

Nature – Iraq Organization

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***A Report
On the workshops and Training Programs
Held in Syria***

From 26/10 to 14/11/2006

***Organized by
Nature Iraq & Canada Iraq Marshland Initiative***

***Participants
University of Waterloo, Canada
Aleppo University, Syria
University of Baghdad, Iraq
Basra University, Iraq
Sulaimania University, Iraq
Ministry of Environment, Iraq***

***Sponsors
Canadian International Development Agency
Italian Ministry of Environment and Territories***

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Abbreviations

- Canadian International Development Agency (CIDA)
- Canada-Iraq Marshland Initiative (CIMI)
- Italian Ministry of Environment and Territories (IMET)
- Key Biodiversity Areas (KBA)
- BirdLife International

Summary of Activities

- CIMI Program Activities
 - The workshop in Cham Palace Hotel, Damascus, 26 - 28/10/2006
 - The training course in Lake Asad, Al Rekka, 29/10 - 3/11/2006
- CIMI Management meeting, Cham Palace Hotel, Damascus, 4/11 - 6/11/2006
- KBA Program Activities
 - The workshop in Cham Palace Hotel, Damascus, 7/11/2006
 - The training course in Lake Asad, Al Rekka, 8 – 14 /11/2006

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Program of the workshops and trainings for both CIMI and KBA projects

Activity	Date	Time	Item
CIMI Workshop	Thursday 26/11	9.00am	Lecture The status of aquatic macrophytes in the restored marshes of Southern Iraq
		10.00am	Lecture Seasonal study of plant communities and standing crop biomass at some location of the central marshes-Iraq
		11.00am	Lecture Phytoplankton and Their Productivity of Mesopotamian Marshes after Restoration
		11.30am	Lecture Distribution and Abundance of phytoplankton in Southern Iraqi Marshes January, 2005 – June, 2006
		11.45am	Lecture Rotifers in Southern Iraqi Marshes
		12.00pm	Lecture Distribution and Abundance of Cladocera in Southern Iraqi Marshes
		12.30pm	Lecture Copepoda in Southern Iraqi Marshes
		1.00pm	Lunch
		2.00pm	Lecture Seasonal development of benthic insects in Southern Iraqi Marshes Autumn, 2005 – Summer, 2006
		3.00pm	Lecture A preliminary investigation of the benthic macro-invertebrate fauna in selected marsh sites and shutt Al-Gurma, South of Iraq.
		4.00pm	Lecture Species composition, ecological indices, length frequencies and food habits of fish assemblages of the restored southern Iraqi Marshes

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Activity	Date	Time	Item
		5.00pm	Lecture: Estimation of toxicological effects in Southern Iraqi Marshes using fishes as bioindicators
	Friday 27/11	9.00am	Lecture Water chemistry in Mesopotamian Marshes
		9.30am	Lecture Water quality in Mesopotamian Marshes
		10.00am	Lecture Comprehensive study of buffaloes in Iraq wetlands
		11.40am	Lecture Current environmental changes in marshes of Southern Iraq based on paleoecological studies
		1.00pm	Lunch
		2.00	Lecture The six CIMI sites in Southern Iraqi Marshes
CIMI Workshop	Saturday 28/11	9.00am	Discussion and suggestions How to publish our papers in the recognized international journals
		10.00am	Brief reports By work groups
		10.00am	Macrophytes group
		10.15am	Phytoplankton group
		10.30am	Zooplankton group
		11.00am	Macrobenthos group
		11.30am	Fish group
		12.00pm	Water quality group
		12.30pm	Buffalo group
		1.00pm	Paleoecology group
		1.30pm	Discussion and suggestions
CIMI Training	Sunday 29/10	9.00am	Traveling to Lake Assad, Al-Rekka Governorate
Activity	Date	Time	Item
		5.00pm	Arrival to the site of accommodation and training
		8.30pm	Lecture: Wetlands; Places and People
	Monday	8.00am	Lecture

