International Funding bodies: to demonstrate the unique value of the area and to attract the interest of international foundations and universities to collaborate on its preservation program.

The preparatory phase started in July 2007 with the execution of the activities necessary to obtain the permits from the Ministry of Culture – State Board of Antiquities and the drawing up of the evaluation sheets and maps for the field work:

- Basic Form: consists of a synthetic description of the investigated sites. It included some selected parameters in order to permit the score each site and a clear comparison among them. It comprised additional information about the site's historical name, environmental features and land use.
- Data Base: an electronic database connected to the Basic Form was created.

In November 2007, the first survey was conducted by an Iraqi archaeologist assisted by two other researchers, in the territory of Thi -Qar Governorate and surrounding areas. The report and correlated evaluation of the findings and maps were drawn up in February 2008. The recorded sites were 36, 13 of them are within the Park's boundaries with a total extent of 320 hectares and are mainly of the Parthian, Sasanid and Islamic period.

Four of them, which belong also to the New Babylonian period, are ranked "of international importance". Additionally, 7 other sites are in a radius of 20 kilometers from the Park's boundaries, they measure a total extent of 80 hectares. Most of them belong to the Parthian, Sasanid and Islamic period.

In March 2009 the second survey was conducted, by the same team, in the areas of the Missan and Basrah governorates included or close to the National Park boundaries. Three of the 31 recorded sites are located inside the Park area, while the remaining 29 are inside a radius of 8 km from the park. The total extent of the sites is about 170 ha. The sites are mainly from the Parthian and Sasanid periods, while 3 are from Old Babylonian and Parthian periods and 4

from the Islamic period. The majority of them are threatened by agriculture and grazing activities.



Fragments of ancient pottery

A final report was drawn up, collecting the all data and designing a thematic map, but, for preservation and protection of the sites, the document cannot be printed and the NP team have used it only for internal studies. The collected information will consent to the researchers, when the park will be formally created, to compare the archaeological sites locations with the environmental features and with the socio economic data. The comparison will be used to define the park internal zoning and to share with the Iraqi Tourism and Antiquities Ministry the priority and type of actions to carry out for the protection of the archaeological heritage.



Pieces of ancient pottery found near an archaeological site



16. Pilot Project on Fish Cages (2007-2009)

Aquaculture is an important income-generating activity in Iraq but is not always conducted in an efficient, sustainable or environmental friendly manner. Most of these activities in Iraq have consisted of establishing fish ponds fed from the closest available water resource, which drained to the same source. Such activities have implications for land ownership; pollution from oil and fuel used in generators, which are used to pump a supply of fresh water and re-oxygenate the pond, and also high cost of construction and operations. Under the New Eden Project, a new pilot project was introduced to promote the development of aquaculture in Iraq in a more sustainable and efficient manner that could address some of the problems of previous projects.

The use of floating fish cages is a common practice in aquaculture and may be suitable for some southern water bodies of Iraq. Floating cages for fish culture can be constructed from a variety of materials and in practically every shape and size imaginable. Basic cage construction requires that cage materials be strong, durable, and non-toxic. The cage must retain the fish yet allow maximum circulation of water through the cage. Adequate water circulation is critical to the health of the fish by bringing oxygen into the cage, and removing wastes from the cage.

The pilot project aimed at supporting social-economic development in the marsh areas, promoting the sustainable use of fisheries, an increased awareness of fisherman by teaching them about aquaculture and some simple environmental aspects. The aim was also linked to the development and protection of the core area of a National Park project in the Central Marshes by promoting aquaculture as one of the sustainable solutions for supporting marsh dwellers in the area of the park, which will provide an alternative means of income for fisherman near the park. Related activities that can be developed to service aquaculture in the region include fish hatcheries and fish processing plants. With proper planning and sensitivity to the local environment, these types of projects can protect the fisheries resources of Iraq and promote the sustainable use of the National Park area. The activities performed were comprised of:

- Designing the fish cages and drafting the work plan;



- Identifying suitable sitea considering different criteria (as moderate water flow, water depth between 1.5-2.5 m, etc.);
- Defining contracts for the supply of fingerlings, food, cages, nets and framework;
- Constructing the floating fish cage;
- Training the personnel to manage the fish maintenance;
- Managing and monitoring the fish cage;
- Bi-monthly visits and reporting along the project duration.



The fish cages project built close to Abu Subat

During the period of October 2007 to December 2008, Nature Iraq staff, with the support of Italian experts who also visited the pilot project site, designed and constructed a fish cage located near the town of Abu Subat on the Euphrates River. Site was selected according to the international criteria published by FAO and other agencies. The dimensions of the cage are 12 x 6 x 3 meters built of PVC piping filled with foam for floatation. Nets resistant to UV were then attached to this framework to retain the fish. The fingerlings (Grass Carp or *Ctenopharyngodon idella*) were introduced in April 2008 and they were harvested in Autumn 2008.



Monitoring the water and releasing fingerlings

During all the steps in this process, the local people have taken an active interest in the project and have helped at many stages in the construction of the cages. The last step of the pilot Fish Cages Project (testing and disseminating the best practices for an integrated aquaculture to the marshlands environment) is the Final report on the carried out activities. The report includes the detailed description of all the activities performed, the methodologies applied, Materials and Methods, constrains, financial viability appraisal, lessons learned, results and discussion including the first recommendations for the future improvement and development of aquaculture activities.



Aquaculture report

17. Management Plan for Hawizah Marsh Ramsar Site (2007-2009)

Hawizeh Marsh was proposed as the first designated Wetland of International Importance in Iraq under the Ramsar Convention on Wetlands. This designation came into effect when the Government of Iraq formally submitted its accession documentation to UNESCO in Paris on October 17, 2007. In 2003, the 300,000 hectare area of the Hawizeh Marshes represented the remnants of a once vibrant set of Mesopotamian Marshes spread across southeastern Iraq and border areas shared with Iran. Almost 90% of these globally important wetlands, the broadest extent of marshes in the Middle East just 20 years ago, were drained or damaged by a series of directed actions by the previous Government of Iraq. After 2003, 65% of the marshes constituting the Hammar, Central and Hawizeh marshes areas were rewatered with complementary revival of fish, birds, wildlife and habitat.

Part of these recovery efforts included the designation of 137,700 hectares of the Hawizeh Marsh Iraq as a Wetland of International Importance. Nature Iraq in concert with the Iraq Ministries of the Environment, Marshes, Water Resources, Municipalities and Public Works,



Agriculture and other ministries, as well as with international assistance from the Government of Italy, prepared a draft Management Plan for the area centered on the Hawizeh Marsh, completed in early April 2008.

The following initiatives occurred in support of the Hawizeh Ramsar site planning initiative:

- Nature Iraq and UNEP prepared two digital maps of the status in July 2005 of vegetation, water and related land cover characteristics and cultural features of the area that the Government of Iraq is proposing as the bounded area of the Ramsar site. An updated version, dated February 2008, of the land cover and habitats map was also.
- Nature Iraq, the Iraqi Ministry of the Environment and the Iraqi Ministry of Water Resources cooperated in preparation of 20-page “Ramsar Information Sheet (RIS)” outlining the ecological and cultural features of this area and the rationale for its designation as a Ramsar site.
- Nature Iraq organized a working meeting with Iraqi Ministry of the Environment officials in Sulimanyia July 3-4, 2007 to outline the steps and to seek Ministry officials’ advice on the path forward.
- Based on this meeting, it was agreed to host a broader workshop from September 7-9, 2007 to draft the outline for the Management Plan and derive advice from key Iraqi Ministries. This meeting was held in Amman, Jordan and facilitated by Iraqi, Jordanian and Canadian experts. It was focused on the drafting of a proposed Table of Contents, objectives and principles for the Plan, define the stakeholders, and discuss expectations and barriers to initiating the writing of this Plan.
- A draft Management Plan was completed in April 2008 for direct consultation with the Iraqi Interministerial Ramsar Committee (IIRC).
- In May-July 2008 representatives of the IIRC held other meetings to further discuss finalization of the Plan and to discuss implementation issues and resources. Further discussions with local tribes, municipal councils, local NGOs and other stakeholders on their engagement in this process and with



representatives of the Government of Iran on the shared wetland areas along the Iraq-Iran border are still required.

It was agreed the Plan:

- Is meant to benefit local people first and improve the quality of the environment for people and Nature.
- Will be implemented by government, local councils and local peoples.
- Will be planned by the IIRC, local municipalities, and ministries.

The final report provides recommendations for actions to facilitate the implementation of the Management Plan. These actions are presented with recommended implementation actions against 14 management objectives:

- Follow-up to the September 2007 Scientific Peer Review Panel Recommendations for Hawizeh Marsh
- Management of Water Quality and Water Quantity in the Marsh
- Maintenance of Cultural Heritage
- Management of Agricultural Development and Impacts
- Promotion of a Land Tenure System
- Promotion of Sustainable Development and Infrastructure Planning for Bridges, Roads and Dykes
- Ensuring Conservation of Natural Heritage
- Facilitating Fisheries Restoration and Development
- Creation of an Environmental Monitoring Program and Protected Areas
- Creation of a Legislative, Policy and Planning Framework
- Management of Border Issues with Iran
- Facilitating Oil Development
- Understanding Stakeholder Demands, Involvement and Needs

- Considerations for Future Tourism and Other Opportunities

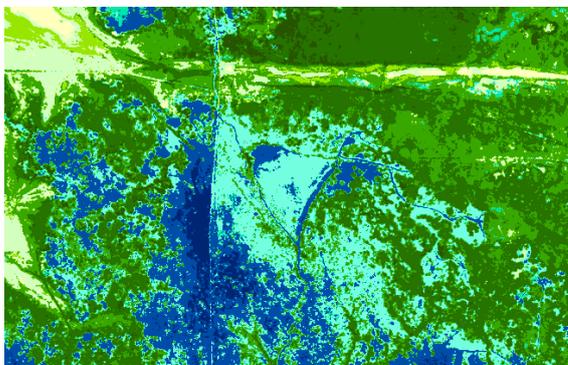
18. Remote Sensing of the Iraqi Marshes and Development of MODIS (2007-2009)

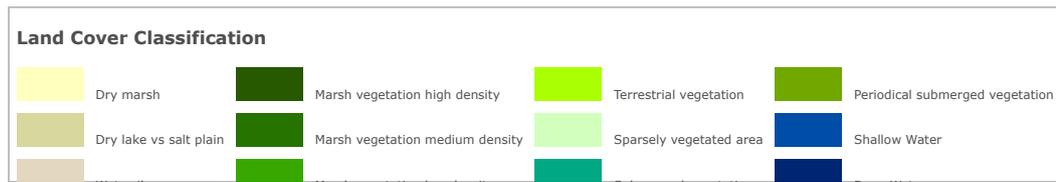
The remote sensing activities carried on by the New Eden Team between 2007 and 2009 were concentrated on a territorial analysis of the coverage of the Marshes. This project aimed at developing a tool featuring the classification of the territory used as a base for the further definition of the Marshlands Habitat Classes.

In particular the activities were detailed for the Central marshes and Hawizeh marsh to obtain up-to-date maps, serving the scopes of two relevant projects: the National Park in the Central marsh and the Ramsar area for Hawizeh marsh. Those remote sensing activities allow to survey the extension and the distribution of the land cover classes of the marshes and to analyze the development of wetland vegetation. Mapping and monitoring the changes of the natural environment is a key element for marshlands restoration and for understanding natural dynamics.

The National Park project in the Central marsh

The cartography of the Land Cover of the Central marsh was done to serve the purpose of the National Park project. A first map of the Central marsh was developed on the base of SPOT images acquired on July 2006. The first phase of the work focuses on a spectral analysis of 2 different resizes (pilot areas) of the study area. Photo-interpretation and analysis of vegetation indexes allow to realize spectral analyses of surfaces and to characterize the different land cover classes. Then the application of techniques of supervised classification allows obtaining detailed land cover maps at the scale of 1:20,000. The results extended to the whole area allow obtaining a map at the scale of 1:50,000



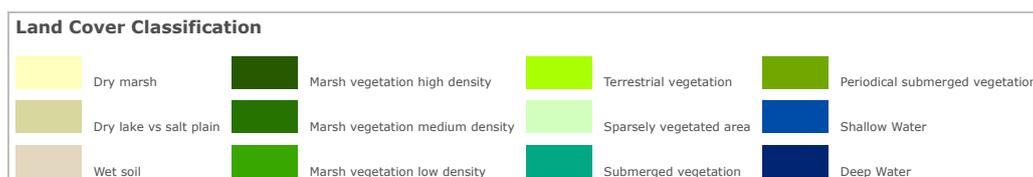
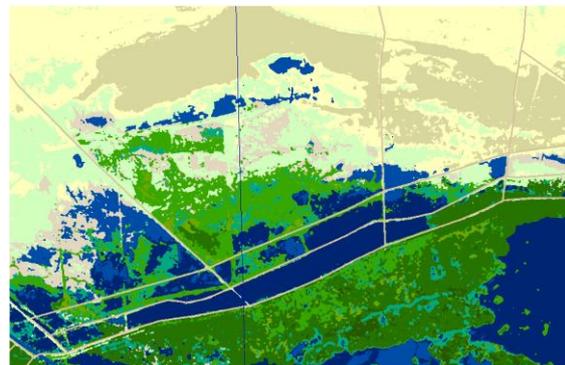
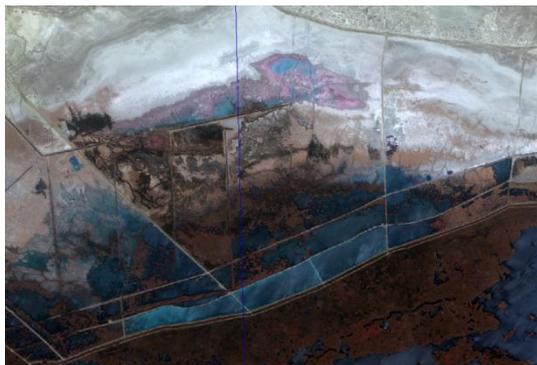


A zoom view of Land Cover Classification of Central Marsh realized on the base of SPOT images

In a second phase of the work, ASTER images acquired on July 2007 were processed to obtain up-to-date maps of the study area. The same techniques of supervised classification used for SPOT images are applied, and thanks to the high spectral resolution of the images, detailed land cover patterns are extracted. Finally, the monitoring survey (ground-truthing) gave the parameters necessary to refine and validate the Land Cover Classification obtained from the Remote Sensing analysis. Specifically, a map of Central Marsh at the scale of 1:100,000 and two detailed map at the scale of 1:50,000 were obtained.

Ramsar area - Hawizeh marsh

The activity of Land Cover mapping of Hawizeh Ramsar area aimed at bringing up to date the Land Cover Classification of July 2005 proposed by UNEP. For this purpose FORMOSAT-2 high resolution images acquired in February 2008 are used as a base for the analysis of the study area. A ground-truthing survey was carried on onsite contemporary to the image acquisition, in order to get the parameters necessary to refine and validate the Land Cover Classification issued by the Remote Sensing analysis.



A zoom view of Land Cover Classification of Hawizeh Marsh based on FORMOSAT-2 image

Finally, the Land Cover map at the scale of 1:100,000 was produced by the classification of the single FORMOSAT images.



Land Cover classification of Central Marsh, scale 1|100000, based on FORMOSAT -2 images acquired on 15th February 2008

19. Water Leakage Reduction Pilot Project in Sulaymania (2007-2009)

Leakage in water distribution networks is a major problem world wide for utilities committed to delivering efficient services to their customers at limited costs. In fact leakage represents the waste of water, an ever-increasing valuable resource, but also raises the costs of water production in terms of pumping and water treatment. For this reason, and particularly in those areas facing water scarcity, all efforts must be spent to save water and leakage reduction is crucial in a utility's operational improvement program.



The Italian Ministry for Environment, Land and Sea (IMELS) has co-funded, together with the European Commission, a research project focused on the development of technologies for leakage control. This project is called TILDE and it has developed a suite of technologies and tools to facilitate the application of leakage control methods to water operators, in order to guide the water manager in the leakage control processes, to store and elaborate all leakage related data and to assess the leakage performance of a utility.

The current project's overall objective is to contribute to the efficient use of water in Iraq, activating a first pilot project for leakage detection and reduction in the Municipality of Sulaimaniya in Kurdistan. Specifically, the project shall contribute to strengthen the capacity of the managers and technical personnel at Sulaimaniya's water utility to manage leakage in the water networks and improve water services, training them in the use of state-of-the-art technologies for controlling water losses. Further the project could become a model for replication in other areas facing similar problems to those of Sulaimaniya.

Based on similar previous experiences, the overall project is formed by two consequential phases, which have been split in eight different tasks, and namely:

- Task 1 - Stakeholder involvement and introductory workshop
- Task 2 - Training in leakage control and utility operation
- Task 3 - Water audit and assessment of economic level of leakage
- Task 4 - Procurement
- Task 5 - Pilot demonstration
- Task 6 - Definition of the leakage management methodology for Sulaimaniya
- Task 7 - Dissemination
- Task 8 - Project management

Phase 1 comprehending Tasks 1÷3 started on November 2007 and ended on April 2008.

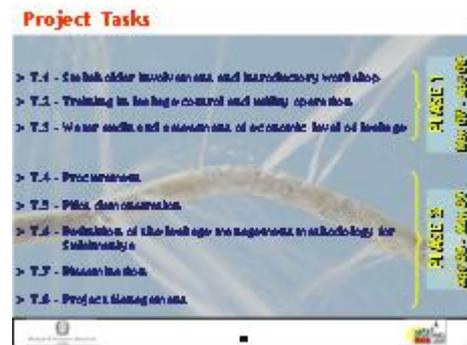
Phase 2 comprehending Tasks 4÷8 started on May 2008 and ended on January 2010.

Stakeholders' Involvement and Introductory Workshop

In November 2007 a preparatory kick-off workshop was held, aiming at introducing the project to the stakeholder and secure its active participation in the implementation of specific actions. The Italian consultants explained the main issues of the project, key problems and

topics regarding leakage detection and control and the state-of-the-art methodologies and tools to reduce the impact of the problem.

At the same time, the Italian experts learned about main problems and works of the water network. Furthermore, a site visit was carried out aimed at direct contact and look of the local water distribution system. About 20 technicians from WUS, Italian and Iraqi experts attended the meeting in the first day. Among the other main Iraqi water companies invited, representatives from Water Directorates of South Iraq (Baghdad, Thi Qar, Basrah and Missan) attended the workshop in the second day in order to assess the interest and feasibility of such a project in their Directorates.



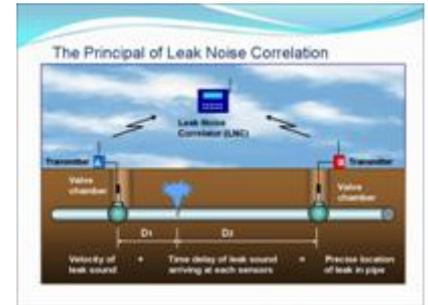
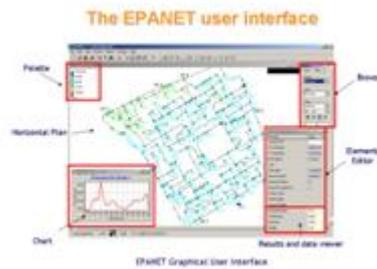
The introductory kick-off workshop

Capacity Building for the Technical Staff of the Sulaimaniya Water Utility

Between February and March 2008 a 10-day training course was held at the premises of Palace Hotel in Sulaimaniya. The training was attended by around 20 people from technical staff of Sulaimaniya' s water office and it was split in three different modules:

- GIS and network mapping session (trainer: Ms C. Teatini);
- Numeric modelling of hydraulic networks session (trainer: Mr C. Caccavo);
- Tools and methodologies for leakage management (trainer: Mr C.Serrani).

During all the above session, many practical exercises were performed in order to guarantee a direct involvement of the attendees.



The three different training sessions

Data Gathering

During the training, a specific Questionnaire aimed at gathering all the key info of the water supply system of Sulaimaniya was explained to the attendees and then delivered to WUS for its filling. Also, the main components of the Non Revenue Water and main items composing the water balance were presented. The final goal of this task was to perform the water audit for the Sulaimaniya Water Directorate, assess the performance indicators related to leakage and deliver a report on leakage management strategies applicable to the Water Utility of Sulaimaniya.

Training in Italy at a Water Utility Facility

The following Phase 2 of the project, started with the second session of the Task 2: know-how transfer on practical aspects of water utility management in Italy as well as practical applications of leakage detection on the field. The training was held from 7th July to 11th July 2008 at the premises of the Multiservizi SpA water utility in Ancona, Italy. The following picture shows the agenda of the training.

Since the objective of training has was to get the technical staff of the Sulaimaniya Water Company acquainted with best practices on European utility organization, networks management and leakage control and detection, the agenda was thought for transferring not only theoretical knowledge but also direct experiences of field and technology. Furthermore, many direct meeting and exchange of experience with top managers and executives of key sectors within Multiservizi SpA were organized.

Split in five days, the study tour included the following activities: network planning, management and maintenance; visit to the telecontrol (SCADA system) and GIS departments

and to Multiservizi analysis laboratory; session dedicated to presentation of the Multiservizi leakage management policy, equipment to detect the pipes, equipment to measure flows and pressures in the networks and to detect and pinpoint leakage; visit to Multiservizi drinking water facilities of Villa Terni reservoir and Gorgovivo spring; presentation of Multiservizi water network modelling activity deepening the topic of how to implement and carry out a monitoring campaigns in order to calibrate the models; field demonstration of the application of a multi-frequency Georadar for network mapping, leak pinpointing and soil classification; training on the field about using equipment to detect and pinpoint leakage such as correlator, noise logger, electronic listening stick and geophone.



Snapshots of the training in Italy

Pilot Project

In order to perform the actual demonstration on the field (Task 5), a pilot area within the supply network of Sulaimaniya was chosen in agreement with WUS's technicians. Its selection had to take into account such criteria as: area's representative character (i.e. similarity to other parts of the served territory to facilitate future application of proposed improvements), availability of data on network specifics and extent of area's separation from the network (i.e. its boundary character).



The site visit on pilot area and its location

The Pilot demonstration implies utilization of set of equipment for training on the job of WUS engineers and, first at all, for leakage detection purpose within the pilot area itself (Task 4). At this goal, detailed technical specifications of the equipment were prepared. Equipment utilized includes hardware, software, monitoring equipment (flow meters, pressure meters, consumption meters) as well as tools for leakage detection (noise loggers, correlators, listening sticks, geophones, etc.). Pilot activities included installation of flow and pressure meters, methodology for district metered area (DMA) set-up and monitoring, leakage detection and pinpointing, assessment of the leakage rate based on the monitored data and consumption records.

Water Audit and Performance Indicators

Adopting the IWA (International Water Association) best practices and methodologies the total losses affecting the network (see following figure) have been quantified and the main leakage performance indicators calculated (see following table).



1. Distribution Input Volume100000 m ³ /day	1.1 Authorised Consumption 70000 m ³ /day	1.1.1 Billed Authorised Consumption 55000. m ³ /day	1.1.1.1 Billed Metered Consumption 0. m ³ /day	Revenue Water	
			1.1.1.2 Billed Un-metered Consumption 55000 m ³ /day		
	1.2 Water Losses 30000 m ³ /day	1.1.2 Unbilled Authorised Consumption 15000 m ³ /day		1.1.2.1 Unbilled Metered Consumption 0 m ³ /day	Non- Revenue Water (NRW)
				1.1.2.2 Unbilled Un-metered Consumption 15000 m ³ /day	
		1.2.1 Apparent Losses 3000 m ³ /day		1.2.1.1 Unauthorised Consumption 0. m ³ /day	
				1.2.1.2 Customer Metering Inaccuracies m ³ /day	
1.2.2 Real Losses 27000 m ³ /day		1.2.2.1 Leakage on Transmission and/or Distribution Mains 2950 m ³ /day			
		1.2.2.2 Leakage and Overflows at Utility's Storage Tanks 50 m ³ /day			

The IWA water balance table filled with the key data of Sulaimaniya water system

Water Company	Leakage (m ³) / Km / day	Leakage (m ³) / connection /day	% NRW / water produced
Sulaimaniya	126	0.37	45%

Leakage Performance Indicators

In the Sulaimaniya water supply system, a preliminary assessment of Unaccounted For Water ratio gives a value of around 45%; besides, the overall performance indicator Zone Ranking Factor was calculated taking into account current level of leakage, cost of water, cost of leakage location exercise and time since last survey, showing an almost severe situation related to leakage. Upon completion of the previous task the impact of actions from the leakage reduction viewpoint were evaluated (Task 6). Based on the results of the pilot demonstration as well as the feedback received from the participating utility staff, possible modifications and adjustments to the methodology were introduced in order to better tailor the approach to particular context and to the WUS specifics (e.g.: type of pipe material, number and density of connections, pressure in the network, amount of water produced and billed, operation and maintenance practices etc.). This will help to increase methodology's



effectiveness. The results supported by the feedback from the WUS served as the basis for elaboration of guidelines for reduction of water losses in other Kurdish/Iraqi water utilities.

Throughout the project, technical meeting and presentations of ongoing activities and achieved results with representatives of the main Iraqi water companies (for instance, (Baghdad, Thiqr, Basrah and Missan water companies) were carried out (Task 7). The Italian experts explained to representatives from Water Directorate of South Iraq the main topics regarding the problem of leakage and the general methodology and approach proposed in the present project and application in Sulaimaniya. Also, some different issues were taken into consideration regarding the specific contexts of the different water companies and the reproducibility and adaptation of the proposed approach to their water supply systems. Project dissemination was aimed at fostering the diffusion of knowledge on leakage control and enable wide group of stakeholders at the national and international level to benefit from the current best practice. Finally, the Project Management activities (Task 8) have been addressed to facilitate achievement of project expected results and ensure meeting project objectives.

20. Stakeholder Involvement Process for the National Park (2008-2009)

After the presentation of the draft Management Plan, which was then translated into Arabic to promote its dissemination among the local authorities, a series of meetings (with also the presence of Italian experts) were organized to explain the significance of the project, using the maps depicting the proposed vision as communication material. Mainly, special attention was given to the multiple functions that the Park should develop in the future, beside its main scope that is to protect, restore and enhance the biodiversity of the Park's area, and in particular:

- Protection of the cultural heritage;
- Education point for children and schools;
- Research center for sustainable use of natural resources;
- Support to local farmers, breeders and fishermen;
- Coordinator between different stakeholders and donors;
- Logistic base and support for national and international researchers;



- Information center and facilities for ecotourism development.

Hereafter are presented the list of the activities/meetings carried out in the Park neighboring areas in the period April 2008 - September 2009:

- April 2008 - Meeting in Sulemanya for the presentation of the draft management plan. Participants: representatives from Iraqi Ministries' (MoE, MoPW, MoWR, MoA, MHESR), National Committee for protected areas, Council of Thi Qar, Missan and Basrah and from local tribes;
- May 2008 - Establishment of the Thi Qar Committee for the National Park;
- 5 June 2008 – Nasiriya- First seminar organized by Thi Qar Committee and Nature Iraq, to explain features and functions of the park, answer to questions and collect recommendation from locals.
- June-August 2008 - 10 meetings, focused on NP presentation, buffaloes management and fishing practices, have been organized as follows:
 - 21 June 2008 – Chibayish; district centre (About National Park)
 - 21 June 2008 – tour around the marshes for press representatives;
 - 26 June 2008 – Al Fuhood ; Subdistrict centre;
 - 20 August 2008 - Al-Chibayish district /Abu Subbat village;
 - 22 August 2008 -Al-Hammar sub-district/Bani Hetayit village ;
 - 22 August 2008 - Al-Hammar sub-district /Al-Bu Shama village;
 - 24 August 2008 – Al Fuhood Sub-district /Al-Machri village;
 - 27 August 2008 - Al-Aslah sub-district/ Sayid Yousha' village;
 - 28 August 2008 – Chibayish; district Abu-Subbat and Al- Bahar villages;
 - 29 August 2008 Chibayish; district Al-Amayreh and Abu-Narsi villages;
- July 2008 – Sulemanya: meeting with the National Committee on Protected Areas
- 12- 30 August 2008 – Buffaloes Treatment Campaign;

- 1 September 2008 - Environmental awareness campaign in local communities, involving children in a day dedicated to clean areas near Euphrates river;
- 21-28 September 2008 – Italy - Italian Parks Study Tour. Participants: Representatives from MoE, National Committee for protected areas and Thi Qar Committee for the National Park;
- April 2009 - Inauguration of the NP Information center with local authorities, PRT representatives, press;
- September 2009 - National Committee of Marshes and wetlands in Iraq (RAMSAR) holds a meeting in the National Park Mudhef. Participants: Iraqi Ministries and representatives from the three governorates (Basra, Thi-Qar and Missan).



Stakeholders involvement in NP Project - Meetings in the villages of Thi-Qar Governorate



Press tour in Central Marsh



Day dedicated to clean the shore of the Euphrates river

21. Development of Management Plan for Marshlands National Park (2008-2009)

The decisions taken during the development of the Feasibility Study for the National Park and its final approval have been the basis for drawing up the National Park Management Plan, which represents both the major policy document that states the National Park long term vision, its overall strategy and guiding principles and a practical document that provides the management decisions and actions necessary to achieve the objectives. Due to the sensitive and particular site situation, the planning process has been adapted in order to give the highest importance to the fundamental involvement process of all the stakeholders that, somehow or other, are interested or affected by the Park establishment.



Main phases of the National Park project

The report was presented to the Iraqi authorities in April 2008. Therefore the management plan delivered in April 2008 is a draft version that provides the matters for an “Operational Program” to be implemented during the last year of the project (see the figure above). An Arabic version was delivered in July 2008. The main objective is to create a strong consistent connection between the objectives of the protection of environmental and cultural heritage and the actions for promoting sustainable socio-economic development and improving the locals’ quality of life. As a matter of fact, lessons learned from similar situations all over the world demonstrate that active involvement of local population is the only way to ensure the successful establishment of protected areas. In this manner the various actions carried out in the region will be aggregated in a coordinated and well-structured program instead of being developed separately. The organization could also synchronize the others projects implemented by the new Eden Team in the same region to obtain a further positive impact on local communities.

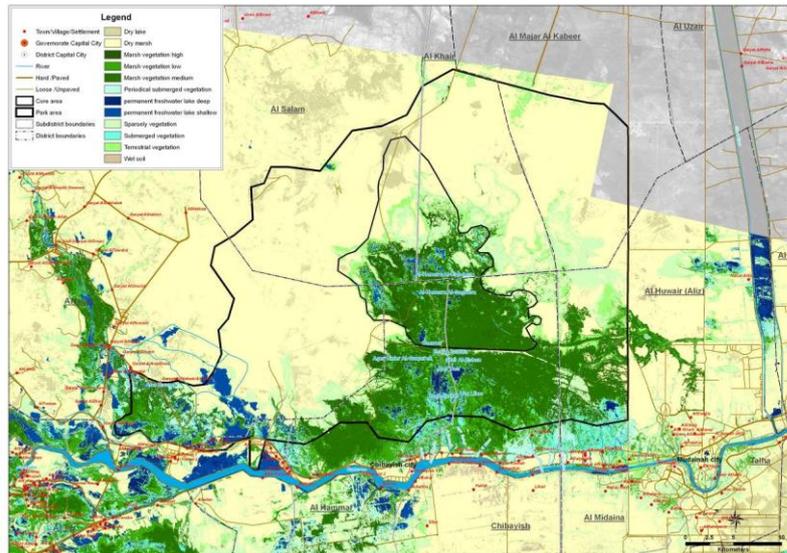
The preliminary phases of the operational program have already started with the conduction of the first socio-economic surveys on three villages situated near the Euphrates River: Al Moajed, Abu Sobat and Nahar Salel. The Nature Iraq and Italian teams applied the Participatory Rural Appraisal tools previously acquired and focused through two workshops held in Amman and in Sulaimanyiah. Other two activities which are part of the socio-economic program have been drawn up and further detailed in this report: a pilot project on



fish cages and a pilot project on water buffalos and their effects on the environment and their economic potentials. The presented draft Management Plan consists of two parts:

- 1) Part One is mainly composed by the feasibility study deliverables, updated and completed with recent data. It focuses on the description of the site and it provides the information and assessment on the following features.
 - Groundwater
 - Terrestrial Environment
 - Vegetation
 - Land cover
 - Habitats
 - Terrestrial Fauna and Birds
 - The Map of fauna presence and habitat relevance
 - Socio-economic Features
- 2) Part Two is the proper Management Plan. It is the document that defines the characteristics of the Park, the Vision and Objectives to be achieved and the consequent strategies, projects and actions to be implemented for the development and the management of the Park's area. The main topics addressed by the document are the following:
 - Water, Reeds & People
 - The Park Features
 - The Park & Its Values
 - The Park & The People
 - The Park & The Visitors
 - The Park & its Surrounding Areas
 - Summary of the Management Plan's Objectives

The final version of the plan was delivered in April 2009, revised and updated taking into account the recommendations, the experiences and findings gathered during the implementation of the Operational Program.



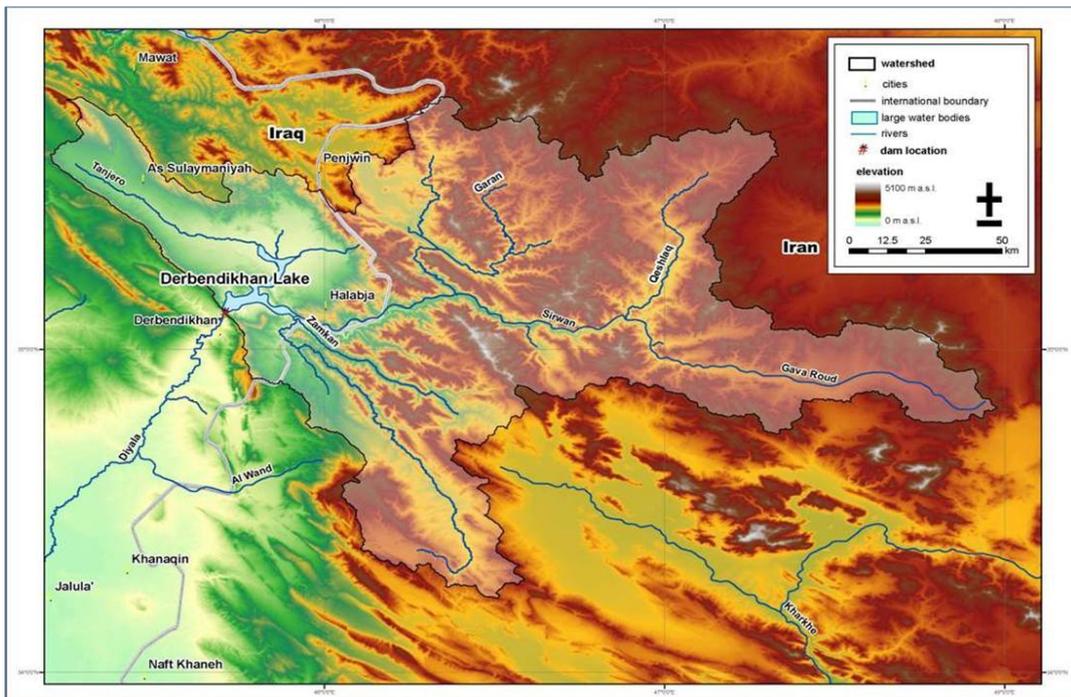
The proposed area for the Mesopotamia Marshlands National Park

22. Darbendikhan Lake Restoration Project (2008-2009)

The project was started after a reported fish kill event on the Tanjero River, a main tributary to Darbendikhan Lake that occurred at the end of July 2008, with news reports varying in voracity and accuracy regarding the main cause of the problem. News reports identified fishermen who reportedly used poison to cause the deaths of thousands of fish. Teams from Nature Iraq investigated the site of the kill and found not only dead fish, but also turtles and other fauna. Other official sources indicated that the fish deaths were specific to a certain species and yet others indicated that the deaths were not related to poison but rather oxygen depletion.



Map of Darbandikhan Lake



Map of Darbandikhan Lake Basin including the catchment of Dyala/Tanjero rivers

Several high level meetings were held to discuss the matter and there was continued disagreement as to the exact cause of the fish kill, and the results of the tests on samples collected by various entities and further analyzed by different laboratories. In addition, it was



soon clear that there are problems not only in the Tanjero River but in the entire basin of the reservoir both inside and outside Iraq. Further analyses of satellite pictures indicated that the problems are not very easily quantifiable as there are temporal changes as well as special changes to the shape of the lake and the areas leading to it.

Therefore, it was concluded by participants in the meetings held that the New Eden team, in the State of the Environment report, had to address the entire basin using a PSR model (Pressure State Response) not only identify the problems in terms of pressure on the environment and current state of environmental components, but also prioritize the actions to address the identified problems and furthermore to prevent future problems before they materialize using experiences from the West.

The State of the Basin report is focused on the following objectives:

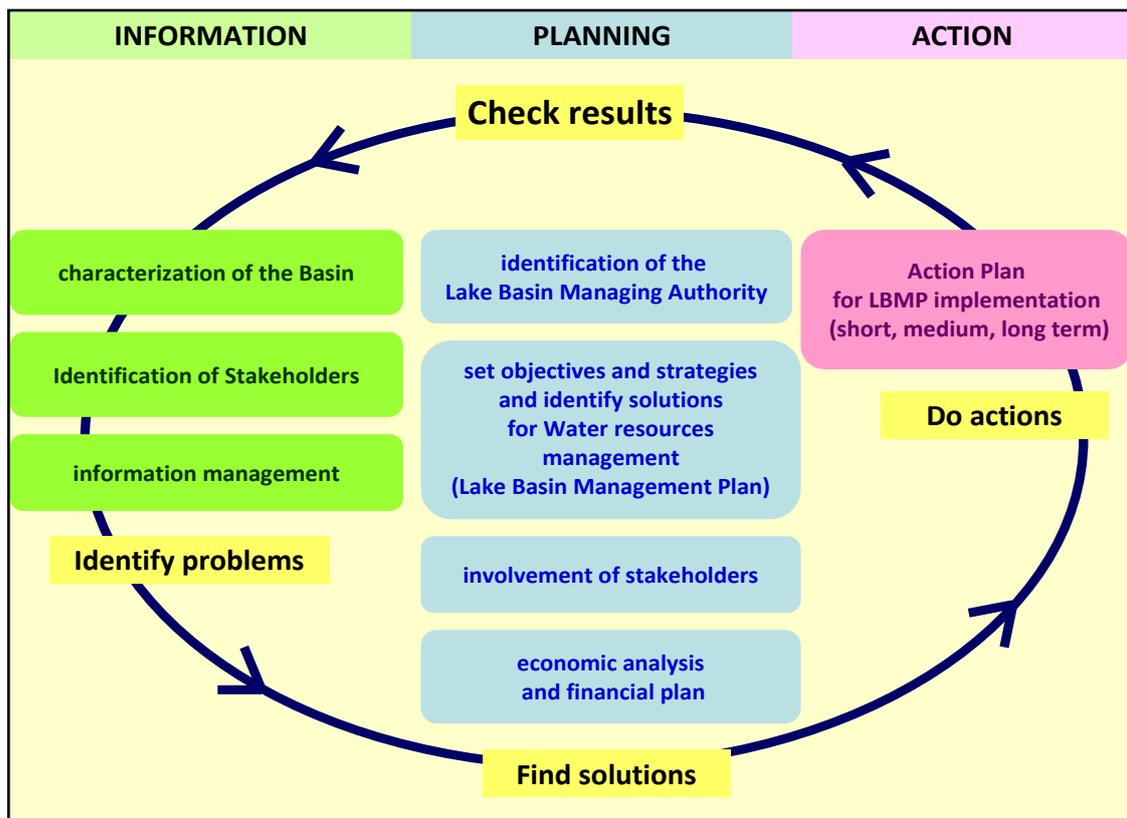
- Collect and assess all readily available off-the-shelf information on the basin;
- Provide a centralized geographical database accessible to the various stakeholders;
- Identify gaps in the available information;
- Develop a first characterization of the Darbandikhan basin;
- Perform a preliminary assessment of the most significant anthropic “pressures” on the basin;
- Evaluate and seek strategies to solve the diverse environmental problems affecting the Darbandikhan Basin;
- Define the priority actions to be implemented in the short term;
- Provide the basis for the development of a more comprehensive study of the entire basin and for the activation of a long-term program.

