



# **Management Plan for the Hawizeh Marsh Ramsar Site of Iraq**

## **Second Draft**

### **Volume 2: Management Issues and Recommendation**



**A Report Prepared for the  
Iraq National Marshes and Wetlands Committee**

**December 2008**

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This two-volume report, *Management Plan for the Hawizeh Marsh Ramsar Site of Iraq* has been prepared for the Iraq National Marshes and Wetlands Committee (INMWC) to assist the Government of Iraq in its implementation of national Ramsar Convention responsibilities. The drafting of this report was led by Nature Iraq during the September 2007 to November 2008 period. It is one of a series of reports prepared by Nature Iraq to summarize and inform partner agencies on the status and progress of its biodiversity partnership initiatives in Iraq.

Financial support for the drafting of this report was provided by the Italian Ministry of the Environment, Land and Sea.

NOTE: This report is the second formal draft of this Management Plan. It is fully revised based on review comments provided by the members of the INMWC and other stakeholders after two meetings held at Sulaimani, Kurdistan, Iraq from April 30-May 1, 2008 and October 5-6, 2008. This second draft includes corrections to minor errors in the first draft released on May 1, 2008. The Plan remains in draft form, thus it will continue to receive additional input and observations by stakeholders and the INMWC as appropriate.

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## **Volume 2: Mangement Issues and Recommendations**

**Prepared for the  
Iraq National Marshes and Wetlands Committee**

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**December 2008**

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## Executive Summary

This two-volume report, *Management Plan for the Hawizeh Marsh Ramsar Site of Iraq*, provides recommendations for actions that are needed to bring this Plan forward to an operational condition. These respond to 14 management objectives outlined in Section 7.0 of Volume 2. Of the 93 recommendations made in this report, ten are identified as potential “First Step Projects” that could energize the broad-scale implementation of many elements of this Management Plan.

Marshes restoration efforts in Iraq since 2003 have received significant contributions of expertise and financial resources. This has included projects funded by donors including the United States Agency for International Development (USAID), the Canadian International Development Agency (CIDA), the Italian Ministry of Environment, Land and Sea (IMELS), and the Japanese International Cooperation Agency (JICA). Donor contributions have been complemented by allocations and staff time from the Iraq Ministry of Water Resources, the Iraq Ministry of Environment, and other ministries in Iraq.

Meaningful new allocations from any source will depend on broad-based endorsement of a new series of projects. While a set of “First Step Projects” are recommended in this report, it is not yet possible to quantify their cost in detail as too many unknowns still exist. However, two approaches may prove useful to consider:

- (1) Discuss and achieve consensus with a sufficient partnership for a limited set of projects and bring these to the attention of government leaders and donors; and
- (2) With a single donor, seek a significant financial commitment over five years towards the key aspects of this Plan, and design implementation of a limited suite of projects that will wisely apply these funds to a key set of priority projects.

A significant investment by the Government of Iraq in partnership with international donors would be needed to initiate these First Step Projects starting in 2009-2010.

This *Executive Summary* provides:

- the Management Objectives of this Plan;
- a set of ten recommended “First Step Projects”; and
- a wide range of Management Actions that are also recommended, as described in more detail in Section 7.0 that follows here in Volume 2.

## Management Objectives

This document presents a proposed Management Plan for the Hawizeh Marsh, Iraq’s first Wetland of International Importance, as designated in October 2007 under the Ramsar Convention on Wetlands of International Importance. This Plan provides recommendations, presented in detail in Section 7.0 in Volume 2 of this report, for actions to facilitate the implementation of this Management Plan. These actions are summarized against the 14 management objectives (presented in Section 4.3 of Volume 1 and repeated here) in four groups:

### Management Objectives for the Environment

- 1) Responding to the Peer Review Process
- 2) Conservation of Natural Heritage
- 3) Environmental Monitoring Program and Protected Areas