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	30/10		The nature of Lake Assad
		9.00am	Field trip Survey for the wetlands in the area
		2.00pm	Lecture Wetlands in the Lake Assad and Euphrates
		4.30pm	Lecture How to measure and analyze plants in the wetlands
		5.40pm	Lecture Field design of ecological experiments and studying Eiegen values
		6.30pm	A trip to Al-Thawra town
		8.00pm	General discussion Constructing groups to study the wetlands in the area
	Tuesday 31/10	9.00am	Field trip to Al- Baath Dam
		10.00am	Field trip to Al- Assad Dam
		10.00am	Field trip to Al- Safasifa village
		2.00pm	Field trip to Jaabar Castle and Lake Assad; With lunch
		6.00pm	Lecture Where all carbon go? From macrophytes to fish through bacteria
		7.00pm	Lecture Classification of wetlands
		11.00pm	Field trip to the wetlands for sampling
	Wednesday 1/11	9.30am	Field trip to the wetlands for sampling
Activity	Date	Time	Item
		10.30am	Work trip to the Water Directorate in Al- Thawra town for water samples analysis
		11.30am	Work trip to the fish market to study and collect fish specimens
		3.00pm	Collecting and analyzing data
	Thursday 2/11	8.30am	Lecture On water buffalo: Present work and future plans
		9.30am	Work and coordination trip to Aleppo University
		9.30am	Field trip to the wetlands for sampling
		9.30am	Laboratory work

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		12.30pm	Work trip to the Water Directorate in Al- Thawra town for water samples analysis
		3.30pm	A session for collecting and analyzing data
		6.00pm	Final discussion session and ending speech
CIMI Training	Friday 3/11	8.00am	Trip of return back to Damascus
CIMI Meeting	Saturday 4/11	9.30am- 4.00pm	Management meeting
	Sunday 5/11	9.30am- 4.00pm	Management meeting
CIMI Meeting	Monday 6/11	9.30am- 4.00pm	Management meeting
KBA Workshop	Tuesday 7/11	2.00pm	Opening and welcoming speech
		2.15pm	Welcoming speech
		2.30pm	Introductory lecture KBA, Project and Sites
		3.05pm	Lecture Water Quality in Southern Iraqi Marshes
Activity	Date	Time	Item
		3.20pm	Lecture Quality, Quantity, and biodiversity of phytoplankton in Southern Iraqi Marshes
		4.00pm	Lecture Development of the biodiversity of Macrobenthos
		4.30pm	Lecture Fish surveys in the Key Biodiversity Areas for Summer, 2006
		5.00pm	Lecture The agricultural strategy for the restoration of Iraqi marshes
		9.00pm	Lecture Plants in Southern Iraq
		9.20pm	Lecture

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			The road to the Marshes: Results of bird's team
		10.00pm	End of the workshop
KBA Training Program	Wednesday 8/11	9.30am	Traveling to Lake Assad, Al-Rekka Governorate
		5.00pm	Field trip to discover the Lake Assad
		7.00pm	General discussion Grouping teams for field work
	Thursday 9/11	8.00am	Field trip to Al- Baath Dam Learning basics of birds monitoring
		7.00pm	Discussion of the results and putting outlines for drawing data tables
	Friday 10/11	8.00am	Field trip to the wetlands in the area
		6.00pm	Discussion of the results
	Saturday 11/11	8.00am	Field trip to the wetlands in the area to collect samples
	Sunday 12/11	8.00am	Field trip to the wetlands in the area to collect samples
		6.00pm	Discussion
	Monday 13/11		
	Tuesday 14/11	8.00am	Trip of return back to Damascus

Recommendations

At the end of the CIMI workshop the following recommendations were made in order to be submitted to the management of CIMI program:

1. Work in the monitoring and surveying program is to extend for the period of the next twelve months.
2. Several proposed projects (Annex 1) are to be submitted to the management of CIMI.