Water Management Planning at the Basin Scale

The first three parts of the State of the Basin report have clearly highlighted the fact that there is a deep gap of information about the overall situation of the watershed of Darbandikhan Lake: about two third of the basin lies in Iranian territory, and little information is currently available about the loads that are carried to the Lake from Iranian tributaries. The Iraqi portion of the Basin has more data available, mainly derived from existing publications and reports, but not all aspects can be detailed enough to allow for the definition of clear

objectives and targets and for outlining appropriate strategies of water resources management in the years to come.

While urgent actions have to be taken for addressing some problems that affect the population and pose a serious threat on their health (drinking water quality, sanitation services, control of hazardous substances), other severe issues cannot be solved without a further investigation at the widest scale possible, at least on the Iraqi side of the watershed. The ultimate aim would be building a more comprehensive picture of the characteristics of the Darbendikhan Lake Basin. Adverse environmental effects (eutrophication, fish kills, reduced biodiversity, etc.) are often the end result of long-term environmental changes that started far off in the past and are related to many aspects, not only environmental but also social and institutional. The purpose of the State of the Basin Report is to provide a snapshot of the existing conditions of the Darbendikhan lake watershed. The report proposes a road map for the development of a Darbendikhan Lake watershed water resources management strategy.



Main steps in the process of watershed management



The problems that Darbendikhan Lake has been showing in recent years are not only related to the characteristics of the lake itself, but also to the quality of waters that flow into it and to the loads deriving from the surrounding areas. Therefore, these problems can only be addressed at the Basin scale, not at the local scale, where not all the complex relations between the involved components can be properly identified (hydrology, hydrogeology, environmental aspects, urbanization, land use, use of water resources, etc.).

The Lake Basin planning process requires a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, develop protection or remediation strategies, and implement and adapt selected actions as necessary. The outcomes of this process are documented or referenced in a Lake Basin Management Plan, with a goal of defining and addressing existing or future water quality problems from both point sources and nonpoint sources of pollutants that affect the lake and its tributaries.

Experience over the past decade has shown that effective watershed management includes active participation from stakeholders, analysis and quantification of the specific causes and sources of water quality problems, identification of measurable water quality goals, and implementation of specific actions needed to solve those problems.

Characterization of the Basin

The Part III of the Report shows that there is a gap of information for a comprehensive characterization of the environmental state of Darbendikhan Lake and its Basin. In general, five broad categories of data are used to adequately characterize a watershed:

1. Physical and natural features;
2. Land use and population characteristics;
3. Waterbody conditions;
4. Pollutant sources and loads;
5. Waterbody monitoring data;

Each of these items has been addressed in the first Parts of the Report, but the available information does not allow for a comprehensive analysis of environmental quality of water bodies in the Darbendikhan Basin. Knowledge on the sources of impairment to water bodies



is essential for the appropriate analysis of environmental problems affecting the Lake. A good baseline assessment is a fundamental element for the identification of effective measures in the planning process.

Information Management

Another key element of the planning process is information management: the collection, organization and elaboration of gathered information into a system that allows for complex data analysis and production of clear thematic maps. As reported in Part III, information, maps and data collected for the development of the report have been organized in a geo-database that will provide a platform for the future data collection and elaboration. This database includes:

- Raw data stored in the GIS on Darbendikhan watershed:
- Data derived from publications, reports, other documents;
- Environmental monitoring data;
- Maps;
- Satellite images.

Involvement of Stakeholders

Successful development and implementation of a watershed plan depends primarily on the commitment and involvement of people and organizations that have a stake in the outcome of the watershed plan (stakeholders). Stakeholders are those who make and implement decisions, those who are affected by the decisions made, and those who have the ability to assist or impede implementation of the decisions.

It is essential that all of these categories of potential stakeholders—not just those that volunteer to participate—are identified and involved in the planning process. Encouraging stakeholders to focus on the water resource under study and opportunities to cooperate can help to address water quality impairments or threats. Therefore, it is critical to build partnerships with key interested parties at the outset of the watershed planning effort. In general, there are at least five categories of participants to consider when identifying stakeholders:

1. Stakeholders that will be responsible for implementing the watershed plan;



2. Stakeholders that will be affected by implementation of the watershed plan;
3. Stakeholders that can provide information on the issues and concerns in the watershed;
4. Stakeholders that have knowledge of existing programs or plans that you might want to integrate into your plan;
5. Stakeholders that can provide technical and financial assistance in developing and implementing the plan;

Definition of Strategies and Key Objectives

The strategy for surface water management is to foster sustainable use of surface waters, harmonizing the needs for socio-economic development of the territory with the conservation and enhancement of the ecologic structure and functions of Darbendikhan Lake and its watershed. General measures are identified according to three main categories:

- **Preventive and conservation measures**, that are maintain and improve the status of water bodies;
- **Rehabilitation and protection measures**, that increase the availability and safety of water use, and to restore and rehabilitate impaired water bodies that have low ecological quality;
- **Measures for protected Areas**, identify and safeguard the areas that are designated for specific uses of water resources and also manage protected areas that are designated for the conservation of natural water habitats, their structure and functions.

These strategies are usually implemented to discourage the inefficient uses of water resources, while encouraging the environmentally friendly use of water. The key management objectives for Darbendikhan Lake's Basin should be:

- Control of pollution sources
- Improve water quality
- Promote sustainable use of water resources
- Improve water services levels.
- Rehabilitate the environment of Darbendikhan Lake and its affluents
- Create protected areas



- Implement environmentally sound technologies and best practices.

A variety of management approaches are available to address water quality problems in the planning area. These include regulatory and non-regulatory approaches for dealing with point sources and nonpoint sources, management measures and management practices for controlling pollutant sources. In developing the watershed planning strategies and management measures, not only the state or local water quality or hydrology targets should be addressed, but also other decision criteria should be considered, such as:

- Fiscal impact on local governments;
- Cost to the development community;
- Benefits that will be realized;
- Overall regulatory feasibility of the strategy;
- Compatibility with other local planning objectives and policies;
- Overall political feasibility.

Economic Analysis and Financial Plan

Another key step of the water management process is to assess how important water resources are for the economy and socio-economic development of the Darbendikhan basin territory. The economic assessment of the basin will delineate the economic profile in terms of general indicators, e.g. economic turnover, gross income, employment or number of beneficiaries for significant water uses, etc. When available, also the importance of economically significant aquatic species will be highlighted.

The selection of economic instruments is a key part of the development of water management measures. The principle of recovery of the costs of water services, including environmental and resource costs associated with damage or negative impacts on the aquatic environment should be taken into account, following the polluter pays principle. Therefore, an economic analysis based on long-term forecasts of supply and demand for water resources in the basin is necessary for the identification of appropriate management strategies and measures. In particular, the economic and financial tools that are usually applied are:

- Incentive pricing;



-
- Tariffs for water services;
 - Recovery of costs for water services;
 - Recovery of environmental costs (Internalization of environmental costs).

The economic analysis is carried out with the aim of assessing the value of water in the main water-demanding sectors (irrigation, industrial use, household use, Fisheries, hydropower use).

Implementation Program

The final step of the planning process, after having identified watershed management measures that meet the objectives, is the development of an implementation program. Designing the implementation program generates several of the basic elements needed for any effective watershed plans:

- An information/education (I/E) component to support public participation and build management capacity related to adopted management measures
- A schedule for implementing management measures
- Interim milestones to determine whether management measures are being implemented
- Criteria by which to measure progress toward reducing pollutant loads and meeting watershed goals
- A monitoring component to evaluate the effectiveness of implementation efforts
- An estimate of the technical and financial resources and authorities needed to implement the plan
- An evaluation framework.

Roadmap to Darbendikhan Lake Master Plan

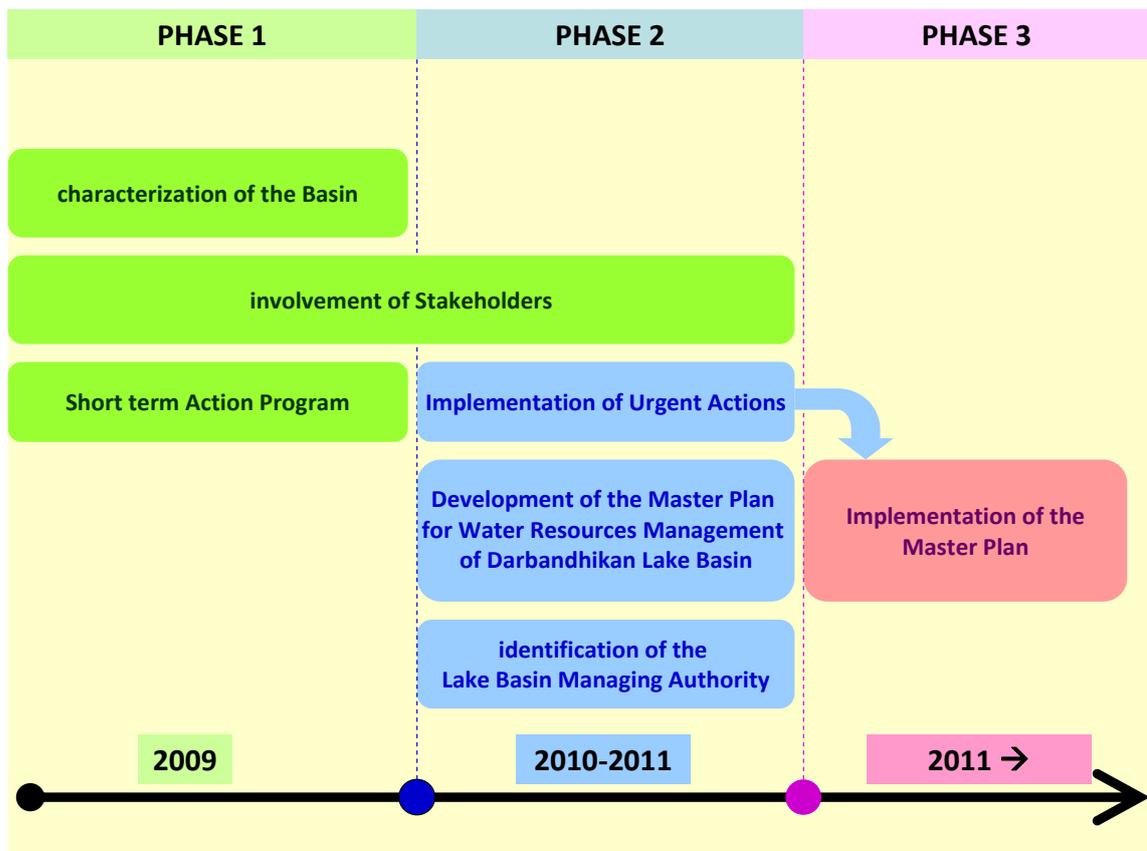
The problems of Darbendikhan Lake basin are much broader and more significant than a single fish kill event and as a consequence a long-term program aimed at the restoration of the entire basin should be activated. The “health” of the Darbendikhan Basin is a priority at the national level, considering the heavy effects on human health and on the environment that the pollution coming from the Darbendikhan basin cause on the districts and governorates located downstream of the lake. As a consequence, the actions activated by the KRG Ministry of



Environment are to be considered just as the first step of a long term program that will entail both the development of a *Master Plan for the restoration of Darbendikhan Lake basin*, including *detailed studies* for the investigation of the main issues affecting the watershed, and the activation of *investment programs* for the implementation of the actions/projects identified by the plan/studies.

A 3-phase approach represented in the following was proposed as a roadmap to the development of a management planning process for the Iraqi portion of Darbendikhan Lake basin, with the development of the Master Plan and the definition of a medium and long-term investment program aimed at the restoration of Darbendikhan Lake and sustainable use of water resources:

- Phase 1 – Characterization of Darbendikhan Lake basin;
- Phase 2 – Activation of the urgent short-term investment program and development of the Master Plan for Water Resources Management of Darbendikhan Lake basin (2009-2011);
- Phase 3 – Implementation of the Master Plan (long term investment program).



Roadmap for the Master Plan of Darbandikhan Lake basin

The report is the starting point of the planning process for the management of water resources in Darbandikhan Lake basin. The data collected so far provide a first baseline assessment that gives a general picture of the watershed and determines the gaps of information that need to be filled, as well as the most relevant areas of intervention for a short term programme of urgent actions. Basing on the preliminary analysis included in the State of the basin report, a comprehensive Master Plan for the clean-up of the Darbandikhan basin should be developed. The Master Plan should provide a detailed long-term investment program with a 15-20 years timeframe. The program should include:

- Establishment of the institutional and legislative framework for water resources management;
- Actions for achieving more efficient uses of water resources;
- Actions for the minimization of the pollution generation;
- Actions for the remediation of the polluted sites;



- Definition of monitoring programs.

The development of the Master Plan might take 18 to 24 months and will need the participation of all the relevant Authorities at the regional and national level. The main phases of the Master Plan could be:

- Execution of field surveys and detailed characterization of all the major polluting activities/sources;
- Execution of extensive monitoring campaigns on surface/ underground waters, sediments, soil, air and detailed characterization of environmental issues affecting Darbendikhan Basin;
- Modelling of the major pollutants in the surface/underground water;
- Definition of the objectives, policies and strategies for each environmental component;
- Identification of short, medium and long-term actions for the reduction of the pollution generation;
- Identification of short, medium and long-term actions for the remediation of the polluted/contaminated sites;
- Definition of the investment program, including the time schedule and the financial resources to be allocated.

The overall project will require several years to complete and, starting already from Phase 2 of the program, extensive financial support from the Iraqi Government, from the Kurdistan Regional Government and Local Government Bodies that are involved in water resources management.

Short Term – Urgent Actions for Darbendikhan Lake

As a result of the state of the basin report a first set of actions was proposed, that can be activated in the short term (2-3 years). These actions are organized in four main categories:

- Water management
- Wastewater treatment
- Waste management
- Environmental monitoring and data collection

- Study on health impacts of pollution.



Tanjero River at Sulimania



Sulimania dump fields



23. Assistance to MoE for the Formulation of a Proposal for Rerag (2008-2009)

The Regional Environmental Rehabilitation Advisory Group (RERAG), established under the UNCC Decision 256/2006 between the national focal points of Kuwait, Saudi Arabia, Jordan, Iran and Iraq (with the UNCC as observer) has recommended that Iraq needs to initiate an environmental and health assessment program to assess short and long term impacts of wars, and develop an environmental rehabilitation program to be carried out by Iraqi institutions and international experts. On 29th October 2006, the Government of the State of Kuwait recognizing Iraq's need to address the adverse effects of the environmental damages, agreed to allocate ten million US dollars to finance a program for the monitoring and the assessment of Iraq's environmental damages.

The funding will serve to carry out a Rapid Environmental and Health Assessment Study (hereinafter referred as Iraq's Environmental and Health Assessment Study or IEHAS). Top Iraqi national scientists and experts from Universities and Ministries have been invited to propose specific projects in accordance with RERAG requirements. Each professor has submitted a project concept idea to the NFP for a total of 13 different projects. Some of them were not properly matching the RERAG requirements and some others were overlapping.

The Iraq National Focal Point has therefore created the IEHAS Management Team including the all major exponents of Iraqi scientists specialized in the above listed sectors and also experts from Nature Iraq (NI) and international experts with the final purpose of identifying and formulating a single comprehensive project proposal to be presented by the Iraqi Ministry of Environment which will act as a coordinator of the initiative. It was in fact agreed during a meeting organized by the NFP and held in Sulimania with most of the professors that an organic and unique proposal would have more possibilities to be financed than thirteen individual proposals.

All the participants agreed on this strategy and NI and the international experts have therefore harmonized all the proposed projects into a single one with the purpose to tackle all the aspects related with war contamination in Iraq following the indications of RERAG. The clusters that have been covered according with RERAG specifications are:

- Assessment of military fortifications and mine/ammunitions/DU;
- Terrestrial/soil surveys and assessment, impact on wildlife;



- Groundwater surveys and assessment;
- Water (river and marine) and coastal pollution monitoring and assessment, impact on fisheries;
- Public health impact assessment;
- Social Impact;
- Support services

The main objective of the proposal which was submitted to RERAG on July 2009 is to provide a rapid assessment of those aspects related of the state of the environment in Iraq and to collect data that can be used to assess the health risk, especially in the south of Iraq. In doing so, it is recognized that knowledge must be built at a national level. For this reason, a practical goal was the construction of a database where much of the information collected throughout the years will be organically catalogued for further analysis.

The RERAG Commission made some observation on the submitted proposal which have been studied and recognized in an updated version of the proposal which have been then delivered to the Commission.

24. Community Activities in Kurdistan (2008-2009)

Starting in 2008, Nature Iraq took the initiative to design and implement grassroot-type projects to advocate a healthy and clean environment in the towns and villages where NI operates. These small projects proved to become attractive initiatives for both locals and professional institutions. After all, an NGO main role is to advocate and promote the ideas that they were formed to perform. Nature Iraq's main goal is to preserve and improve the status of the environment in Iraq in all aspects, and the most important element in becoming successful doing so, is for the general public to be actively involved in such efforts and work with them as partners to achieve the goals we seek. Some of the initiatives Nature Iraq took in that direction, are mentioned below:

Clean Kurdistan Campaign

This initiative was designed to take place during the period that Kurds start celebrating the Spring season and the Kurdish New Year (Called Nawrooz locally) during which heavy

traffic of locals go outdoors camping and picnicking to celebrate the season, which ultimately impacts the environment negatively.

Nature Iraq, Sulaimani office, decided to design, print and distribute large posters to be placed in popular locations throughout the region, to promote a clean and healthy holiday season. NI staff went to the streets distributing flyers sending the same message. The impact of this initiative was widely positive on locals as well as top officials who commended the activity and asked to spread it even wider.



Figure 63 - Posters that were placed in popular locations during Nawrooz holiday

AUI-S Environmental Activities

Nature Iraq is helping spreading the message of Environment preservation in many ways. One is through an environmental enrichment class that was given from 2010-2012 every Tuesday during the academic year at the American University of Iraq – Sulaimani. These classes were 3 hours long and they involved field trips to locations around the city of Sulaimani in an effort to raise the awareness of student in regards to their immediate environment and some of the poor practices that are taking place that are in desperate need for immediate remedies. The

classes were very popular amongst the students, and they became more interested in the subject and active in suggesting sound solutions.

The whole staff from Nature Iraq's Sulaimani office also assisted in the planting of trees at a new AUI-S construction site, a landmark hill adjacent to the presidency building that is near completion.



Figure 64 - AUI-S students during enrichment class field trip to a local stream

General Advocacy

Nature Iraq became more active in spreading the word and taking a more aggressive advocacy stance. Advocacy campaigns were designed to use all available media outlets in an effort to send the conservation and environmental sustainability messages that are needed to as wide an audience as possible, be it the general public or government officials. Some of the outlets that Nature Iraq have used are as follows:

- Nature Iraq experts appear regularly on local state-owned Kurdish TV station (KurdSat) and have been hosted for half-hour shows on the Wednesday morning show (Good Morning Kurdistan) talking about Botany, Birds and the general conservation activities that Nature Iraq is running.



Figure 65 - Korsh Ararat, NI Ornithologist appearing on Kurdsat TV

- NI office in Chibaish puts a bi-weekly environmental article in local newspapers touching on hot environmental issues to advocate for remedies.
- In 2009, Nature Iraq appeared in part of the famous NBC's 60 Minutes television show on the restoration of the Mesopotamian Marshlands. The segment "Resurrecting Eden" received worldwide attention.

Nature Iraq has regularly appeared on many other print, radio and television media both within Iraq and internationally.

Nature Iraq Community Activities

Nature Iraq has conducted communities activities such as street clean-ups in Sulaimani, Chibaish, & Dukan and organized two "Green Music and Arts Festivals" in Suliamani in 2012 & 2013.



NI team Planting a small road-side garden (left) & exhibit area of the Green Music and Arts Festival (right)



25. Detailed Environmental and Sustainability Assessment for a Large Park Project in Suleimania (2008-2009)

Hawary-Shar Park is a multifunction park presently under construction just northeast of Sulaimani city in Kurdistan. The park, once completed, will cover an area of approximately 1,000 ha (4,000 donums) and will include, among other spaces, a golf course, a hotel and several business units (hotel, restaurant, etc). Water requirements for such a large park are the primary concern of this assessment performed by NI, as they might not fit the present and future water availability in the area.

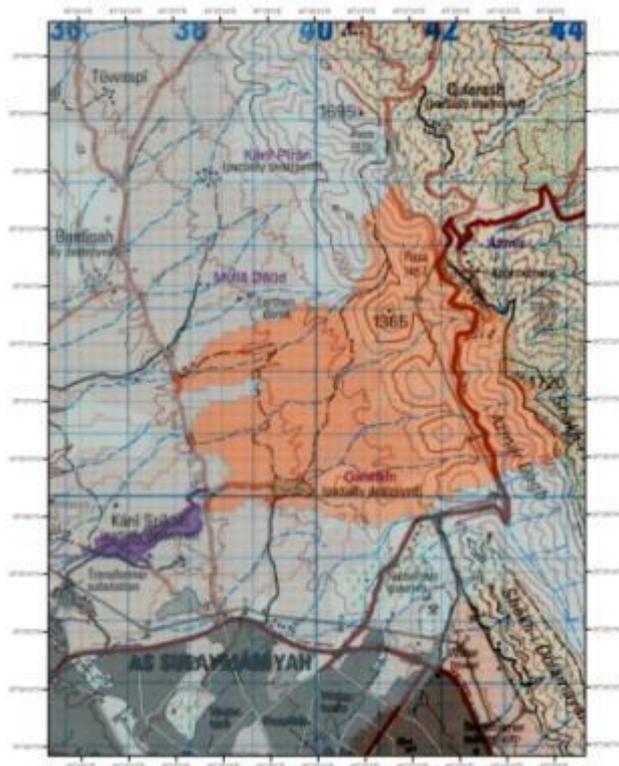
Performed Activities

Based on the general information NI has been provided, under the present design the park is expected to require an average of 500 cubic meter of water per hour (CM/hr), 10 hours/day, 365 days a year or 1.825 million cubic meters (MCM/Y) of water per annum.

Water requirements are dictated by the type of landscaping and by the type of businesses identified by the project. Water requirements for landscaping purposes vary widely depending on type of plants, climate conditions, nature of the soil, season of the year and age of the plant. Landscaping should be carefully selected to best-fit local climate conditions.

Similarly, water requirements for human-related activities should also be scaled accordingly to local climate and water availability.

The area where the park is presently being built is not known for its water abundance (the name of the valley is Dawla Rut “the dry valley”).



Watershed location

Some groundwater potential exists but is not adequate to sustain the park neither in its present nor future conditions. The four wells, which are constructed inside the park, provide approximately 0.5 MCM/Y of water thus covering less than a third of the total water requirements of the park. Furthermore, over pumping of the aquifers is now becoming a serious problem in the Sulaimani governorate with thousands of wells gone dry just in the last few years. For this reason, groundwater resources at this scale should not be considered a dependable source of water.

Surface water potentials are somehow larger. According to the hydrological analysis presented in the report, three small watersheds would provide a direct contribute to the park with a total average runoff of 4.02 MCM/Y with lows near to 1.4 MCM/Y and highs near to 7 MCM/Y. Nevertheless, the topographical and geological conditions of the area are such that storing water for the park is quite difficult: the gullies are small (thus only very small reservoirs can be foreseen) and the terrain quite permeable (thus a great proportion of the runoff infiltrates in the terrain).



Water storage is an issue at the project site due to the particular climate conditions of the region: the rain season in the Sulaimani area concentrates during five months (September through January) and leaves the remaining 200 days of the year dry. For this reason, if the park had to depend on surface water only, it should be assumed that the demand of 500 CM/hr will have to be stored to support the park for the 200 days of no rain. This translates into a storage requirement of 1.3 MCM if evaporation rates from the reservoir are taken into account. Such storage will have to be provided within the park area (and most preferably on the lower end or near to the existing road) as well as outside the park and would likely cover an area of 30-40 ha.

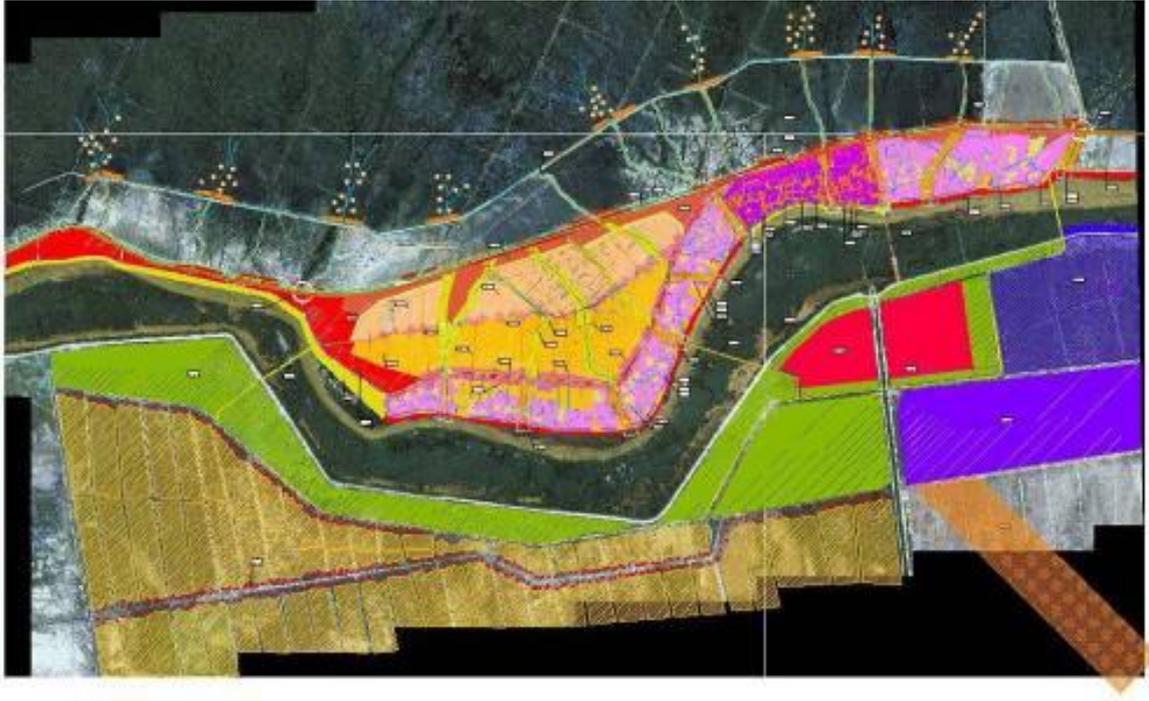
In conclusion, if the water requirements used during the evaluation were confirmed, it cannot be seen how the present design of the park can be considered sustainable from a water demand stand point. Specifically, NI believes that some of the land uses foreseen for this park should be carefully revised in order to reduce the total water requirements; the golf course should be eliminated, the various businesses (hotel, restaurant, etc) revaluated and storage of surface water (in the form of lakes) increased in order to reduce the dependence from the groundwater system.



A panorama of the park area

26. Urban Plan for Chibayish – Phase 2 (2008-2010)

The final version of the Urban Plan for the town of Al Chibaiysh was presented and submitted to the Client during the meeting held in Sulimaniya from 27th and 28th of April 2007.



Urban Plan for Al Chybayish: Third Scenario Map

During the second phase of the project, specific functional plans to be integrated with the already submitted UP have been developed. During the year 2008 several meetings with the Client, the National and Local Authorities took place in Iraq to develop and define the project of the Preliminary Urban Plan for Al-Chibaiysh. In the following points, a brief summary of the above mentioned meetings are outlined:

Sulaymania Meeting 28th April 2008: The meeting was focused on the necessity to provide to the MMPW in Baghdad a hard copy of all projects, reports and all the thematic maps. The report and the planning scenario map were supplied also in Arabic language. During this meeting a hard copy of the report and the most important thematic maps of the UP project have been provided to the MMPW.

Sulaymania Meeting 22nd May 2008. The following points have been discussed during the meeting:

- proposal of trainings for engineers from the south on GIS in order to keep the continuous updating of the previous work and data base have been arranged;



-
- presentation of the three scenarios worked out for the development of the city: Scenario 1: Short term (5-10 years), Scenario 2: Medium term (10-15years) and Scenario 3: Long term (15-30 years).
 - activation of too many projects at the same time would be not manageable by the Municipality organization.
 - the need to develop water canals that are required by the marsh people in the western part of the city. The Ministry of Water Resources will assess the possibility of avoiding the concrete lining of the new channels, using compacted soil wherever possible.
 - The need to improve the transport network of the city.
 - The potentiality of implementing the Chibaiysh Urban Plan and the National Park project in parallel in order to coordinate and integrate these projects as much as possible.

Al-Chibaiysh Meeting 24th June 2008: This meeting, held in Al-Chibaiysh, served as public seminar in the Municipality Council of Al-Chibaiysh. The main points of the plan, goals, stages of works and “borders” of the work were illustrated.

Sulaymania Meeting 22nd July 2008: This meeting in Sulimaniya was organized to identify the future activities for the development of the Urban Plan for Al-Chibaiysh city, taking in consideration the suggestions and the needs of the Municipality. The meeting was an important opportunity for discussing with the participation of the members of the Municipal Council, the representatives of the Directorate General Physical Planning office and Nature Iraq together with the Italian experts who developed the UP for Al-Chibaiysh.



Meeting in Sulimaniya, 22nd July 2008

The main topics presented and analyzed during the meeting were:

- Presentation of the Preliminary Urban Plan (UP 2007);
- Open discussion and clarification on the main notes and requests from the Municipality and from the DGPP (in detail 9 notes for the Final Master Plan of Chibayish and the site location of new buildings and functions);
- Presentation of the proposal approach for the future activities: in particular the development of the Functional Urban Plans.

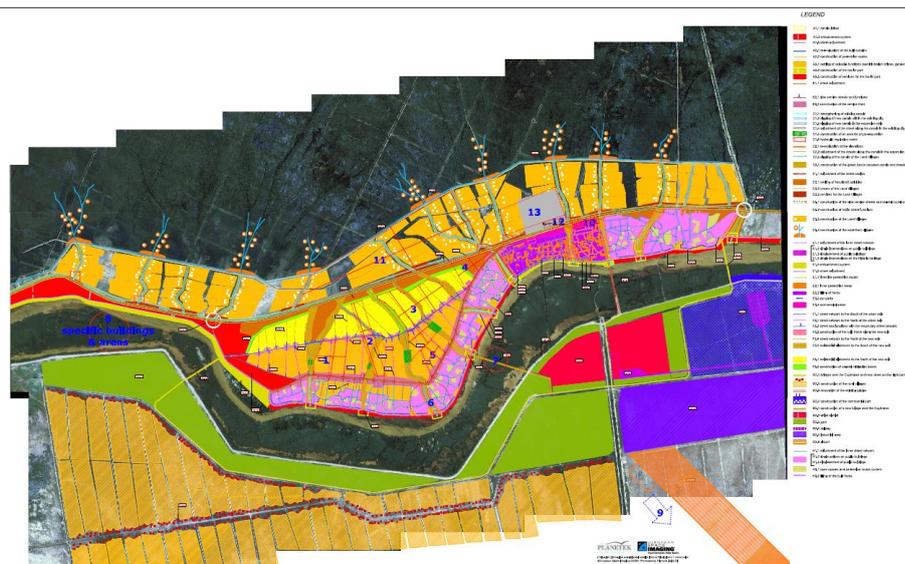
Sulaymania, Training Course 13th -18th December 2008: The training course was organized to work on GIS system applied on the Urban Plan for Al-Chibaiysh city, the Database & GIS application (theory and practice) and some activities related the UP and the planning methodological approach, in particular:

- Presentation of the Preliminary Urban Plan (UP 2007);
- Planning framework and methodology;
- Future planning proposals and Proposal approach for the future activities (data collection, Comparison between the public property map and the UP map, Functional Urban Plans, Urban Design of strategic projects, Final and Detailed Design of strategic projects);
- Open discussion on the planning approach and on the Proposals & Alternatives.



Training Course in Sulimaniya, December 2008

An additional meeting was held in Baghdad in July 2009, at the MMPW office with the aim to present to the DGPP the final release of the Chibaiysh Preliminary Urban Plan according with the changing of the land uses proposed by the Plan and occurred in 13 zones within the city.



Chibaiysh Urban plan Land Use

During the meeting that was held in Suleimania in May 2010, with representatives of the Ministry of Municipalities and Public Works, Governorate of Thi Qar and Chibaiysh municipality, it was agreed that the Master Plan would be updated according to the new situation and that a new detailed survey (similar to the one carried out during the summer of 2006) would be done.



At the same time it was agreed to start a capacity building program to train the local engineers on each phase of the Master Plan development, starting from the field survey. It was in any case agreed to proceed with a temporary update of the Master Plan according to the comments and requests of amendments given by the Municipality representatives who attended the meeting in Suleimania.

The New Eden team carried out the update of the Master Plan in the following two months and then presented and re-submitted a new version of the final Land Use map to the Ministry of Municipalities and Public Works (Director General Dr. Mohammed Sabah and Deputy DG Haytham Obaid) during a meeting organized in Italy at the end of July 2010

The capacity building program was started with a classroom session in Suelimania (8-13 November 2010) at the training center of the Twin Rivers Institute for Scientific Research. The course contents were:

- PUP main maps, actions and land uses;
- GIS theory and practice for the survey;
- Main planning principles;
- Field Survey simulation.

A total of 10 engineers from the Governorate of Thi Qar attended the course, which was presented by two Italian experts (urban planner and GIS expert).



In the first months of 2011, the New Eden team carried out a detailed review, together with the Municipality of Chibaiysh, of the areas/data covered with the previous survey and agreed with them the detailed scope of work of the new survey. Immediately after this review was completed, the New Eden team proceeded with the preparation of the new field survey by

procuring a new satellite image (special acquisition), drawing the updated detailed blocks and preparing all the other tools needed for the survey. All these documents were then submitted to the Municipality for their review and comments

Meetings were then held in Nasiriyah and Chibaiysh to reach a final and agreed detailed scope of work of the new survey, which was followed by the preparation of the final survey material (maps with blocks, field forms, database, GIS), on which the local engineers were trained (in June 2011) in order to make them ready to participate to the survey carried out by Nature Iraq.

The Field survey was carried out between July and September 2011 and by the end of October all the data of the new survey were stored/validated into the GIS, and the data analysis activities were completed by the experts working on the Master Plan update.

The update of the Master Plan, complete with all the new thematic and planning maps, was completed by December of 2011 and submitted to the Municipality of Chibaiysh for checking/validation, which was done also through direct meetings with the local Directors/engineers.



The final updated version of the Master Plan was presented to the Governorate, the local Municipalities and the Ministry of Municipalities and Public Works during a meeting held in February 2012 in Suleimania. During the meeting, following a specific request from the

Municipality, the New Eden team presented also several proposals for the development of detailed/functional plans.



27. Procurement of Equipment and Rehabilitation of Veterinary Centers in the Marshes (2008-2010)

Veterinary services in Iraq today face the challenge of re-establishing an effective health care system. The supply of veterinarian goods and materials carried out within the New Eden project goes in this direction and is aimed at addressing the abovementioned issues. Brucellosis, a worldwide zoonotic disease of ruminants, as well as other zoonotic diseases such as Q fever or schistosomiasis etc., are of particular concern in Iraq because of the close proximity of animals to humans and the cultural habits that favor disease dissemination among the population. Public health education and awareness campaigns shall be developed to complement the deployment of veterinary goods and materials, to educate citizens about e.g. zoonotic diseases and the ways to prevent them.

Enlarging the scope to the whole agricultural sector, and since agriculture is not as high-tech as in the western countries, veterinarians need better, more up-to-date training, as well as better access to supplies in order to keep Iraq's farms healthy and prospering. They have not had any continuing training in the past 15 years. The other challenge, a recurring theme for Iraq's rural farmers, is regular access to quality supplies and treatment. It's hard getting drugs, vaccines and supplies. The first phase of the project was focused on the rehabilitation of four Veterinary Clinics of Thi Qar Governorate that are within the National Park area of influence, namely:

- Veterinary Center in Al-Chibayish City (near municipality Council of District)
- Veterinary Center in Al-Hammar (northwest Al-Hammar)
- Veterinary Center in Al-Fuhood (east angle from Al-Fuhood area near Al-Hai Al Sunaai)
- Veterinary Center in Al-Aslaah (near the department of Al-Isolah District)

Other than the above mentioned, five public veterinary centers and other ten small private clinics exist in the area principally acting as medicine dispensaries. These centers are in operation and they mainly aid cows, sheep and water buffaloes. The Al Chibayish and Al Hammar Veterinary Clinics is planned to become the veterinary reference structures for the development of Pilot Projects proposed for the establishment of the National Park (Wildlife Center, Buffalo pilot farm, etc.).



The main goals of this phase of the project are:

- To supply the necessary equipment to the centers;
- To improve the skills of the personnel;
- To start the rescue of injured wild animals;
- To plan well-organized animal health care services to protect farm animals and humans from epidemic diseases.

On September 24th, 2008, during one of the meetings held in Padua, Italy, with members of the Marshlands National Park Committee of Thi Qar Governorate Council, a presentation on the progress of Veterinary Centers project was given. During the discussion that followed the presentation, it was pointed out by the Committee members that the local veterinaries need to be trained to improve their capabilities on prevention, vaccinations, surgery, first aid etc.

Concerning the veterinary materials and equipment required for upgrading the existing selected veterinary centers in the Nassiriya area (Al-Chybaish, Al-Hammar, Al-Fuhud, Al-Islah) a priority list was drawn up (since not all the needs can be funded within this project):

- Primary sanitary treatment;
- Surgery;
- Artificial insemination;
- Vaccination.

A basic design for rehabilitating the four veterinary centers was developed by the Italian engineers and discussed with the representatives of the Thi Qar Committee. About the provision of drinkable water through water treatment units, power generation and air conditioning systems the Committee Members agreed on the proposed materials and devices.



Veterinary Center of Al Hammar



Veterinary Center of Al Chibayish

Preliminary Questionnaire

Nature Iraq personnel teamed up with the Veterinaries of the Governorate and of the Provincial Reconstruction Team for collecting detailed information on the existing Veterinary Centers and their requirements and in particular:

- The detailed description of each center and related property (exact size, age of buildings, current state of conservation, construction materials, external areas and other items, etc.);
- The detailed layouts of the buildings of the 4 existing veterinary centers;
- The detailed layouts of the existing facilities of the 4 existing veterinary centers (water supply, water treatment for medical use, wastewater discharge, electric power supply, etc.);
- The full list of available equipment at each center, with the evaluation of the actual functionality of each piece;
- A proposal for changes in the layout of buildings and external areas;
- A preliminary estimate of costs of the facilities and construction works to be done at each center.

A questionnaire was submitted to the personnel of the Veterinary Centers – after revision by the PRT veterinaries – on the technical needs and priorities for the effective rehabilitation of the centers and their services. Nature Iraq’s staff in cooperation with the Veterinaries of the



Provincial Reconstruction Team collected the basic information on the situation of the existing veterinary centers, on the following aspects:

- Assessing the current level of the veterinary services in the area and the basic needs to be addressed;
- Providing the most urgently needed equipment and medical provisions for the prompt rehabilitation of existing veterinary centers;
- Supporting the organization of the most urgently needed veterinary services that are required by farmers;
- Creating the necessary staff structure for conducting the veterinary centers and providing the services on the premises that are required by the farmers;
- Setting a system for data collection and elaboration and for the periodic reporting to the competent authority (Ministry of Agriculture) on the provided veterinary services.

After the meeting of September 2008 preliminary works were done for setting up updated layouts within the Vet Clinics; calculating the necessary room for installing new power generators, water treatment units, air conditioning devices; redistributing the internal volumes within the Vet Centers for the incoming materials and equipment.