### Management Objectives for Water Resources

- 4) Management of Water Quality and Water Quantity in the Marsh

- 5) Sustainable Development-Infrastructure Planning (Bridges, Roads and Dykes)

Management Objectives for Cultural and Social Issues

- 6) Maintenance of Cultural Heritage
- 7) Promotion of a Land Tenure System
- 8) Creation of a Legislative, Policy and Planning Framework
- 9) Management of Border Issues with Iran
- 10) Understanding Stakeholder Demands, Involvement and Needs

Management Objectives for Economic Opportunities

- 11) Management of Agricultural Development and Impacts
- 12) Fisheries Restoration and Development
- 13) Facilitating Oil Development
- 14) Considerations for Future Tourism Opportunities

## First Step Projects

Ten actions are proposed as priorities for “First Step Projects” seeking funding support. These are derived from the complete set of 93 recommendations presented herein. It is urged that these First Step Projects be implemented as soon as feasible. All of the recommended actions in this two-volume report are deemed important but, due to practical and financial constraints, these nine First Step Projects are suggested. They may be effective in starting the long-term support and management of all aspects of the conservation and wise use of Hawizeh Marsh.

The ten proposed First Step Projects are:

- a) Develop a Hawizeh Marsh Risk Management Assessment to address all current threats to the Hawizeh Marsh taking into account water and natural resources users, and planned and future impacts (such as oil exploration, fisheries and agricultural expansion, agricultural irrigation, cultural and traditional uses, tourism and transboundary flows with Iran). (See recommendation #47).
- b) Complete the installation of the hydrological monitoring equipment procured by Nature Iraq within the New Eden Project in 2007, one station to be placed on the Kassarah River and one on the Swaib River. (See recommendation #39).
- c) Create a land use planning framework and digital map base of Hawizeh Marsh to include information such as: delineation of community development areas, wildlife and fish protection or special management zones, agricultural lands, border security areas, hazard lands/waters such as mine fields, and water management units. (See recommendation #66).
- d) Consult Iran on the creation of a Hawizeh-Al Azim Marshes Joint Management Commission for the transboundary marshes to promote shared responsibility and improved management of the Iran-Iraq border wetland resources. (See recommendation #70).
- e) Establish a Hawizeh Marsh Stakeholder Advisory Committee or similar citizen policy group that represents the broad range of interests of the community. (See recommendation #71).
- f) Undertake a survey of the State of Hawizeh Agriculture on the borders of the Marsh, highlighting soil and water conditions, including the impact of salinization. This survey should describe the potential for agriculture production integrated and compatible with the marshes environment. (See recommendation #76).
- g) Organize training and education sessions on sustainable hunting and fishing practices with local communities to discourage the use of unsustainable harvesting practices (such as fishing with electro-shocking, explosives and poison). This should be translated into

- local community-based initiatives and investments in local fish and wildlife associations with guidelines or regulations as needed. (See recommendations #27 and 86).
- h) Ensure protection of the ecological character of the Hawizeh Marsh, a Ramsar Convention treaty requirement, is fully considered in environmental assessments of the introduction of oil and gas development including the use of modern lateral drilling techniques to minimize environmental impacts. (See recommendation #89).
  - i) Continue, and expand as appropriate, a rigorous Hawizeh Marsh Strategic Monitoring Program on the hydrology, water quality, biota, soils and sediments for the Marsh. Monitoring of hydrology should include: (a) continuous records of water levels over time in several locations; (b) accounting of surface inflows and outflows; and (c) long-term, real time monitoring of water elevation at two separate locations within Hawizeh Marsh, one in the northern part and one in the southern part of the Marsh. (See recommendations #2, 11 and 41).
  - j) Undertake studies to design a Hawizeh Marsh Cultural Heritage Centre in the Hawizeh Marsh area to encourage the collection of cultural artifacts, language dialects, photographs, music, art, and books; to encourage Iraqi and international media about and research interest on the unique cultural heritage of this region; and to instill pride of local peoples in this heritage. (See recommendation 57).