Annex 1

Proposals and ideas for the future work

Team	Proposals
Water Quality	<ul style="list-style-type: none"> • Study the input and output sources (chemical and hydrological). • Study environmental pollutants, such as pesticides, petroleum hydrocarbons, and trace elements (i.e. Hg, Cr, Cd, Pb) in water, sediment and biota samples. • Microbiological study: Bacteria, mainly pathogens, and fungi. • Additional parameters to be detected in water, such as, K and Na • It is very important to select one or two organisms as bioindicators.
Macrophytes	<ul style="list-style-type: none"> • Drawing maps for the vegetation changes by remote sensing. • Establishing a library for all wetlands publications as a source of information and data. • Studying the economic and medical values of marsh plants.
Phytoplankton	<ul style="list-style-type: none"> • To continue work in the same previous sites. • Studying the epiphytic phytoplankton.
Zooplankton	<ul style="list-style-type: none"> • Studying the kinetics and seasonal variations for zooplankton. • Taking samples from near the button.
Macrophyeta	<ul style="list-style-type: none"> • Collecting Samples from all sites indicated in the preliminary periods for further period of 12 months. • Attempts will be made and care will be taken as far as possible to identify the fauna to the lowest possible taxonomic level. • Distinguished the Belharizia Gastropods. • Monitoring the established communities of the fauna specific to the area under study. • Monitoring the exotic species, which may be present or likely to invade the area because of prevailing new conditions of water management. • Monitoring water quality using benthic macroinvertebrates community. • Comparing sites to establish the differences between inundated sites with those on feeding stream.
Fish ecology team	<ul style="list-style-type: none"> • Continue the present work for the coming year. • Estimate the stock assessment of the dominant fish species. • Determine the age structure (year class) for the dominant fish species. • Determine the fecundity of several species to assess recruitment

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	<p>indices.</p> <ul style="list-style-type: none"> • Monitor the trophic pyramid in the marsh for the coming year.
Team	Proposals
Paleoecology team	<ul style="list-style-type: none"> • vegetation changes according to palynological studies. • Catastrophes that could be also evidence from pollen diagrams. • Archeological remnant examination of the buildings, pottery, clay figurine, tools, seals and writing on stones to find times and places of human settlement or ancient city and correlating these times with events of palaeovegetation and the pollen diagram constituents. • Biomarkers and sequences stratigraphy. • Palynofacies and biomarkers of Companion Khasib formation used to assess oil source correlation and suggestion for other traps along the migration path, East Baghdad oil field, Iraq. • Mishrif Formation oil biomarkers used to assess hydrocarbon generation, migration path and accumulation sight in Ratawi, Zubair and Rumaila oil Fields, southern Iraq. • Organic geochemistry, palynofacies and hydrocarbon potential of Middle Jurassic Sargelu Formation. southern Iraq.
Buffalo team	<ul style="list-style-type: none"> • Finish the study of distribution of water buffalo population in the southern three provinces of Iraq. • Evaluation of the impact of water buffalo on marshes (both undrained and reflooded). • After finishing the previous work, effort should be concentrated on studying milk production of the buffalos in the representative locations. • Fecundity and fertility must be deeply studied and improved in order to improve buffalo production in general. • Depending on the above suggestions we surely need to provide a reasonable skill to one or two of the coworkers by allowing them participate in training courses.

Annex 2

Abstracts submitted by the teams participated in CIMI workshop

Conference Abstracts Day One

THE STATUS OF AQUATIC MACROPHYTES IN THE MARSHES OF SOUTHERN IRAQ

Macrophytes are the primary source of energy in the biosphere and are therefore the basis of all life on land, in fresh water and in the oceans. Studies have shown that they play a fundamental role in sustaining life by providing food, oxygen, shelter and bioindicators for ecological and environmental changes.

The ecology of aquatic macrophytes of three restored marshes, Huwaizah, Chebaish and Hammar, were studied. Monthly samples were taken during October 2005 to September 2006. Some physiochemical factors for water were analyzed. Estimation of percent cover, biomass and species richness of the plant community was done using transect and quadrat methods. Twenty replicates were taken in each site.