Procurements of Veterinary Materials and Equipment

The defined provisions have been based on the results of a field assessment of the current status of the existing Veterinary centres, which was performed by personnel of Nature Iraq in collaboration with the Ministry of Agriculture, Department of Thi Qar. Renovation works and key equipment for the implementation of this project are hereinafter briefly listed and described:

Infrastructures renewal/refurbishment: establish a permanent Veterinary presence in the Thi Qar Governorate by renovating the existing centres and, where necessary, adding new rooms/spaces for an effective provision of fundamental veterinary facilities such as basic animal surgery, orthopaedics, obstetrics, vaccinations, etc. Providing essential facilities such as water supply, electricity generators, air conditioning equipment, water treatment, wastewater discharge, etc. including the necessary works for installation of new equipment.



Basic veterinary instrumentation such as medical veterinary sets, veterinary tables, drug delivery systems for animal sedation, centrifuges, wire saws, cool boxes, containers, medical garment, tubs for animal treatments (parasites disinfestations), cattle prods etc.

Consumables: disposable syringes, needles and needle holders, evacuated blood collection tubes, cotton, gloves, boots, etc.

It was challenging to develop the project deliverables and take care of the quotations for equipment and materials, contact the veterinary equipment providers, translate the required material lists from Arabic to English and finally obtain three quotations by the end of August, deadline of the announcement. After the first phase of the survey, investigation and in-depth analysis of the existing situation, a work for choosing and contacting in Italy the suppliers of the required equipment and veterinary materials that couldn't be found locally have been performed:

- explaining the current sanitary situation in Iraq, taking into consideration the hard infrastructural and environmental conditions of the area;
- looking for the most modern and reliable instrumentation, having to face in some cases challenging operating conditions;
- taking care of the logistics and choosing the best solution – at sustainable costs – for transporting materials of different origin and with different characteristics to destination.

At the beginning of 2009 local companies were contacted for preliminary civil works to be done most urgently and be completed by February 2009. Afterwards, the supply order for veterinary materials and equipment could be delivered (the order could have been issued on the condition that the preliminary civil works were defined and a contract was in place with a local company).

Materials that could be found on the local market such as power generators, air conditioners etc. were purchased locally. The sea freight shipment was organized with an Italian shipping company: on the 23rd of July 2009 the vet materials and equipment, water treatment units and other materials were loaded on the ship Victoria at Brindisi Port in southern Italy. The shipment started on the 29th of July from Brindisi and ended at Kuwait Free Trade Zone on

the 25th of August. After long Custom clearance controls and procedures at the KFTZ the cargo was transported from Kuwait to the final destination at Nassiriya through Safwan Customs at the Kuwait/Iraq border. The shipment was finally completed on the 1st of October with the delivery of the cargo to the Thi Qar Governorate Council of Nassiryia. In October 2009 the equipment and veterinary materials were delivered to the vet Centers.



Shipping and delivery of veterinary materials from Italy to Iraq



Shipping and delivery of Water Treatment Units from Italy to Iraq



Installation of air conditioning units in Al Hammar Veterinary Center



Installation of a 30 KV power generator in Al Hammar Center



Delivery of veterinary materials to Al Hammar Center



Arrival of vet materials and equipment at Al-Fuhood Vet Clinic



Veterinary Materials delivered to Al-Fuhood Vet Clinic



Delivery of veterinary materials to Al-Aslah Center



Delivery of veterinary materials to Al-Aslah Center



Delivery of a 30 kW power generator to Al-Chybaish Center



Delivery of Air conditioning Split Units to Al Chibayish Center

28. Sustainable Agriculture Project (2008-2010)

After several years of work on the water issues, the New Eden team has been involved indirectly with the agriculture sector. The agriculture sector is into a phase of crucial transformation and is facing new challenges for its future:



- There are needs concerning the dissemination of upgraded farming techniques among the rural Iraq.
- The territory is degraded with erosion and salinisation, and some actions needs to be undertaken in order to prevent damages and to increase the areas available for agriculture.
- The territory has a high potential for agriculture.
- The transformation of the Iraqi agriculture needs to be accompanied to sensitize actions towards sustainability.

On the basis of those preliminary considerations, the New Eden team has planned to undertake several actions mostly dedicated to promote sustainable agriculture and efficient irrigation: the SWAM project: Sustainable Water and Agriculture Management. The SWAM project is composed of:

- An analysis of the current state of the agriculture, mostly carried out in the Kurdistan area. The analysis is based on interviews and meetings with actors of the rural world.
- A series of training courses for the stakeholders and technical experts acting in the rural development. The training course is divided into three main modules: Irrigation & Drainage (Module 1); Sustainable Agriculture (Module 2); Land Management and Erosion control (Module 3).
- The development of a pilot farm to promote techniques of sustainable agriculture and efficient irrigation.

The table below summarizes the tasks developed.

Task	Description
Analysis of the current state of the agriculture.	Study tour in the Sharazoor area (Sulaymaniah governorate KRG) Meeting with the KRG Minister of Agriculture to promote the SWAM project, and to gather information on the current state of agriculture Meeting with the Governorate and other district offices of agriculture to promote the SWAM project, and to gather information on the current state of agriculture
Training Courses	Preparation of a set of training courses on sustainable agriculture, land and water management, based on the results of the previous analysis and the needs expressed by the various actors of the rural world. Promotion of the course to several ministries and universities Selection of trainers and trainees from the National and Kurdish Ministries of agriculture and water resources



Task	Description
	Training of Module 1 on Irrigation and water management on February 8-12 2008 Training of Module 2 on Sustainable Agriculture on February 14-19 2008.
Pilot Farm	On site visit and site selections for a potential Pilot Farm Cost analysis for the development of a Pilot Farm Preparation and signature of a contract for the rent of a piece of land of 25 donums for the development of the Farm in Bestansur, Arbat County, in Sulaimani governorate. Selection of candidates for the role of farm manager Design and development of the farm Building of a nursery Building of an irrigation network to serve the farm Building of a greenhouse Summer season 2009 Autumn-Winter season 2009-2010



Site visit

The Training Course

Module 1 & 2 of SWAM course were carried out on February 8-19 at the Twin Rivers Institute (5 + 5days). About 20 students took part to the classes. All the students were from Sulaymaniah. The students were originating from:



-
- Ministry of Water Resources (Irrigation and Surface water directorate, Groundwater Directorate)
 - University of Sulaymaniah (Agricultural College and Research Center)
 - Ministry of Environment (Environment Directorate of Sulaymaniah)

Module 1

The aim of the course was:

- To deliver a general course on irrigation and drainage,
- To present and to form the students on the use of practical tools for agrometeorology
- To deliver a detailed course on water use efficient irrigation techniques
- To present and to identify the various key elements of an irrigation project integrated within its environment.

The software presented were:

- CROPWAT for windows: an agro-meteorology software used for the planning of irrigation projects and the estimation of the water balance
- NEW LOC CLIM: an agro-climatic database used for the extraction of agro-climatic data for the planner

Finally, a site visit to present several irrigation schemes and several irrigation methods was carried out within the Sharazoor area.

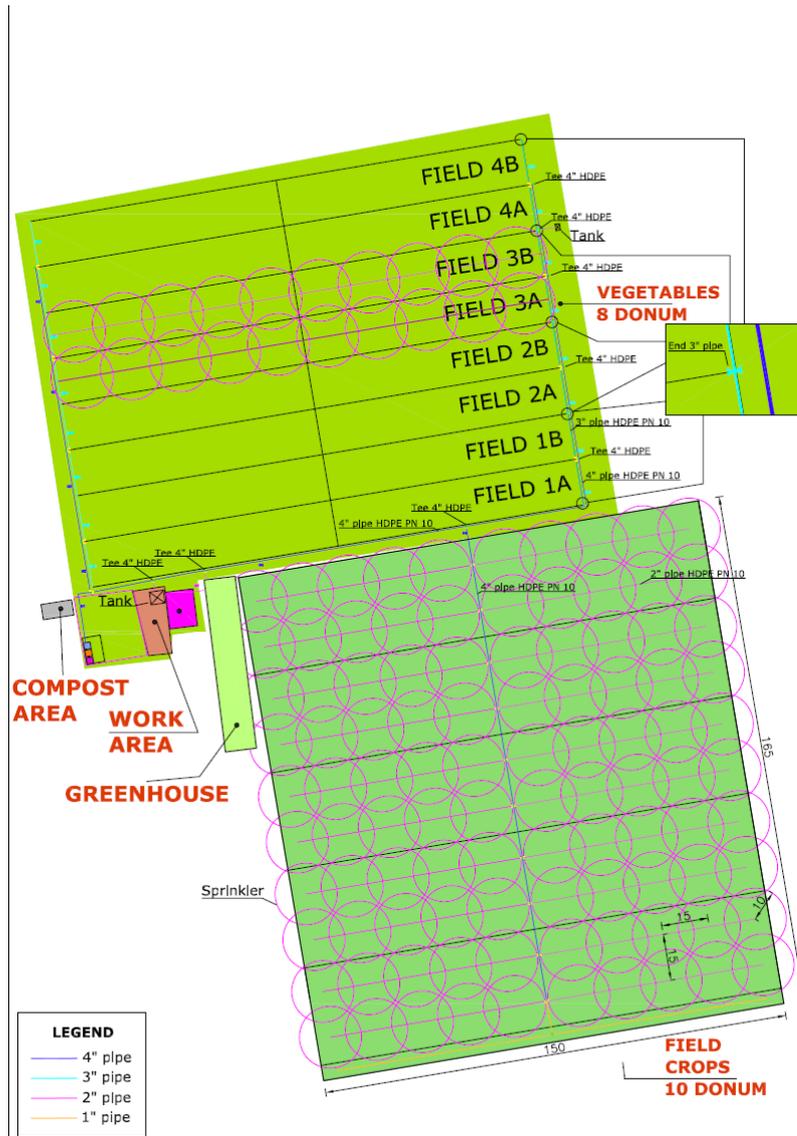
The Pilot Farm

The pilot farm was started in April 2009 after the final selection of a location for its development. The area selected was in Bestansur, a typical village in the Sharazoor plain, in Sulaimani governorate. The farm extends over an area of 25 donums. The New Eden team started the design of the farm with the rehabilitation of the existing well that will supply the irrigation system. A pump has been purchased and installed in May 2009. The irrigation system serving in a first phase an area where will be cultivated summer vegetables has been designed, installed and connected.



The vegetable area with the 15 beehives in the backyard

In the meanwhile, 15 beehives were installed in the farm. The bees were serve the pollination process of the farm. Berseem, watermelon, tomatoes and potatoes have been sown and grown for the summer season. With the end of the summer season and the preparation of the autumn winter season, the farm area has been extended and field crops has been introduced in the cropping pattern. The figure below shows the cropping pattern for the vegetable and the field crops for the winter season:



Layout of the pilot farm

A green house was also build at the end of the summer season to demonstrate sustainable techniques of covered cultivations. Vegetables are grown in the greenhouse: pepper, eggplants, tomatoes and squash. The greenhouse has also used in winter providing off season crops for the local market.



Figure 91 -- Vegetables growing in the greenhouse

The pilot farm project was initiated in April 2009 and after the preliminary phase of its development during spring 2009, the summer season of 2009 was carried out as a test in the farm on one part of the land and dedicated to vegetable crops. The next phase has seen the development of the autumn and summer season over the complete area of the farm (25 donums) on mostly three areas:

- The vegetable area
- The field crops area
- The greenhouse

Although the cold winter had several impacts on the production of the farm, the autumn and winter season were successful. Squash and kidney beans were cultivated successfully through an intercropping technique in the greenhouse, inline green vegetables were also cultivated: lettuces, broccoli, radish, cauliflower and onion. The farm has had a demonstrative effect on the following techniques:

- Advanced and sustainable soil preparation techniques for the wheat cultivation;
- Green manuring cultivation (broad beans) to prepare the spring season and to increase soil fertility without the use of chemical fertilizer;
- The introduction of sound- environmental techniques for the farm management with the integration of bees into the farm.

The hedgerow was not realized in autumn due to the unavailability of the desired tree species locally but will be set in the early spring alternating bushes of pomegranate and olive trees.



The broad beans field before cutting



Cauliflower cultivated in the farm



The bees eating the broccoli flowers at their wake up from the cold winter

29. Assistance to MoWR on Management of Hydrological Monitoring Network (2008-2010)

Thanks to funds provided by the Italian Ministry of the Environment, Land and Sea, during the year 2007, Nature Iraq started a project for the updating of the stream gauging network in Iraq. This project was a cooperative effort between the Iraqi Ministry of Water Resources in



Baghdad and the Iraqi Ministry of Water Resources in Kurdistan, Nature Iraq, the USGS and HEC.

Further, based on the coordination effort with the New Eden Group, USGS, HEC and the US State Department, the MoWR was able to ensure that 80 additional stations plus several training in USA were delivered in strong coordination with the work and material provided with the New Eden Project. Despite all this coordination effort, much work was required to ensure that the MoWR successfully install, maintain and operate this large quantity of equipment and new technologies. Considering the current situation and the fact that, based on the past experience, the MoWR is not yet in a position to successfully install, operate and maintain all the hydrological monitoring equipment procured under the US and New Eden Programs, a number of objectives were set for this task as follows:

- Assist the Ministry of Water Resources in Kurdistan and in Iraq (MoWR) during the installation of the equipment procured under the New Eden project;
- Assist the MoWR in growing a class of technicians able to gather, organize and interpret the various information collected by the automated hydrological monitoring network;
- Assist the MoWR in coordination effective operation and maintenance programs of the various parts of equipment procured under the New Eden Project;
- Assist the MoWR in completing the preparation of rating curves for all sites where the equipment procured under the New Eden Program will be installed;
- Strengthen the coordination between the various MoWR's offices charged with the task of installing and managing the hydrological monitoring equipment.

The following activities were successfully carried out:

- Establishment of a permanent staff, working at Nature Iraq's office in Suleimani, for the monitoring of the data gathered by the automated stream gaging stations.
- The staff collected, on a weekly basis, all incoming data from the automated network. After collection, data were cleaned from mistakes and was converted from stage readings into flow records via available rating curves (which were also developed as part of this year activities).



- The staff compared data collected via the automated telemetry with other data collected manually by the MoWR at the same location where the automated station was installed.
- Data collected manually was shared with Nature Iraq on a weekly basis.
- The MoWR was invited to join Nature Iraq staff working on the data collection on a weekly bases in order to discuss the procedure and the ongoing status of the hydrological records being collected, discuss the methodology adopted for the statistical analysis and the cleanup of the data (on the job training).

Installation of Stream Gauging Equipment in Kurdistan

A team for the installation and management of the 4 new stations as well as the two existing one was successfully created. Nature Iraq provided technical assistance during all phases of the installation as well management and guaranteed Interaction between international providers/technical experts and local staff during the installation and maintenance of the equipment via phone, e-mails and direct contacts.

The New Eden team provided assistance during the coordination of the efforts for the installation of the equipment and On the job training for the installation and maintenance of the equipment; The New Eden also provided assistance in the preparation of an installation and maintenance program of all the stations installed in Kurdistan.

Updating of the Rating Curves at Selected Sites in Kurdistan

For the updating of the rating curves at selected sites in Kurdistan, the New Eden team conducted monthly vists to several sites designated for the installation of the gauging stations (the staff was typically composed of 2 to 3 team members): the MoWR-KRG was invited to join the group at all times. Once recorded, data were post processed and technical reports issued on a regular basis. Data were shared with the MoWR in Kurdistan and in Baghdad.

Training and Capacity Building

Aside from the two training performed in Italy and the one in Suleymani, several other trainings were provided directly on the job and they were related to the installation of the gauging stations, management of the stations and the data collected as well as on the use and maintenance of the ADCP equipment and the data collected for the updating of the rating



curves. Several coordination meetings were hosted or initiated by Nature Iraq in order to strengthen the coordination among various organizations active in the management of the stream gauging network in Iraq.

30. Water Quality Index Project (2008-2010)

The Goals of the project are to produce environmental indices that are mainly directed to decision-makers to help them prioritize and make decisions regarding water quality and biota issues and problems in Iraq. In 2008, a small team inside NI started the process of seeking for such a new method in processing and presenting the data. The idea was that the method should provide a clear image about the situation in the site of the study both in terms of water quality (WQ) and biotic components. The goal was to have a conclusive and multi-parametric decision about the status of the site.

The objectives of the Project are:

- Finalizing the models produced so far;
- Publishing the reports in well-recognized journals;
- Producing new models as follows;
- WQ & IBI: New indices for the Marshes;
- Using GIS technology to produce maps of the final products;
- Seeking the possibility of having a survey in which data are specifically collected for producing indices.

After a series of discussions, the team decided to apply the models of the Water Quality Index (WQI) for water quality data and the Indices of Biological Integrity (IBI) for those of biota. The idea was soon reviewed and thoroughly discussed with the CEO and the Director of Operations of NI who passed the idea and more than that, they liked it. Soon after that the idea became a project with a project manager, a team, and a work plan.

Six months later, it was the time to present the results to the scientific community. More than 15 of the best experts of environment in Iraq were invited to Sulaimania to discuss 4 models produced so far by NI in cooperation with 2 experts from Basra University. For WQI, the Canadian model was selected and one example was produced using NI data for Hawizah marsh as a raw material. Dr Najah Abboud from Basra University and Mr. Ibrahim Mahdi



(PhD student) from NI produced this model as well as another model that dealt with the Fish Index of Biological Integrity (F-IBI). Mr. Mahdi was also part of the team that produced similar indices for phytoplankton (P-IBI) and zooplankton (Z-IBI) in cooperation with Dr Azhar Al Sabonchi from Basra University and Mrs. Ghasak Sabah (MSc) from NI. In addition to having an idea about NI new trends in environmental studies, the workshop was also an opportunity for the invitees to listen to more details about the WQI idea and models through lectures presented by Drs Abdul Hameed Mohammed Jawad from the University of Technology and Dr Hussein Musa from Kufa University.

Not surprisingly at all, besides maturing the original 2 original tasks of WQI and IBI, the experts came into a very important suggestion. It came according to the following logical sequence “If you want to use more efficient methods to process your data, then you should have credible data which, in turn, requires credible and applicable methods”. The experts suggested starting a new task that aims at standardization of the methods used all over Iraq to study the different hydrological and biological aspects of aquatic environments. The experts also suggested that NI supports and executes this task and NI agreed to this suggestion.

Since then, this huge task required the circle of the experts involved to be larger and larger; whenever a decision was made to include the methods of a new parameter, a new expert was asked to join the team. Now, the team includes 10 experts from the universities of Technology, Basrah, Erbil and Baghdad who are on their way to finish the production of selected set of methods that can be used by scientists in Iraq to investigate the environment in terms of WQ, fish, benthos, zooplankton and phytoplankton.

The last, but not least, step is the production of books by NI that covers these important topics and puts the fruits of more than one year of efforts within the hands of the Iraqi specialists and ministries. The final version of the book has been already produced by the team of experts.

31. Preliminary Steps for Adoption of International Environmental Conventions (2008-2010)

During the New Eden coordination meeting held in July 2008 in Sulimania, the Iraqi Minister of Environment, H.E. Mrs. Narmin Othman asked the IMELS to formulate a proposal of assistance for the implementation of the Convention on Biological Diversity (CBD) in Iraq.



In the occasion of the Bilateral Conference on the Italian-Iraqi Cooperation for Improvement of the Environment and Territorial Stability, that was held in Rome on the 9th of October 2008, a meeting was held with the delegation of Iraqi MoE in Rome to start a project for the assistance to the Iraqi MoE in the process of implementation of the Convention on Biological Diversity (CBD) in Iraq.

The Iraqi delegation was composed by:

- Deputy Minister of Environment, Mr. Kamal Hussain;
- a representative of Ministry of Environment, Mrs. Mais Sa'ad;
- a member of the National Committee for Protected Areas, Mr. Nadheer Abood.

A 1-day meeting was held in Rome for the presentation to the MoE delegation of the following aspects, related to the process of ratification of the CBD and implementation at national level and specifically:

- Guiding principles of CBD;
- Structure of the CBD;
- Institutional frame work (COP, Secretariat, Working Groups, GEF, SBSTTA);
- National Focal Point;
- Focal areas of actions, Programmes of work (Articles 6 – 20 of CBD);
- The European context;
- EU specific measures for implementation of CBD;
- Italian legislative framework about CBD;
- Italian specific measures for implementation of CBD;
- Italian initiatives to biodiversity conservation.

Then a proposal for steps and actions needed to ratify and implement CBD in Iraq was discussed with the delegation members:

- Establishment of contacts with the CBD Secretariat;
- Signature and ratification of the Convention;
- If part of a regional economic integration organisation Iraq will have to check for any legal obligation under that agreement to the purposes of the Convention;
- Enact national legislation adopting the text of the Convention in accordance with possible regional agreements;



- Establish a technical committee to set national biodiversity priorities;
- Draw up and adopt a national biodiversity strategy and action plan.

After the meeting in Rome, the Iraqi delegation was accompanied in a 3-day visit to the Po Delta Regional Park and to Venice lagoon, as examples of Italian wetlands and key sites for the protection of biodiversity both at national and international level.

During the visit to the Po Delta Park, a meeting with the Park Authority's Director was organized, with a presentation on the management framework and activities of the Park. The delegation took a tour in different sites of interest within the Park (Mesola Forest, Comacchio "valli" area).

In July 2009 a technical meeting with MoE representatives was held in Sulimania (Iraqi Kurdistan) for the discussion of proceedings and technical assistance in the process of ratification and implementation of 5 International Environmental Conventions in Iraq: the UN Convention on Biological Diversity (CBD), the Convention on International Trade of Endangered Species (CITES), the Convention on Migratory Birds (CMS), the UN Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, and the Convention for Combating Desertification (UNCCD).

The meeting was attended by 12 representatives of IMOIE and by representatives of Thi Qar Governorate Council.



Meeting at TRI- AUI-S, Sulaimani, July 2009



The UNFCCC and Kyoto Protocol and the CBD were ratified in August 2009 and Iraq officially became a Party to the Conventions in October 2009.

The process of ratification of UNCCD, CITES and CMS conventions is currently undergoing the approval procedure in the Parliament.

A proposal for technical assistance to National Focal Points designated within MOE for UNFCCC and KP and for CBD was prepared and presented to IMOIE during a meeting held in Sulaimani in January 2010, as described detail in the following sections of the report.

32. Assistance to MOWR for Implementation of New Eden Master Plan Recommendations and Study on Hydrology of Tigris and Euphrates Rivers (2008-2011)

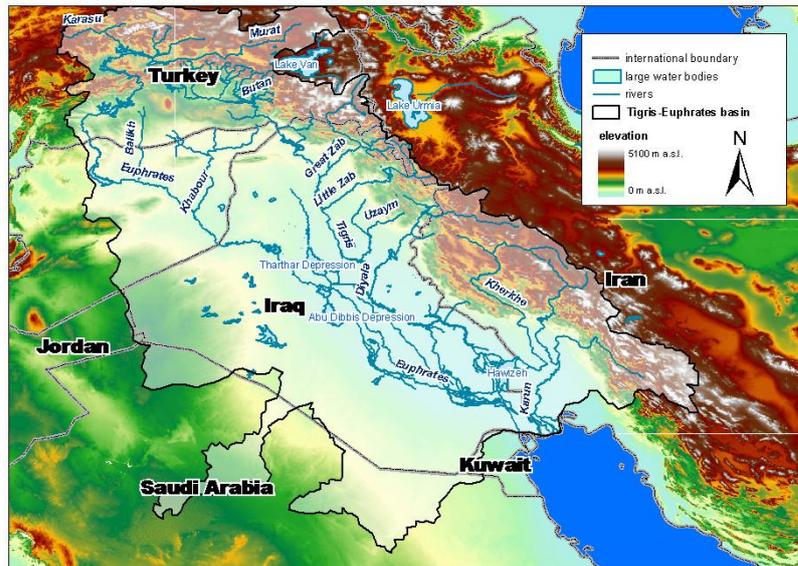
The main activities of the project were:

- Update of the Master Plan;
- Hydrology analysis of Tigris and Euphrates basins.

Background

The Tigris and the Euphrates are both international rivers shared by Turkey, Syria and Iraq as principal co-riparians, and by Iran and Saudi Arabia as secondary co-riparians. They originate in the Kuridsh Mountain region of Turkey, from the mountains of South East Anatolia, then cross Syria, and enter Iraq, where they join together just before the Gulf, becoming the Shatt Al Arab river, which flows into the Gulf.

In the last decades, each riparian Country tended to develop its water use plans unilaterally, without any coordination with the other riparians and without any particular attention to the environment, or the actual capacity of the watershed, causing severe shortage of water for the countries located downstream. If Turkey, Syria and Iraq accomplished their plan for the use of the Euphrates and of the Tigris, according to several studies, the volume of available water simply would not be enough. The hydrology and geography of the basin makes the lower co-riparian, Iraq, the most affected from the upstream management of water; on the other hand the upper riparians, Turkey and Syria, have been developing water usage of the Tigris - Euphrates in a manner which may reduce quantity and quality of the water available for Iraq.



Tigris – Euphrates basin

The development project of Turkey on the Tigris – Euphrates basin, called GAP (South Eastern Anatolia Project), covers sectors as irrigation, hydroelectric energy production, urban and rural infrastructure. The project can be considered presumptively complete by 2040 – 2050; some doubts about the actual completion of the whole project are reasonable, due to technical motivations. Syria too has development projects, both in the Tigris and in the Euphrates basins, which probably will never be fully implemented, as a consequence of technical and financial problems. There are also international agreements which set limits on the withdrawal from the Euphrates.

The Update of the New Eden Master Plan

The 2006 New Eden Master Plan was a complete study about the water resources in the Southern Iraq, but in the last years Nature Iraq acquired a set of information about existing studies and projects and new data, thanks of the strengthening partnership with the involved Ministries, and of the monitoring network activities which are providing daily data contributing to improve the environmental knowledge of all the area. The update of the Master Plan was essential to keep the plan alive and in tune with the developments on the ground as a result of the extreme variability of the wetland ecological system and its deep reliance on the available water: the complex system of the marshlands is highly changing day by day since the restoration started, and it is very important to assess all the boundary conditions in order to better define the existing environmental situation of the area.



Particularly climatology and hydrology of the area can change drastically due to the amount of information available; moreover the knowledge of the land cover and of the restoration level evolution of the marshlands highly improved in the last two years due to the remote sensing analysis, providing newly acquired information to be added to the Master Plan study of the actual conditions of the marshes. A water economy study needs to be carried out in order to provide a summary of the water balance of the Tigris and Euphrates River basin and introduce the concepts of Integrated watersheds management.

Detailed Study of the Hydrology of Iraq

Under the hydrological point of view the marshlands are located in the downstream part of the Tigris and Euphrates basins. This means that the wetlands are highly dependent on how the water resources are managed upstream, in terms of hydraulic infrastructures impact and of water allocation for agriculture, industry and civil needs. Moreover, since the Tigris and Euphrates basins are international rivers, particular attention needs to be paid to the trans-boundary issues due to the water utilization. Those general settings lead to the need of analyzing the current and future availability of water entering Iraq in a separate study concerning the Iraqi shared water issues, which takes into account the actual conditions of the hydrological settings of the Tigris and Euphrates basins and considers the future developments in terms of irrigation/farming project implementation and water use.

Another aspect is the management of the marshlands according to the hydrological conditions: particularly during droughts, it is essential to know how to best allocate the water among the different utilizations. The first step necessary for the implementation of this analysis is the creation of a flow time series as long as possible, which can provide information about dry, average and wet hydrological periods.

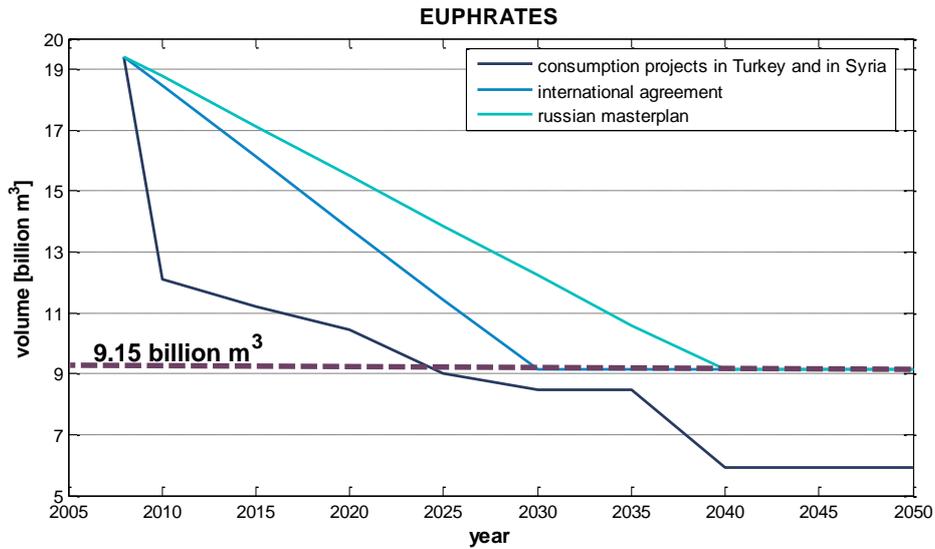
To achieve this purpose a stochastic analysis of the recently observed flow records has to be carried out, combined with an impairment analysis of the historical data, considering the influence of hydraulic structures and irrigation plans on the discharge of the rivers entering Iraq. The main activities performed involved basically the data collection and data analysis. On the other hand the Iraqi Shared Water Issues study was finalized, both in terms of analysis and of report. The table below summarizes the performed tasks.



Task	Description
<i>Master Plan Update</i>	
Climatology study	Climatic data collection and analysis
Hydrology study	Hydrological data collection and analysis
Marshland recovery and land use study	Remote sensing data collection and analysis
<i>Hydrology of Tigris and Euphrates basins</i>	
Iraqi Shared Water Issues	Flow, hydraulic structures, development plans, agreement data collection, analysis and report
Stochastic analysis of flow	Flow data collection and analysis
Impairment analysis	Flow, hydraulic structures, development plans data collection and analysis
Drought analysis	

The volume of water entering Iraq through Tigris and Euphrates after the total or partial accomplishment of upstream development projects was estimated in different ways. For the Euphrates, at the border between Syria and Iraq, where the current volume is of about 19 billion m³, three available water scenarios were analyzed:

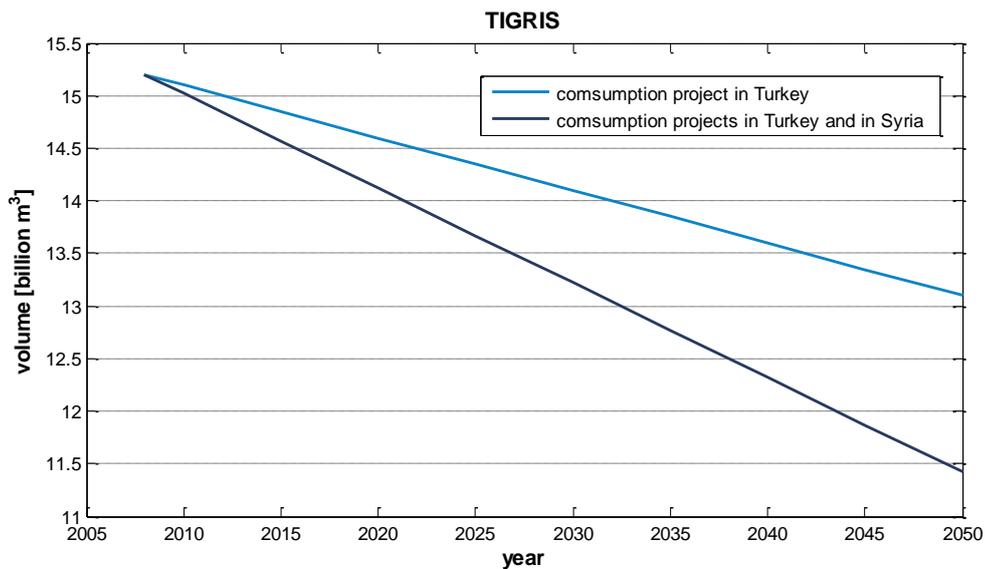
- The GAP will be complete according to the plans and the Syrian projects are partially completed, so that the water entering Iraq by 2050 may drop from the historic levels to as little as 6 billion m³/year.
- International agreements guarantee that the volume at the border between Syria and Iraq will not be less than 9.15 billion m³/year; the limit may be reached in 2030.
- The linear weighted method based on the 1982 Russian Master Plan forecasts, counts that by 2035 the threshold of 9.15 billion m³/year may be accomplished.



Water available for the Euphrates

For the Tigris, at the border between Syria, Turkey and Iraq, where the current volume is estimated to be about 15 billion m³, the possible scenarios reflect:

- The full level of accomplishment of the Turkish and Syrian plans, which brings to Iraq 11.5 billion m³/year.
- The full level of accomplishment of the Turkish projects, but the defection of the Syrian Plan, which brings to Iraq 13 billion m³/year.



Water available for the Tigris



E. Activities from 2009 to 2011

1. The National Environmental Strategy for Iraq (Amman, April 2009; Erbil November 2009)

The Iraqi Ministry of Environment (MoE) organized two technical meetings in cooperation with the World Health Organization (WHO), in order to develop a National Iraqi Environmental Strategy for the next five years. The first technical meeting was in Amman on 29th - 30th of April, 2009 and the second was in Erbil, Iraqi Kurdistan on November 5th -7th , 2009.

The 1st meeting (Amman, Jordan)

WHO, believes that there is a tight relationship between health and environmental sustainability so the overall objective of the Strategy is to integrate and optimize environmental policy in order to prevent further environmental degradation in Iraq and help improve the overall environment in Iraq for all Flora and Fauna, including humans.

WHO and MoE invited all stake holders from the Iraqi Government as well as NGO representatives who were represented by Nature Iraq as the only NGO present, to participate in the first technical meeting in order to choose the key environmental sectors that will be the base for drafting the strategy, in addition to selecting the steering committee that will follow up the meeting minutes and perform as the secretariat for the group in whole. Six sectors have been chosen in the meeting to be the backbone of the Iraqi environmental strategy as follows:

- Water sector
- Air sector
- Wastewater sector
- Soil sector
- Solid waste sector
- Biodiversity sector

Nature Iraq was invited by the MoE to provide support to write the Biodiversity sector and to comment on the other sectors.



Proposed objectives for the Strategy

- Improve Environmental Legislation, Policies and Institutions;
- Eliminate Main Risks to Human Health through Pollution Prevention and Control;
- Manage Natural Resources in a Sustainable Manner;
- Fully Integrate Environmental Considerations into the Development of Key Economic Sectors;
- Establish and Strengthen Mechanisms for Mobilizing and Allocating Financial;
- Resources to Achieve Environmental Objectives;
- Promote Environmental Democracy and Strengthen the Information Base for Policy-Making.

Nature Iraq drafted the Biodiversity sector which was largely quoted when the MoE finalized its own draft for that sector. In addition, Nature Iraq made heavy contributions to the drafted Water sector, these contributions were also adopted in the final version.

The second meeting (Erbil, Iraqi Kurdistan)

MoE and WHO invited the same participants who attended the first technical meeting to develop the introduction of the draft strategy, and to review and edit the draft of the National Environmental Strategy that was written by all the participants in Baghdad and Erbil, after several dedicated meetings. The second meeting took place in Erbil on the 5th -7th of November 2009.

Final comments were made during this second meeting to finalize the drafts of all the sectors. Direction was given to the sector leaders to re-visit their drafts and make the necessary changes and edits. A follow up meeting took place at the end of December 2009 to finalize this effort.



First WHO meeting in Amman

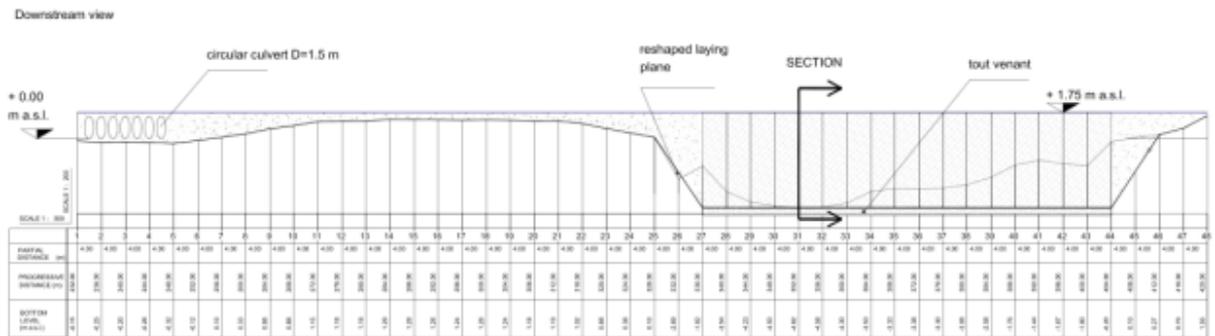


Second WHO meeting in Erbil

2. Feasibility study and Environmental Impact Assessment for the connection of the MOD with the Hammar Lake (2009-2010)

In January 2009, it became evident that despite the normal snow fall and rain fall conditions in the mountains of Kurdistan, the water levels in the Euphrates and Tigris were low and as a result portions of the resorted marshes were drying out in the winter. A review of satellite pictures indicated that upstream storage of water in Iraq and outside was the most likely reason for the reduction of flow, done as such, Nature Iraq contacted the Ministry of Water Resources as well as the Prime Minister Office to alert the authorities on the impending disaster.

In February 2010 in response to a direct request of the Iraqi Minister of Water Resources a concept note on the possible reutilization of the MOD water have been prepared and presented to the Minister of Water Resources. In February 2009 Nature Iraq presented two main ideas on how to conserve as much of the restored marshes as possible.



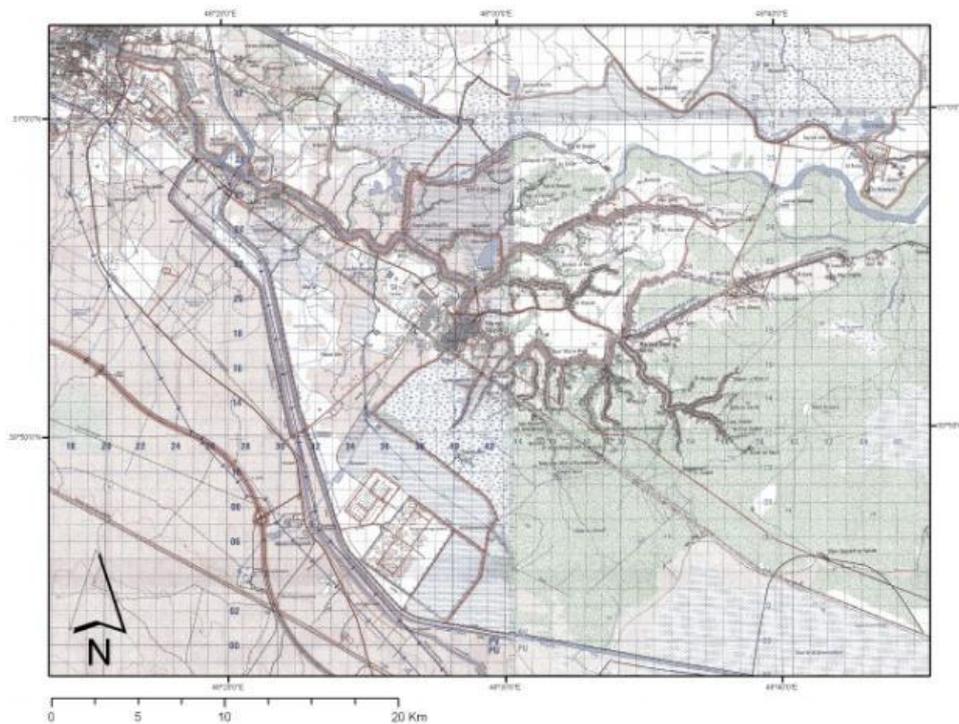
Downstream view of the proposed weir

The Ministry of Water Resources, after a quick review, approved the design and mobilized to build it. However, once construction began, the locals in Mdaina opposed it claiming that the project would adversely affect their agricultural lands. Given the local security conditions, it was not possible for the MoWR to proceed with the construction. Currently, the Governor of Dhi Qar is considering the idea of building a similar structure in an area under his administrative control that would essentially result in feeding water into the Central Marshes.