## List of Recommended Management Actions

A more detailed discussion of these recommended actions is presented in Section 7.0 that follows.

### *Management of the Environment*

#### **Responding to the Peer Review Process**

Management Objective #1: To obtain an independent review and recommendations for action regarding major components of the Hawizeh Marsh environmental monitoring and management program.

The 2007 Peer Review Panel recommended a group of actions, including:

Recommendation #1. The New Eden Plan is an ambitious and generally well-focused wetland restoration program and should be supported by the Iraqi government and the international community.

Recommendation #2. A rigorous, yet strategic program of monitoring of hydrology, water quality, biota, soils and sediments for the restored marshes should be established.

Recommendation #3. A joint water management process such as a commission for the Euphrates and Tigris Rivers encompassing the Governments of Turkey, Syria, Iran and Iraq should be established.

Recommendation #4. Efforts should be made in Iraq to establish a joint water commission that includes the relevant government departments and other stakeholders where national water management issues can be dealt with in a holistic way.

Recommendation #5. In the management of natural resources in the marshes, efforts should be made to involve local users/stakeholders.

Recommendation #6. A review of all water chemical analytical procedures, especially for phosphorus and nitrogen, should be done for the monitoring effort and a comparison (e.g. inter-calibration) with one or several established laboratories should be done as well.

Recommendation #7. A one-year water sampling program should be implemented with emphasis on nitrogen and phosphorus.

Recommendation #8. Data on cadmium concentrations are high and of concern. New samples should be taken and analyzed by an established laboratory with experience with

this element. If confirmed, remedial actions and damage control must be implemented. Release of the water into the Gulf should be avoided. The use of part of the wetland complex as a deposit is in this context preferable until the source has been identified and remedial actions taken.

Recommendation #9. All efforts should be made to investigate old studies.

Recommendation #10. This plan of the Marshlands restoration is generally robust and it is recommended that it be implemented promptly. The Panel felt it will provide the following benefits:

- flood control, drought moderation, and provision of microclimate;
- nutrient management (e.g. N, P, K, Na) and pollution control (heavy metals, organic contaminants, etc.) for the downstream Gulf;
- soil management including erosion prevention, soil salinity and soil quality;
- habitat regeneration for fish, birds and other wildlife;
- improvement in overall sustainability and quality of life in the area; and
- carbon sequestration.

The 2007 Panel also commented on the management of the proposed National Park in Central Marsh in Iraq and its relationship to the Hawizeh Marsh Ramsar Site. They noted that the proposed National Park and the Hawizeh Ramsar Site should have their objectives focused on solving six current and major problems of these wetland areas today: (1) loss of biodiversity; (2) salinization of water and soil; (3) pollution; (4) overgrazing; (5) illegal fishing and hunting; and (6) spreading of settlements without appropriate land planning. Primary objectives they felt should include: (a) restoration of the marshlands ecosystem; (b) protection of endangered species; and (c) conservation of cultural heritage.

Monitoring Programs: The Panel made additional recommendations on the monitoring of the hydrology of the marshes:

Recommendation #11. Monitoring the hydrology should include continuous records of the hydroperiods (water levels over time) in several locations and an accounting of the surface inflows and outflows.

Recommendation #12. If done properly, this should include stage measurements in the centre of each wetland basin and flow measurements at key inflow and outflow positions where possible.

Recommendation #13. Monitoring organisms of the wetland should mainly include identifying and monitoring the important components of biological diversity, and characterizing life histories of key species and necessary habitat conditions.

Recommendation #14. Field monitoring for the National Park and the Hawizeh Ramsar projects is proposed on a schedule of 14 sites every three months.

Recommendation #15. The Panel recommended that the wetland classification system used by Ramsar be investigated for its appropriateness in this situation.

### **Conservation of Natural Heritage**

Management Objective #2: To maintain the biological diversity of the Hawizeh area and restore and protect populations and habitats of species at risk while ensuring sustainable harvest of wild species for human needs.