Sampling of biomass was taken twice a year, in mid summer and in mid winter. 10 quadrates of 1m x 1m were taken at each site. Plants were cut at or near the ground level. The harvested plants were sorted into species, dried and weight.

All stations may categorize as oligohaline, variation in pH values were in the alkaline direction. There were 17 species of aquatic macrophytes identified in Huwaizah marsh, whereas in Chebaish and Hammar there 14 and 15 species found, respectively.

The highest value of diversity and evenness were in Huwaizah which was 2.47 and 0.89 respectively. The highest value of richness, 2.46, was recorded in Hammar marsh. The value of the similarity index showed that the highest value, at 81.25%, was between Chebaish and Hammar marshes.

Huwaizah recorded the highest value of percent cover for emergent and submerged macrophytes. The highest value of biomass was in Huwaizah, reaching 856 g/m². *Phragmites australis* recorded the highest value of biomass followed by *Schoenoplectus litoralis* and *Typha domengensis*.

SEASONAL STUDY OF PLANT COMMUNITIES AND STANDING CROP BIOMASS AT SOME LOCATIONS OF THE CENTRAL MARSHES, IRAQ

Iraqi marshlands represent around 85 percent of the Mesopotamian marshlands. It is the largest wetland in the Middle East and one of the most outstanding freshwater ecosystems in the world. Large parts of the marshlands have been lost mainly as a result of drainage and damming. The central marshes are located at the confluence of Tigris and Euphrates rivers near Omara and Nasseria cities.

The total area of the central marshes is about 2400 km². It is the largest depression in the region, from the north there is Omara AL-Fajar road, with Tigris River on the east.

The study included three stations: the beginning of AL-Baghdadia, the Middle of AL-Baghdadia, and Abw-Chewelán. In addition to those three stations, we studied two additional stations that represent disturbed sites affected by activity of local people and animals. One of them is in the beginning of Al-Baghdadia and the other is in the middle of AL-Baghdadia.

Twenty-six families, 40 genus, and 53 species were found in this study, and 10 communities were recognized. The study of the communities included measurement of biomass, percent cover, and density in square meter quadrates. We found that Phragmites community had the highest biomass, and it was 3067.5 g/m². This community had the highest density as well, which is 110 stem/m² in at 68 % that represents emergent communities. For submergent communities, the highest value for biomass was for the community of Ceratophyllum demersum, at 232.19 g/m² with percent cover at 88 %. The highest biomass for short emergent communities in summer was for Potamogeton lucenus community at 168.9 g/m² with percent cover 66.2%. The highest biomass value for floating communities was for Salvinia natanus community at 246.1 g/m² with percent cover 46%. In addition to the biological parameters, this study included the measurement of water quality (water temperature, pH, EC, DO, Salinity, TSS, TDS, TH, Ca⁺, Mg⁺, HCO₃⁻², SO₄⁻², CL⁻¹, Na⁺, K⁺ and turbidity), water flow, water level and air temperature. In addition, some environmental parameters for sediment such as pH, EC, salinity and O.M. % were also measured.