Divert MOD Water into the Westerly Hammar Marsh

The other idea that was discussed with the Ministry of Water Resources is to use the waters of the main outfall drain to preserve the westerly portion of Hammar marshes. This idea is based on a previous study conducted through the funding of IMELS, which focused on studying a temporary wetland created through the diversion of MOD water into the emergency escape north of the Euphrates, while the pumping station was being completed in 2005/2006/2007. At that time, the water of MOD was passed through the emergency escape into a dry area to the south of Abu Zirig marsh. Nature Iraq teams conducted monthly visits at the time to collect water samples from the MOD, and the middle of the created wetland as well as the exit area. Further, the team included botanists and fish experts that collected additional information regarding the health of the wetland that was created at the time. A follow up project would have created an experimental station to study the length of time needed to “clean” the MOD water in various conditions and temperatures. This projects was supposed to be undertaken by UNEP (all the design and data collected during the study have been provided to UNEP), however, it appears that UNEP was unable to generate interest in the project from various donors.

When the conditions in the marshes were predicted to be worsening this past summer, Nature Iraq proposed the use of the MOD water informally to MoWR and it was requested that a study be presented as to the potential environmental impact of the project on the health of the marsh. MoWR chose and designed the path of the canal and proceeded with the civil engineering study needed to assure that there is adequate gradient for water flow from the MOD into the marsh without the aid of pumping stations. Ministry of Water Resources provided the general design of the canals diverting water from the MOD some 140 kilometers after its crossing the Euphrates. The path of the canal was chosen by the MoWR to limit the taking of lands irrigated by locals and the design was modified to allow for long term operation of the diversion canal so that it can be used not only for this season but future times when the MOD water proves to be of good quality or when the conditions in the marsh reach dire straits in terms of drying and deteriorating water quality conditions.



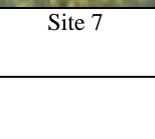
General location of the MOD diversion canal

Nature Iraq proceeded to compile a preliminary study for the proposed diversion canal and informed the authorities that a proper environmental impact study would require a lot of time and effort to do properly and that the proposed project is an emergency measure intended to put prevent the drying of the marshes. The study was completed in a record time and



submitted to the Ministry of Environment as well as the Prime Minister's Office. Both had comments on the study, which Nature Iraq agreed with. The study essentially outlines the needed steps in monitoring of the conditions once the canals are excavated and put into operation.

Subsequently, Nature Iraq conducted a site survey (January 5th 2010), in order to collect some basic water quality parameters and assess the level of implementation of the project. Water quality was measured at 8 different locations (as shown in the following table).

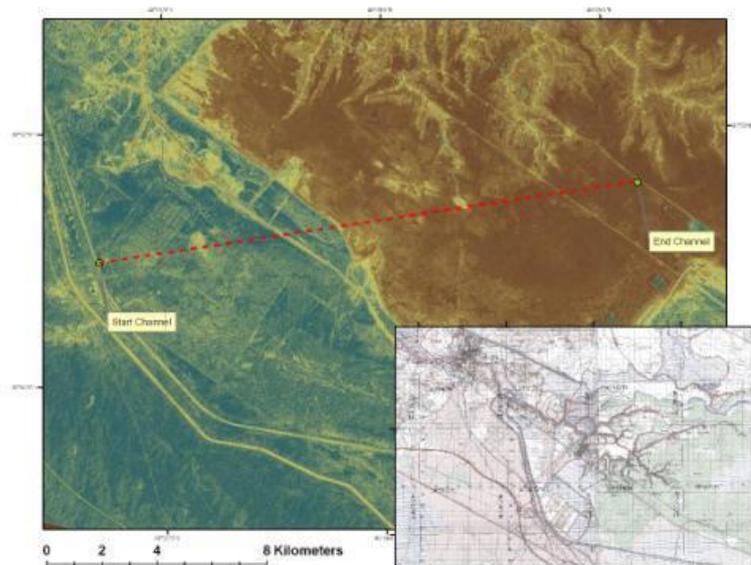
Site No	Description	Coordinates	Water quality					
			PH	EC	TDS	DO	DO%	T
Site 1 	Downstream MOD main pumping station	N:30 58 10.6 E:46 20 01.1	8.8	6829	3760	9.64	97	14.3
Site 2 	Beginning of new canal	N:30 47 26.9 E:46 23 30.7	8.2	6590	3570	13.5	135	14.2
Site 3 	Km 3.780 from beginning of new canal		8.3	6400	3500			14.2
Site 4 	The end of the new canal	N:30 48 54.1 E:46 35 47.9	8.4	5880	3640			15.2
Site 5 	West of Karmashyah road mark	N:30 48 48.6 E:46 35 52.3	7.85	5500	3240	9.8	101	14
Site 6 	West of Karmashyah road mark	N:30 48 04.2 E:46 37 05.8	8.4	8236	5400			14.2
Site 7 	East of Karmashyah road mark	N:30 48 14.3 E:46 37 12.9	7.8	5450	3300	7.4	74	14



Site No	Description	Coordinates	Water quality					
			PH	EC	TDS	DO	DO%	T
								
Site 8 	East of Karmashyah road mark, canal from Euphrates	N:30 49 53.4 E:46 34 15.4	8.46	3630	2340	14	137	15.3

List of water quality measurements made on January 2010 along the lower end of the MOD

The alignment of the newly built channel is presented in the following image.



Alignment of the proposed channel

The general map shows the presence of the extent of the marshes as of July 2007 (SPOT). The location map is derived from NIMA 100 scale maps.

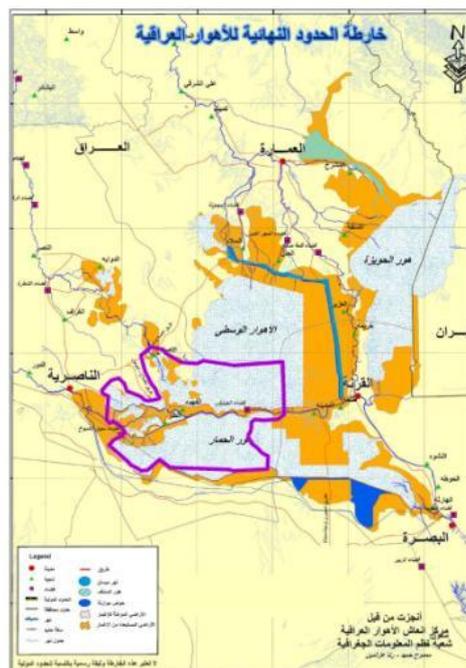
3. Support to the Provincial Council for the Development of the Marshes Strategic Plan (2009-2010)

The Provincial Council of Thi -Qar provided, in August 2009, to the Iraqi Ministry of Planning, a five - years strategic plan for the development of the marshlands areas comprised

within its boundaries. The objective of the activities performed was to identify a suitable methodology to allocate the available resources, financed by the Government of Iraq, divide them by year and sector, taking in account the complex situation that affects the governorate both in terms of environmental and socio - economic aspects.

Delineation of the marshes area within Thi- Qar

Due to both 2008 drought and the intense use of Euphrates water for irrigation, the areas of marshes are drastically decreased and currently covers not more than the 35% of the former area. As the Ministry of Water resources plans to restore around 60% of the former marshes, the area to consider as marshes in Thi Qar Governorate has been identified using a satellite map, acquired in July 2007, when the re-flooded area was about the 60% of the former extension. The selected area comprises parts of three districts and part of eight sub-districts, including 186 villages and cities with a number of residents equal to 266.997



Thi Qar Governorate marshes area

Identification of the Sectors

Thi Qar Governorate Council prepared the “Plan to revive the marshlands, 2010” collecting a list of proposed projects for 2010 by two Districts (Chibayish and Suk ash Suyukh) and six Sub Districts (Akaika, Hammar, Islah, Tar, Chibayish, Suq Ash Suyukh). These projects were



divided by 11 sectors, but, to ensure a balanced development of the territory, five other fundamental sectors have been added. The final list of sectors is as follow:

SECTOR	القطاع
WATER SUPPLY	قطاع المياه
ELECTRICITY	قطاع الكهرباء
EDUCATION	قطاع التربية
HEALTH	قطاع الصحة
TRANSPORT (ROADS AND BRIDGES)	قطاع الطرق والجسور
WATER RESOURCES	قطاع الموارد المائية
AGRICULTURE	قطاع الزراعة
SANITATION	قطاع الصرف الصحي
HOUSING	قطاع الاسكان
MUNICIPALITY (SOLID WASTE) & URBAN PLANNING	قطاع التخطيط الصلبة والنفايات البلديات قطاع العمراني
ENVIRONMENT	قطاع البيئة
HANDICRAFTS AND SMALL INDUSTRIES	قطاع الصناعات الحرفية والصناعات الصغيرة
CIVIL SECURITY	قطاع الأمن
SPORTS & YOUTHS & CULTURE	قطاع الرياضة والشباب والثقافة
TOURISM	قطاع السياحة
COMMUNICATION & IT	قطاع الاتصالات وتكنولوجيا المعلومات

List of Sector

Setting the sectors' priorities

The period to develop the projects of each sector is of five years. Considering the basic needs of the population, the current situation of the area and the interdependency of some sectors to the realisation of others, a scale of priorities has been identified, as follows

SECTOR	القطاع	PRIORITY
WATER SUPPLY	قطاع المياه	1



SECTOR	القطاع	PRIORITY
ELECTRICITY	قطاع الكهرباء	1
EDUCATION	قطاع التربية	2
HEALTH	قطاع الصحة	2
TRANSPORT (ROADS & BRIDGES)	قطاع الطرق والجسور	3
WATER RESOURCES	قطاع الموارد المائية	3
AGRICULTURE	قطاع الزراعة	3
SANITATION	قطاع الصرف الصحي	4
HOUSING	قطاع الأسكان	4
MUNICIPALITY (SOLID WASTE) & URBAN PLANNING	الصلبة والنفايات البلديات قطاع العمراني والتخطيط	4
ENVIRONMENT	قطاع البيئة	4
HANDICRAFTS AND SMALL INDUSTRIES	قطاع الصناعات الحرفية والصناعات الصغيرة	4
CIVIL SECURITY	قطاع الأمن	4
SPORTS & YOUTHS & CULTURE	قطاع الرياضة والشباب والثقافة	5
TOURISM	قطاع السياحة	6
COMMUNICATION & IT	قطاع الاتصالات وتكنولوجيا المعلومات	6

Priority scale for sector of intervention

Population and Marshlands Economy Incidence

To better align the budget allocated to the districts/sub-districts, the actual incidence that the marshlands economy exerts on each district and sub-district have been considered together with their current population. Division of the available budget for inter-District projects, Districts and Sub-districts The third criterion to be considered for the allocation of the funding is related to the characteristics and scale of the projects to be implemented for each sector.



The projects related to the sectors Water resources, Health, Environment and Tourism have been considered only at the inter -district level.

The budget for the sectors Water supply, Electricity, Transport, Agriculture, Handicraft and small Industries and Communication & IT have been allocated both at the inter-district and at the sub-district level. The portion of the budget allocated for the inter-district projects vary by sector and by years. Finally, for the sectors Education, Sanitation, Housing, Municipality (Solid waste), Civil security and Sport, Youth & Culture, the budgets have been allocated only at the Sub-district level.

Planning Process

In order to maximise the efficiency in the utilization of the budget allocated for the Marshes area and guarantee a successful development process for the local population, a proper and comprehensive planning is needed both at a general and at a sector level. The planning process requires the following main steps:

- General socio-economic survey of the Marshlands,
- Detailed analysis of the data collected with the survey for each sector
- Definition of detailed and quantified short, medium and long-term objectives for each sector according to an identified time frame (15, 20 or 25 years): the objectives for the different sectors will have to be strictly coordinated. This step should also include a general framework for the development of each sector.
- Preparation of specific and detailed development plans for each sector.

4. Assessment of Water Harvesting Potential for Residential Lots (2009-2010)

Nature Iraq was approached to conduct a study for an 80 donums lot at the outskirts of Sulaimani city to build a residential compound and a farm. Nature Iraq conducted a series of evaluation trips to the area to study the problems of water supply where the lot is located.

After a physical and morphological, geological and hydro-geological and climatic outline and a data collection from a site survey in 4th November 2009, a preliminary analysis of different options for water harvesting in the area has been carried out. The options analyzed are the following:

- Ground water extraction from currently investigated well;
- Ground water provision from wells in alternative sites;
- Water harvesting at lot scale for domestic use and garden irrigation;
- Micro water harvesting;
- Underground basin for water harvesting;
- Surface basin for water harvesting.

A full preliminary report was drafted to give advice on the best available options for maintaining a steady water supply to the lot that would be adequate for the use of the local residential and farming needs.



A panorama of the area of study



The potential of water harvesting location



5. Flora of Iraq Book (2009-2011)

The Flora of Iraq book series was produced by the Iraqi National Herbarium from the 1940's through 1985 in conjunction with Kew Gardens in the United Kingdom. Iraqi and international scientists and academics have highlighted with increasing emphasis in the last years the need for the completion and update of the work produced up to the mid 80s, which was then abandoned due to the well-known difficulties encountered by Iraq. Within the New Eden project, a specific work plan was developed for carrying out the preliminary stages of the updating/completion of the books available at the present time for the Flora of Iraq.

Project components

The work-plan for this project comprised five integrated components.

1) Flora of Iraq

A new Flora of Iraq should provide user friendly and definitive floristic accounts of all families, genera and species in Iraq. Taxonomy and identification keys for all species need to be revised and updated in line with significant changes in plant systematics. A case in point, the Brassicaceae account (Hedge et al., 1980) needs substantial updating, as 13% of the species need nomenclatural adjustments. The Flora of Iraq should be primarily based online, allowing regular updates and revisions to incorporate new taxonomic information. The online interface will offer a number of options for accessing taxonomic data:

- Search tool - for short cut to families, genera and species.
- Dichotomising identification keys - text based, jargon free keys, supplemented by hotlinks to photographs/diagrams illustrating important diagnostic characters.
- Interactive identification keys - using Delta Intkey.
- Species pages - including text descriptions, interactive distribution maps, bibliographic information, comparative descriptions and links to easily confused taxa, as well links to a database of diagnostic digital images (including Iraq Digital Herbarium).

In the early stages of the project, training workshops in Iraq with potential users in universities and herbaria were planned to introduce new methodologies and techniques to Iraqi students and scholars. The Flora of Iraq project is based upon an extensive fieldwork



aimed at collecting new material for taxonomic work. The last collections made in Iraq are over 30 years old and not readily available.

2) Iraq Digital Herbarium

A major concern for the Flora of Iraq project is the poor herbarium collections held in Iraq. Due to a lack of resources, many herbaria have been poorly managed and maintained and approximately 40% of the collections held at the National Herbarium in Baghdad (BAG) were destroyed in the recent military conflicts. Floristic research in Iraq will benefit massively from the creation of a high quality, high volume, and virtual herbarium. The creation of the Iraq Digital Herbarium will involve the digitization of all extant collections within Iraq and also at major herbaria with significant Iraqi collections (RBGE, RBG Kew, Natural History Museum, Vienna). The Iraq Digital Herbarium will be an important natural heritage collection and will provide unparalleled access to Iraqi plant specimens for botanical research.

3) Field identification tools

Field based identification tools are vital for providing rapid and accurate identifications for biodiversity surveys, environmental impact assessments and monitoring studies. The field identification guides for the Flora of Iraq need to be based upon the revised taxonomy, species descriptions and identifications provided by the online Flora of Iraq. Initially the project foresees the production of an identification guide to Qara Dagh in Kurdistan, a proposed Key Biodiversity Area (KBA) in Iraq with the aim of creating a model to allow Iraqi partners to produce similar guides to all Iraqi KBAs.

4) Capacity building and training

In contrast to updating or completing the outdated *Flora of Iraq*, beginning a new Flora project provides great opportunity for increasing the capacity for Iraqi floristic research. The creation of the Iraq Digital Herbarium will be a huge boost for botanical studies in Iraq. The proposed Flora of Iraq project is intended also to act as the vehicle for education and training of Iraqi botanists and environment professionals, key areas for training being:

- Taxonomic training – taxonomic methods, account writing, diagnostic keys, interactive keys both in Iraq and in U.S.A/U.K.
- Field work methods
- Photographic techniques



- Collection of herbarium specimens and dried DNA samples for molecular research
- Establishment of a germplasm centre in Iraq
- Specimen digitization
- Collections management
- Database management
- Collaborative research and publications
- Intensive courses in recent advances in systematics and evolutionary research
- Joint fieldwork and expeditions to unexplored or poorly studied areas of Iraq

5) Floristic database

All the above components of the project are underpinned by the development of a floristic database, which acts as a repository for all information on plant biodiversity in Iraq. The database needs to be flexible in its application by holding information such as:

- All specimen data – including georeferenced location, collector, habitat notes
- Taxonomic accounts and keys
- Bibliographies and on-line links to taxonomic literature unavailable in Iraq
- Distribution maps
- Photographic profiles
- Digitised herbarium specimens
- Ethnobotanical data

The floristic database, which will be readily accessible on the web, is to be co-managed by Iraqi and international partners and to be used for the design and publication of a variety of hard copy publications; from books aimed at children, to popular field guides through to traditional Floras aimed at taxonomic experts.

Participating Institutions

The Flora of Iraq Project was planned to be achieved through collaboration between Iraqi universities and botanical research institutes, Iraqi government Ministries of Agriculture and Environment, Non-governmental Organizations (NGO) and biodiversity research centres in Europe and U.S.A. The main partners have been:

- Royal Botanic Garden Edinburgh (RBGE) - International coordinating center



- Twin Rivers Institute for Scientific Studies, American University of Iraq-Sulaimani (TRI) - Iraqi coordinating center
- Ministry of Environment of Iraq (MoE)
- Italian Ministry of Environment, Land and Sea (IMELS).
- Nature Iraq (NI)
- Missouri Botanical Garden (MBG)
- Old Dominion University, Virginia (ODU)
- International Herbaria (Royal Botanic Garden, Kew and Naturhistorisches Museum Wien).
- National Herbaria (National Herbarium of Iraq, Baghdad and Kurdistan Region Herbarium, recently established, College of Science Herbarium, College of Agriculture Herbarium, Basra University, Mosul University herbarium, Salahaddin University herbarium in Arbil).

Performed Activities

After initial investigations and inquiry with Kew Gardens and the Ministry of Agriculture, a meeting was held in August of 2008 at Kew Gardens between representatives of Nature Iraq, Kew Gardens, the Royal Botanic Gardens Edinburgh's (RBE) Center for Middle Eastern Plants, Missouri Botanic Gardens) and Old Dominion University, Virginia. At that meeting it was decided to host a conference in March in Sulaimani the following year to bring all stakeholders to the table to discuss the completion of a modern flora for the Country.

The meeting to discuss the history of the Flora of Iraq book series was held on 23rd -24th of March, 2009 and was attended by Her Excellency Minister Narmeen Othman, Minister of Environment of the Government of Iraq. The attendees (the meeting involved a total of about 40 experts) included representatives from the Prime Minister Office, various Ministries of the Central Government of Iraq as well as of the Kurdistan Regional Government, professors from the Universities of Baghdad, Basrah, Tikrit, Mosul, Babylon, Salahaddin-Erbil, Suleimania, international experts representing the Missouri Botanical Gardens (MBG), The Royal Botanic Garden Edinburgh (RBGE), and Old Dominion University in Virginia (ODU) and Italian experts of the New Eden team.



Presentations included a history of the events leading to the publication of six of the nine volume series of the Flora of Iraq and the recently published series of flora from the region. A workshop followed to discuss the challenges of completing the Flora of Iraq series and the alternatives available to Iraqi scientists.



The urgency of the protection of the environment and natural resources, degraded by more than thirty years of war and economic sanctions, was recognized by the attendees. The following is a summary of the conclusions and recommendations:

- The production of a modern Flora (online and hard copies) should be the focus of future work rather than the completion of the remaining three volumes.
- A committee has to be formed to include national and international experts to manage and monitor the production of the Flora series.
- The project requires:
 - funding from related federal and regional ministries and international sources, both public and private, to support the project;
 - training and capacity building in field methodologies, data base management, digitization, red listing, curatorial techniques, taxonomic training, editorial training, and bio-informatics;
 - field expeditions including national and international participants to survey all parts of Iraq, especially those underexplored;



- creation and management of a comprehensive database;
- launching outreach programs, such as periodic press releases, newsletters, and ultimately publication in international journals.
- Rehabilitation of the National Herbarium and creation of regional herbaria, and botanical gardens.
- Consider the creation of protected areas under national legislation and international conventions.
- Encourage the participation and engagement of Iraqi expatriates in this project (and other projects) both in fieldwork inside Iraq and training and capacity building inside and outside Iraq.
- It is agreed that NI, TRI, MBG, RBGE, and ODU will submit joint proposals that include Iraqi institutions to local and international funding agencies.

Following the meeting, a 10-day training was held at the end of April with botanists from Nature Iraq, the Iraqi Ministries of Environment and Agriculture, the National Herbarium, and various Iraqi universities and two trainers from the RBGE's Centre for Middle Eastern Plants. This training was conducted with a Bird training as well. Participants were selected by an open-enrollment process and the course focused on modern field methods.

Since then, and on an on-going basis, specimens have been collected in field trips conducted on a seasonal basis throughout the Kuridsh region and trainings continued on an annual basis by Dr. Ihsan SHabas from the Missouri Botanical Gardens, and Toney Miller from the Edinburgh Royal Botanical Gardens. Over 100 botanists have been trained thus far. Given the complexity of the project, it was decided by Nature Iraq to transfer the authority over the project to a newly created sister organization called the Kurdistan Botanical Organization which will undertake the fund raising to build botanical gardens and continue the collection of samples for herbaria and a seed bank as well as other expanded projects focused on the flora of Iraq and the flora of Kurdistan (the greatest variety) more specifically.

6. Development of Operational Program for the Mesopotamian Marshlands National Park (2009-2011)

The Operational Program: was aimed at establishing a set of pilot projects to implement during the preparatory and start-up phase of the Park (after its official approval), to



communicate the vision and the objectives of the MMNP in a positive and effective way to the local inhabitants. The main purpose was to create a strong and consistent connection between the objectives of the protection of the environmental and cultural heritage and the actions for promoting sustainable socio-economic development and improving the quality of life of local population.

The pilot projects concern the traditional activities as fishing, water buffalo breeding and agriculture, based on the exploitation of natural resources inside and close to the Park's area and carried out by the local population that live along the boundaries of the protected area. The projects implementation, supported by socio-economic surveys and environmental and awareness communication campaigns, allows to highlight that the preservation and protection of traditional activities is important and economically sustainable, while the zoning of the park must be respected.

Updating of the National Park Management Plan: In parallel with the operational programs activities, the revision and updating of the preliminary proposals included in the first version of the Parks' Management Plan was carried out, in order to define the final version of the document to be used after the official establishment of the park. Beside to the Operational program, results and the stakeholders recommendations gathered during meetings and workshops, the contents of the new Iraqi Legislation on protected areas, that is under approval by the Government, was the most fundamental document to be considered in the Management Plan, especially for the matter related to the establishment of the National Park Management Authority.

As previously explained, the completion of the third phase was achieved through the update of the Management Plan, hereunder described, and the drawing up and partial implementation realization of a series of pilot projects and activities included in the Operational Program. These projects, listed below, for a better understanding of their implementation, are described separately:

- Environmental Education Program
- Socio Economy Survey Program
- Stakeholder Involvement



-
- Archaeological Sites Research
 - Wildlife Center
 - Buffalo Pilot Farm
 - Water buffalo Fodder Plant
 - Fish Cages Pilot Project
 - Pilot Project on Date Palm

The updated version of the Management Plan consists of a general revision of sections and maps, the addition of an introductory chapter and of an annex containing the “*Plan to support the first step of the National Park*” described in the following paragraph. It is necessary to highlight, in fact, that also this version has to be considered as a draft document because the uncertainty of the situation from the environmental, cultural, socio-economic and legislative point of view leaves some essential aspects still undefined. Especially, the not yet approved new legislation on Protected Areas prevents the definition of fundamental contents such as the detailed features of the internal zoning, the management framework and the source of the financial supports needed to implement the National Park activities.

The situation determined by the second year of drought, in addition to the effects of the hydraulic infrastructures built in Turkey and Iran, further reduced the water level of the Euphrates and the Tigris River. Permanent water and marsh vegetation are the 18% of the former extension and mainly in Central Marsh and south Hawizeh Marsh they have decreased almost to the level of 2003. Only in the deepest channel a small quantity of water, of very bad quality, remains. The desertification had constricted the buffalo breeder to move their herd once again.



Buffalos in a dried marshlands area

The updating changes are, therefore, proposed taking into consideration the basic items, recommendations and planned interventions listed below:

Local level

Goals achieved through the Operational Program implementation:

- declared commitment of the three governorates of Thi Qar, Missan and Basrah to establishing the NP;
- list of recommendations provided by each governorate council;
- demonstrated possibilities for the park staff to act as coordinator between different actors operating on the ground.

National Level

- Approval of the park project by representatives of the following ministries that are members of the National Committee for Protected Areas:
 - Agriculture
 - Education
 - Municipalities and Public Works
 - Sciences and Technology



- Tourism and Antique Affairs
- Higher Education. and Scientific Research, with detailed recommendations by the Iraq Natural History Research Center and Museum ;
- Ministry of Water Resources, with some indications about water sources to feed Central marsh;
- The ongoing procedure of approval of the new legislation on Protected Areas;
- Letter from the Council of Ministers requesting clarification regarding the update of the management plan, the structure of the management body and the financial asset;
- Realization of already planned hydraulic infrastructures by the Ministry of Water Resources.

International Level

Iraq has started the procedures for the ratification and implementation of international conventions:

- UN Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol
- UN Convention on Biological Diversity (CBD).
- Convention on Migratory Species (CMS)
- Convention on International Trade In Endangered Species of wild fauna and flora (CITES)
- United Nations Convention to Combat Desertification (UNCCD)

Plan to Support the National Park First Step

The proposed plan is an Interim Program that is aimed at supporting the start up of the Mesopotamia Marshlands National Park, during a time frame of 1 year (2010-2011) in view of the finalization of the National Law on Protected Areas. This document is complementarily linked to the updated version of the draft Management Plan of the MMNP, previously described. It is the logical continuation of the Operational Program that has raised many expectations between the population living near the boundaries of the proposed National Park. In fact, the costs-effective small projects and the communication activities



performed by the members of the NGO Nature Iraq, supported by the Thi-Qar National Park Committee, have reached the invaluable result of creating a favorable attitude among the residents: the Mesopotamia Marshlands National Park already exists, even before its formal institution.

The overall aim of the present document is to avoid losing this important result by promoting a series of activities, while the new legislation on Protected Areas will be definitely approved in the meantime.

The proposed fields are:

- Equipment Provision
- Park facilities construction
- Education and environmental awareness raising
- Sustainable practices and local stakeholder capacity building
- Monitoring and environmental research
- Intangible Cultural Heritage
- Communication

Special attention is devoted to the planning of park infrastructure and services on a plot of land bought in Thi-Qar Governorate, near the village of Abu Subat, in order to create the first National Park Center with the possibility to implement applied research useful for local communities.



Location of the National Park Center

The construction of basic eco-lodges, using traditional techniques, is foreseen to host researchers and, in the future, tourists. Various pilot projects have been identified in other part of the park area, in order to involve the governorates of Basrah and Missan. They concern on water management good practices, sustainable agriculture and other traditional activities such collection of data related to the intangible cultural heritage, capacity building and the creation of the first stage of a wildlife center.

Environmental Educational Program of National Park (2009-2010)

Defending the invaluable natural resource needs to change the behavior of many people. To modify the behavior in a lasting way requires a voluntary change. This change can be obtained through an education program that involves the people, helping them to identify the interrelation between livelihoods and the condition of their surrounding environment. The coincidence of the two programs highlights an effective relation between socio-economic incentives and environmental awareness to demonstrate the tangible benefits arising from the protection of the natural resources of the environment.

The villagers are the stakeholders of the wetland and therefore they play a fundamental role in determining the success of environmental conservation measures. The school children and teachers hold a key status in the village community and play a vital role as disseminators, mediators, and opinion makers and tend to influence to a large extent the attitude and

behaviour of the community as a whole. The methodological approach adopted is primarily based on best practices suggested by international institution that are constantly involved on Environmental Education throughout the world as UNESCO, FAO, and IGES.

Taking in account their recommendation the main objective of the program was to carry out an Environmental Educational Program for children aged 11-15 years to promote the understanding on contents related to the Marshlands environment and its sustainability.

The following activities have been performed.

- Designing and realization of three animated videos:
 - Module 1- Animated video: Why Marshlands are important?
 - Module 3- Animated video: What is a National Park?
 - Module 4- Animated video: How to Ensure a Healthy Environment
- Designing of:
 - 1 presentation on “Marshlands History”
 - 1 colored Booklet for children
 - 1 Booklet for teachers, as support to the videos explanation
- Purchase of land and construction of a Mudhef as first educational center.





Figure E-1 Illustrations from the animated video “Why Are Marshlands Important?”

Water Buffalo Fodder Plant

The project foresaw the study and design of a fodder pilot plant that can produce concentrated food to enrich the current diet of the buffalo. The area for the pilot project belongs to Thi-Qar Governorate, which hosts approximately 20.000 water buffalo.



Water Buffalos

At present water buffalo feeds on common reeds by grazing as well as on reeds cut by their owners. A variation on the daily diet of water buffalo with the introduction of concentrated food will benefit the milk production providing additional economic gain to local farmer. The



construction of the manufacturing plant will, in fact, generate new direct and indirect jobs opportunities in the area encouraging the production of local products for sale.

The following activities have been carried out:

- Data collection about:
 - Raw material available to assess the proper diet to be implemented in the fodder plant. Such a diet will not substitute entirely the current diet but will be added as integration. The quantity of raw material available is also a fundamental information that will allow to proper size the storage facilities and methods within the plant;
 - Current buffalo feeding practices and animal health;
 - Existent supply chain and farmer locations;
- Consultation of Italian experts on buffalo diet to draw the necessary characteristic of the equipment;
- Identification of the fodder plant features taking into consideration the following constrains that characterize the area of intervention:
 - Concentrated food has to be composed with sub products as much as possible in order to be economically;
 - Operation and maintenance costs have to be as lower as possible;
 - Operation and maintenance have to be easy in order to avoid production interruptions;
 - Fodder plant has to be reachable for the majority of the small breeders;
- Planning and design of three building layouts of different capacity, with particular attention to the needed extent of the stoking, manufacturing and packing area and related issues;
- Consultation with the Iraqi representatives of the Thi-Qar council to define the final strategy and location of the fodder plant;



-
- Definition of the strategy that foresees, when completely developed, the construction of three, similar, small fodder plants to locate along the main road and the purchase of a mobile machinery that will move to one place to the other. This approach will facilitate the logistic of both raw material supply and final products delivery, making easier for farmers to collect the concentrated food;
 - Design the first model of the fodder pilot plant, to fit the space necessity determined by the following parameters:
 - Target numbers of Buffalos for Pilot Project: 6000-7000 buffalos;
 - Theoretical need of feed per buffalo: 4 kg per day/buffalo;
 - Theoretical need of feed production for Pilot project: 24-28 Tons per day (to this value has to be added 10/20 % of lose-inefficiency □ 2.5-3 tons per day)

The building, as the time of stocking the goods is reduced to few days, has been designed using, as far as possible, the traditional techniques.

- Definition of the characteristics of the equipment to be purchased and in particular:
 - Movable - average speed: 30 km/h;
 - Feed equipment production capacity □ 8 Tons per cycle (cycle=1 hour);
 - Expectation life of the feed equipment (mortgage years) □ 10 years;
 - Ordinary Maintenance - main type of intervention;
 - Crude Engine oil: ~ 70 US\$ (every 400 hours of working);
 - Gearing oil: ~ 70 US\$ (one time per year);
 - Greasing of landslide: ~ 1200 US\$ (one time per year);
 - Filter: ~ 120 US\$ (every 400 hours of working);
 - Tire change: : ~ 3000 US\$ (after 5 years);
 - Hydraulic oil: ~ 2000 US\$ (one time per year);



- Fuel consumption □ 8 liters per hour;
- Personnel need □ 2 Divers / equipment operator + logistic co-workers;
- Training and equipment test: 2-3 Italians technician for one week.

After completing all the studies, the New Eden Team, based on the status of all the projects and equipment that were completed to date and delivered to the local governments, and went into a state of disrepair due to improper maintenance or lack of operational budgets, and given the lack of funding from Italy (and Iraq), decided to delay the purchasing of equipment and installation of the proper system for the long term management and operations of the project.

7. Update of the Management Plan of the Hawizeh Marshes Ramsar Site (2010)

Nature Iraq conducts the field studies through field surveys in Huwaiza beginning in 2005, and on regular basis since that time (stopping in 2011 to analyze the data and complete the Key Biodiversity Project), very important observations and recoveries of rare and key bird species were collected and documented. Through the bi-annual surveys over these marshlands, the Bird Team understood to some extent the dynamics avifaunal situation in the entire area over fairly distributed sites. In 2010 Nature Iraq was tasked by the National Committee for the Ramsar to assess the conditions of Hawizeh Marshes as a consequence of the severe drought of 2009.

Recoding of Hawizeh Site in the Montreux Record

In April 2010 the Hawizeh Ramsar site was included in the Montreux Record upon request of Iraq, due to the adverse change, or potential adverse change, related to the significant decrease in water inflows to the marsh caused by external and internal factors.

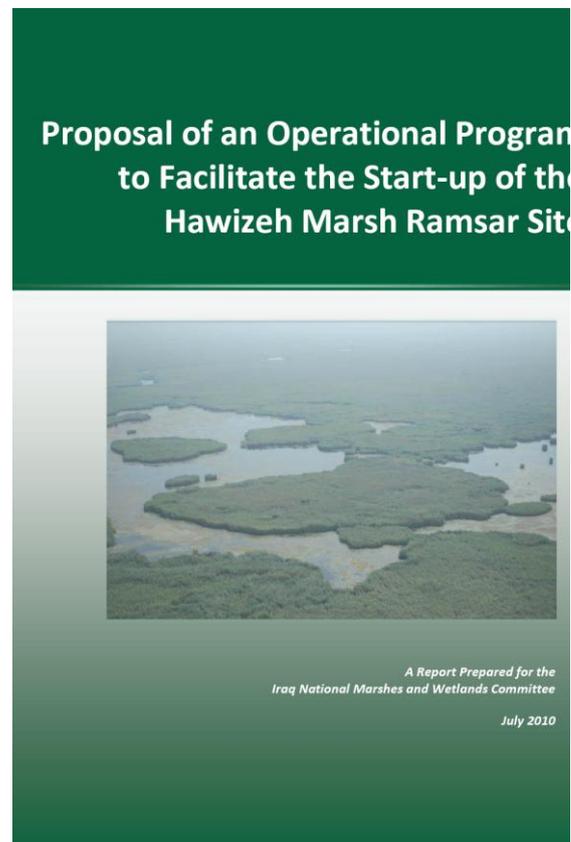
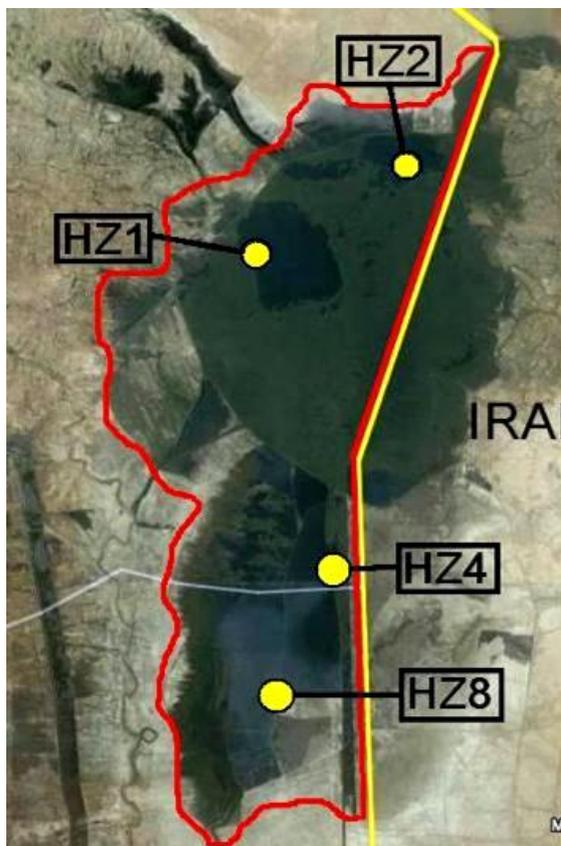
Update of Hawizeh Site Management Plan

The scope of the update report was to propose an Operational Program for implementing selected and targeted activities in the Hawizeh Marshes, based on the management plan objectives, able to face the main issues that affect the Hawizeh Marsh Ramsar site and the surrounding areas. All the proposed activities are intended to be carried out with the indispensable involvement of the key stakeholders at national and local level.

The development of the operational program represents the basis for promoting the solution of those factors that caused the inclusion of the Hawizeh site in the Montreux record. Accordingly, a documentation of decisions, undertaken monitoring phases, actions and achieved results were presented at the 11th Meeting of the Conference of the Parties, in 2012. A targeted socio-economic survey was performed in June 2010 in Hawizeh marshes area, by interviewing key people of 12 villages. The total population of the visited villages reaches 25,960 residents for a total amount of 3,655 households.

From the hydrological point of view, the situation of Hawizeh was re-evaluated, since the preparation of the Management Plan, Hawizeh Marshes had changed dramatically mostly due to the occurrence of two years of draughts and the completion of the dike along the Iranian-Iraqi border. The effects of such large water shortages severely affected the wetland. Comparison between water/marshlands extent in may 2008 and may 2010 shows that the later extent of Hawizeh Marshes reduced of nearly 50% in two years.

Additional field biodiversity surveys were carried out in June 2010 in Huwaiza wetlands.



Update of Hawizeh Marshes Management Plan: field surveys and Operational Program (July 2010)



The Operational Program for the Hawizeh Marshes included the following activities:

- Biodiversity Conservation Actions: Environmental Monitoring, measures for Conservation of Biodiversity, Expand the protection status of Hawizeh Marshes;
- Stakeholder Involvement: Socio-economic survey, Local Communities Involvement Program; Establishment of a Hawizeh Stakeholders Advisory Group, Environmental Awareness and Educational Program for Children;
- Capacity Building: Water Management Good Practices, Livestock Management, Sustainable Fisheries Practices, Sustainable Agriculture.

8. First National Biodiversity Report (2010)

In August of 2009, Iraq deposited its instrument of accession to the UN Convention on Biological Diversity (CBD) with the Secretary-General of the United Nations and on the 29th October of 2009 became the 192nd Party to the Convention. Article 1 of the Convention provides three overall objectives to be achieved in accordance with all the provisions of the agreement, namely:

- the conservation of biological diversity;
- the sustainable use of its components and
- the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

Since 2004, the Iraqi Ministry of Environment (MoE) has been involved in a number of initiatives to begin research in the restored Mesopotamian Marshlands of southern Iraq. These efforts, conducted with support from the Canadian International Development Agency (CIDA), the United Nations Environmental Program (UNEP), the United States (USAID) and the Italian Ministry of Environment, Land & Sea (IMELS) and with logistical and staff support from Nature Iraq (NI), have lead to a national program to survey the countries biological diversity. This program is called the Key Biodiversity Areas (KBA) Project. In addition, Iraq signed on to the Ramsar Convention on Wetlands of International Importance and designated Hawizeh Marsh as its first Ramsar Site in 2008.

Iraq has also completed the process of joining several other international environmental conventions such as UNFCCC and UNCCD.

In addition, Iraq is now working towards the development of the Mesopotamian Marshlands National Park in the Central Marshes and listing the marshlands as a World Heritage Site.



Coordination Meeting at Sulaimania, January 2010

A coordination meeting between the MoE (represented at that time also by H.E. the Minister Narmeen Othman), NI and the Twin Rivers Institute for Scientific Research (TRI, a part of the American University of Iraq-Sulaimani - AUI-S) took place in January 2010 in Sulaimani, where 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 National Focal Point to the CBD stated that the MoE has started the implementation process by setting up the National Committee for the CBD, which includes all relevant ministry representatives.

