

# **ECOLOGY: ECOLOGICAL PARAMETERS**

## AN INTRODUCTORY PERSPECTIVE TO THE ECOTOXICOLOGY OF THE IRAQI MARSHES' ANTHROPOGENIC PROBLEMS

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### ABSTRACT

To facilitate the effective protection of valuable environmental systems subjected to anthropogenic activities, there must be a basic understanding of three areas. These are: 1) how is the variety of biological components of the ecosystem exposed to stress? 2) How does the ecosystem respond to that disturbance? And 3) how does the ecosystem recover or adapt? This is the so-called *ecosystem exposure-response-recovery relationship*. This ecotoxicity approach may be utilized in the overall process of risk assessment-risk management of chemical input into the Iraqi marshland ecosystem. Concerning the case of the Iraqi marshes, the risk assessment of releasing chemical, biological, and other harmful agents directly or indirectly into the marshland ecosystem begins by organizing the fundamental considerations into three basic categories. These include the fate, the transport, and the effects of such agents on the marshes' ecosystem quality. Hence, the perspective we are introducing in this study is to consider the marshes ecosystem and its interaction with the large number of chemicals, such as heavy metals, pesticides, oil, waste discharges, etc. for ecotoxicological evaluation. This is, of course, a long step approach, from recognition, to standardization and to implementation of methods that address the needs for various tasks of evaluation in such virgin, valuable, and under restoration ecosystem of the southern Iraqi marshes. We anticipate the outcome of such an ecotoxicology evaluation program will pilot to dramatic improvement in water quality and to the protection of the marshes ecosystem on the long run basis of the restoration process. National and international support, efforts, organization, and implementation of the various segments of such an approach are vital in the overall process of the restoration of the unique ecosystem of the Iraqi marshes following their massive devastation in the 1990s.

## **REVIEW OF WATER CHEMISTRY OF HAMMAR MARSH BEFORE THE EXTENSIVE DESICCATION**

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### **ABSTRACT**

The quantity of fresh water reaching the marshes via the Tigris and Euphrates rivers plays a major role in salinity fluctuations. Alkaline pH (7-8) was a sign of strong decomposition in the East Hammar marsh. Chloride and sulphite salts are vital elements in the hardness of marsh water. Shallowness of the marsh facilitates the exchange between the water column and the sediments and leads to increased concentration of nutrients. Enrichment experiments indicated that aquatic plants and phytoplankton need more nitrogen than phosphorus. Iraqi inland waters (including the marshes) exceed the mean values for world rivers by 1-2 orders of magnitude for all major cations and anions except for K.

**ANALYTICAL CHANGE DETECTION TECHNIQUES FOR  
ENVIRONMENTAL EVALUATION OF SHATT AL-ARAB REGION AND  
SURROUNDINGS**

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**ABSTRACT**

The present area of study is located in the southern part of Iraq lying within the limits of the Mesopotamian plain. During the last three decades, the area has been subjected to many natural and artificial changes. Two Landsat images with three bands (green, blue and near IR) have been used at different periods (1975 and 2002). A number of different visual and digital (differencing, rationing, NDVI and PCA) techniques have been used for detecting changes in the area studied. Good results have been obtained by using visual change detection, image rationing and PCA1 for environmental changes.

## **STUDY OF ECOLOGY AND MORPHOLOGY OF THE IRAQI SOUTHERN MARSHES**

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### **ABSTRACT**

The southern marshes and their surroundings are distinguished by the abundance of fresh water and the proper climate for harvesting crops and vegetables. The marshes are considered to be the natural habitat of water buffalos were it can not be able to breed only in this place and which thousands were living in the area before the 1980s.

The last two decades of the last century was the beginning of marshland drainage for reasons relating to the political and security situation of the former governing regime, without any consideration given to the environmental effects on Lower Mesopotamia. By conducting the draining work the previous regime benefited from the construction works of older projects that were constructed on the banks of the Tigris and Euphrates rivers. The main aim of these earlier projects was to control the flood of these two rivers by filling these marshes such as Al-Khidia Dam on the Euphrates, Al Kut Dam on the Tigris (1918), constructing an earthen dam between the towns of Al Qurna and Al Madena in the region of Al-Hammar Marshes, and so on.

Regarding what happened to the southern marshes by the misguided policy of the last regime: The former regime proclaimed the possibility of planting crops such as wheat and barley in the drained area in an attempt to relieve the effect of the economic sanctions imposed by the U.N in the 1990s. Therefore an attempt was conducted to study the existing environment and to describe and evaluate the geomorphologic nature of the southern marshes and to study such aspects with the study of marshes water resources, the mechanism of draining process and the damages that occurred later. This study included the tectonic formation of the area.

## **ECOLOGICAL STUDY OF AQUATIC MACROPHYTES IN THE RESTORED MARSHES OF SOUTHERN IRAQ**

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### **ABSTRACT**

Aquatic macrophytic plants play an important role in the environment by providing food, oxygen, and shelter for aquatic animals. They are also useful biological indicators of environmental changes.