PHYTOPLANKTON AND THEIR PRODUCTIVITY OF MESOPOTAMIAN MARSHES AFTER RE-FLOODING

The three main marshes, Al-Hammar, Al-Hewyzah and Central marsh, in southern Iraq were studied monthly during the period of November 2005 to September 2006. Samples were collected to determine phytoplankton community composition, phytoplankton productivity and the concentration of main nutrients. Two sites were chosen in each marsh in agreement with the other project teams. Phytoplankton were collected using a 20 μm plankton net for qualitative purposes, whereas, a sedimentation method was followed for quantitative analysis. The light and dark bottle method was used to measure primary production at the surface and at 1m depth, with incubations of 3-4 hours. Chlorophyll-a was measured using a spectrophotometer following digestion with 90% acetone. Nitrate, as nitrite, was determined with the cadmium column method; phosphate was determined using the ascorbic acid method. Diatoms (70 %) were the dominant phytoplankton group, followed by green algae (13.5%) and blue-green algae (8 %) at all of the study sites, while Euglenophytes, Pyrophytes, and Cryptophytes were represented by less than 2 species. Primary productivity ranged between 12.5 – 415 $\text{mg}\cdot\text{C}\cdot\text{m}^3/\text{hr}$ at the surface and 9.37 – 237.5 $\text{mg}\cdot\text{C}\cdot\text{m}^3/\text{hr}$ at 1m depth. The highest rates of primary production were determined from Al-Hewyzah marsh, which also had the highest nutrient concentrations. Nitrate was the dominant form of nitrogen, ranging between not detectable (ND) – 450 $\mu\text{g}/\text{L}$, while phosphate concentrations were ND – 102 $\mu\text{g}/\text{L}$. With an active fishery within the marshes it is important to understand the dependence of the fishery on these phytoplankton communities.



PHYTOPLANKTON DISTRIBUTION AND ABUNDANCE, SOUTHERN IRAQ (JANUARY – JUNE 2006)

Phytoplankton distribution and abundance was studied in the Iraqi marshes, southern Iraq, from January until June 2006. Six representative sites were selected from which phytoplankton specimens and some physico-chemical variables were collected. Detrended correspondence analysis (DCA) method and Principal Components Analysis (PCA) method were used to analyze the distribution, abundance, diversity of the community, and the effects of the studied environmental variables upon these variables.

The results showed that the most important environmental variables to explain the variance in the community structure were air temperature, water temperature, silicate, nitrate-nitrogen, calcium, magnesium, total Hardness, & Total Dissolved, and pH. Phytoplankton samples along the study period demonstrate the dominance of Bacillariophyceae followed by Chlorophyceae.

March 2006, which considered as spring was the most diverse month. The flourishing during spring is one of the most important evidences that Iraqi marshes started its seasonal cycle as an indicator of gradually balanced ecosystem.



THE DISTRIBUTION AND ABUNDANCE OF CLADOCERA IN THE SOUTHERN IRAQI MARSHES

Cladocera play an important role in the marsh ecosystem of southern Iraq, forming a major component of the zooplankton community in the marshes. Abundance ranged from 1 to 14762 ind./m³. The highest concentration of Cladocera was found in the Al-Hammar marshes, followed by the Al-Chibayish and Al-Hawaizah marshes. Peaks of abundance occurred in March, May and August 2006 in the Al-Hammar marshes, whereas, in the other two marshes there was only one peak in abundance which occurred in February and March. An exception to this was the high peak in August at the Um el-Warid open-water station which was caused Miona species.

ROTIFERA OF THE SOUTHERN IRAQI MARSHES

Rotifera play an important role in the food chain of the marsh ecosystem. The numerical abundance of rotifers ranged from 1.1-23.8, 0.2 – 16.1 and 1.2 – 18.2 ind.x10³/L in the Al-Hammar, Al-Hawaizah and Al-Chibayish marshes, respectively. Three peaks of abundance were noticed in the three marshes in December 2005, and in March/April and August 2006.

COPEPODA OF THE SOUTHERN IRAQI MARSHES

Nine species of cyclopoida were identified with an additional four identified to the genus level. Two species of harpacticoida were recognized, with 4 identified to the genus level. Calanoida only formed one species, newly recorded in the region, one species identified to the genus level and one new species. March and April 2006 marked a pronounced increase in copepod abundance, particularly in Al-Hammar and Al-Chybayish marshes. These peaks were due to copepod nauplii and Cyclopoida, and in a few instances, by cirriped larvae.



SEASONAL PROGRESS IN BENTHIC INSECTS, SOUTHERN IRAQ (AUTUMN 2005 – SUMMER 2006)

Seasonal progress in benthic insects was studied in the Iraqi marshes, southern Iraq, from autumn 2005 until summer 2006. Six representative sites were selected from which benthic insects' specimens and some physico-chemical variables were collected. Detrended correspondence analysis (DCA) method and Principal Components Analysis (PCA) method were used to analyze the distribution, occurrence, diversity of the community, and the effects of the studied environmental variables upon these variables.