The Iraqi National CBD Committee for Biological Diversity is headed by the National Focal Point for CBD, that is a representative of MOE. The other committee members are representatives of:



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- Ministry of Education (MoED)
 - Ministry of Science and Technology (MSAT)
 - Ministry of Water Resources (MoWR)
 - Ministry of Finance (MoF)
 - Ministry of Higher Education and Scientific Research (MoHE)
 - State Ministry of Tourism and Archaeology (SMTA)
 - Ministry of Agriculture (MoA)
 - Ministry of Planning (MoP)
 - Ministry of Foreign Affairs (MoFA)
 - Kurdistan Ministry of Environment (KMoE)
 - Ministry of Environment (MoE)
 - Nature Iraq (NI)

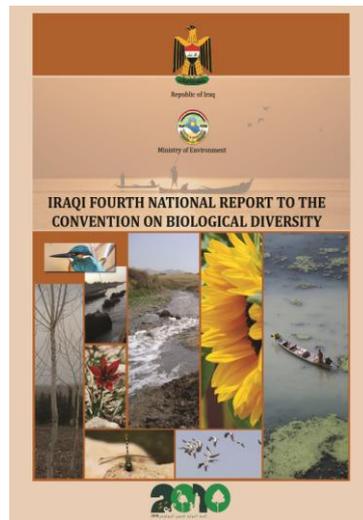
Art. 6 of the Convention requires the Parties to submit a National Strategy on Biodiversity and Action Plan (NSBAP) and periodic National Reports to the CBD Secretariat. The MoE tasked Nature Iraq and consultants from IMELS to lead the effort in drafting this first National Report on Biological to be submitted to the Secretariat as part of Iraq's obligations as a new party to the convention.

Through several meetings the final methodology and contents of the Report was discussed and agreed between the MoE and the New Eden team and a schedule was defined for the main tasks of the project with the aim of submitting the final version of the report to the CBD Secretariat before the end of the summer. The main tasks of the project were the following:

- Data collection including field survey and report/books/academic thesis analysis
- Data validation, with the support of Iraqi academics and International experts
- Data analysis, including the elaboration of a set of biodiversity indicators
- Definition of the objectives in terms of biodiversity protections and conservation
- Development of the draft Fourth national report
- Review of the draft report by the MoE and International experts (including experts from UN agencies)
- Issuance of the final Fourth National report
- Submission of the Fourth national report to the CBD Secretariat.



The status of biodiversity within Iraq was analyzed through a set of 25 Biodiversity Indicators based on the available information on biodiversity according to the environmental PSR Model (Pressure / State / Response). The baseline analysis of biodiversity was used to lay the groundwork and a roadmap to the future NBSAP that Iraq can implement to promote improvement and protection of its biological diversity, in line with the goals and objectives of the CBD Strategic Plan. Though Iraq is a new party to the convention and this was the country's first report to the CBD Secretariat, the CBD guidelines for the development of the Fourth National Report were used for the preparation of this document, in order to fully align the National report with the requirements of the Convention. The Fourth National report of Iraq was submitted to the CBD in July 2010, and was presented at the CBD COP10 in Nagoya, Japan in October 2010.



Iraq's 4th National report to the CBD in 2010

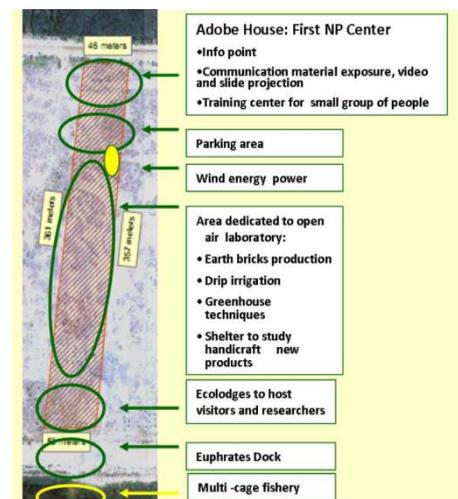
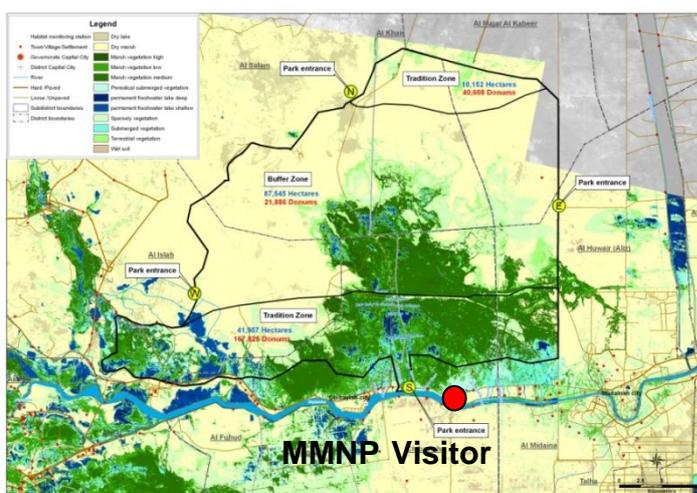
9. Start Up of the Mesopotamian Marshlands National Park (2010-2012)

The proposal for the creation of the Mesopotamia Marshlands National Park was first approved by all the members of the National Committee for Protected Areas in 2009. In 2010, the Ministry of Environment started the formal procedure for the declaration of the National Park by the Ministers Council. Throughout 2010 and 2011 Nature Iraq supported the Ministry of Environment to follow up with the procedure for the approval of the MMNP.

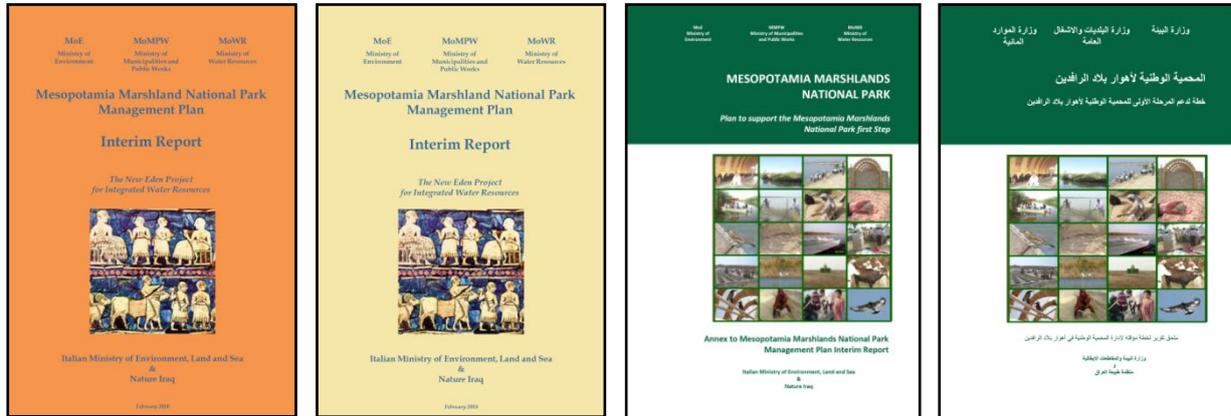
In order to support the procedure and at the same time to allow the start up of activities for the establishment of the National Park, Nature Iraq developed an Interim Report of the MMNP

Management Plan with a Technical Annex with a 3-year Program (including details on the budget needed for each of the proposed actions) for the MMNP establishment and start up, that included the following elements:

- Organization, planning and implementation of the National Park Visitor Center and facilities
- Procurement of equipment and materials for the start up
- Creation and capacity building for a local MMNP Startup Team
- Education programs for schools
- Conduct a set of socio-economic surveys in the MMNP area and in the surrounding areas
- Implement the Buffalo Pilot farm
- Prosecute the multi fish cages project
- Design and build a Wildlife Rehabilitation and Reintroduction Center (WRRC)
- Design and build a Herbarium with a collection of native species of Iraq and Middle East region
- Design and build a Ecolodge (tent camp) with basic facilities for researchers and eco-tourists
- Plan and implement a pilot project on wise use of natural resources
- Organize a handicraft center for conservation and interpretation of traditional knowledge and activities of the Marshlands
- Develop Communication and Education activities



Location and proposed layout of the Visitor Center of the Mesopotamia Marshlands National Park



Mesopotamia Marshlands Management Plan – Interim report 2010 and Start Up Plan (English/Arabic, 2010)

Nature Iraq and the New Eden team also provided technical assistance and fieldwork for the interventions of building an embankment across the Euphrates (just before the town of Midaina). This increased significantly the level of the water in the Central Marsh (east of Chibaiysh) and brought a big benefit to the locals for their daily activities (buffalo breeding, fishing, reeds cutting etc.). People from Midaina, despite their initial objection to the project, reported that the water in their area has become sweeter since its main source now is from the Tigris.

10. Hawizeh Marshes Ramsar Site (2010-2012)

Nature Iraq conducts field studies in Hawizeh since 2005, and since that time, very important observations and recoveries of rare and key bird species were collected and documented. Through the bi-annual surveys over these marshlands, the Bird Team understood to some extent the dynamics avifaunal situation in the entire area over fairly-distributed sites. In 2010 Nature Iraq was tasked by the National Committee for the Ramsar to assess the conditions of Hawizeh Marshes as a consequence of the severe drought of 2009.

Recoding of Hawizeh Site in the Montreux Record

In April 2010 the Hawizeh Ramsar site was included in the Montreux Record upon request of Iraq, due to the adverse change, or potential adverse change, related to the significant decreased in water inflows to the marsh caused by external and internal factors.



Update of Hawizeh Site Management Plan

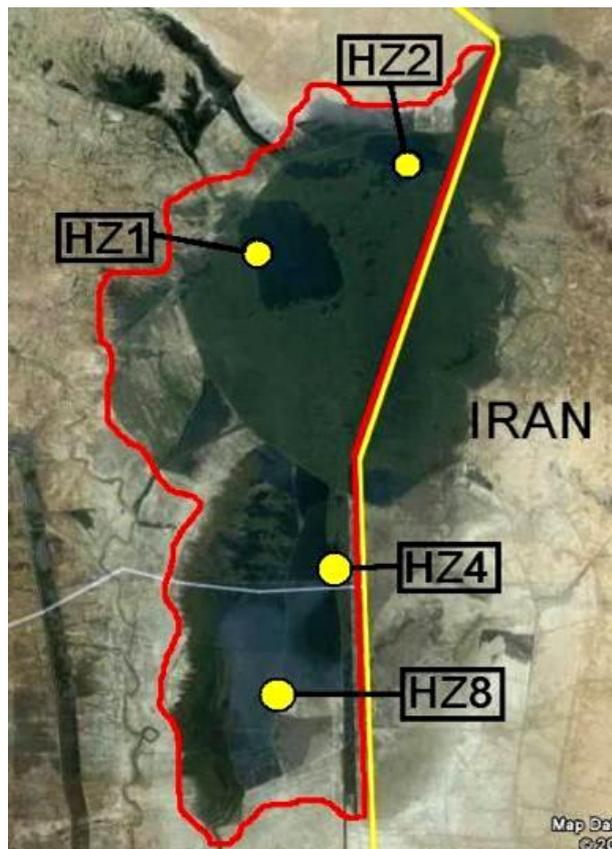
The scope of the update report was to propose an Operational Program for implementing selected and targeted activities in the Hawizeh Marshes, based on the management plan objectives, able to face the main issues that affect the Hawizeh Marsh Ramsar site and the surrounding areas. All the proposed activities are intended to be carried out with the indispensable involvement of the key stakeholders at national and local level.

The development of the operational program represents the basis for promoting the solution of those factors that caused the inclusion of the Hawizeh site in the Montreux record. Accordingly, a documentation of decisions, undertaken monitoring phases, actions and achieved results will be presented at the 11th Meeting of the Conference of the Parties, in 2012.

A targeted socio-economic survey was performed in June 2010 in Hawizeh marshes area, by interviewing key people of 12 villages. The total population of the visited villages reaches 25,960 residents for a total amount of 3,655 households.

From the hydrological point of view, the situation of Hawizeh was re-evaluated, since the preparation of the Management Plan, Hawizeh Marshes had changed dramatically mostly due to the occurrence of two years of draughts and the completion of the dike along the Iranian-Iraqi border. The effects of such large water shortages severely affected the wetland. Comparison between water/marshlands extent in may 2008 and may 2010 shows that the later extent of Hawizeh Marshes reduced of nearly 50% in two years.

Additional field biodiversity surveys were carried out in June 2010 in Huwaiza wetlands.



Proposal of an Operational Program to Facilitate the Start-up of the Hawizeh Marsh Ramsar Site



*A Report Prepared for the
Iraq National Marshes and Wetlands Committee
July 2010*

Update of Hawizeh Marshes Management Plan: field surveys and Operational Program (July 2010)

The Operational Program for the Hawizeh Marshes included the following activities:

- Biodiversity Conservation Actions: Environmental Monitoring, measures for Conservation of Biodiversity, Expand the protection status of Hawizeh Marshes;
- Stakeholder Involvement: Socio-economic survey, Local Communities Involvement Program; Establishment of a Hawizeh Stakeholders Advisory Group, Environmental Awareness and Educational Program for Children;
- Capacity Building: Water Management Good Practices, Livestock Management, Sustainable Fisheries Practices, Sustainable Agriculture.

Update of the Ramsar Information Sheet for Hawizeh Site

The project was aimed at providing consulting services to the Iraqi Ministry of Water Resources - Centre for Restoration of Iraqi Marshlands and Wetlands (CRIM) for the update of the Ramsar Information Sheet of Hawizeh Marshes (Ramsar site no. 1718 designated on 17/10/2007) and of the National Report on the Implementation of the Ramsar Convention on Wetlands in Iraq, according to the requirements and specific guidelines of the Ramsar



Convention on Wetlands. The RIS for Hawizeh was updated by Nature Iraq and the New Eden team between June and July 2012.

11. Environmental, Social and Awareness Raising activities carried out by Nature Iraq (2010-2012)

Nature Iraq is continuously involved in environmental and social activities throughout Iraq, including education and training initiatives, development of eco-tourism, awareness campaigns, development of materials and initiatives for media communication, promotion of

Eco-tourism projects: Construction of an Ecological Camp in Kurdistan and Activation of Boat Riding Trips on the Lesser Zab

Nature Iraq's eco-tourism programs are designed to develop ecologically sustainable tourism activities in Iraq centered on the proposed Mesopotamian Marshlands National Park (MMNP) and other important Key Biodiversity Area Sites and natural areas throughout Iraq. Such projects will bring much needed economic growth to rural areas, and are based on concepts that emphasize sustainable development and preservation of environmental, cultural and rural values. Nature Iraq has developed and maintains two camps known as the Mergapan Eco-camp at Peramagroon Mountain in Sulaimani and the Adobe House in Chibaiysh near the proposed MMNP.

The Mergapan Eco-camp was completed in October 2010 and has been used since then for raising awareness meetings and events to promote the environment of Iraq and Kurdistan.





Mergapan Eco-camp

Furthermore, Nature Iraq, within its program for the development of eco-tourism in Iraq and for the conservation of its water resources, organized a service of rafting trips on the Lesser Zab. The boats were procured in Italy in March 2012 and transported to Iraq by land by Nature Iraq staff in March 2012. In 2012, there were two rafting trips on the Lesser Zab River to promote eco-tourism and the work of Nature Iraq. The first took place with a British security expert in June and the second took place in July with Jane Arraf from Al-Jazeera English Satellite Channel.

Sociable Lapwing Project

Surveys for the critically endangered Sociable lapwing were conducted during the fall of 2010 and spring of 2011 by O.F. Al-Sheikhly, the project manager of the SL Project. Though no SLs have been directly observed (one has been satellite tracked to Central Iraq) other important data has been collected. Additional work is now underway under the project leadership of Mudhafar Salim that is focused on education and raising awareness among hunters and hunting associations about the importance of protecting these species and hunting regulations.

Ornithology and Eco-tourism Course

This course, taught by the Nature Iraq Bird team with assistance from Richard Porter, NI Bird Team Advisor, took place in Sulaimani on 24-29 April 2011. Nine trainees participated. Some additional days were devoted to discussions and trips focused on leading bird tours.

IUCN Red-listing for Plants Course



This course that featured field-work at Qara Dagh and was co-funded by the Mohammed Bin Zayed Species Conservation Fund. It took place in Sulaimani on 14-23 May 2011 with two instructors from the Royal Botanic Gardens Edinburgh (Sabina Knees and Matthew Hall). Eleven trainees from across Iraq participated in the course on red-listing. Additional 6 endemic plants to the Qara Dagh area in Sulaimani were assessed.

Wildlife Medicine Course

Twelve participants were selected for the Wildlife Medicine short course (6 are funded positions under a grant from the SeaWorld & Busch Gardens Conservation Fund). The course occurred on 22 -27 October 2011 with instructor Iman Memarian, a Wildlife Veterinarian from Tehran and during the course, trainees were able to get hands-on experience working



with and treating Wild Species at the local Nawruz Zoo. This course was repeated in collaboration with the Veterinary Department from the University of Sulaimani in 2013 and both trainings received partial support from the Busch Gardens/SeaWorld Conservation Fund.

Euphrates Soft-Shelled Turtle Survey

Nature Iraq fauna staff assisted in the visit from an Iranian reptile specialist, Hanyeh Ghaffari of the Pars Herpetologists Institute, to conduct surveys for Euphrates Soft-Shelled Turtle and collect samples from Ganow Lake near Rania from 27 October – 6 November, 2011. In addition, Hanyeh and her husband Barbod Safa (also a reptile specialist) gave talks at the University of Sulaimani and the Kurdistan Environmental Protection & Improvement Commission organized by Nature Iraq.

Herpetology Surveys

A herpetology and amphibian cooperative survey & training with Elnaz Najafi Majd (a zoology PhD student) took place from May to June 2012 in Sulaimani, with the participation of Omar F, Al-Sheikhly and other NI staff.



Training on the Ichthyology of the Tigris River

From June 4, 2012 to June 13, 2012, a basin survey and training was done on the Ichthyology of the Tigris River by Dr. Jörg Freyhof from the Leibniz Institute of Freshwater Ecology and Inland Fisheries, in Germany. Hana Raza and Mariwan Qadir participated in this as well as Omar F.Al-Sheikhly. The purpose of the survey in Kurdistan, northern Iraq was to find species of Blind Fish from the Zab River. No Blind Fish were found in the surveyed sites but a sample was transferred from the south to Sulaimani where it was taken by Freyhof back to Germany for the purpose of their study and DNA analysis and he later confirmed that two blind fish species were identified from a sink hole at Sheikh Hadid Shrine that is part of Haditha Wetlands & Baghdadi KBA site in Anbar. The NI staff also gained experience in surveying fish species and collecting data.

Scientific Papers and Publications

In the framework of its monitoring and research activities, Nature Iraq developed several scientific papers to be published on a variety of journals or presented at national and international conferences (some of these were peer-reviewed publications):

- *"Animal and Bird Trade & Hunting in Iraq"*
- *"A Survey Report on the Trapping and Trade of Raptors in Iraq"*
- *"The Mesopotamian Marshlands National Park"*
- *"Habitat mapping and classification scheme in the Marshlands of Southern Iraq"*.
- *"Marbled Duck,"*
- *"First Photographic Record of Persian Leopard in Kurdistan, northern Iraq"*

Nature Iraq also published the *"The Checklist of the Birds of Iraq"*.

Waterkeepers Iraq Program

Waterkeepers Iraq (WI) is a program of Nature Iraq that began in May of 2011 and advocates for and works to protect the rivers, streams and waterways of Iraq and support local communities in the sustainable use of these natural resources. Currently, this project supports one Waterkeeper on staff, the Iraq Upper Tigris Waterkeeper (IUTW), based in Sulaimani, Kurdistan, northern Iraq, but in future, as Waterkeepers Iraq is developed, our jurisdiction will cover additional waterways and basins throughout the country. WI works in the following

three program areas: A) Effective Water Resource Planning; B) Water Quality Protection, and C) Advocacy, Education & Outreach. WI Activities in 2012/2013 included:

- The Lesser Zab Threat Assessment and Action Plan Project began in 2012 and were partially funded by the Rufford Small Grants Fund. It consists of surveys throughout the year of the Lesser Zab River and its tributaries to identify and evaluate all threats to the river based on criteria identified by the International Union for the Conservation of Nature (IUCN). This project is conducted in cooperation with the Kurdistan Environmental Protection and Improvement Board and presently a series of threat maps that identify areas requiring high priority actions have been developed. Survey work concluded in December and over 225 individual threats were observed. Some of the highest threats were gravel mining, human disturbance and pollution. Action plans are being developed that will effectively address these threat. A press conference was conducted for the March 2013 on the International Day for River Action to release the findings of the work and the Action Plan, which will guide future WI efforts. In addition, most of the following WI activities and actions were developed as part of or out of this project.





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- In January of 2012, “The Waterkeeper”, an educational art film on the problems faced by our rivers, was debuted to 200 attendees at Amna Sureka, a museum in Sulaimani. The film was later shown to over 250 children and adults from schools such in Bogd Village, Klesa Village, Sulaimani Junior School, University students at the American University of Iraq-Sulaimani, the Sulaimani College of Art as well as community organizations such as Kurdistan Save the Children. Two artist-facilitators, Julius Richard and Zoilo Lobera, worked with Nabil Musa, the Iraq Upper Tigris Waterkeeper, on this project.
 - Following a clean-up effort that took place at the end of 2011 in collaboration with SulyOn, a local arts group, The Waterkeeper returned to the town of Dukan in March of 2012 together with other Nature Iraq staff and volunteers to provide rubbish bins for each house along the right bank of the Lesser Zab River (Qashqoli), where previously garbage was being dumped directly into the river because residents had no garbage service. Over 75 bins were distributed among the villagers. Money for the bins was provided by the First Organizing Centre of the Patriotic Union of Kurdistan (PUK). The municipality in Dukan will from now on provide services and collect the trash from this community.
 - The Waterkeeper and other staff of Nature Iraq organized the first and 2nd Green Arts & Music Festival in Sulaimani, for Earth Day in April of 2012 and 2013 to bring together artists and musicians in a celebration of the environment. Over 1000 people attended these outdoor festivals in Azadi Park, Sulaimani, with over 10 community and regional NGO exhibitors participating. The event was organized with the Development Now group from the American University of Iraq-Sulaimani and was sponsored by Nature Iraq, the Ministry of Culture Media Centre, the Nature Iraq Foundation, and the Kurdistan Environmental Protection & Improvement Commission.
 - In July 2012, A Swimmable Waters Campaign took place in Dukan Lake that included a 13km swim by Nabil Musa, the Waterkeeper and a volunteer, Beth Newton, to raise awareness about the need for protection of our rights to clean, safe, swimmable waters.



- From September 2012 to January 2013, with partial support from the German Foreign Federal Office, NI organized a water quality, monitoring project called RiverWatch. This project allowed NI to hire a River Educator to assist the Waterkeeper in the project. Sampling was done in two river basins (The Tanjero/Diyala and Lesser Zab Rivers). Rather than just a straightforward sampling program and educational component was added by organizing the survey trips into field trips for different stakeholder groups (K-12, journalists, government staff, etc.). Thus the project collected water quality data that was shared with all stakeholder groups and used for education and awareness-raising. Subsequent sampling was done in the spring and fall of 2013 and a scorecard that grades the river based on their water quality is currently being prepared.

In 2011, 2012 and 2013 WI staff attended the annual Waterkeeper Alliance meetings in Illinois, Oregon and Georgia and made several presentations to conference attendees.

A new logo was developed for the project (initially called the Iraq Upper Tigris Waterkeeper Project), that more naturally allow for expansion of the program into other areas of the country.



Mesopotamian Outreach Project (MOP)

The Mesopotamian Outreach Project was an initiative of Nature Iraq that uses education, the arts, and advocacy to build support for the conservation of the natural resources and cultural heritage of the Tigris and Euphrates River Valley. MOP worked on trans-boundary water issues, water policy and long-range planning, issues of water allocation and prevention/removal of dams that damage rivers and their communities through advocacy and outreach. Activities of MOP in 2012-2013 included:

- NI developed an art/puppetry performance out of recycled materials performed in Hasenkeyf, SE Turkey. The performance depicts the Mesopotamian flood stories, which could be found in many cultures in Mesopotamia. Focusing on the Ark as a metaphor for survival in the face of universal flooding and environmental destruction,

the performance draws attention to the consequences of the Ilisu Dam for Iraq and Turkey.

- On May 22nd, Nature Iraq organized a trip for a number of Marsh Arab elders to protest the Ilisu Dam Project in Hasankeyf.



Marsh Arabs travelled to Hasankeyf

Darwin Conservation Project

This project, technically entitled “Building capacity for in-situ conservation in Iraq” is one of Nature Iraq projects started in April of 2012; trainings for the project took place in the UK in September. Two Nature Iraq staff participated in the trainings; the project focuses on the conservation of the Peramagroon Mountain area northeast of Iraq, a Key Biodiversity Area that is facing threats from urban expansion and other development. The project has three components:

- Botanical and Land Management Surveys primarily at Peramagroon Mountain, located in Sulaymaniyah, Kurdistan, Northern Iraq (which will help in the development of user-friendly identification tools, botanical red listing and Important Plant Area assessments);
- Capacity building in Protected Area Management (which will include a component of outreach and training to local schools),
- Development of a distance learning program to provide university students with foundation skills in conservation issues.



An online-course prepared for students in the University of Sulaimani, Faculty of Agriculture was conducted as another part of activities related to the educational component of the project; over 30 students participated in the 1st course, which completed in the summer of 2013 and a second course is underway. Under this project, which has partial funding from the Darwin Initiative, the land management and botanical surveys took place in the spring, summer and fall of 2013.

Other Outreach/raising awareness Activities Carried Out by Nature Iraq

- Support to the Summaryah (National) TV Channel to produce a film about the Iraqi Marshes under title “Return to the marshes”
- Support to the Al-Fayhaa TV channel to produce a movie about the Central marshes under title ‘Return of the Soul’
- Support to the Der Spiegel (German magazine, 13-19 July 2011) by hosting and accompanying their journalist/photographer during their trip in Hammar and Central Marshes
- Participation to the UK BirdFair and advocating for the Iraqi marshes and the need to support their restoration and protection
- Support to the Associated Press during their trip to the Marshes.
- Support to the Beladi TV Channel (March 2011) for their trip to the marshes
- Support to the Associated Press team (10-14 April 2011) during their visit to the marshes
- Supporting and hosting CBS staff during the recording of “Resurrecting Eden” an interview with Azzam Alwash by Scott Pelley on 60 Minutes, an American TV-News program (re-aired on 24 July of 2011). This film received the Edward R. Murrow Award.
- “Talking Naturally” to support conservation, Dr Azzam Alwash interviewed in August at the UK BirdFair on the British Radio and Podcast program.
- Support to the Al-Hira satellite channel during their visit to the Chibaish office and into the marshlands (February 2012)
- In February 2012, several meetings were held with the Satellite channels Iraqia, Sumeria, Rashid and Al-Missar concerning water issues and how to use the water of the MOD to feed Hammar Marshland.



- NI joined a meeting in February 2012 with the UNAMI representative in Basra about projects in the marshlands, which included meetings with UNESCO, UNDP and CRIM representatives in Basra about these projects.
- In March 2012 Dr. Azzam Alwash spoke on Marshland restoration in Iraq at TEDxBaghdad.
- In March 2013, Dr. Azzam Alwash spoke in regards to the water issues facing the area in TED in Tunis.
- In March 2013, Dr. Azzam Alwash spoke in Cambridge University regarding water issues.
- In November 2013, Dr. Azzam Alwash, spoke on the marshes and water issues at the University of Babylon (KeyNote speaker for environmental conference)
- On 7-10 May 2012 NI had an exhibit tent at the Azadi Park Flower Festival in Sulaimani.

12. Assistance to Local Authorities for Improvement of the Marshes (2010-2012)

Since the completion of the Master Plan for Integrated Water Management in the Marshlands area Nature Iraq, with the support of the Italian experts, have been assisting the local Authorities of the three Governorates (Thi Qar, Basrah and Misan) in finding solution to the main environmental issues affecting the area (water salinization, water/soil pollution) and in promoting activities to improve their socio-economic activities. The following is a list of the main activities/meetings, which took place in the 2010-2012 period:

- Several meetings were held to discuss the problem of water shortages in the Sayed Dekhail sub-district as well as issue of water quality. The main ones were a) A meeting with UNAMI on 31 January 2011 in Mittca (a place in Ali base in Nasiria Governorate); b) a meeting was held with the Water Resources Directorate of Thi Qar on 8 February 2011 which also discussed the collection of data and the performance of tests about this issue in the marshes, and c) A meeting was held with representatives of UNESCO and UNAMI on 9 February 2011.
- NI hosted several meetings with fishermen in Qarmat Bani Sayead within Hammar Marsh in January 2011 to discuss checking of water quality and the socio-economic situation for people in this area



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- The Chibaish office staff met with the Director of the Thi Qar Environment office several times in March-April 2011 to organize a regularly monthly monitoring program for water quality in the Central marshes. The NI staff started collecting water samples for tests and took coordinates in the Central marshes on 26 March 2011 and provided training to the local Environment office on water sampling/monitoring/analysing. Also about 30 water samples for different places in Hammar marshland were collected and sent for testing in a lab of the Thi Qar Environment office.
 - The Chibaish office hosted a delegation from Ministry of Water Resources & Committee department on reviving marshes for three governorates Basra, Thi Qar and Missan at the end of March 2011 and organized for them several trips to the Marshes
 - Support for several trip to the marshes for the Provincial Reconstruction Team (January-April 2011)
 - On 20 April 2011 the Secretariat of the Council of Ministers cooperated with Nature Iraq to organize a large ceremony at the National Park Mudhif that was about the Anniversary of the passage forty years ago of the Ramsar Convention on Wetlands. There had been several preparatory meetings in March-April of 2010. A number of related side activities and presentations were made such as the presentation of Archaeological books, Model Exhibit of the Green Village Proposal, Folkloric industries, documentary films on the marshlands and kids drawing pictures on marshes, etc.
 - The Chibaish office established an exhibition of photographs in Basrah in cooperation with the Basrah Governorate Council on 21 March 2011. The exhibition was on Biodiversity in marshlands and the environment and nature of Iraq.
 - A meeting with staff from the General Authority for Industrial Development and Research within the Ministry of Industry as well as the minister's Secretariat Council and the Ministry of Technology and Science occurred on 23-24 March 2011 to discuss the Green Village Project in the marshes.
 - The NI Chibaish office held a meeting at the National Park Mudhif on 29-30 March 2011 with the marsh committees for the three governorates of Basra, Thi Qar and



Missan, as well as representatives from the Ministry of Water Resources, Marsh Committee Affairs to discuss a number of issues such as flooding limit averages and marshland areas: trips to the marshes were organized in the same days

- The Chibaish Office hosted a site visit by Mark Nelson, an engineer, and Meridel Rubenstein, an artist/ photographer on May 12-25, 2011 to discuss options for the development of a Wastewater garden. As part of this trip, Mark and Meridel met with the Chibaish Municipality Council on 15 May 2011 and, on 16 May with representatives from the Thi Qar Environment office, the Thi Qar Sewage office, the Governorate Council and the Director of the Water Office in Chibaish. These meetings were to discuss how to cooperate and secure funds for the project of recycling wastewater as well to obtain assistance to facilities the project and provide information on the best site for the garden. Mark and Meridel in the next weeks gathered information from the Chibaish NI Staff to draft a proposal for the garden in Chibaish
- Organization of an exhibition of photographs for Migratory Bird Day in cooperation with the Iraqi Ministry of Environment in May 2011
- Nature Iraq supported the organization and actively participated to the Conference of “National Conference Revisiting the Iraqi Marshlands: Rethinking Strategies for Sustainable Future” in Basra on 7 June 2011. Issues discussed included: The water needs for marsh development; Management and governance of the marshes; the role of civil society and the private sector and the international community in the development of the marshes, and Achieving a balance between environmental protection and social and economic development (prioritizing the use of land).
- Meetings were held with the Ministry Secretariat Council and the Thi Qar governorate council in June 2011 to discuss connecting the Main Outfall Drain with Kermashia Marsh and assess both the potential positive and negative results of this connection. Nature Iraq participated in an additional event on this issue with the Councilors Authority Office within the Ministry Secretariat Council on 10 July 2011, which formed a committee to be responsible for this.
- The Chibaish office hosted a meeting of American Archaeological Experts with the Director of Thi Qar Archaeology Department on 10-11 July 2011.



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- Meetings were held in January 2012 with the Ministry of Water Resources regarding the Operational Plan for the right eastern irrigation channel of the Euphrates and the range of effects of this channel on the Hammar Marshland under different options.
 - In February, NI participated in Baghdad to several meetings at the Ministry of Environment about the assessment of filling Hammar Marshland with water from the Main Outfall Drain (MoD) to solve the drought issue in Hammar. A subsequent meeting with held with the technical Committee at the MoWR on this issues as well
 - Meetings in Basra with the Marshes Department at the Basra Governorate and in the Water Resources office about several issues including the Shatt Al-Arab salinity (January 2012)
 - In February 2012, NI staff participated (also supporting the organization) to a ceremony at the Ministry of Water Resources in Baghdad to celebrate “Global Day for Wetlands”. NI organized and set up a photo exhibition that included 80 photographs about the marshlands and environment of Iraq as well books in both language Arabic and English.
 - In February, NI staff in Chibaish (Al-Fuhood Sub-district) organized courses for widows in sewing, cosmetics and education as well as training on democracy, human rights, health, raising children, etc.
 - In March 2012, a delegation from Thiqar Governorate Council Delegation was hosted at the Adobe house and Carolyn Drake, a National Geographic magazine photographer and Donald R. Belt, a writer with the magazine spent 15 days there.
 - In March 2012 several meetings were held in Basra with Dr. Kamal Latif (MoE Deputy Minister), representatives from the Southern Oil Company (SoC) and the Marine Science Center at the University of Basrah about the proposal of the Ministries Secretary Council to draw out from Regional Organization for the Protection of the Marine Environment (ROPME) convention.
 - NI participated in April-May 2012 to several meetings in Baghdad with the MoWR/CRIM about the implementation of the RAMSAR Convention.
 - In April-June 2012 NI held several meetings with the CRIM of Missan Governorate to discuss water levels in Hawizah marshland



- Nature Iraq carried out extensive socio-economic and infrastructure surveys in the rural areas of the Thi Qar (1,500 villages) and Amarah (600 villages) Governorates, updating the similar information collected in the preliminary phases of the Master Plan (August-September 2005). All the collected data have been given to the Ministry of the Municipalities and Public Works and to the Governorates
- NI hosted the Dutch Ambassador to Iraq, Ambassador Roodenburg, who visited the NI Chibaish office and marshlands in May 2012
- NI supported the visit of the Ministry of Culture delegation to the National Park Center and to the marshes (April 2012).

13. Support to MOE for the National Biodiversity Strategy (2010-2013)

In 2010, Nature Iraq assisted the MOE and UNEP in the preparation of a GEF project proposal for the development of the National Biodiversity Strategy and Action Plan (NBSAP) of Iraq. The project proposal was structured in 4 main components:

- Assessment of State of Biodiversity in Iraq
- Institutional Framework for Biodiversity Management (or NBSAP Development)
- Development of a National Biodiversity Strategy and Action Plan
- Capacity needs assessment on key issues to implement CBD

The PIF was submitted to the GEF in August 2010. After technical evaluation of the PIF, the GEF requested the NBSAP project to be split and developed under the Biodiversity Enabling Activities (GEF-5). A revised PIF for the development of the NBSAP and the preparation of the 5th National Report of Iraq, integrated with additional baseline information on biodiversity, was developed and submitted to the GEF for approval in May 2011. With the overarching goal of integrating CBD Obligations into National Planning Processes through Enabling Activities, the main objective of this project is to enable Iraq to develop its National Biodiversity Strategy and Action Plan (NBSAP) and to prepare the Fifth National Report to the CBD.

Nature Iraq also carried out several sessions of capacity Building activities to the Ministry of the Environment staff focused on field work on biodiversity surveys: specific training was also given to the Environment Protection & Improvement Board of the KRG.



14. Protected Areas (2010-2013)

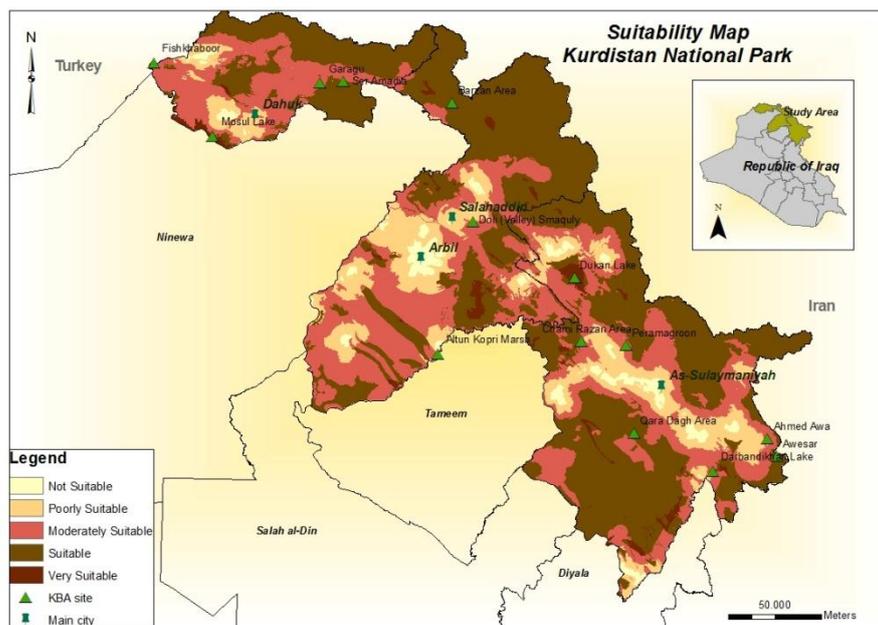
The activity for planning and establishment of a network of Protected Areas in Iraq are of great importance to the Ministry of Environment. As such, in the second half of 2010 Nature Iraq made a strong effort for the review and elaboration of existing information collected in the extensive monitoring programs carried out since 2003, organized in a GIS database that allowed establishing a procedure for the elaboration of primary and secondary data on biodiversity in order to select priority sites to be proposed as future Protected Areas in Iraq.

Study on Protected Areas in Kurdistan

A study on potential Protected Areas in the Kurdistan Region, based on a GIS suitability analysis was developed and presented to the Ministry of Environment in a technical meeting held in Rome in February 2011. The purpose of the analysis was to give a first evaluation of the suitability of the territory to establish Protected Areas in Kurdistan. The method adopted in the research was constrained by some factors, nevertheless it represented an important tool to start the discussion among stakeholders and a potentially very useful instrument for adaptive management.

Taking into account the suitability map with five classes, suitable areas spread quite homogeneously along the Zagros mountainous area bordering with Iran and Turkey, corresponding to the Zagros-mountains forest steppe (critical-endangered) eco-region. Other important suitable patches of territory can be found nearby the Dohuk city and in the vicinity of Garagu and Ser Amadia KBA locations, northwards and southwards from the Salahddin city, in correspondence with the Middle East steppe area west from the Erbil city, west from Sulaimanyia city in correspondence of Middle East Steppe and Mesopotamian shrub desert. The potentiality of connecting suitable areas is quite evident in the Dohuk Governorate, while it should be further investigated and researched in areas such as the surrounding of Erbil and Salahddin, or the areas lying eastwards and westwards from the Sulaimanyia urban surroundings, where the separation of suitable areas is equally evident and straightforward. One of the strengths of this method is that it allows to visually select critical/problematic areas and therefore plan on the spot surveys and approaches to further investigate and build adequate management measures.

It was recommended that the boundaries of the protected areas be decided through stakeholder consultation, possibly taking into account at least “suitable” and “very suitable” category areas, inside these categories an additional classification could be established providing for “core areas” that will be possibly formed by the “very suitable” category and management oriented categories (to be created inside the “suitable” category) differentiated for instance into species specific reservoirs and tribal reservoirs for sustainable use and productions.



Map of suitability for Protected Areas in the Kurdistan region (2011)

Study on Protected Areas in Iraq

As a further step, the suitability analysis was extended to all Iraq, with the aim to elaborate a feasibility study for a national system of Protected Area, which was also aimed at providing a background for the activities to be carried out for the implementation of the CBD’s Programme of Work on Protected Areas in Iraq.