An ecological study was done for aquatic macrophytes in the three restored marshes, Huwaizah, Chebaysh and Hammar. Samples of macrophytes were collected monthly in the study stations from November 2005 to October 2006. Vegetation cover and species richness were estimated for plant communities by using transects and quadrats. Twenty replicates for vegetation cover were done in each station. Some physiochemical factors of water were measured in the field.

Seventeen species of aquatic macrophytes were recorded in Huwaizah Marsh while 14 and 15 species were recorded in Chebaysh and Hammar respectively. The highest values of biodiversity and evenness were in Huwaizah Marsh, and were 2.47 and 0.89 respectively. The highest values of the similarity index were between Chebaysh and Hammar marshes. The values of water quality indicated low salinity and alkaline direction.

## PHYSICAL AND CHEMICAL PARAMETERS OF WATER IN THE MARSHES OF SOUTHERN IRAQ

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### ABSTRACT

During 2005 - 2006, six locations, four in the Hor Al-Hammar (Al-Barka, Al-Nakara and Al-Baghdadia 1 and 2) and the other two in Hor Al-Haweizah (Um Al-Warad and Um Al-Neiach), were selected to study the physical and chemical parameters of water in the Mesopotamian marshlands of Iraq. Physical and chemical stressors were studied, including the natural water quality parameters of dissolved oxygen (DO), biological oxygen demand (BOD), turbidity, total suspended solids (TSS), total dissolved solids (TDS), electrical conductivity (EC), water and air temperature, salinity, total hardness (TH), and pH.

The mean ranges of the following data recorded during summer were: pH (7.42-8.03), EC (1.18-4.87 mmohs/cm<sup>2</sup>), Ca (92.81-216.43 mg/L), Mg (43.74-243.00 mg/L) Cl (257.01-1205.3 mg/L), TSS (8.25-66.0 mg/L), TDS (916.0-3316.0 mg/L), DO (4.2-10.4 mg/L); turbidity (3.87-59.0 FTU), salinity (0.35-2.5 ppt), water temperature (28.25-33.0°C), air temperature (31.0-40.3°C), SO<sub>4</sub> (242.4-879.48 mg/L), HCO<sub>3</sub> (201.33-305.05 mg/L), and TH (430.0-1480.0 mg/L). The corresponding data recorded during winter were pH (7.53-8.82), EC (1.21-3.16 mmohs/cm<sup>2</sup>), Ca (84.14-160.32 mg/L), Mg (88.69-223.56 mg/L), Cl (319.05-779.9 mg/L), TSS (9.5-39.0 mg/L), TDS (911.0-2770.0 mg/L), DO (8.2-13.5 mg/L), turbidity (4.34-25.69 FTU), salinity (0.67-1.95 ppt), water temperature (12.04-14.22°C), air temperature (12.0-22.1°C), SO<sub>4</sub> (242.08-833.13 mg/L), HCO<sub>3</sub> (134.22-353.86 mg/L), and TH (675.0 -1100.0 mg/L). The results showed some fluctuation in some of these parameters during winter and summer at different locations in the marshes of southern Iraq.

The results obtained during this survey established important background information and demonstrated overall good water quality. A correspondingly rapid restoration of most wetland function seems to indicate that the recovery of ecosystem function is well under way.

## **STUDY OF PHENOLES IN THE SEWAGE OF AL SADER AL TAÉLIMI HOSPITAL**

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### **ABSTRACT**

Phenoles level have been detrimental and the physical and chemical characters in Shatt Al-Arab river on the study area, which included three stations. The first station was the direct pipe of disposition to the Al Taélimi hospital, the second station before one meter of pipe and the third station is the point of mixing river water by the hospital sewage. Air temperature in the study area ranged between 11-43°C, water temperature varied from 8-34°C, pH between 6.0-7.3, and salinity varied from 1.49-2.86 ppm. The study also showed total dissolved solids (TDS) levels between 910-2200 ppm, total alkalinity between 110-299 mg/l; biological oxygen demand (BOD) between 1.5-3.5 mg/l, and TOC between 0.157-1.092 %. Levels of phenol varied from 0.00479-0.018 µg/l. The percent study shows an increase in phenol level in the area of study above the local and national mean levels because of the effect of sewage from the hospital.

**PHYSIOCHEMICAL BEHAVIOR OF CARBONATE MINERALS IN SOILS,  
SEDIMENTS AND WATER OF THE TIDAL FLATS OF THE  
NORTHWESTERN ARABIAN GULF AND THE SHATT AL- ARAB RIVER**

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**ABSTRACT**

Our study recommends that either Davies and Jones or Reddy and Noncollass may describe the mechanism of carbonate minerals precipitation. It consists of sudden precipitation of calcium carbonate with an energy of  $41.66 \text{ KJ mol}^{-1}$  and the crystal rearrangement to crystal growth formation. The precipitation coefficient rate for the first stage is higher than that of the second stage.