The results showed that the most important environmental variables to explain the variance in the community structure are Water Depth (m), Dissolved Oxygen (mg/l), salinity (ppt), Total Hardness (mg/l), Sulphate (mg/l), Chloride (mg/l), Calcium (mg/l), Magnesium (mg/l), Nitrate-Nitrogen N-NO_3^- ($\mu\text{g/l}$), Nitrite-Nitrogen N-NO_2^- ($\mu\text{g/l}$), and Orthophosphate P-PO_4^{3-} ($\mu\text{g/l}$). In addition, autumn 2005 was the poorest season in species distribution, occurrence, and diversity followed by winter 2006. While spring and summer 2006 were the richest seasons, during which benthic insects' diversity was in its high levels.

On the other hand, Al Hawizeh marsh in its two stations was the most diverse marsh than the others. However; each marsh was on its way to achieve the restoration process and the coming years are assumed to exhibit flourish benthic insects' communities.

INVESTIGATION OF BENTHIC MACROINVERTEBRATES COMMUNITY IN SELECTED MARSH SITES, SOUTHERN IRAQ

Freshwater benthic macroinvertebrates, or more simply "benthos", are animals that are larger than ½ millimeter, live on rocks, logs, sediment, debris and aquatic plants during some period in their life. The benthos is an important part of food chain especially for fish. They also play a critical role in the natural flow of energy and nutrient in natural habitats. The benthos represent an extremely diverse group of aquatic animals, and the large number of species possess a wide range of responses to stressors such as organic pollutants, sediments and toxicants. Many benthic species are long lived allowing detection of past events such as pollution, inundation or desiccation of natural habitat.

The area of southern Iraq is unique by its marshland, a natural habitat that offer living requirement for a vast number of organism, terrestrial and aquatic. Some parts of this area have been the subject of ill practices in the past decade. The drying out of some marsh lands has inflicted catastrophic ecological effects. The benthic-invertebrate community severely suffered from such practices. Thus, present investigation address this issue through comparison between circumstances of the past and present. The study established the structure of present faunal community.

Seven stations were choose as a sampling sites , two in Hawiza (Um Al Wared & Um An Najj); two sites in Chibayish (Beginning and middle of Baghdadia) and two sites in Hammar (Al- Naggara & Al Birka) in addition to 7th site on shutt Al- gurma for comparison .

It was clear that there were abundance of gastropoda and aquatic worms. Two species of neriedae were detected, they are identified as Dendronereides heteropoda and Namalycastis sp. The majority of Oligochaetes worm is recognized as Tubificidae and Lumbriculidae . Among Gastropoda five species were detected in addition to two species of bivalvia. The majority of insects sampled were Chironomides larvae.

SPECIES COMPOSITION, ECOLOGICAL INDICES, LENGTH FREQUENCIES AND TROPHIC NATURE OF FISH ASSEMBLAGES OF THE SOUTHERN IRAQI MARSHES

The marshes of southern Iraq were the largest wetland in the Middle East. The aim of the present study is to determine the species composition and structure of the fish assemblage in the three re-flooded marshes. From October 2005 to September 2006 two stations were sampled in each marsh. Four collection methods (seine net, fixed gill net, electrical fishing and small dip net) were used to capture fish. Monthly and seasonal changes in diversity, evenness, richness and similarity between sampled stations and marshes were determined. The length frequencies of collected species and food habits of major species were recorded to classify fish species into trophic groups and determine the shape of the trophic pyramid.

Liza abu was the most dominant species in each marsh. *Barbus luteus* and *Carassius carassius* were either the second or third most abundant, except in Al Hammar where *Acanthobrama mermaid* replaced *B. luteus*.