According to the Fourth National Report on Biodiversity in Iraq (2010), the total area of officially protected areas in Iraq is 184666 ha, which includes 31514 ha of buffer areas, and represents a percentage of officially protected area to total area of 4%. A National System of Protected Areas (NSPA) may comprise national and regional parks, nature reserves, wildlife sanctuaries, natural monuments, forest reserves, marine reserves, archaeological sites and

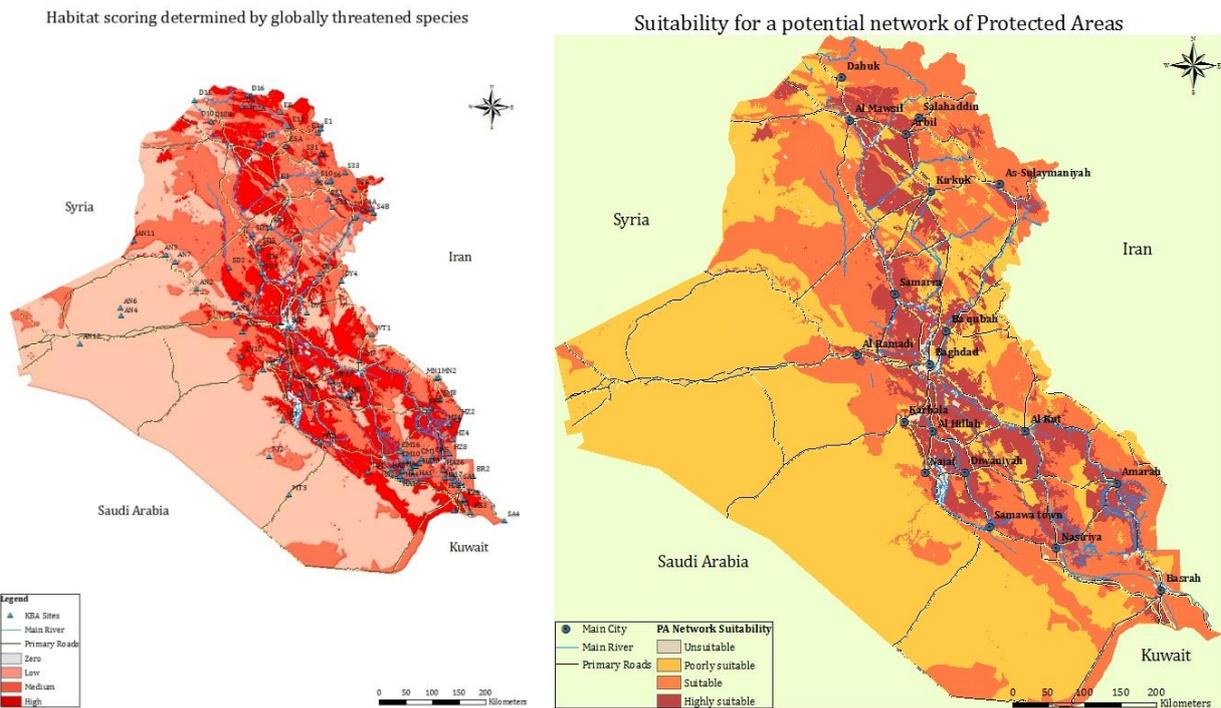


archaeological reserves, as well as private reserves, strategic biological corridors and scenic landscapes of geomorphic significance.

To plan a National System of Protected Areas requires to provide a set of criteria and guiding principles for screening, selection, declaration, modification and re-designation where necessary; management and administration; socio-economic assessment and analysis; ecological assessment and analysis, and monitoring and evaluation of marine and terrestrial protected areas in Iraq. At the same time, as it is explained more in detail in the chapter related to the Habitats Project, the extension of the Iraq territory is 432,162 km² and comprises five major terrestrial ecoregions of the world and four smaller ones.

The Feasibility Study was focused on developing the following:

- define a national strategic outline for the NSPA, articulating the national significance and priority given to protected areas, also considering the national policies that are relevant for protected areas
- define the types and management categories of protected areas and develop a sound planning framework and road map for the NSPA, including sites designated under international agreements or conventions (Ramsar sites, UNESCO MAB and WH sites, KBA sites, etc.), and define the relationships between (a) different units and categories of protected areas; and (b) protected areas and other relevant categories of land
- identify key stakeholders (national, regional and local level) and their roles and functions in promoting, establishing and managing protected areas, as well as the relations between these players
- support the enforcement of the upcoming new national Law on Protected Areas, which is in the process of approval by the Iraqi Government
- Identify natural values that are most threatened by climate change, and include climate change scenarios in the selection of new Protected Areas, with the aim of preventing habitats fragmentation and provide for ecological connectivity (establish new corridors or biolinks, ecological networks, important habitat buffer zones), assist migration, support ex-situ conservation efforts
- address the needs and opportunities of the NSPA in the broader context offered by bio-regional planning.



Map of suitability for Protected Areas in Iraq (2011)

Capacity Building

A 4-day training workshop with UNEP and IUCN titled "Strengthening institutional and technical capacity for biodiversity conservation and ecosystem management of the Iraqi Marshlands" was organized by the MOE and Nature Iraq in Sulimania in October 2010. Nature Iraq organized logistics and accommodation for the entire group, provided a full day of presentations and organized the field trip.

The workshop addressed topics like the different types of protected areas (IUCN classification), wetlands and their ecological importance, administrative planning, basis for the selection of protected areas, Ramsar Convention, Protected areas in Iraq and on-going projects, the management of protected areas.

On the third day of the workshop, Nature Iraq organized a field trip to the Peramagroom area, which is a proposed protected area by the KRG Government. The next day, IUCN and NI trainers conducted a training exercise for the attendees for the development of a Management Plan for the Peramagroom area.



National Project on Protected Areas of Iraq

In the second half of 2011, Nature Iraq provided technical support to the MOE and UNEP for the preparation of a GEF project proposal on Protected Areas of Iraq. The project PIF was structured in 3 main components:

- Design of Protected Areas System and institutional strengthening
- Protected Areas Network implementation
- Public Awareness.

The expected results of the project were identified as: Outcome 1.1 Improved management effectiveness of existing and new protected areas - Outcome 1.2 Improved management effectiveness of existing and new protected areas - Output 1. New protected areas (2) and coverage (224,000 ha) of unprotected ecosystems.

The activity in 2012 was addressed to the implementation of the CBD Program of Work on Protected Areas in Iraq. Following up the development of the Feasibility Study for a network of Protected Areas in Iraq and related capacity building, technical assistance was provided to the IMOIE for the preparation of the National Report on Implementation of the PoWPA in Iraq and related Action Plan. This document was prepared in February-April 2012 and submitted to the CBD Secretariat at the end of May 2012, in view of the CBD COP11 in New Delhi (13-19 September 2012).

This National Report includes the objective of planning the selection of 8 priority areas in Iraq for the future establishment as protected areas of national/regional level by 2020. The first step of the PoWPA Action Plan will be the finalization of the approval procedure of the National Law on Protected Areas by the Ministries Council of Iraq, which has not been completed yet. Pending the issuing of the national law, the structure of the Feasibility Studies for the proposal of the new protected areas to the National Committee for Protected areas was defined, as long as the GIS database structure for the collection of all available environmental information that is needed to characterize the selected sites.



15. Inventory of Key Biodiversity Areas of Iraq (2010-2013)

Key Biodiversity Area Programme

The biodiversity rapid assessment carried out in the KBA Program since 2005, as previously discussed in the section on environmental monitoring, has been highly successful in identifying globally and/or regionally important sites of Iraq. The program is based on six key objectives, which are as follows:

- Conduct winter and summer surveys of as many potential KBA sites as possible and evaluate these sites to determine if they meet KBA criteria;
- Record information on the status of the flora, fauna and overall habitats and threats to these sites;
- Evaluate these sites to determine if they meet KBA criteria, delineate them and determine their conservation status;
- Provide advice to the Iraq Ministry of Environment and other Iraqi stakeholders on the future management and restoration of KBA sites;
- Undertake advocacy efforts that promote the protection, conservation and restoration of KBA sites; and
- Publish relevant scientific and technical findings in reports and papers in peer-reviewed scientific journals to make the information widely available to stakeholders.

In 2010 Nature Iraq conducted a review of the program itself that evaluated how well these six program objectives have been met and develop a list of recommendations and next steps for the program.

KBA Field Survey Sites and Data

Details on the survey results are provided in the previous section on environmental monitoring. From 2004 to 2010 over 200 sites (note that many of these are sub-sites to larger proposed areas) had been visited throughout the country resulting in thousands of individual bird, other (non-avian) fauna and plant observations. Some additional surveys that occurred for other projects in 2011 and 2012 augmented this work further. Data from these surveys was used to inform a number of other New Eden Projects as has been discussed.



Delineation and Final Selection of KBA sites

For successful conservation actions to take place, a specific area or boundary for each site needed to be determined. Consideration must be given to the habitat, range and size of the local plant and animal populations as well as their habitat requirements, in addition to logistical concerns such as the ease of access to the site, the number of entry and exit points, and its physical size. This process is known as site delineation. The KBA team attempted a preliminary delineation of many sites throughout Iraq in 2009 but from 2010 to the present, the team attempted to further refine these delineations.

In addition, a final list of confirmed KBA sites needed to be determined based on the application of the global KBA Criteria (which includes Important Bird & Biodiversity Area (IBA) and Important Plant Area Criteria systems). When applied to the full data set obtained from the surveys, some sites will meet these criteria and some will not. The analysis of the KBA criteria is in its final stages as of January 2014 and this analysis is being peer-reviewed by the following international experts:

- Bird Assessments: Richard Porter (NI Advisor, formerly with the Royal Society to Protect Birds and an advisor at BirdLife International, UK)
- Mammal Assessments: David Mallon (IUCN [Antelope Specialist Group, UK](#))
- Reptiles and Amphibian Assessments: Hanyeh Ghaffari & Barbod Safa (Pars Herpetologists Institute, Tehran)
- Fish Assessments: Brian Coad (Canadian Museum of Nature) and Jörg Freyhof (Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin)
- Botanical & Habitat Assessments: Tony Miller and Sophie Neale (Royal Botanic Garden Edinburgh, UK).

Once the review process is complete a final list of up to 100 confirmed KBA sites is likely to result.

Inventory of Key Biodiversity Areas of Iraq

In 2012 and 2013, the KBA Team has been developing the final text for each individual KBA site assessment. Once the list of KBA sites is finalized, these assessments will be bound together in a book entitled “The Key Biodiversity Areas of Iraq” and distributed to all stakeholders. The document will provide information on locality, site descriptions,



preliminary delineations, threat assessment results, criteria assessment results, additional information on conservation concern species and habitats, and recommended conservation actions.

This book will provide a strong foundation and defense for the development of Iraq's future Protected Area Network and will serve as a reference and baseline document on the core sites that warrant conservation in Iraq. Stakeholders that will use this the information in this document include government officials, researchers, universities, private sector entities and both national and international conservation organizations.

Management of KBA Sites

The KBA reports developed in 2008, 2009 and 2010 have listed a number of next steps and recommendations that are site specific and address many of the threats observed at the survey sites. These include education and awareness-raising of local stakeholders (children to adults); restoration activities that physically restore damaged sites; sustainable development initiatives adjacent and within sites; creation and implementation of rules and regulations that control the use of the natural resources at the sites and enforcement to stop their misuse. These conservation actions need to be implemented both on the site, regional and national scale. Many of these key sites are also at risk to further deterioration and loss of their globally significant biodiversity if actions are not taken soon. The Inventory of Key Biodiversity Areas will summarize the most critical management issues for the sites and lay out the next steps forward.

Monitoring of High Priority Sites

It is important that the survey and data collection effort continues. A number of the high priority KBA sites should be the subject of a regular, consistent and long-term monitoring program. They clearly meet KBA Criteria but many of these sites, such as areas in the Mesopotamian marshlands, are facing continual ecological changes and human threats. Others are relatively protected and remain unique refugia for globally threatened species. They deserve further surveys, expanded survey efforts for different fauna groups and longer study periods to fully assess them, identify all the species that are utilizing these sites and understand the role these sites play as areas that are globally and/or regionally significant.



Monitoring, Research and Conservation Programmes

Starting from the extensive baseline information provided by the KBA assessment results, Nature Iraq has developed and/or assisted in specific monitoring, research and conservation programmes for a number of different taxa including:

- The Wild Goat project (co-funded by the Conservation Leadership Program)
- The Social lapwing conservation programme (co-funded by the Mohammed Bin Zayed Conservation Fund)
- Lesser Zab Threat Assessment & Action Plan Project (co-funded by the Rufford Small Grants Fund)
- Providing assistance to visiting researchers (i.e. Surveys for Euphrates Soft-Shelled Turtle Survey, Kurdistan Newt and fish).

16. Technical Support to MOE (2010-2013)

The New Eden Group is also assisting the MoE by serving as a member/advisor on several technical committees. The New Eden Group participated in a series of meetings and workshops of the National Committee on Climate Change, including as an example the following activities in 2011:

- In July 2011, the New Eden Group helped initiate the development of the 1st National Communication on Climate Change for Iraq, in cooperation with MoE and the UNEP/UNDP.
- According to the recommendation of the workshop, the New Eden Group would lead the biodiversity group to write the chapter that relates with the status, vulnerability, and adaptation of climate change of biodiversity in Iraq. Also, the New Eden Group would help the other Green House Gas (GHG) groups write the chapter on GHG inventory and emissions, as well as submit socioeconomic surveys and reports to aid the Ministry of Planning to write a chapter on the effect of climate change on the socio-economy, especially in the Iraqi Marshlands.

In 2012, a number of additional meetings were including the following:

- The meeting on 18 January covered Iraq's obligation towards UNFCCC, the authority of the members, the 1st national communication and results of COP17,



Designated National Authority (DNA) constitution, Clean Development Mechanism (CDM) projects and procedures, as well as mitigation and adaptation projects.

- The 28 January meeting discussed in details procedures of accepting CDM projects, following up on the GHGs inventory, searching for academic projects related to the CC work in the Iraqi universities, encouraging studies related with effect of CC on Iraqi environment, instructions about formal communications with UNFCCC secretariat, and discussing plans of different Arabian countries regarding climate change.
- The 23 April meeting designated a committee for writing the 1st national communication, held a workshop/training about using the GHGs database, discussed CDM projects and MOE Climate Change Center.
- The 17 July meeting discussed several projects as well as amendments of the UNFCCC and Iraq's participation in COP18 in Qatar. Also progress on the 1st national communication and suitable ways to prepare for the national adaptation strategy were discussed.
- The 8 October meeting discussed the Amman meeting with UNDP and UNEP regarding the 1st national communication, Iraq participation in COP18 in Doha, CDM (carbon injection/ store) and KRG projects.
- The December meeting analysed the potential CDM projects which were submitted in the previous months by the Ministries of Industry, Electricity and Transportation.

Additional workshops were held with the Committee in Saudi Arabia from 30 April to 2 May and in Amman, Jordan from 13-16 October. Further information on these activities can be found in section B.

In 2012, additional meetings of the National Committee for Biodiversity (CBD) occurred, which included:

- During the 8 February meeting the New Eden Group was presented several ideas and plans to help MoE to prepare the National Atlas for Biodiversity and how to prepare national documents. In addition, the New Eden Group helped in the preparation for Master Program on Biodiversity, which will be implemented under the supervision of the MoE in cooperation with the New Eden Group.



- During the 10 April meeting, the committee studied the Master Program on Biodiversity and how to implement the project. Also the New Eden Group representative were assigned to help the National committee to find ideas and themes for Iraq celebration of the International Day for Biodiversity that was held in 22nd of May 2012 and themes were discussed and appreciated by the committee members. During the meeting Biodiversity reports made by MoE sections were reviewed and provided feedback (additional review and feedback is on-going).
- During the 25 September meeting the committee discussed the attendance of Iraq representatives to the COP11 in India, as well as reviewed the National Strategy for the biodiversity and prepared the work plan for the National strategy and the 5th National Report for Biodiversity in both Arabic and English.
- An additional informal meeting occurred with Dr. Ali Alami on 23 April to continue the discussions on the Program.
- During November/December several meeting were held at the MoE head-quarters for the preparation of the first work-shop for the GEF funded project on the National Biodiversity Strategy which was held in Baghdad on December 19-20 (see previous paragraph C1).
- Meetings of the National Committee for Protected Areas occurred on 12-19 February, 13-14 March, 28 May, 12 Aug and 4 Sep. A celebration of World Migratory Bird Day was organized on 16 May, hosted by the Ministry of Environment and on 12 August the committee discussed the Biodiversity Project.
- There were no meetings or activities with the National Committee on Avian Flu due to internal reorganization at the Ministry of Environment
- There were no meetings or activities with the National Committee on Desertification due to internal re-organization at the Ministry of Environment.
- In 2012, the New Eden Group assisted the National Committee for Ramsar Wetlands Convention in developing the National Report (submitted in July for the COP11) and updating the Ramsar Information Sheet on Hawizeh Marshes (submitted in July and is currently being revised based on comments received from the Secretariat after COP11). Additionally workshops about wetlands and the Ramsar convention occurred on 8 and 9 February and on 5 April in Baghdad.



- A workshop was held with international trainers from the International Fund for Animal Welfare, Al Ma'wa for Nature & Wildlife (Jordan), and other experts for the National Committee for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in Sulaimani on 15-19 January.
- In 2012, the National committee for Converting the Main Outfall Drain (MOD) to Hammar Marsh has been involved in several activities. Meetings occurred on 18, 24, 25, 28 January to discuss how to resolve issues of drought in Hammar Marshes and how to use the MOD to resolve this problem. Also a meeting occurred on 2 February with satellite channels including Iraqia, Summeryah, Rashid and Al Missar to talk with them about the issues with water and how to use the waters of the MOD to feed Hammar marshland.

Finally, the New Eden Group is assisting the MoE in writing a portion of the UNESCO report regarding the marshlands and its potential designation as a UNESCO World Heritage Site. On 3rd June there was a additional preparatory session of the National Committee on Protected Areas to discuss the listing of the marshlands as a World Heritage Site.

17. Technical Assistance for the Implementation of the UN Framework Convention on Climate Change and Kyoto Protocol (2010-2014)

The whole set of activities performed in order to support the Iraqi minister can be divided in 4 main categories:

- **Greenhouse gases emission inventory:** the main activities were aimed at providing technical assistance and capacity building to the IMOIE for the creation of the Greenhouse Gas Emission Inventory database, in collaboration with the National Committee for the UNFCCC, and for contributing to the development of the First National Communication of Iraq, in coordination with the ongoing project of UNEP and UNDP.
- **National climate change center development:** the main activities were focused on helping the ministry of environment setting up the national climate change center with the purpose of dealing with all the technical aspects related to global warming.
- **International convention-conference support** (e.g. Conference Of Parties (COP) 18): Nature Iraq assisted the Iraqi ministry of environment during the organize and



preparation of intervention and a side events aimed at highlight Iraqi's efforts toward greenhouse gases emissions reduction.

- **Clean Development mechanism studies:** Nature Iraq prepared a study for exploiting the potential of gas flaring in terms of energy production.

Greenhouse gases emission inventory

The GHG National Inventory is the main tools for the fulfillment of the international treaties of climate change and the base for the development of strategies and policies aimed at reducing iraqi's contribution on global warming: it allows experts and policy makers to base their analysis on solid data. Nature Iraq developed and finalize the database for the inventory of the greenhouse gases emissions for the Iraqi country in cooperation with the experts of the Iraqi ministry of environment and international organizations.

Figure 7: images of the GHG Database





Here below an example of the technical features shared with the local experts and customized according to the Iraqi needs: notation keys

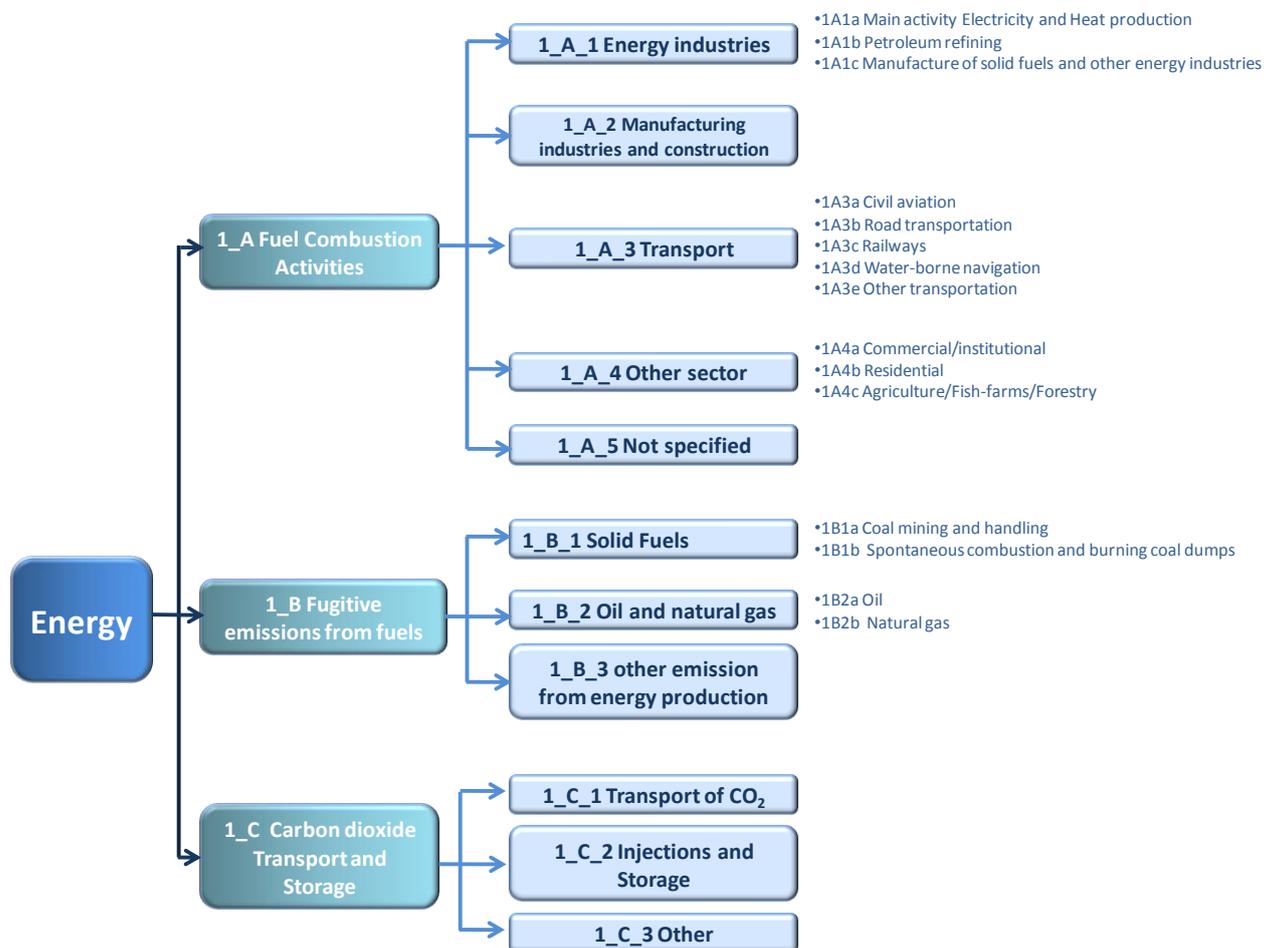
Figure 8: Notation keys list

<i>Notation Key</i>	<i>Definition</i>	<i>Explanation</i>
<i>E</i>	<i>Estimated</i>	<i>The Complier has to report the corresponding data</i>
<i>NE</i>	<i>Not Estimated</i>	<i>Activity occur but have not been estimated or reported.</i>
<i>IE</i>	<i>Included Elsewhere</i>	<i>this activity or category are estimated and included in the inventory but not presented separately for this category. The category where these activities are included should be indicated.</i>
<i>C</i>	<i>Confidential Information</i>	<i>Reporting this activity could lead to the disclosure of confidential information.</i>
<i>NA</i>	<i>Not Applicable</i>	<i>The activity or category exists but relevant emissions and removals are considered never to occur.</i>
<i>NO</i>	<i>Not Occurring</i>	<i>An activity or process does not exist within a country.</i>

The main references for the technical aspect are the 1996 IPCC guidelines for National Greenhouses Gas Inventories” and the “Good Practice Guidance for National Greenhouse Gas Inventories: based on their recommendation, a series of key emission categories for the Iraqi territory had been identified and the whole range of human activities had been categorized in 4 key sectors plus “others” (Energy Industry, Agriculture and forestry, Solid waste and Other).

Here below an example of the split for the energy sector: it is clear how the division in categories and subcategories includes all the activities related to energy production or transformation.

Figure 9: Energy sector categories split



The development of the database has been a great example of synergy between NI, the expert of the Iraqi ministry of Environment and the UN organization (namely UNDP and UNEP). Several meetings were held among international experts and the local counterparts in order to customize the database according to the needs of the Iraqi experts (Rome, Baghdad, Sulaymaniyah, amman, etc...) : the coordination with the Iraqi Ministries involved in the climate change project had been fundamental in order to define the best data collection strategies.

In April 2011, 8 international experts organized a 4 days workshop in sulaymaniyah and successfully show the database and all the fundamentals behind the technical features of it.

Figure 10: Sulaymaniyah Workshop



This workshop had seen the attendance of several representatives of key Iraqi ministries (e.g. Ministry of Environment, Ministry of Oil, Ministry of industry, Ministry of Agriculture, Ministry of Municipalities, etc...).

Here below is reported the panel of experts engaged for this workshop:

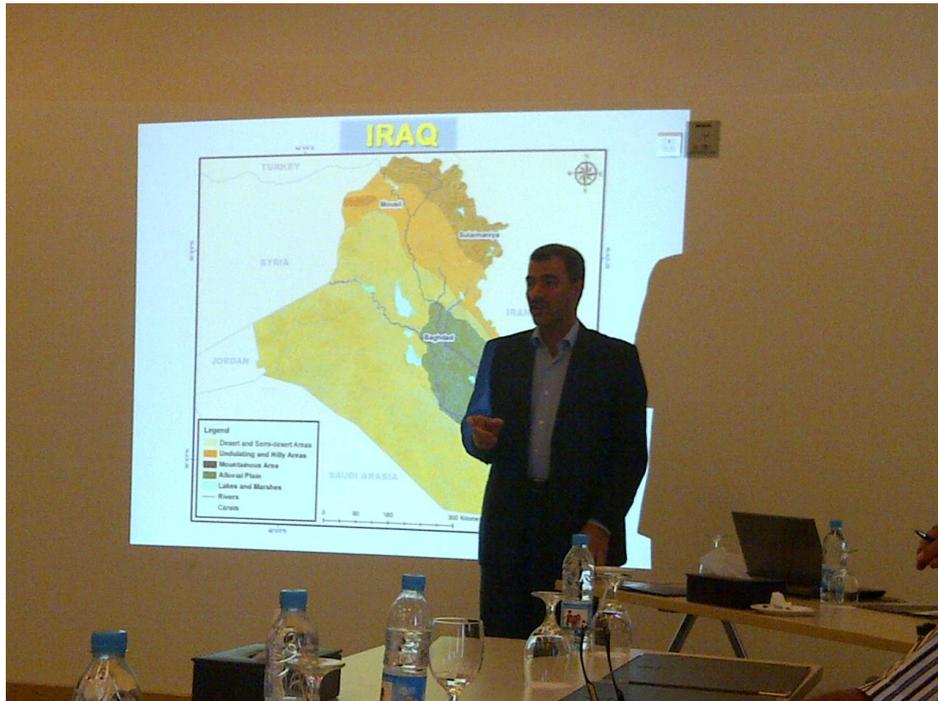
Figure 11: Panel of experts of sulaymaniyah workshop

Training program	
Panel of experts	
Iraqi Ministry for the Environment → H.E. Dr. <u>Kamal Hussein Latif</u> , Deputy Minister → Ms <u>Susan Banna</u> , National Focal Point → Dr. <u>Ismael Al-Mulla Ismael</u> , Ministry Expert for Climate Change → Dr. <u>Ali Al-Lami</u> , Minister Advisor	Nature Iraq → Dr. <u>Azzam Alwash</u> → Mr. <u>Yadhir Abbaod Fezea</u> → Mr. <u>Ahmed Jassim Al-Atwadi</u> → Mr. <u>Giorgio Galli</u> → Mr. <u>Felipe Zarate</u> → Mr. <u>Leonardo Karrer</u> → Mr. <u>Gianclaudio Oliva</u> → Ms. <u>Elly Ravazzolo</u> → Mr. <u>Matteo Mantovani</u> → Mr. <u>Moez Sakka</u> → Mr. <u>Daide Triacca</u>
(Day-1) 09/04/2011	
9:30–9:45	→ Opening and introduction to the main contents of the training
9:45–10:15	→ Introduction to the training course by Ms. <u>Susan Banna</u> (Iraqi National Focal Point)
10:15–10:45	→ Introduction to the training course by Dr. <u>Ismael Al-Mulla Ismael</u> (MoE Consultant for Climate Change)
10:45–11:00	→ Coffee break

One of the main topics discussed had been the definition of the best way to collect and store the needed information (emission data, technological features of some selected categories, etc.). The collection of national /local data regarding anthropogenic activities within the Iraqi national boundaries is aimed at providing the key decision makers with the value of the national emissions divided by sectors or categories.

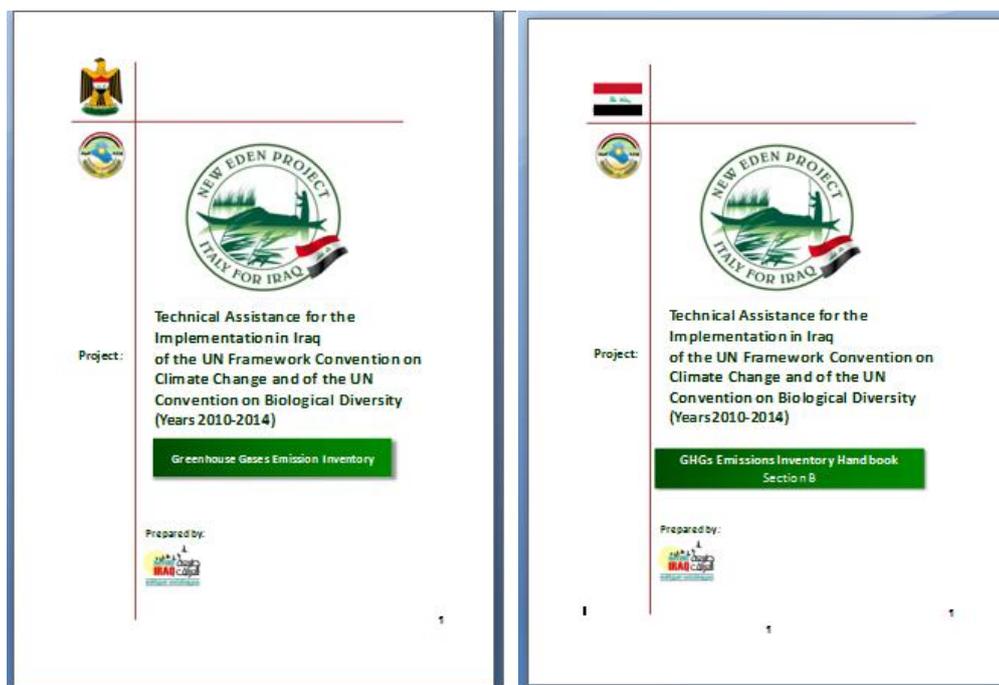
The international experts shared their knowledge about climate change and the technical tools to defeat the problem as well as received several feedback from the local counterpart: those feedback were necessary in order to finalize the database and customize it according to the needs of the Iraqi people. After the Sulayimaniyah workshop and a successful meeting with UNDP and UNEP representatives in Amman, Nature Iraq was able to finalize the database.

Figure 12: NI presentation in Amman



The Data management tools was shared during a meeting in Baghdad with the representatives of the key Iraqi ministries where the international Project manager spent 1 day highlighting the features of the tool. Moreover, Specific guidelines and handbook had been prepared in order to help the experts using the database.

Figure 13: Frontpage of the Database Handbook



Support for the compilation of the National Inventory

An accurate and truthful data entry of the emission database is fundamental for a reliable analysis and consequent elaboration of strategies. Bearing this in mind, Nature Iraq did provide the expert of the National climate change expert with the support and assistance they needed: training, ad hoc meeting, the presence of a Database/GIs expert available to help them filling the database are some of the means to achieve the final result. Once the Database had been finalized and disseminated, the experts of the several ministries had started filling it with the needed data. Nature Iraq and the international experts provided assistance for the compilation of the database and met the Iraqi experts in Baghdad in several occasions.

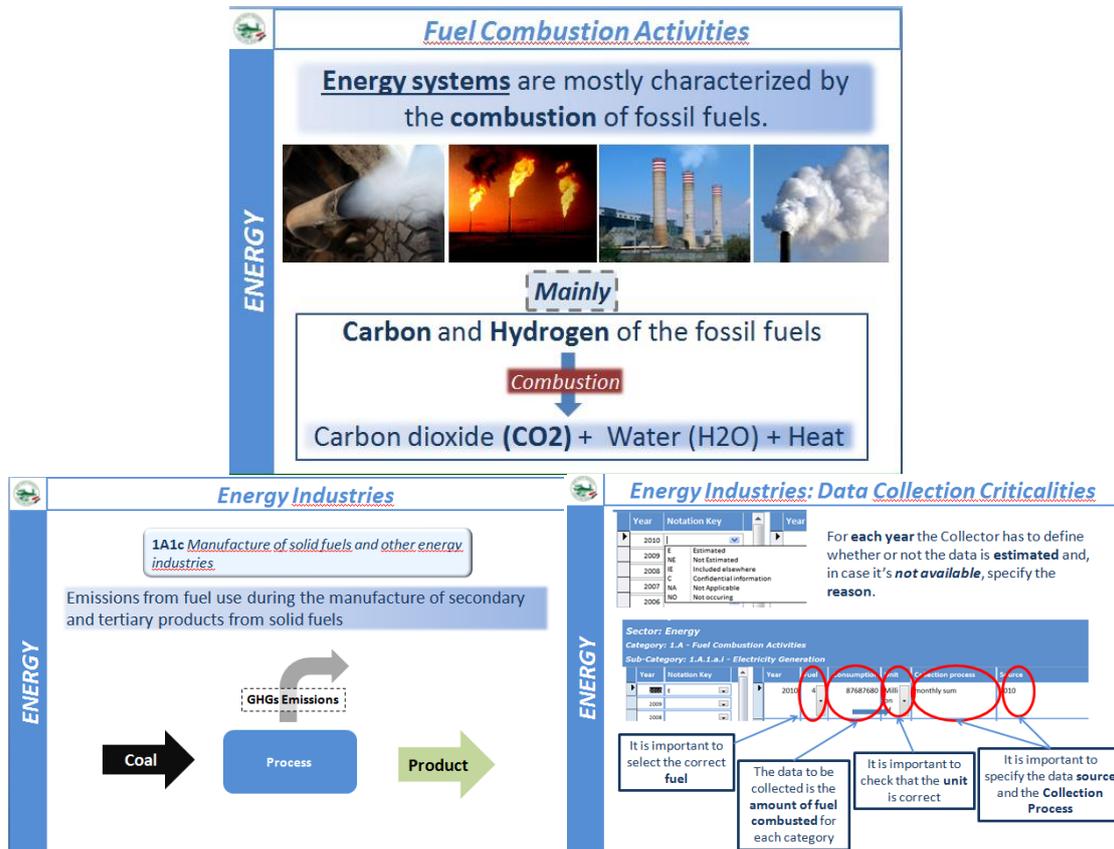
Figure 14: Workshops in Baghdad





Moreover, emission calculation examples were highlighted by international experts in order to better represent the final goal of the climate change project.

Figure 15: Screenshot of presentation performed in Baghdad



National Climate Change Center (NCCCC)

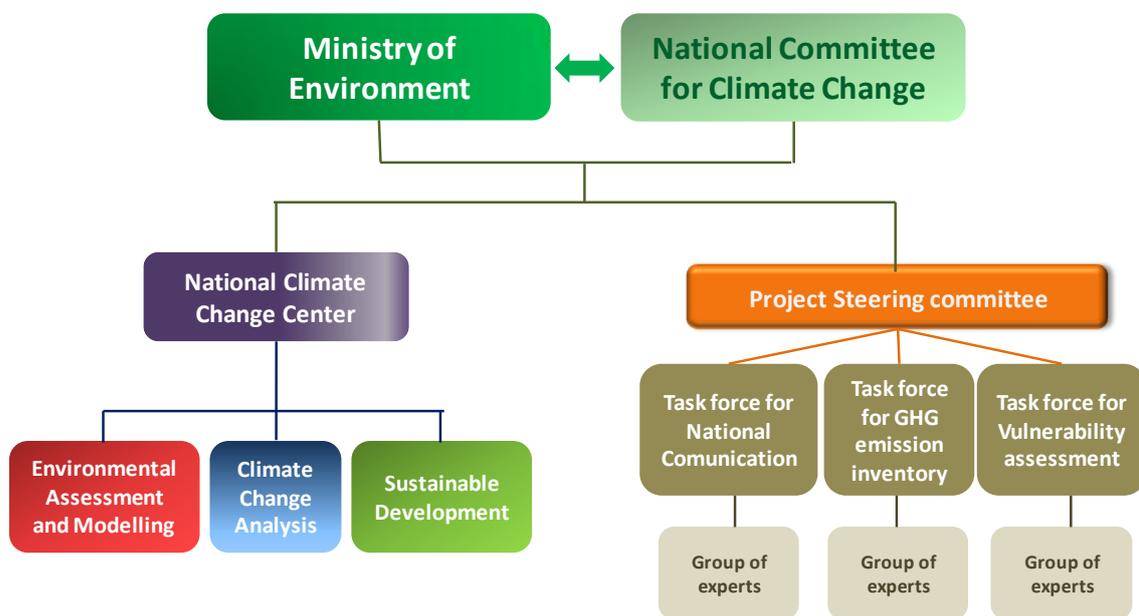
The Iraqi Ministry of Environment is responsible for the oversight of policy, planning, regulation and enforcement of controls on matters that affect the Iraqi environment. The Ministry is in charge of monitoring and discovering environmental abuses, as well as educating and informing Iraqis on the proper use of their country's natural resources.

The MoE created a center in charge of all the activities that affect the climate in Iraq: the National Climate change center (NCCC). The center is focused on technical, scientific and research activities in the field of climate change. It is planned to provide the necessary technical support and scientific consultations to the decision makers in the governmental and non-governmental sectors regarding climate change issues. Furthermore, the center aims to collaborate with universities, national and international research bodies, and the industrial

sector in order to advance national capabilities in interpreting the causes of observed climate variations, and to apply this knowledge to improve climate models and forecast.

Nature Iraq, after a thoroughly study of the national centre around the world (special focus on the middle east), came up with the structural design of the expertise skills of the center as well as the institutional framework of it Here below a chart that represents the foreseen interaction between the NCCC and the MoE and the steering committee and the different section within the NCCC.

Figure 16: National Climate change center and its institutional interaction

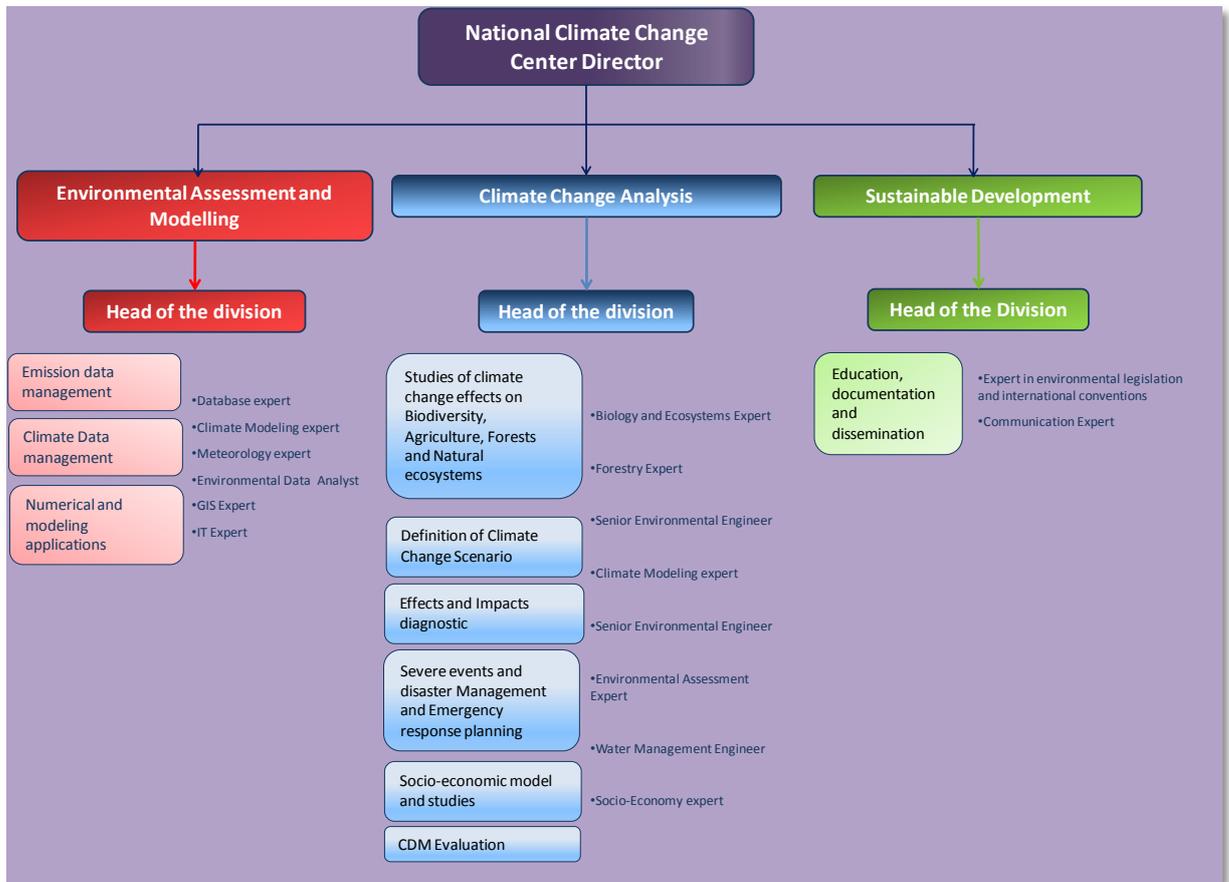


Besides, NI organized the structure center for what concern the different internal expertise and division. The Structure of the center has been divided into three sections according to different fields of expertise:

- Environmental Assessment and Modeling;
- Climate Change Analysis;
- Sustainable Development.

Image below shows a summary of the division of the National Climate Change Center.

Figure 17: National Climate change center and its institutional interaction



The Structure of such center was defined and developed together with representatives of IMoE during several coordination meetings (e.g. meeting in Rome in 2011). Moreover Nature Iraq helped the National Climate Center manager assess the type of expertise and curricula needed for the key technical positions. An example of the contribute of Nature Iraq is represented by the table below where the main skills and background (academic and professional) that the staff should have is mentioned:



Position	Academic requirements	Professional requirement	Other
Database expert	MSC, proficiency in Visual basic	At least 5 years of relevant professional experience	Proficiency in other programming languages would be an asset
Climate Modeling expert	Master degree in physic or engineering and PhD in climate modeling field	At least 7 years of relevant professional experience	Previous work experience in a international environment would be an asset
Meteorology expert	Master Degree in Physics, pr meteorology, PhD or specific courses in meteorology field	At least 7 years of relevant working experience	
Environmental Data Analyst	Master degree in Environmental Engineer	At least 5 years of working experience as data analyst in an middle eastern country	Availability to travel for short time assignment
IT Expert	MSC	At least 3 years of relevant working experience	
GIS Expert	MSC, GIS course	At least 5 years of relevant working experience	
Biology and Ecosystems Expert	MSC	At least 5 years of relevant working experience	International work experience would be an asset; availability to travel within the country for short term assignment
Forestry Expert Senior	MSC	At least 5 years of relevant working experience	
Environmental Engineer	Master degree in Environmental Engineer	At least 3 years of relevant working experience	
Senior Environmental Engineer	Master degree in Environmental Engineer	At least 7 years of relevant working experience	International working experience is mandatory
Environmental Assessment Expert	MSC	At least 5 years of relevant working experience	International working experience is mandatory
Water Management Engineer	Master Degree in Hydraulic engineering	At least 5 years of relevant working experience	
Socio-Economy expert	Master Degree in Social Studies	At least 5 years in Socio-Economic studies and planning	Experience in a Arab Country
Expert in environmental legislation and international conventions	Master degree in Law	At least 5 years of relevant working experience	Proficiency in French language would be an asset



Clean Development Mechanism: Assessment and Pilot Proposal

CDM, Clean Development Mechanism, is one of the key tools introduced with the Kyoto Protocol Ratification. Basically it allowed developed countries (Annex A) to gain carbon credits through the execution of projects in developing countries (e.g. Iraq) aimed at reducing the greenhouse gases emissions. Iraq, once completed the First National Communication, will be entitled to benefit for projects and green technologies coming from developed countries. For this Reason, Nature Iraq and the New Eden team performed a series of activities aimed at preparing the Iraqi experts on this topic.

The first task had been scouting for the main interesting projects that could benefit and legitimate an investment from developed countries within the Iraqi boundaries. Industry, Forestry and Oil are some of the most common issues addressed when it comes to CDM. As expected, oil and energy are the main contributors and the priority sectors to be addressed for carbon credits. At the beginning of 2010, the New Eden team also produced a study on the opportunities to develop Concentration Solar Technology plants in Iraq, again as part of the start-up of the CDM system in Iraq.

The study addresses the following topics:

- Kyoto flexible mechanisms: CDM projects
- Introduction to CDM
- CDM market: overview of MENA countries
- CDM in Short: Project Cycle
- Registration, Crediting and Monitoring
- Obtaining CERs
- How Iraq could develop CDM market
- Potential sectors of development
- Key steps to be followed for the implementation of CDM projects in IRAQ
- Key barriers for CDM development
- Concentrating Solar Power: Potentialities of Thermodynamic Solar Plant in Iraq
- Renewable energies and Concentration Solar Power: Iraqi Potentialities
- Solar radiation;
- Technical characterization of a CSP plant

- Why CSP
- Example of CSP tower technology: the PS10 and PS20.

Figure 18: front page of the CDM study



Furthermore, a specific assessment was carried out by the New Eden team in the second half of 2010 on the potentiality of the oil sector, especially in relation to the flare gas technologies. An extensive data collection was carried out to provide all the data and information needed for the development of the study.

The study addressed the following main topics:

Introduction to Flaring Gas Technology

Flaring Gas Technology and GHGs Emissions (example on the right)

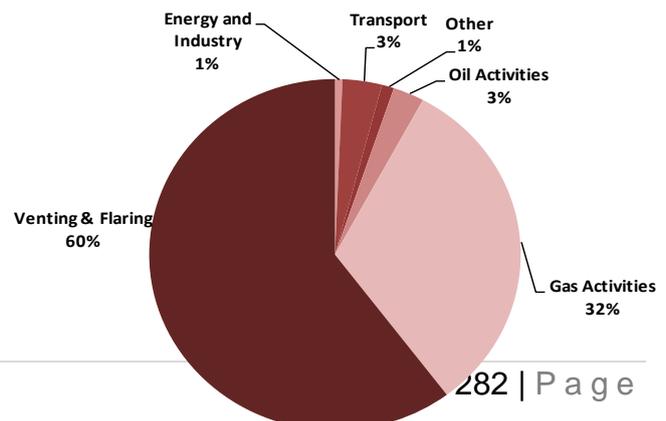
Flaring Gas Market and CDM opportunity

Environmental and Economic Scenarios

Do Nothing vs Flare Gas Scenario (2020)

Case studies

The study concentrated on the well known possibilities in the region for upgrading or





retrofitting industrial facilities in order to limit GHG emissions, such as emission reduction of HFCs, PFCs and CH₄ (e.g. landfill gas and fugitive emissions).

Furthermore, the study assessed the potentialities of the implementation of carbon capture and storage (CCS) activities Initially for Enhanced Oil Recovery (EOR) purposes and possibly later for permanent storage in empty oil and gas fields. It was also highlighted that recovery of associated gas that would otherwise have been flared is one of major possible realistic option in the region that is eligible under CDM.

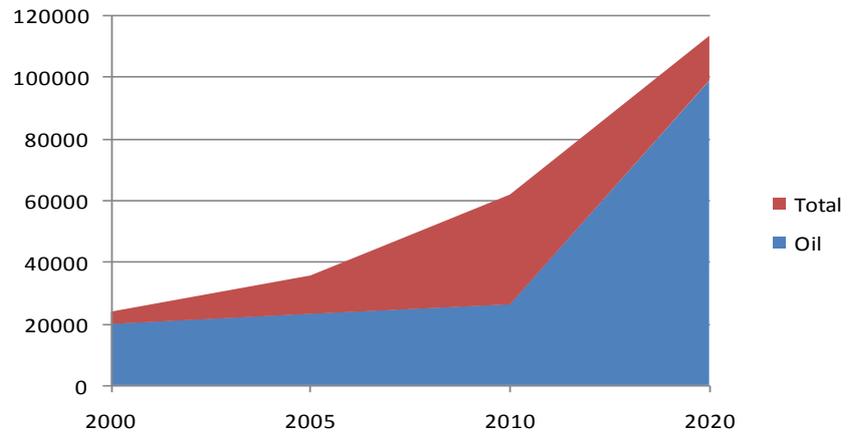
The potential of Iraq in terms of gas flaring recovery is confirmed by the following table, which provide the top ten Flaring Countries in the world in the period 2005-2007 (with volumes expressed in BCM):

Figure 19: Top ten Flaring Countries in the world in the period 2005-2007 (with volumes expressed in BCM)

Country	Year		
	2005	2006	2007
Russia	55.2	48.8	50.0
Nigeria	21.3	19.3	16.8
Iran	11.3	12.1	10.6
Iraq	7.1	7.4	7.0
Kazakhstan	5.8	6.2	5.3
Algeria	5.2	6.2	5.2
Libya	4.4	4.3	3.7
Angola	4.6	4.0	3.5
Saudi Arabia	3.0	3.3	3.4
Qatar	2.7	2.8	2.9

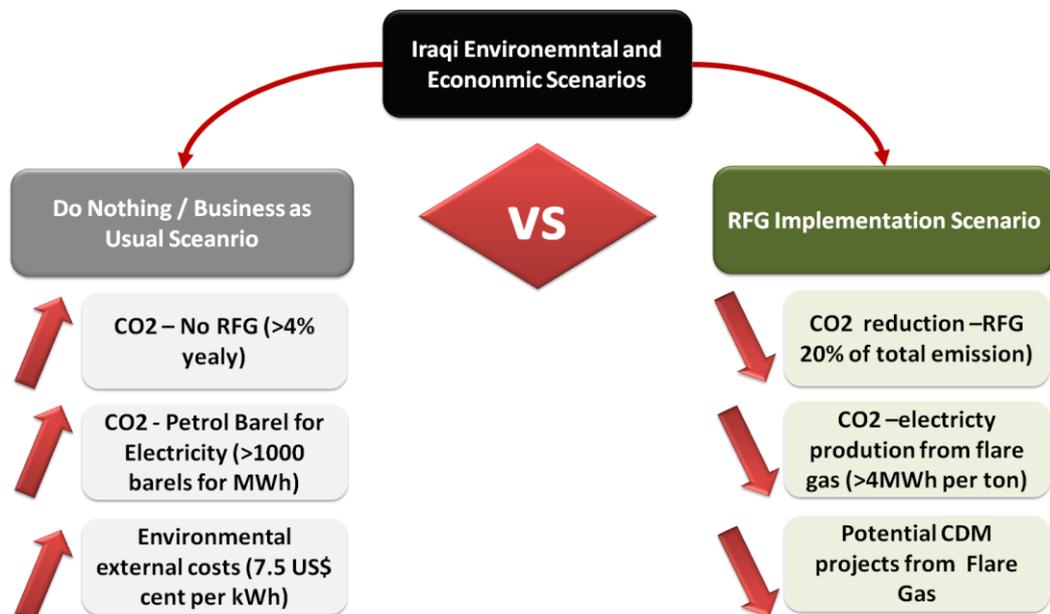
Considering the significant expected development of the oil exploration/exploitation activities in Iraq in the next 20 years, the potential for gas flaring recovery will become huge and, according to the results of the study, the recovery of Flare Gas could reduce the total GHGs emission by 20-25%.

In the next 10 year the Iraqi GDP is expected to increase by 20% yearly: the country energy needs are expected to duplicate in the next 5 years (from 100 to 200 Mtoe). Without a clear emission strategy the tCO₂/capita shall pass from the present value of 3 to 10.



The study evaluated the potential saved environmental costs of flaring at 3.4 US\$ cent per gas tons. A Do Nothing vs Flare Gas recovery comparison for the year 2020 was carried out, according to the scheme shown below. The results confirmed a potential reduction of the GHG emissions through their recovery of 20-25% vs. an increase of 40% of the total emissions with the Do Nothing option.

Figure 20: Do Nothing/Business as Usual Scenario vs RFG Implementation Scenario

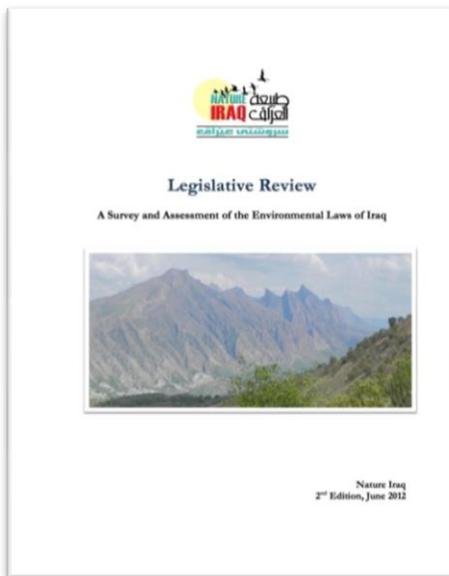




The results obtained and the numerical value had been discussed and presented by the Italian experts together at the Steering Committee of Rome, February 2011. The first step had been the assessment of the Iraqi possibilities toward this market and what could have been the most profitable and rewarding field from which the entire Iraqi population could benefit. The outcomes of the analysis was presented in Baghdad to key representatives of the relevant Ministries through dedicated meetings.

18. Environmental Legislative Review (2011)

In 2011-2012, an environmental legislation review took place, which resulted in the publication of the report *Legislative Review: a Survey and Assessment of the Environmental Laws of Iraq*. This report, which was issued in 2011 and updated and republished as a 2nd Edition in 2012, gives an overview of the environmental laws, regulations, and instructions of Iraq and the Kurdistan Region. In so doing, it seeks not only to explain the existing operative laws but also recommend ways to improve compliance and protection.



In the latest edition, particular emphasis was given to:

- EIA
- Soil
- Hazardous Waste
- Compliance and Enforcement
- Penalties



-
- Forest Management
 - Hunting
 - Water, and
 - Protected Areas

This Review has been a pivotal tool in both present and planned activities to improve environmental laws and regulations. For example, when the New Eden Group gave an Environmental Impact Assessment training to IMoE staff in September and November of 2013, the robust legal review served as the context and framework for planning the training and advising IMoE on how best to improve their laws in this area.

Ongoing regulatory work concentrates on:

- Conducting a series of consultative meetings and trainings with governmental stakeholders to discuss not only the findings of the report but also lend expertise in crafting future regulations, as detailed in section D.5
- Developing a series of guidelines for implementation of EIA and SEA procedures, with particular focus on integration of measures for habitats and biodiversity protection.
- Working with IMoE on draft legislation for the creation of National Parks.
- Consulting IMoE on how best to satisfy Iraq's obligations under various international agreements, including the Ramsar Wetland Convention, the Convention to Combat Desertification, the Convention on Biological Diversity, and the UNFCCC.

For 2014, Nature Iraq will launch the Iraq Waterkeeper Environmental Law and Advocacy Project, funded by the European Commission, which aims to improve the governance environment in Iraq by facilitating the development of a culture of civil society. Specifically, the four-year project aims to increase the capacity of local non-profit organizations to advocate for effective use of natural resources, increase NGO/government partnerships for problem solving and planning, improve participation and feedback between NGOs, the public and government in the process of developing effective environmental laws and regulations, increase the capacity of government workers who are responsible for environmental



enforcement, and bolster NGO involvement in the implementation of environmental and natural resource laws and regulations.

In addition to raising CSO capacity in running successful advocacy campaigns and increasing cooperative CSO-Government partnerships, a specific objective of the project is to improve participation and feedback between CSOs, the public and government in the process of developing effective environmental laws and regulations. Although the final version is published in the Official Gazette, the laws of Iraq are developed without public input. Nor are there public meetings or comments allowed for the promulgation of regulations that help implement the laws. Although there has been some outreach to local communities living in the Mesopotamian Marshes in southern Iraq by the Ministry of Water Resources, this attempt at public participation is localized and very limited. Overall, the public has no input and rarely even knows when a law is passed or what their rights are under the law.

This objective will work to increase transparency by hosting joint meetings with municipal and regional government leaders, CSO directors, and community stakeholders to explore mechanisms for greater public involvement in the promulgation of legislation and regulations, including allowing public comment on draft laws. Albeit on a local level, such meetings can help enable public participation in decision-making processes and, as a result, improve transparency and make policies better fitted to the facts on the ground and needs of the people.

Another objective is to increase the capacity of government workers who are responsible for environmental enforcement, and bolster CSO involvement in the implementation of environmental and natural resource laws and regulations. This objective, therefore, has two interwoven components: enhancing the capabilities of governmental workers tasked with enforcement to understand and respond to illegal behavior; and working to create opportunities for cooperation in enforcement between CSOs and the government. The result will be greater technical skills for government workers, better environmental protection and adherence to the rule of law, and increased communication and collaboration between a range of actors, including CSOs, government, and private businesses.

The environmental laws of Iraq and the Kurdistan Region are more comprehensive than one might assume for a country that created its first-ever Ministry of Environment in 2003.



Although regulations that flesh out the specifics are often lacking, the general framework exists for protecting water, air, soil, biodiversity, and natural heritage as well as for regulating hazardous substances, waste, hunting, and forestry. There are also laws requiring environmental impact assessments for business projects and creating protected areas for habitat preservation. Iraq is also a signatory to several international conventions such as the Convention on Biological Diversity, World Heritage Convention, Convention to Combat Desertification, United Nations Framework Convention on Climate Change and Kyoto Protocols, Ramsar Convention on Wetlands, and Vienna Convention and Montreal Protocol. The problem, therefore, is not so much in the law as it is in the enforcement. This project will help address that by giving government workers some of the tools they need for better implementation, and will bring the CSO community into the discussion so that organizations can help serve as watchdogs on behalf of the government, and government workers can begin to see non-governmental organizations as a help rather than a hindrance.

19. Master Program on Biodiversity in Iraq (2011-2012)

The MoE is planning to develop in collaboration with the New Eden Group, an Iraq Master Program for Biodiversity Conservation (IMPBC), called here simply the “Master Program on Biodiversity” aimed at starting scientific coordination for organization of existing data collection, gap analysis evaluation, harmonization of methodologies and criteria for biodiversity assessment and compilation of checklists of species, planning of field activities in different scientific sectors, developing reports and a comprehensive GIS database, as well as dissemination of knowledge about biodiversity in Iraq through organization of workshop, involvement of Iraqi universities, development of scientific publications and peer reviews, creating communication materials for public awareness raising.

In 2011-2012, the New Eden Group assisted the MoE in several Biodiversity Capacity Building activities that included: Trainings that took place on Plant Red-Listing and Field Methods for Birds and Wild Ungulates. These training programs included several staff from the Iraqi Ministry of Environment and Kurdistan Environment Protection & Improvement Board. In June 2012 the MoE formed a Working Group made up of the MoE, Nature Iraq (New Eden Group), MoHE and outside experts. This Working Group focused on fauna and created 6 sub-groups/sectors (GIS/Database, Birds, Mammals, Amphibians, Reptiles, & Fish),



which focused in turn on gap analysis, collect information and references, and submitted plans for gap filling in each sector. Work plans documenting how each task was going to be accomplished were outlined for each group. The Working Group used these sub-group plans to make a masterwork plan and budget covering all work for these individual groups and send to the Minister of Environment for final approval.

Consultative and coordination meetings for the project have occurred on 13 August, 5 & 10 September. In September-October of 2012, the New Eden Group assisted in reviewing some of the biodiversity data that MoE maintains on reptiles and other fauna, providing translations of key research papers and developing the work plan and budgets for program activities and field work for the specific sub-groups as well as integrating these work plans. The New Eden Group also helped in developing a logo for the program.

F. Activities from 2012 to 2013

1. Management of Animal Ecology and Adaptation to Climate Change in the Mesopotamian National Park (2013)

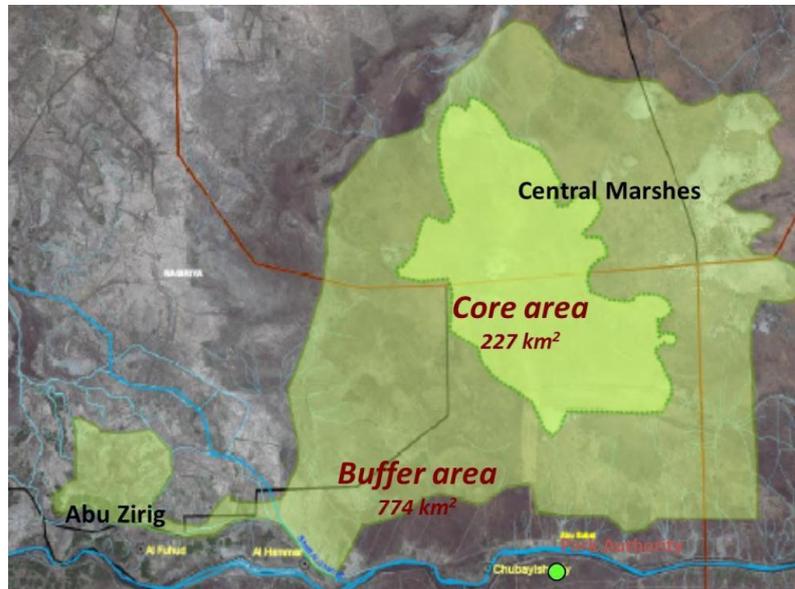
As mentioned above, MOE is currently developing the First National Communication to be submitted to the UNFCCC Secretariat. Unfortunately, as already highlighted many times during the past several years, information regarding climate change and biodiversity throughout Iraq is difficult to collect on a wide scale.

In order to remedy this situation, IMoE and Nature Iraq have agreed to engage in a study with significant fieldwork activities aimed at concretely addressing the issue of the effects of climate change on the biodiversity of the marshes and identifying the possible adaptation measures to be taken to mitigate or eliminate those effects. Iraq is Non-Annex I country in the UNFCCC and therefore should focus on adaptation studies and scenarios, and adopt a plan against climate change.

Study Area

The Study Area for assessing the impact of climate change on the biodiversity of the Mesopotamian marshlands is part of the first National Park (NP) area in Iraq, one of the ambitious strategic projects that have been planned for the Iraqi Marshes. The NP site is

located in the Central Marshes, to the north of AL-Chibayish city, Thi Qar province. The NP covers an extent of 1910 km², 55% in Thi-Qar Governorate, 36% in Missan and 9% in Basrah Governorate, with a maximum length of 58 km and a width of 40 km.



The area of the Mesopotamian Marshlands National Park

The field survey project covered 400 km². The area is known for its traditional economic activities (including fishing, animal husbandry, reeds weaving, agriculture, and hunting), a great deal of which depends on water buffalo as a source for milk, milk products, and meat. Large numbers of buffalo are observed in this area, especially in the areas surrounding the core NP area.

Project's Objectives

The project is aimed at addressing the following issues/questions:

- Evaluate the impact of climate change on water buffalo and wild vertebrates in the Marshlands;
- Identify the main indicators/signals of climate change in the Marshland area;
- Define the suitable projections/predictions model for Water Buffalos and wild vertebrate populations and distribution in the Marshland in 2020 and 2030;
- Assess the possible limits posed by the water quality, quantity, and water salinity to the biodiversity distribution in the area;



- Identify the impact resulting from climate change on Important Bird Areas (IBAs) and Key Biodiversity Areas (KBAs) sites in the area of study; and
- Define a future adaptation plan for climate change in the study area as a pilot plan to then be extended to other similar areas in Iraq.

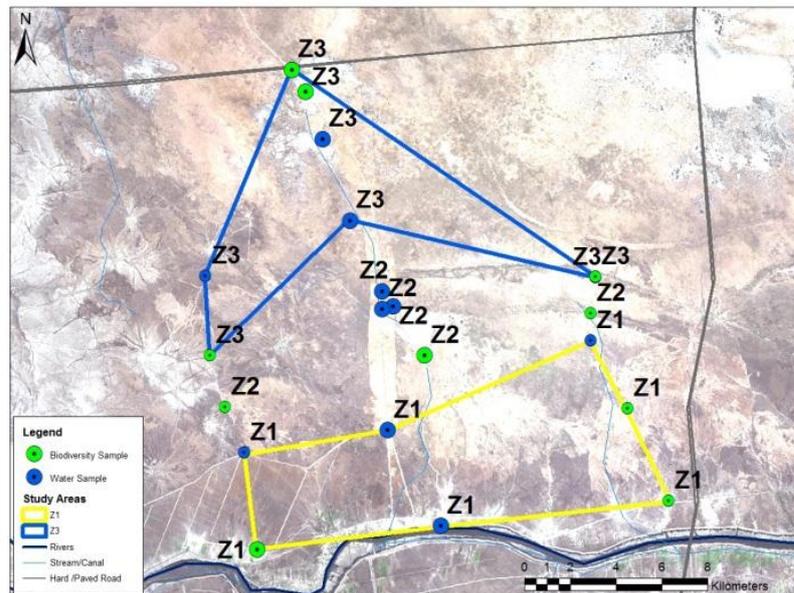
Tasks

The project includes several tasks, which are briefly described below:

- **Climatic parameters:** air and water temperature are the main parameters that were studied. The newly collected data are being compared with historical data for the same area (already retrieved from the relevant authorities and elaborated), and connected to other data in order to draw an adaptation model for the National Park.
- **Water quality:** the most suitable model of Water Quality Index (WQI) has been selected according to the nature of the marshes and the most effective water quality chemical and physical parameters currently being collected and analysed.
- **A water quantity model** for three years was designed according to the quantity of water that feed the area of study.
- **Water Buffalo:** data on the distribution, condition and productivity of the water buffalos in the study area are being studied.
- **A wide-scale temporal data collection** was organised for the historical data of climate conditions, water quality, and water buffalo. These data are being compared to the current data collected through the present study.
- **An overall predictive model** was designed in order to predict the possible future effects of climate change on water quality and quantity and, thereby, on water buffalo and fauna in the study area and how these elements naturally adapt to this change in climate. This model might be modified in the future in order to suggest the best and most applicable scenarios for adaptation management.

Three transects were chosen and surveyed inside the NP area according to the nine channels feeding the area (see Figure below). The 1st transect starts from the 1st channel feeding the NP in Al Hamrawia (Al Moajed village) in the west part of the NP, the 2nd transect starts from

Abo Sobat channel in the middle of the main water channels, and the 3rd transect starts from the last channel feeding the NP in the eastern part in Al Kinziri area.



Map of the three transects in the National Park

Each transect is about 20km long and is divided into three zones that were visited monthly for one year to measure the environmental, physical and chemical water quality parameters (pH value, Salinity, Turbidity, Electrical Conductivity, Total Dissolved Solids), using a Multi-Meter instrument to measure the physical water quality parameters in the field, and an Atomic Flame and Spectrophotometer in the lab. The lab of University of Technology in Baghdad is being used for the analysis.

Approximately 400km² (20km by 20km) through the three transects were surveyed in order to define the exact number and distribution of water buffalo and wild vertebrates inside the area. GPS equipment was used to identify the distribution of fauna in the area, mapped using GIS technology. Four economic representative points will be surveyed four times/month for twelve months (from Oct, 2013 to Oct, 2014) to evaluate the Central Marsh NP ecosystem services.

Performed Activities

The transects were visited three times in October, November, December 2013, and January 2014. Each transect started from the Euphrates River and ended in the last point of the water

in the north of the river, inside the National Park. The survey team carried out the following steps during the surveys of each transect:

- Measure the physical water quality parameters (pH value, Salinity, Electrical Conductivity, Total Dissolved Solids) in 20 sites in all the transects, using Multi-Meter equipment.
- Take water samples from the 20 sites in each transect for lab analysis.
- Approximately 400km² (20km by 20km) through the three transects were surveyed in each month in order to define the exact number and distribution of water buffalo and wild vertebrates inside the area.
- A preliminary description of vegetation was made: in January 2014 a more detailed study regarding the vegetation in the area of study was started.
- Ecosystem services survey and assessment was started according to the frequency/criteria indicated above.

The pictures below were taken during the first four months of field surveys.

Transect 1





Zone 2 (Soft shell turtle)



Zone 2



Zone 2 (Moorhen)



End of zone 2 dragon fly



Zone 3



Zone 3

Transect 2



Fishing in Zone 1



Fishing in Zone 1



Reed harvesting in Zone 1



Main economy point in Zone 2



Hunting in zone 2



Zone 2 Marsh Harrier



Zone 2



Zone 2 Cormorant



Zone 2 Marsh Harrier



Zone 3 - Al Hamara Al Kabira



Zone 3 Squacco Heron



Zone 3 Cattle Egret



Al Hamara Al Kabira (Gulls)



Al Hamara Al Kabira



Al Hamara Al Sagera

Transect 3



Zone 1



Zone 1



Zone1



Fishing in zone 1



Fishing in Zone 1



Zone 1 - Point for selling plants



Water Buffalo in Zone 2



Pied kink fisher in Zone 2



Human activity in Zone 2



Red Wattlebird in Zone 3



Surveyors in Zone 3



Some houses in Zone 3



2. GHG Emission Inventory (2013)

Based on the established 2010-2014 Work Plan and utilizing the “1996 PCC guidelines for National Greenhouses Gas Inventories” and the “Good Practice Guidance for National Greenhouse Gas Inventories” instruction, the New Eden Group provided significant assistance for collection and validation of emission inventory data obtained from various Iraqi ministries in 2012 through 2013.

Support of the compilation of the National Inventory was a prioritized activity in this phase. In coordination with IMoE, Nature Iraq defined and guided the collection, organization and archiving of the data needed for the preparation of the National Inventory with all of the concerned Ministries (Ministry of Environment, Ministry of Oil, Ministry of Industry and Minerals, Ministry of Agriculture, Ministry of Electricity, Ministry of Transportation, Ministry of Housing & Construction, Ministry of Water Resources, Ministry of Science and Technology, Ministry of Higher Education and Scientific Research, Ministry of Health).

The creation of an emissions database is a massive undertaking, requiring the collection and organization of large amounts of data. In order to understand how best to create such an important tool in addressing climate change, key meetings and interviews were organized with IMoE in 2013 in order to define the main needs an Iraqi emission inventory. The New Eden Group provided a range of information needed to plan, carry out and report results of a national inventory, using the IPCC system as a model and guide. The Climate Change Center focal points supported the New Eden Group during these meetings, which is pivotal to the project. Indeed, having members of the Iraqi Center fully engaged will make the difference between a failed project and a successful one. At these meetings, the experts of Nature Iraq focused their activities on checking the consistency of the collected data and the reliability of the source, which is always a difficult but supremely important aspect of understanding the impact of climate change in a country. All of these actions are fundamental for a correct development of the final emission data set.

3. Technical Assistance for the Implementation of CBD in Iraq (2013)

National Biodiversity Strategy

In parallel with the ongoing GEF funded project “First NBSAP for Iraq and Development of Fifth National Report to the CBD” developed by UNEP and IMoE, the New Eden Group is



supporting IMoE in the implementation of CBD related activities. Chiefly among them is the preparation of the National Biodiversity Strategy and Action Plan (NBSAP), which is identified under Art. 6 of the CBD as the principal instrument for implementing the Convention at the national level.

The stakeholder consultation process is a key element of the preparation of the NBSAP. The New Eden Group, therefore, has been providing assistance to IMoE staff in the stakeholder analysis and the elaboration of the stakeholder consultation plan. Additionally, the Group is aiding with the organization and preparation of materials for five workshops (two national workshop and three regional workshops) held in Iraq and one international workshop held in Jordan in 2013 and reporting of outcomes of the consultation. The sub-national (regional) consultations invited all of the Iraqi governorates to take part in the consultation process, including representatives of the governorates and local communities under each major geographic group identified as follows:

- North Iraq and Kurdistan: Ninewa, Kirkuk, Sulamanyah, Erbil, Dohuk
- Central Iraq: Anbar, Kerbala, Baghdad, Diyala, Salah Ad Din, Babil, Wasit
- South Iraq: Basrah, Najaf, Missan, Dhi-Qar, Diwaniya, Muthanna.

At the end of the stakeholder consultation, an international workshop was organized by UNEP-ROWA and IMoE in Amman, with the participation of 32 representatives of Iraqi institutions in order to start the target setting process according to the CDB Strategic Plan 2020 and the Aichi Targets. Several technical meetings were then held in Baghdad with IMoE and national biodiversity experts for the organization of the stakeholder consultation process.

	Workshop	Participants	Objective and Outcomes
1	First National Workshop on Stocktaking and Biodiversity Assessment (Baghdad, 19-20 Dec 2012)	National Decision Makers (Ministries, Governorates) Scientific Community (Universities, National Research	Introduction to NBSAP process Stakeholder involvement and stocktaking Biodiversity Baseline Assessment



Workshop		Participants	Objective and Outcomes
		Centers, Museums) NGOs, media	
2	Second National Workshop on Biodiversity Target Setting (Baghdad, 26-27 May 2013)	National Decision Makers (Ministries, Governorates) Scientific Community (Universities) NGOs, media	1) Involvement of stakeholders in the definition of the first NBSAP for Iraq 2) identification and outline of the National Strategic Objectives and Targets for the implementation of the UN Convention on Biological Diversity in Iraq; 3) 3) setting of national priorities for biodiversity conservation and sustainable use in Iraq
3	Regional Workshop Central Iraq (Baghdad, 27 May 2013)	Provincial Decision Makers (Governorates)	Identification of regional and local targets and priorities of the National Biodiversity Strategy of Iraq
4	Regional Workshop North Iraq and Kurdistan (Sulaimaniyah, 19-20 June 2013)	Scientific Community (Universities, Research Centers) Local Community	
5	Regional Workshop South Iraq (Basrah, 26-	NGOs, media	



	Workshop	Participants	Objective and Outcomes
	27 June 2013)		
6	International Workshop for SMART Target Setting and development of Biodiversity Indicators (Amman, 1-4 July 2013) held by UNEP-ROWA, MOE, CBD and WCMC	UNEP-ROWA MOE National Biodiversity Expert Team National and Provincial Decision Makers International Experts	

The National Groups identified by the Aichi targets were considered the most urgent priorities to be addressed by the National Strategy. Here follows a brief summary of the main pillars extracted from the Group answers to the guiding questions, which will be useful for the formulation of SMART national targets.

There were 20 Targets that were identified and assessed by the national team in terms of priority and importance at the national level. The level of importance was assessed on a scale from zero to three, with three representing the highest importance. The highest national priority targets are as follows:

- Target 1 Awareness raising
- Target 5 Habitat loss halved or reduced
- Target 11 Protected areas increased and improved
- Target 15 Ecosystems restored and resilience enhanced
- Target 16 Nagoya Protocol in force and operational
- Target 19 Knowledge improved, shared and applied

The main purpose of the three sub-national workshops was to identify the regional priorities for the three regions of Iraq with a focus on eco-regions. Therefore, also for the sub-national



consultations, the same approach was based on the five Strategic Goals of the Convention and on the Aichi targets was adopted as a general framework for setting priorities. In addition, as compared with the national process, the sub-national consultation adopted a process that focused on main habitats/eco-regions of Iraq, taking into account those that are present in the North, Central and South Iraqi regions.

At the end of this stakeholder consultation round, an international workshop on the NBSAP and Indicators for Iraq was organized by UNEP-ROWA and IMoE, in collaboration with the Secretariat of the Convention on Biological Diversity (SCBD) and the World Conservation and Monitoring Centre (WCMC), in Amman, Jordan, on 1-4 July 2013. The objectives of the workshop were:

- To set provisional national targets based on the Strategic Plan for Biodiversity 2011-2020 and its Aichi Targets and based on the data collected to date.
- To enable national stakeholders to develop biodiversity indicators utilizing the Biodiversity Indicators Partnership (BIP) guidance.
- To design a road map for the development of the NBSAP for Iraq

The workshop included some training sessions in order to build capacity of twenty Iraqi stakeholders to interpret the global Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets into SMART national targets, and develop impact indicators for monitoring Iraq's biodiversity. The workshop benefited from having all partners present, as well as IMoE, SCBD and UNEP to discuss various project framework components and set a roadmap for the development of the NBSAP for Iraq. Presentations and guidance tools about target setting within the Aichi target framework, mainstreaming biodiversity and promoting MEAs synergies were provided by the SCBD and UNEP.

A field trip to Ajloun Protected Area was organized for the participants on the third day by the Jordanian Royal Society for Conservation of Nature (RSCN), in order to show Jordan's experience in conservation and the contribution of ecosystem services to the economic and social development of local communities in Ajloun. UNEP-WCMC Biodiversity Indicators Partnership (BIP) provided technical support to the workshop through training sessions on indicator development and use in accordance with the Biodiversity Indicator Development Framework (BIDF) and learning tools.



Figure F-1 Participants to the international workshop on SMART Target Setting and development of Biodiversity Indicators

With the facilitation of international experts from UNEP-ROWA, CBD and WCMC-BIPF, the outcomes of the national priority selection were analyzed and framed according to the national context of Iraq, and a set of national targets were developed.

Priority Aichi Targets for Iraq	International Workshop (1-4 July 2013)	Amman	Final Targets for the National Biodiversity Strategy of Iraq
Target 1 - Awareness increased			1. By 2020, 25% of urban and rural people have awareness of the status of biodiversity, its benefits for people, the pressures that affect it, and the actions they can take for its conservation and sustainable use



<p>Priority Aichi Targets for Iraq</p> <p>International Amman Workshop</p> <p>(1-4 July 2013)</p>	<p>Final Targets for the National Biodiversity Strategy of Iraq</p>
	<p>2. By 2020, 100% of policy makers and planners have awareness of the status of biodiversity, its benefits for people, the pressures that affect it, and the actions they can take for its conservation and sustainable use</p> <hr/> <p>3. By the end of 2015 a national survey of tools used for public awareness of biodiversity is completed.</p> <hr/> <p>4. By 2020 the use of tools (films, publications, educational programmes, guidance materials, and training) for raising awareness of biodiversity is improved with locally defined, area based and targeted awareness programs (e.g. governorate level)</p>
<p>Target 5 - Habitat loss</p>	<p>5. By the end of 2015 a GIS database of the extent, condition and protection status of the natural habitats of Iraq has been developed. [I think status needed to be better defined. 'Condition' is still a bit vague, but could be degree of modification from a natural state]</p> <hr/> <p>6. By the end of 2020 the reasons for loss and degradation of each of the natural habitats of Iraq have been identified.</p> <hr/> <p>7. By the end of 2015 the main pressures on forest ecosystems are identified and studied</p> <hr/> <p>8. By the end of 2020 legislation to address the main pressures on forest ecosystems and native forest species is issued, promoting sustainable management, restoration and conservation.</p> <hr/> <p>9. By the end of 2020, about 1,000 square km of desertified shrubland grassland is restored</p>
<p>Target 8 - Pollution reduced</p>	<p>10. By end of 2016 a national monitoring</p>



<p>Priority Aichi Targets for Iraq</p> <p>International Amman Workshop</p> <p>(1-4 July 2013)</p>	<p>Final Targets for the National Biodiversity Strategy of Iraq</p>
	<p>programme is established for identification of the main sources and diffusion paths of chemical and physical pollutants in the natural ecosystems and the effects of pollution on natural ecosystems</p> <hr/> <p>11. By the end of 2018 environmental standards are issued and enforced for prevention and control of priority pollutants in the natural ecosystems</p>
<p>Target 11 - Protected Areas</p>	<p>12. By the end of 2014 a decree is issued for the establishment of protected areas in Iraq</p> <hr/> <p>13. By the end of 2014 at least three training workshops on PA management have been conducted</p> <hr/> <p>14. By the end of 2015 a study and GIS maps of the most sensitive habitats have been developed</p> <hr/> <p>15. By the end of 2020 ten new Protected Areas have been gazetted and established</p>
<p>Target 14 - Ecosystem services</p>	<p>16. By the end of 2016 a national assessment is published of the state of provisioning, regulating and cultural services supplied by natural ecosystems and their importance for rural and urban people and on management options to be developed for the sustainable supply of ecosystem services</p> <hr/> <p>17. By the end of 2018 a national strategy/subnational strategies are established for the sustainable management of ecosystems to supply important ecosystem services for rural and urban people</p>
<p>Target 9 - Invasive species</p>	<p>18. By the end of 2016 legislation is enacted to control the introduction and diffusion of non-native species into the natural environment</p> <hr/> <p>19. By the end of 2020 the list of invasive species of</p>



Priority Aichi Targets for Iraq		Final Targets for the National Biodiversity Strategy of Iraq	
International Workshop (1-4 July 2013)		Amman	
			Iraq and their impacts and invasion pathways has been published.
Target 12	- Threatened species		20. By the end of 2020 the list of threatened species of Iraq has been published and an action plan for the conservation of priority species is produced 21. By 2020 legislation for the conservation of threatened species is issued and enforced
Target 18	- Traditional knowledge		22. By the end of 2020 a survey of indigenous and local communities' traditional knowledge, use and practices relevant for the conservation and sustainable use of biodiversity is published.
Target 20	- Financial resources for implementation		23. By 2016 a Resource Mobilization Plan for implementation of the NBSAP is established and implemented

Communication Plan

Iraq faces many environmental challenges that constitute a source of natural resource degradation and a threat to its future generations. These environmental challenges are due to the inability of available resources to meet people's needs, in addition to the abuse of available resources. Among Iraq's main environmental problems - such as pollution of various types, scarcity of water supplies, population increase, resources depletion – biodiversity loss is becoming a major concern because of its rapid intensification. The direct causes of biodiversity loss – habitat change, overexploitation, the introduction of alien species, nutrient loading and climate change – show no sign of abating.