Fish assemblage of the three marshes formed of the following trophic groups, herbivorous group consisted of *Barbus sharpeyi*, *B.luteus* and *C.carassius*. Detritivorous group . contain *L.abu*, *L.klunzingeri* and *L.subviridis* . Two species constituted omnivorous group *Cyprinus carpio* and *Bathygopius fuscus* .Four species make up carnivorous group , *Alburnus mossulensis* , *Heteropneustes fossilis* and *Mastacembelus mastacembelus*. Two predators existed in the marshes *Silurus triostegus* ; *Aspius vorax* .

Trophic pyramid of Huwaza look normal ,disturbed ones in East Hammar and Chebiyesh ,due to higher abundance of detritivorous species group and low numbers of herbivorous group .

DETECTION AND MONITORING OF ECOTOXICANTS IN THE MESOPOTAMIAN MARSHES

Iraq's freshwater systems, in particular the southern marshy habitats, suffer from various types of pollution, especially those related to pesticides, hydrocarbons or heavy metal toxins. Levels of pollution in the marshes have increased substantially in recent years. In addition to their fatal effect on aquatic organisms, these toxicants may directly or indirectly affect human health. These groups of toxicants have been shown to have damaging effects to humans and/or aquatic organisms; indicating the vital importance of an early alert system for detection and permanent monitoring of these harmful substances in natural water bodies. Local fishermen use lethal doses as an easy method for catching fish. Pesticides from neighboring farms may drain into the marshes. The introduction of motor boats to the deeper areas of the marshes has led to noticeable and frequent oil pollution along the heavily used waterways between the main villages.

The objectives of the present project are:

1. Determine the present levels of pesticides, hydrocarbons and heavy metals in the waters and sediments of the Mesopotamian Marshes, Iraq.
2. Determine the toxicant levels that have accumulated in phytoplankton, mollusk and wild fish, collected from various locations, and the effect of these toxic levels on energy expenditure and population structures.
3. Measuring endocrine disturbance imposed by pesticides and hydrocarbons on selected fish species, as a bioindicator for in vivo monitoring.
4. In vitro detection of the effect of toxicants on cultured fish gill cells, using levels of vitillogenin and oestron as bio-markers.

Conference Abstracts Day Two

WATER CHEMISTRY IN THE MESOPOTAMIAN MARSHES

Water chemistry of the Mesopotamian marshes was studied by taking monthly water samples from 6 sites. Research was concentrated on the heavy metals in Hewizah Marsh. Measurements of abiotic parameters were also taken at each site. The objectives of the study were to:

- Establish the levels of heavy metals in the three marshes
- Identify the main source(s) of heavy metals
- Assess the uptake and release of heavy metals by organisms
- Determine whether the marshes are a sink or source for metals
- Evaluate the effect of re-flooding on metals in the Shatt al-Arab and NW Arabian Gulf

The concentration of Ni, Mn, Fe and Cu in feeding rivers were 0.508 – 10.147, 0.014 – 1.6, 1.217 – 4.993, 0.054 – 0.598 $\mu\text{g/L}$, respectively. Whereas, in the outlets concentrations ranged from 0.5 – 1.77, 0.04 – 0.014, 1.2 – 1.07, ND – 0.026 $\mu\text{g/L}$ for Ni, Mn, Fe and Cu. These results indicate that the Hewizah marshes act as a sink.

During the day, $\text{Fe} > \text{Ni} > \text{Mn} > \text{Cu}$ in dissolved phase, whereas, $\text{Fe} > \text{Mn} > \text{Ni} > \text{Cu}$ in residual and exchangeable part of particulates. The highest concentrations for the dissolved, residual and exchangeable particulates occurred at 18:00. The lowest concentrations were found at 22:00 for the dissolved phase, whereas residual and exchangeable parts of particulates were at a minimum at 12:00 and 08:00. There is an inverse relation between dissolved phase and particulate heavy metals.

The results for water quality (air and water temperature, pH, EC, DO, salinity, TSS, total hardness, Ca^{2+} , Mg^{2+} , HCO_3^- , SO_4^{2-} , Cl^-) were variable between sites. In general, the water quality of each station is within the permissible range of WHO values reported for fresh water.

WATER QUALITY OF IRAQI SOUTHERN MARSHES

After inundation, water quality surveys were designed and implemented by Marine Science Centre at University of Basrah with collaboration of Iraqi Foundation during November 2005 to September 2006 for six locations 4 in the hor Al-Hammar (Al-Barka, Al-Nakara and Al-Baghdadia 1 and 2) the other 2 locations in Hor Al-Hwaaiza (Um Al-Warad and Um Al-Neiach).

The following data were recorded: pH(7.56-7.91), Electrical conductivity EC (1.2-3.09 mmohs/cm²), Ca(126.065-84.631 mg/L), Mg (116.64-55.315 mg/L), Cl (186.768-750.895 mg/L), Total Suspended Solid TSS (11-36 mg/L), Total Dissolved Solid TDS (702.99-1976.7 mg/L), Dissolved Oxygen D.O. (5.4-9.98 mg/L), Turbidity (4.48-37.62 unit), Salinity (0.536-1.978 ppt), Water temperature (21.43-22.51 C°), Air temperature (24-30 C°), SO₄ (343.513-578.411 mg/L), HCO₃ (202.993-333.077 mg/L), and the Total Hardness TH (723.636- 500 mg/L).

The result obtained during this survey established important background information and a baseline for further restoration work in these southern marshes of Iraq and the result of these data show favorable signs of successful restoration.

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COMPREHENSIVE STUDY OF BUFFALOS IN IRAQ WETLANDS

A census of the water buffalos population in the marshes in southern Iraq commenced in May-2006. The southern provinces involved in this research are the (The qar – Maysan – Basrah) In the addition to the number of animals counted some other details were recorded. Number of the farmers was also recorded the number of animals included number of males and females each sex was also divided into these categories according to age of the animals number of lactating cows and amount of milk produced by them was also recorded. Results calculated by research team during the last four months (May, June, July and August) from Thi-qar province.

RECENT ENVIRONMENTAL CHANGES IN THE WETLAND OF SOUTHERN IRAQ BASED ON PALYNOLOGICAL STUDIES

Palynological techniques are useful in reconstructing past environments, especially when other sources information are lacking. We have embarked on a palynological study of the wetlands in southern Iraq in an attempt to determine the nature and extend of past plant communities and other conditions prior to destruction in the 1990s. Ten 1 m long surface cores were collected from selected location in marshes and shallow open water wetlands in the Mesopotamian wetlands of southern Iraq. Pollen diagrams from three short cores from the Hawizeh wetlands serve as a reference because this site has not been drained. The palynomorphs in these cores were: Gramineae, Chenopodiaceae, Typha, Isonandra lanceolata, Bursarea, Artocarpus, Ireantea, Arenga, Crinym, Palmae, Navia, Tofieldia, Ipomorea, Xyris, Morus. Fungal spores including Polyporisorites, Pluricellaesporites Palyadosporites, Fusiformisporites, Spegazzinites indicus, Diporisorites, Plochmopellinites, Lycoperdon, Miliolinites, Dryadosporites constrictus, Trichothyrites padapakarensis were noteworthy. Charcoal was scattered through the cores and indicate activities associated with human settlements. Many other forms of cuticles, filaments, insects, algae and foraminiferal test linings were also recorded. A second set of pollen samples were analyzed from 160 soil samples from eight cores collected from the wetland area which was dried during the 1990s. These data show a mix of pollen and spores that could be used to evaluate past vegetational, climatic and ecological changes. Preliminary results indicated that Chenopodaceae have increased while Gramineae types have declined which probably reflected desertification and a trend towards a more aeolian landscape during the nineties. It is hoped that these studies will be useful in establishing conditions of the wetlands prior to destruction and will assist in setting restoration goals in the future.

Case studies of one deep borehole (153 meters) near Amara city for evaluating late Quaternary history and dig of 3 meters depth to evaluate ancient desertification by wetland dryness were taken for correlation and connection with this recent sediments.

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