Awareness is the most effective means for rationalizing the use of resources and preserve biodiversity. Raising public awareness and concern about the pressures on biological diversity by human activities is one of the key missions of IMoE. Effective communication requires



setting clear objectives as to what needs to be changed in knowledge, attitude, and behavior as well as gaining the support from decision makers and potential partners.

A key message to be disseminated is that biodiversity and poverty reduction are intrinsically linked and demand an integrated approach. The Convention on Biological Diversity (CBD) has long emphasized the need for integrating or “mainstreaming” biodiversity into national and local development and poverty reduction strategies, most recently in its new Strategic Plan for Biodiversity (2011-2020). Iraq is moving its first steps towards the development of its National Biodiversity Strategy Action Plan. It has received funding through GEF financial mechanism for the Enabling Activity Project “*First NBSAP for Iraq and Development of Fifth National Report to the CBD.*”

Nature Iraq has been requested by IMoE to draft, according to the GEF guidelines, the National Communication Strategy on Biodiversity, which is a major commitment for Iraq. The activities carried out for the preparation of the Strategy are summarized here below.

Fifth National Report to the CBD

According to Article 26 of the Convention on Biological Diversity and Decision X/10 of the CBD Conference of the Parties, Iraq has to submit the Fifth National Report on Biodiversity to the CBD Secretariat by March 31st 2014. Proceeding from the Fourth National Report issued in 2010, the New Eden Team is supporting IMoE in developing an update on the current status of biodiversity and related trends and threats, according to the 5NR guidelines of the CBD. Starting in May 2013, the New Eden Team has supported IMoE in developing a widespread biodiversity data collection and elaboration of a set of biodiversity indicators according to the CBD guidelines, in order to provide the update baseline information on the state of biodiversity and ecosystem services in Iraq.

In December 2013, a draft 5NR was prepared for review and integration by the Iraqi national biodiversity experts in cooperation with the New Eden Team. The draft structure of the 5NR of Iraq is as follows:

5NR Structure	Section	Content
	INTRODUCTION	
	EXECUTIVE SUMMARY	



5NR Structure	Section	Content
PART 1	Importance of Biodiversity in Iraq	<ul style="list-style-type: none"> – Main eco-regions of Iraq – Agrobiodiversity – Biodiversity status – Indicators and trends about biodiversity in Iraq
	Major Changes Have Taken Place in the Status and Trends of Biodiversity in Iraq	<ul style="list-style-type: none"> – Desertification – Indicators of Changes in Land cover and land use – Indicators of Deforestation and Grazing
	Main Threats to Biodiversity	<ul style="list-style-type: none"> – Land Mines – Hunting and trading – Alien species – KBA threats assessment
	Impacts of the Changes in Biodiversity for Ecosystem Services and the Socioeconomic and Cultural Implications of These Impacts	<ul style="list-style-type: none"> – Soil quality – Water resources
	Cultural Heritage and Socio-economic activities based on natural resources	<ul style="list-style-type: none"> – Cultural heritage – Socio economic activities
PART 2	Biodiversity Targets in Iraq	



5NR Structure	Section	Content
	<p>Biodiversity indicators to monitor progress in the implementation of the NBSAP</p> <hr/> <p>National Biodiversity Strategy and Action Plan to incorporate Biodiversity Targets and to Mainstream Biodiversity</p> <hr/> <p>Actions taken to implement the CBD Convention since the 4th National Report and outcomes of these actions</p>	<ul style="list-style-type: none"> <li>– NBSAP and related activities <li>– National Environmental Strategy and Action Plan of Iraq (2013-2017) (NESAP) <li>– GEF Project: Initial steps for the Establishment of the National Protected Areas Network <li>– Drafting of the list of proposed protected areas (under the umbrella of the PoWPA programme of the Convention) <li>– Legislation on PAs <li>– Approval of the designation of the Mesopotamia marshlands National Park in the Governorates of Thi Qar, Missan and Basrah <li>– Publication of the KBA Inventory book <li>– Declaration of 2014 year of Environment in Iraq
<p>PART 3</p>	<p>Mainstreaming of Biodiversity into Relevant Sectoral and Cross-sectoral Strategies, Plans and Programmes</p>	<ul style="list-style-type: none"> <li>– National Environmental Strategy and action plan for Iraq (2013-2017) <li>– National development plan (2010-2014) <li>– National strategy on a higher education <li>– Poverty Reduction Strategy <li>– Health strategy <li>– Integrated National Energy Strategy of Iraq 2013-2030 (INES) <li>– Strategy for Water and Land Resources of Iraq (SWRLI)



5NR Structure	Section	Content
		Progress Towards The Implementation of The Strategic Plan for Biodiversity 2011-2020 and Its Aichi Biodiversity Targets
		contribution of actions to implement the CBD Convention towards the achievement of relevant 2015 Targets of the MGSs in Iraq
		Lessons learned in the Implementation of the CBD Convention in Iraq
CONCLUSIONS		
ANNEXES		

4. Technical Assistance for the Implementation of the Programme of Work on Protected Areas in Iraq (2013)

On July 23, 2013, the designation of the Mesopotamia Marshlands National Park was approved by the Iraqi Council of Ministers. This outstanding achievement of the collaboration established between IMoE and Nature Iraq in the New Eden project sets an important milestone of the environmental protection strategy of Iraq. Furthermore, in September 2013, the Iraqi Council of Ministers issued an order to assign the exclusive competence for the designation of Protected Areas to the Ministry of Environment.

Following up with the work developed since 2010 for supporting IMoE in the implementation of the CBD Programme of Work on Protected Areas and according to the request made by IMoE in the coordination meeting in Amman in October 2013, in December 2013 Nature Iraq submitted to IMoE a set of 17 factsheets on the priority sites to be proposed for designation in 2015.

The 17 proposed sites for the establishment of protected areas been assessed for their main environmental features and values. The fact sheet for every proposed protected area has been developed according to the following structure:

- Baseline information about the broader area where the protected area will be established and its main features;
- Site description with its main natural features;
- Socio-economic features

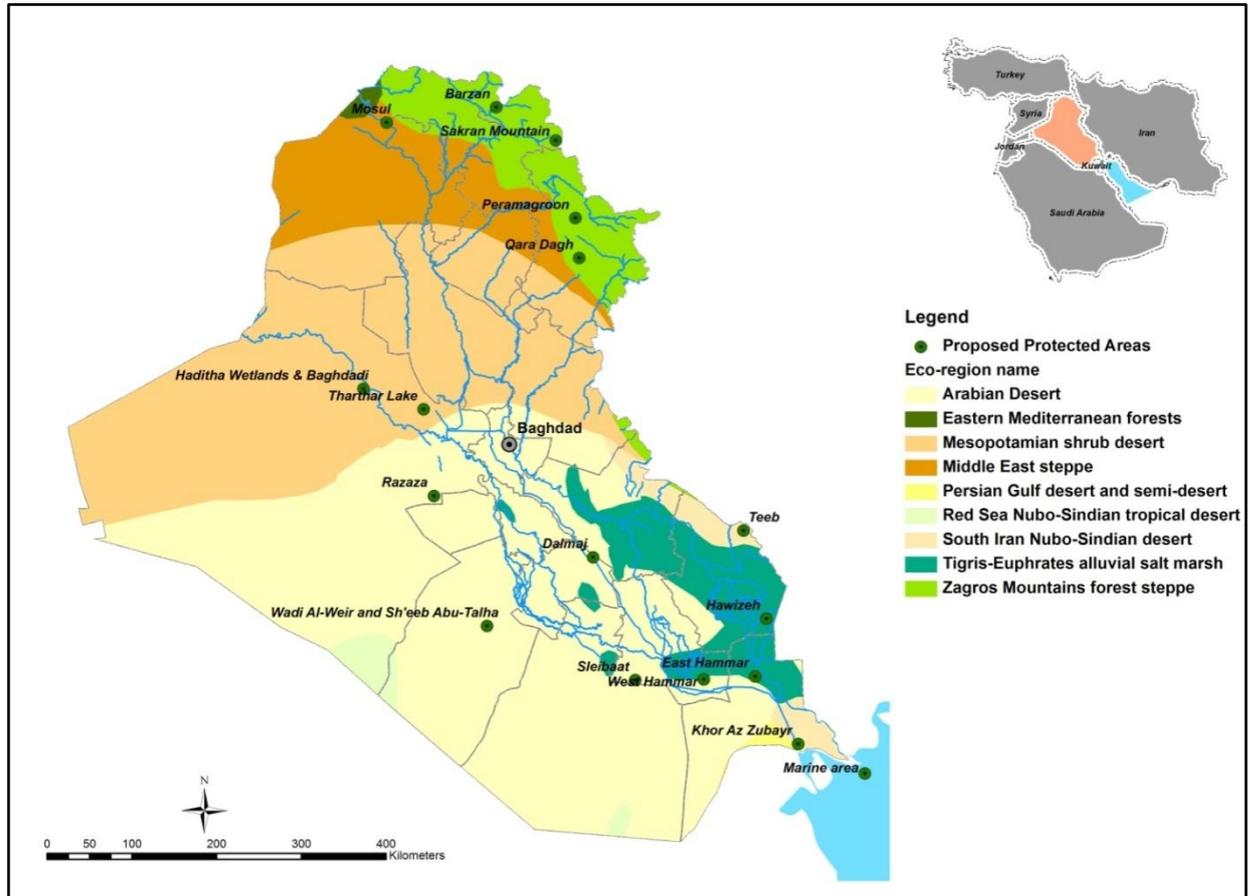


Figure F-2 Map of proposed priority sites for designation of Protected Areas in Iraq

Accordingly, a summary table with main values for each of the 17 proposed sites is presented below:

PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
Dalmaj (wetland)	Marbled Duck (<i>Marmaronetta angustirostris</i>), Ferruginous Duck (<i>Aythya nyroca</i>), Basra Reed Warbler	Ancient Sumerian historical sites along the Nahr An-Neel, the ancient route of the Euphrates	Natural marshland habitat



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
	<i>(Acrocephalus griseldis).</i>		
Mosul (wetland - lake)	European Roller <i>(Coracias garrulus)</i> , Lesser White-fronted Goose <i>(Anser erythropus)</i> , Egyptian Vulture <i>(Neophron percnopterus)</i> , Wild Goat <i>(Capra aegagrus)</i>		
Peramagroon (mountain ridge)	Wild Goat <i>(Capra aegagrus)</i> , Spur Thighed Tortoise <i>(Testudo graeca)</i> , Egyptian Vulture <i>(Neophron percnopterus)</i> ,	Nearby the small village of Zewe, there is an important archaeological site (Merquili) which dates back to the Sassanian period	
Razaza (wetland)	Greater Spotted Eagle <i>(Aquila clanga)</i> , Marbled Duck <i>(Marmaronetta angustirostris)</i>	The city of Kerbala is famous as the site of the martyrdom of Hussein ibn Ali (Imam Hussein), and commemorations are held by millions of Shias	



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
		<p>annually to remember it. Karbala is considered sacred by Shias</p>	
<p>Tharthar (wetland - lake)</p>	<p>Marbled duck (<i>Marmaronetta angustirostris</i>), Euphrates Softshell Turtle (<i>Rafetus euphraticus</i>), Houbara Bustard (<i>Chlamydotis undulata</i>)</p>		
<p>West Hammar marshes (wetland)</p>	<p>Marbled duck (<i>Marmaronetta angustirostris</i>), Eastern Imperial Eagle (<i>Aquila heliaca</i>), Eurasian Curlew <i>Numenius arquata</i> and Ferruginous Duck <i>Aythya nyroca</i></p>	<p>The southern Iraqi marshlands have been proposed as world heritage site of UNESCO because of their outstanding value as natural and cultural feature</p>	<p>Natural marshland habitat and traditional human settlements (Ma'dan)</p>
<p>Khor Az Zubair</p>	<p>Greater Spotted Eagle (<i>Aquila clanga</i>)</p>		



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
Qara Dagh (mountain ridge)	Egyptian Vulture (<i>Neophron percnopterus</i>), Wild Goat (<i>Capra aegagrus</i>), Persian Leopard (<i>Panthera pardus saxicolor</i>), Spur Thighed Tortoise (<i>Testudo graeca</i>).		
Wadi al Weir and Sh'eeb Abu-Talha (desert wadi)	Egyptian Vulture (<i>Neophron percnopterus</i>), Houbara Bustard (<i>Chlamydotis undulata</i>), Goitered Gazelle (<i>Gazella subgutturosa</i>), Striped Hyena (<i>Hyaena hyaena</i>), Spiny-tailed Lizard (<i>Uromastyx aegyptia</i>).	Many archaeological features are present in the area including an ancient road (from the Abbasid era) extending from Wadi Al W'eir to the Iraqi-Saudi Arabian border	Sh'eeb Abu-Talha possibly received its name from a unique tree species that grows nowhere else in Iraq except here, which is called "Talh", the Iraqi Red Thorn (<i>Acacia gerrardi iraquensis</i>).
Haditha wetlands	Euphrates	One of the oldest	



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
<p>and Baghdadi (wetland)</p>	<p>Softshell Turtle (<i>Rafetus euphraticus</i>), Marbled Duck (<i>Marmaronetta angustirostris</i>), Ferruginous Duck (<i>Aythya nyroca</i>), Eastern Imperial Eagle (<i>Aquila heliaca</i>) Pallid Harrier (<i>Circus macrourus</i>), Houbara Bustard (<i>Chlamydotis undulata</i>).</p>	<p>parts of Haditha is the shrine of Sheikh Hadid on the western bank of Euphrates and represents an important cultural and heritage site of the area. Nomadic groups presence</p>	
<p>Teeb oasis (oasis)</p>	<p>Lesser White-fronted Goose (<i>Anser erythropus</i>), Houbara Bustard (<i>Chlamydotis undulata</i>), Eastern Imperial Eagle (<i>Aquila heliaca</i>), Greater Spotted Eagle (<i>Aquila clanga</i>), Striped Hyena</p>	<p>Nomadic groups presence</p>	



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
	<p>(<i>Hyaena hyaena</i>), Spiny-tailed Lizard (<i>Uromastix aegyptia</i>)</p>		
<p>Barzan (mountain ridge)</p>	<p>Wild Goat (<i>Capra aegagrus</i>), Persian Leopard (<i>Panthera pardus saxicolor</i>), Egyptian Vulture (<i>Neophron percnopterus</i>)</p>		
<p>Sakran (mountain ridge)</p>	<p>Wild Goat (<i>Capra aegagrus</i>), Striped Hyaena (<i>Hyaena hyaena</i>), Syrian brown bear (<i>Ursus arctos syriacus</i>), European Roller (<i>Coracias garrulus</i>).</p>		
<p>Sleibaat (wetland)</p>	<p>Houbara Bustard (<i>Chlamydotis</i></p>	<p>Eridu, an ancient Sumerian city, lies close to the</p>	



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
	<i>undulata</i>), Marbled Duck (<i>Marmaronetta</i> <i>a</i> <i>angustirostris</i>), Striped Hyena (<i>Hyaena</i> <i>hyaena</i>)	southeastern part of the site.	
Marine area (marine environment/coral reef)	Dugong (<i>Dugong</i> <i>dugong</i>), Dalmatian Pelican (<i>Pelecanus</i> <i>crispus</i>).		Coral reef
East Hammar marshes (wetland)	Marbled Duck (<i>Marmaronetta</i> <i>angustirostris</i>), Basra Reed Warbler (<i>Acrocephalus</i> <i>griseldis</i>).	The southern Iraqi marshlands have been proposed as world heritage site of UNESCO because of their outstanding value as natural and cultural feature	Natural marshland habitat and traditional human settlements (Ma'dan)
Hawizeh marshes (wetland)	Marbled Duck (<i>Marmaronetta</i> <i>angustirostris</i>), Basra Reed Warbler (<i>Acrocephalus</i> <i>griseldis</i>), White- headed Duck (<i>Oxyura</i> <i>leucocephala</i>)	The southern Iraqi marshlands have been proposed as world heritage site of UNESCO because of their outstanding value as natural and cultural feature, in addition Hawizeh is the only Iraqi Ramsar site, wetland of international	Natural marshland habitat and traditional human settlements (Ma'dan)



PROPOSED SITE	RED LISTED SPECIES	HERITAGE VALUES	OUTSTANDING NATURAL FEATURES
importance			

5. IMO E Capacity Building (2013)

In the coordination meeting held in Padova in July 2013, IMoE asked Nature Iraq to plan for five workshops for IMoE staff to be organized jointly in 2013/2014:

- Workshop on EIA/SEA
- Workshop on Socio-economic Assessment
- Workshop on Environmental Standards
- Workshop on Management of Protected Areas
- Workshop on CITES Convention

The three workshops on EIA/SEA, Socio-economic Assessment and Environmental Standards were conceived as a three-step capacity building for developing and improving the Environmental Impact Assessment procedure in Iraq.

Workshop on EIA

A 3-day workshop on EIA and SEA in Iraq was organized in Sulaimaniyah in September 2013 and was addressed at supporting the MOE and other involved institutions in the EIA decision making process, in order to:

- Develop adequate legislation and regulatory tools for EIA process
- Establish criteria, guidelines and methods to review EIA studies in order to improve project design, construction and implementation, including consideration of possible alternatives, and prevent or minimize serious and irreversible damage to the ecosystems and their functions
- Ensure efficient and sustainable use of resources
- Analyze the impacts on the environment and ecosystem functions and identify appropriate measures for mitigating them and manage residual impacts
- Integrate assessment of social and health aspects



- Ensure stakeholder involvement and public participation in the decision making process
- Inform decision-making and condition-setting for improving the EIA process in Iraq
- Introduce the key concepts and the legislative framework for the establishment of a Strategic Environmental Assessment (SEA) process in Iraq.

The main objectives of the Workshop were:

- Capacity building: this was the first of three workshops on environmental legislation:
 - EIA/SEA
 - Socio-economic Assessment
 - Environmental Standards
- Standards & Methods: overview of EIA legislation and methods
- Communication: enhance communication within the MOE
- Share ideas: use practical examples for stimulating open discussion on EIA and SEA
- Group work: carry out group exercises on reviewing EIA studies.

Workshop on EIA and SEA in Iraq - 3-4-5 September 2013

Day 1	<ul style="list-style-type: none"> • Introduction • National legal context: Overview of the national legislative framework on EIA in Iraq • Key concepts of EIA and SEA • International legal context: Overview of the international legislative framework on EIA and SEA (including integration of social and health components) • Open discussion and wrap up of the first day
Day 2	<ul style="list-style-type: none"> • EIA procedure: screening, scoping and authorization procedure • Stakeholders: involvement of stakeholders and public information • EIA study: structure and content of EIA studies (including integration of social and health components – ESHIA studies) • EIA methodology: review of methods, tools and techniques for developing EIA studies • Group Work - Review of a EIA study (1): baseline environmental analysis • Open discussion and wrap up of the second day
Day 3	<ul style="list-style-type: none"> • Group Work - Review of a EIA study (2): regulatory analysis, project description, analysis of alternatives and analysis of impacts • Workgroup - Review of a EIA study (3): mitigation measures, residual and cumulative impacts and Environmental Monitoring and Management Plan

Workshop on EIA and SEA in Iraq - 3-4-5 September 2013

- Plenary session: Road Map for the development of EIA review and approval process in Iraq
- Final wrap up, distribution of certificates, and closing speech

Table F-1 Topics of the Workshop on EIA and SEA in Iraq (Sulaimaniyah, 3-4-5 September 2013)

The final outcome of the workshop was to lay down a road map for the development of the EIA review and approval process in Iraq. A general overview of the current situation of EIA process in Iraq was developed and an introduction to the current international and national legislative framework and EIA procedure was provided to the participants. Through group activities on reviewing EIA studies, the general methodology for developing EIA studies was analyzed and discussed.



Figure F-3 Workshop on EIA and SEA in Iraq



Overall, 36 representatives of MOE attended the workshop:

- MOE Minister's Advisor Office
- MOE Technical Directorate
- MOE EIA Department
- MOE Water Department
- MOE Marshlands department
- MOE Biodiversity department
- Environmental Directorates of eleven (11) Governorates

The participants appreciated the group work sessions and the plenary debate on EIA process, as they got the possibility to discuss and exchange views with their colleagues of the MOE Central Departments and of Governorate Environmental Directorates. After the workshop, a report on the outcomes was developed by Nature Iraq and submitted to the MOE.

Workshop on Social dimension of Impact Assessment in Iraq

The second 3-day workshop on Social dimension of Impact Assessment in Iraq was held in Sulaimaniyah in November 2013 and was addressed at supporting IMOIE in the assessment of socioeconomic aspects that are integrated in the EIA procedure, in order to:

- Develop adequate legislation and regulatory tools for improving the integrated environmental and social impact assessment process consistently with international standards and acknowledged principles of the SIA process
- Establish criteria, guidelines and methods as a term of reference to review EIA studies with regard to the social aspects considered and the engagement of stakeholders in order to improve project design, construction and implementation, including consideration of possible alternatives, and prevent or minimize serious and irreversible damage to the eco and social systems and their functions
- Analyze the impacts on the social and economic system and identify appropriate measures for mitigating them and manage residual impacts
- Integrate assessment of social and health aspects in the EIA process
- Ensure stakeholder involvement and public participation in the decision making and impact analysis process



- Inform decision-making and condition-setting for improving the EIA process in Iraq through the consideration and analysis of socio-economic issues.

The main objectives of the Workshop were:

- Capacity building: second of three workshops on environmental legislation:
 - EIA/SEA
 - Socio-economic Assessment
 - Environmental Standards
- Principles & Methods: overview of SIA principles and methods
- Communication: enhance communication within the MOE
- Share ideas: use practical examples for stimulating open discussion
- Group work: carry out group exercises on main SIA components, social impact identification and assessment and relevant mitigation measures
- Roadmap: outline a roadmap for improving socioeconomic assessment procedure in Iraq

Workshop on Social dimension of Impact Assessment in Iraq – 5-6-7 November 2013

- | | |
|-------|--|
| Day 1 | <ul style="list-style-type: none"> • Introduction • Overview on ESIA integrated approach • The Social dimension in Impact Assessment and main principles • MOE Socio-economy works • Introduction to Social Impact Assessment: Impact definition, SIA definition and components • Open discussion and wrap up of the first day |
| Day 2 | <ul style="list-style-type: none"> • SIA methodology: Preliminary phases of SIA and Social Baseline Analysis (SBA) • Community Involvement in SIA: Stakeholder analysis & engagement • Socio-economic survey • Group Exercise (1) Social data gathering: selection of methodology • PRA methodology and Nature Iraq work • Open discussion and wrap up of the second day |
| Day 3 | <ul style="list-style-type: none"> • SIA methodology: Social Impact identification and assessment • Group Exercise (2): Social Impact Identification • SIA methodology: Mitigation Measures and Social management plan • Plenary session: Road Map for the development of a SIA process in Iraq • Final wrap up, distribution of certificates, and closing speech |

**Table F-2 Workshop on Social dimension of Impact Assessment in Iraq
(Sulaimaniyah, 5-6-7 Nov.2013)**



Figure F-4 Presentations and Workgroups of the Workshop on Social dimension of impact assessment in Iraq

A road map for the integration of the social dimension in the EIA review and approval process in Iraq was laid down as a main outcome of the workshop. Overall, 20 representatives of MOE attended the workshop:

- MOE Minister's Advisor Office
- MOE Technical Directorate
- MOE EIA Department
- MOE Water Department
- MOE Marshlands department
- MOE Biodiversity department
- Environmental Directorates of eight (8) Governorates



At the end of the workshop, guidance materials on the ESIA process were distributed to all participants. After the workshop, a report on the outcomes was developed by Nature Iraq and submitted to IMoE.

Preparation of the Third Workshop on Environmental Standards

The third workshop on Environmental Standards has been scheduled for early 2014. The preparation of the workshop was started in December 2013 and is focused on the following main topics and the related environmental standards in use:

- Water resources (inland, transitional and coastal waters)
- Soil and sediment, waste
- Air and climate
- Noise, vibrations, electromagnetic fields
- Energy efficiency
- Biodiversity, landscape and natural resources

The workshop is aimed at providing an overview of International Environmental Standards in use and a general analysis of the existing Environmental Standards in Iraq. In parallel with presentation sessions and analysis of relevant case studies (EU Environmental Directives, US-EPA Standards, USGS Standards, WHO Standards, WB/IFC Standards etc.) the participants will be involved in workgroup and practical exercises to discuss the environmental quality goals and objectives to be proposed and achieved in Iraq that will set the base for future environmental regulations and standards to be developed by the MOE.

Summary of Trainings

All the projects activated within the New Eden program include a significant component of capacity building: as a matter of fact it became evident from the very beginning of the project that the lack of adequate technical and managerial skills was a strong limitation to the functionality of the Iraqi authorities involved in the different activities performed in Iraq. Most of the capacity building work was done through a “training on the job” approach, making the staff of the different Ministries and Authorities working together with Nature Iraq and the various experts involved in the projects.

In addition to this, several class training sessions on various subjects related to the New Eden project were held in Iraq, Jordan, Syria, Canada and Italy. It has been a major goal of the New



Eden Project to assist in the building of competent public authorities as a prerequisite for Iraq's successful integration with the international community. Strong institutions play a critical role not only in the development of adequate policies and effective enforcement of laws and regulations but are also the key to the success of foreign-aid programmes. During Phase 1 & 2 of the Master Plan Project, the New Eden team has carried out several training activities (namely courses in Jordan, Syria, Canada and Italy) as well as worked in close cooperation with Iraqi institutions and organization.

The New Eden work was not meant to be a comprehensive capacity building effort as the bulk of this service was provided by other international organizations (UNEP, CIDA, World Bank, etc) as agreed during the October 2004 Venice Donor's coordination meeting. The New Eden Capacity Building Program's main focus is to support and augment the major projects of Phase 1 & 2 of the Master Plan. Several challenges needed to be addressed during Phase 2 of the project. For example, it has been an objective to assist the MoE in work on developing a National Committee on biodiversity and developing their capacity for the creation of a national strategy and action plan. This activity is still considered an important priority for the Ministry but the Iraqi government should take parliamentary action to sign on to the International Convention on Biological Diversity for this project to proceed with adequate support.

One of the main objectives of the Training Program of Phase 3 was to enhance the capability of the Ministries and staff from related institutions in order to provide training support under the specific New Eden Projects described in this interim report; Furthermore, the capacity building program had the scope of increasing the utilization of the tools provided in the Master Plan and contribute to the improvement of water quality and overall environmental management and protection in Iraq. The following table summarizes the main trainings that were organized starting from 2004.

Subject	Venue	Duration	Beneficiaries	Period
Environmental monitoring and field surveys	Baghdad/ South Iraq	10 days	MWR, MoE 30 trainees	March 2004
Numerical modeling techniques	Italy	14 days	MWR/NI 4 trainees	August 2004
Environmental monitoring techniques	Italy	14 days	MWR, MoE 6 trainees	October 2004
Water and Sanitation Survey through GIS	Amman, Jordan	10 days	MMPW	May 2005



Subject	Venue	Duration	Beneficiaries	Period
			15 trainees	
GIS and hydrological modeling	Baghdad	6 days	NI/MWR 5 trainees	May 2005
ArcGIS – Level 1 and 2	Amman' Jordan	10 days	MMPW 10 trainees	July 2005
Environmental studies	Italy	14 days	NI 2 trainees	October 2005
Hydrometric and bathymetric monitoring instruments – Phase 1	Italy	14 days	Univ. Basrah 4 trainees	June 2006
Urban planning through GIS	Amman, Jordan	5 days	MMPW 10 trainees	July 2006
Numerical modeling tools (Climatology, Agriculture, Hydrology)	Italy	30 days	MWR 4 trainees	July 2006
Italian legislation and International agreements on protected areas	Italy	5 days	MMPW/MoE 6 trainees	September 2006
Hydrometric and bathymetric monitoring instruments – Phase 2	Italy	14 days	Univ. Basrah 4 trainees	September 2006
Management of protected areas	Azraq Reserve, Jordan	5 days	MMPW/MWR/MoE 9 trainees	November 2006
Key Biodiversity Areas training – Field Surveys – Phase 1	Syria	14 days	MOE/NI/UNIV. 14 trainees	November 2006
Introduction to GIS	Amman, Jordan	4 days	MoE 4 trainees	January 2007
Utilization of the New Eden Information System through ArcGIS/ArcIMS	Amman; Jordan	5 days	MMPW/MWR/MoE 9 trainees	January 2007
Management of the New Eden Information System through ArcSDE	Amman; Jordan	4 days	MMPW/MWR/MoE 6 trainees	February 2007
Water and Sanitation master planning	Italy	6 days	MMPW 6 trainees	February 2007
Urban Planning techniques	Erbil	5 days	MMPW 8 trainees	February 2007
Installation and operation of RO units	Italy	5 days	MMPW 4 trainees	May 2007
Installation of hydro-meteorological monitoring equipment and Master Station – Phase 1	Italy	6 days	MWR 6 trainees	June 2007
Management plans for Ramsar Areas	Suleimani	3 days	MoE 6 trainees	July 2007
Stakeholder involvement process (Hawizeh-Ramsar project)	Amman, Jordan	4 days	MMPW/MWR/MoE/ MAg 12 trainees	September 2007
Installation of hydro-meteorological monitoring equipment and Master Station – Phase 2	Italy	6 days	MWR 6 trainees	September 2007
Socio-economic surveys' techniques – Phase 1	Amman, Jordan	3 days	NI 6 trainees	September 2007
Socio-economic surveys' techniques – Phase 2	Suleimania - Alton Kopry, Kurdistan	4 days	NI, KRG-MoE 10 trainees	September 2007



Subject	Venue	Duration	Beneficiaries	Period
Leakage management in water supply networks – Phase 1	Suleimani	3 days	MMPW/Suleimani WD 15 trainees	November 2007
Environmental surveys (Key Biodiversity Areas) – Phase 1	Suleimani	5 days	NI 8 trainees	November 2007
Key Biodiversity Areas training – Field surveys – Phase 2	Syria	14 days	MOE/NI/UNIV. 12 trainees	November 2007
Environmental survey (Key Biodiversity Areas) – Phase 2	Suleimani	5 days	NI 8 trainees	January 2008
GIS applied to water supply design	Suleimani	4 days	Suleimani WD 6 trainees	January 2008
Installation of hydro-meteorological monitoring equipment and Master Station – Phase 3	Suleimani	5 days	MWR 4 trainees	February 2008
Socio-economic surveys' techniques – Phase 2	Suleimani	3 days	NI 6 trainees	February 2008
Water supply network modeling	Suleimani	4 days	Suleimani WD 6 trainees	February 2008
Leakage management in water supply networks – Phase 2	Suleimani	4 days	Suleimani WD 10 trainees	February 2008
Field Training in Botany and Sampling techniques	Suleimani	5 days	NI	April 2008
Tanjero cross training	Suleimani	5 days	NI, KRG-MoE 10 trainees	April 2008
Environmental Impact Assessment studies	Suleimani	5 days	MoE/NI 6 trainees	June 2008
Operation and management of chemical laboratory equipment	Amman, Jordan	10 days	NI 8 trainees	May 2008
Management of chemical laboratories	Italy	30 days	NI 3 trainees	May 2008
Leakage management in water supply networks – Phase 3 (Field activities)	Italy	5 days	Suleimani WD 7 trainees	July 2008
Remote Sensing Training Course I	Suleimani TRI	20 days	MoE/MoAg/MWR/ MMPW 11 trainees	October 2008
GIS Training Course Level 1	Suleimani TRI	5 days	MoE 11 trainees	October 2008
Hydrologic Data Management And Hydraulic Modeling	Suleimani TRI	20 days	MWR/NI 10 trainees	November 2008
GIS Training Course II (within the New Eden Information System project)	Suleimani TRI	12 days	MoE/MWR/MMPW 12 trainees	November 2008
GIS Training Course Level 1 (within the Chybaish City Urban Planning project)	Suleimani TRI	6 days	MMPW 12 trainees	December 2008
Fisheries Assessment and Aquaculture	Suleimani TRI	5 days	MoE, Basrah Univ., FAO, NI 12 trainees	April 2009
Birds and botany field training	Suleimani	10 days	NI, KRG-MoE 20 trainees	April 2009



Subject	Venue	Duration	Beneficiaries	Period
Web - GIS / Level III	Suleimani TRI	5 days	MoE, MWR, NI 10 trainees	May 2009
Maplex GIS Training Course	Suleimani TRI	5 days	MoInd, MoPlanning 10 trainees	January 2010
Remote sensing (ENVI software)	Suleimani TRI	5 days	MoInd, MoPlanning 10 trainees	January 2010
Ornithology and Eco-tourism Course	Suleimani	6 days	NI, KRG-MoE 10 trainees	April 2010
IUCN Red-listing for Plants Course	Suleimani	10 days	MoE, NI 10 trainees	May 2010
Wildlife Medicine Course	Kurdistan	6 days	MoE, NI 12 trainees	October 2010
Legislation/Methodologies for EIA and SEA	Suleimani	3 days	MoE 37 trainees	September 2013
Socio-economic studies and assessments	Suleimani	3 days	MoE 25 trainees	November 2013

6. Environmental, Social and Awareness Raising activities carried out by Nature Iraq

Green Music and Arts Festivals

Since 2012, Nature Iraq has been conducting the annual Green Music and Arts Festivals in Sulaimani, featuring exhibitions from local NGOs, musical and theatrical performances from Iraqi and international artists, exhibits of art and photography. Held in the springtime in Sulaimani's Azadi park, the festival is a celebration of nature and the people and groups working to preserve it. This unique event integrates art and music with environmental awareness-raising, and promotes conservation through drama, music, photography and the arts along with demonstration projects, information booths by local environmental groups, and posters and films on environmental information.

In 2013, the festival was expanded to Chibaish, as an explicit celebration of the restoration of the internationally famous Mesopotamian Marshlands. Held on the bank of the Euphrates, the festival featured readings from the Qu'ran, music, poetry readings, boat races for men and women, and photo exhibitions.

Tigris River Flotilla

From the 15th of September to the 15th of October 2013, Nature Iraq orchestrated the Tigris River Flotilla, which was an adventurous journey down the Tigris River, starting in

southeastern Turkey and traveling through Iraq using modern and traditional boats and vessels. The Flotilla was meant as a celebration of Mesopotamian culture and heritage and designed to show the interconnectedness of the Tigris watershed.

Three traditional boat types were build and utilized during the Flotilla: a guffa, a woven basket coated in tar which was described by Heroditus and is thought to be the oldest vessel in the world; a kelek, a simple raft used for down-stream trade traditionally floated on inflated goat or sheep skins; and a tarada, a marshland war canoe. As the traditional way of life in Iraq has given way to the modern world, so too has boat making. As a result, it took months to find the boatbuilders with the requisite knowledge and skill to recreate these ancient vessels.



In addition to the significant contribution to the celebration and revival of these ancient Iraqi boatbuilding trades, the project documented and brought awareness to the myriad threats facing the timeless waters of the Tigris. Water quality samples were taken throughout the long journey and photos were taken of as much flora and fauna as possible. This data was then sent to partners in the U.S. and the UK for analysis. All of the water quality data is freely available online at Nature Iraq’s website.

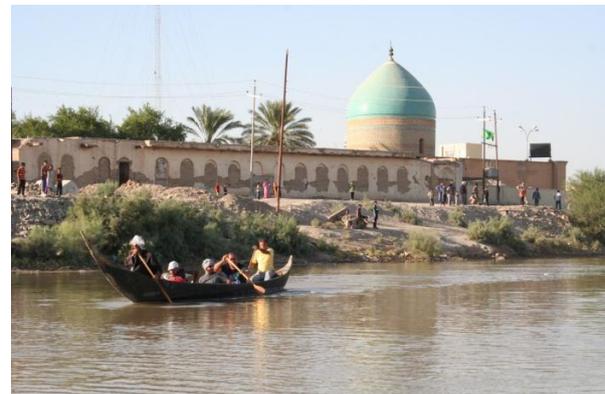




A big component of the project was also outreach and awareness-raising. Events were held in Hasankeyf, Feyshkhaboor, Baghdad, Kut, Ammara, and Chibaish. At each event, there were speakers from both Nature Iraq experts and local Ministry of Water Resources staff to talk about the state of the river and the importance of protecting the Tigris. Most importantly, Nature Iraq stressed the activities people could do in their every day life to preserve water and protect the river.



The Flotilla received international coverage in outlets such as The Economist, The Christian Science Monitor, and Le Liberation as well as various American and Iraqi media outlets, including satellite TV stations, print media, and radio.



Nature Khan Project

Nature Iraq, with funding from the U.S. Department of State Ambassador's Fund, has a program designed to expand access to economic opportunities for disadvantaged persons, preserve disappearing cultural heritage, promote reconciliation and stability by creating common economic interests among diverse groups, and reduce the environmental impact of Iraqi commercial activities.



The overarching aim of the project is the formation of a national crafts cooperative, branded Nature Khan. This cooperative will enable formation of a national retail network to distribute these crafts, provide mutual support for craftspersons across cultural lines, allow for the building of capacity both in terms of knowledge passed on between craftspersons and in terms of financial and marketing skills, and provide a framework in which small producers can pursue and demonstrate environmental sustainability. Numerous programs have been conducted in Iraq to teach and/or preserve culturally important skills and build the capacity of tradespersons, these programs have not addressed product distribution or long-term capacity building.

At the end of the two year program, we intend to have established a network of three shops, located in Erbil, Basra, and Baghdad, which will distribute the cooperative's products and provide space for capacity building, vocational training, co-op development activities, and a venue for local cultural events. More importantly, we intend to form a sustainable structure over those two years, and be able to hand an independent cooperative the management, monitoring, and decision-making tools to allow it to last well beyond the life of the project. This project is, to the best of our knowledge, the first of its kind in Iraq and a regional rarity, in that it employs concepts of environmental and economical sustainability and responsibility. Once Nature Iraq successfully implements the Nature Khan program, we believe it will serve as a leading example of benefit sharing through cross-cultural relationships and demonstrate the potential to unite Iraqis through common interests.