#### **Plants**

Actions needed:

Recommendation #16. Basic research is needed on the value and importance of plant species that may serve specific, unique, and useful purposes in the marshes.

Recommendation #17. Reestablishment of these species in the marshes is needed.

Recommendation #18. Identification of economic species of concern, such as native marshland plants that could be cultivated would provide additional income sources for the marsh dwellers. This might include Brahmin, White Water Lily, and Capers.

Recommendation #19. Study of the role and impact of invasive plants in these marshes would evaluate the effect of the last several decades of impacts and restoration.

Recommendation #20. The effects of increased salinity on the marsh habitats needs to be evaluated, to see if there may be applications of the water flows from the main outfall drain to augment water and revive larger areas of the various southern marshes.

Recommendation #21. Marsh plants provide a unique opportunity to research the progress of environmental restoration in general. Scientific research is a low-impact, appropriate use of the marsh that could provide some income streams for the marsh dwellers (as guides, laborers and research technicians).

### Reptiles and Amphibians

Actions needed:

Recommendation #22. A baseline survey for presence/absence of species and a study of the habitat requirements of reptiles and amphibians are needed in the Hawizeh Marsh.

Recommendation #23. A simple publication for use by local schools on these species would assist in building public awareness of which species are rare and why they are important elements to retain in the Hawizeh ecosystem.

### Birds

Actions needed:

Recommendation #24. Studies of the critical habitat needs for birds are needed for species of conservation concern so that informed decisions can be made in the ongoing restoration process.

Recommendation #25. Identification of important breeding colonies is needed to assess protection measures and establishment of biological reserves.

Recommendation #26. The importance of avian flu, and vectors for possible transmission of this disease to other birds as well as humans, requires interministerial and international cooperation. It is a serious public and wildlife health issue.

Recommendation #27. The sustainability of all wildlife hunting, especially for birds, requires assessment. This could be translated into local community-based hunting initiatives, with training and investment in hunting associations and guidelines or regulations if needed.

Recommendation #28. Educational campaigns to support sustainable hunting and use initiatives are needed at all levels to educate the general population on the importance of protecting threatened, endangered and vulnerable bird species.

### Mammals

Actions needed:

Recommendation #29. Surveys should be expanded to document the status of mammals, to identify their numbers and where their critical habitats occur in the Hawizeh Marsh, and to verify if additional species have moved into the Marsh since 2003.

Recommendation #30. The feeding relationships and life habits of these mammals should be studied to achieve a better understanding of the overall ecosystem so that the effect of further restoration of Hawizeh Marsh can be evaluated.

Recommendation #31. Once wildlife surveys have been established, ecological reserves and managed hunting zones should be established.

Recommendation #32. Local inhabitants and communities should be given instruction in managing local wildlife stocks to promote sustainability and economic opportunity inherent in the existence of these populations.

Recommendation #33. The establishment of wildlife corridors between other southern marshes in Iraq and Iran to facilitate reestablishment of wildlife should be promoted as part of regional sustainable development planning.

### **Environmental Monitoring and Protected Areas**

Management Objective #3: To establish protected zones through regulation or planning mechanisms and, where appropriate, refugia in the interest of ensuring sustainable wildlife and fish harvesting as well as species at risk populations re-establishment.

Actions needed:

Recommendation #34. Securement of key or ecologically representative areas including the Assafia Wildlife Park, in proper protected areas status, through:

- active tribally-based stewardship actions to ensure species management and wise use,
- legislative means, and
- creation of ecological reserves, parks, including seasonal fish and wildlife management zones.

Recommendation #35. Manage the Hawizeh Marsh and its adjacent lands as an IUCN Category VI *Managed Resource Area*. This will recognize that the ongoing interaction of local peoples and wildlife has created a culturally, aesthetically and economically distinct character. This internationally recognized protected areas management concept would permit ongoing wise and sustainable use of natural resources and promote traditional uses of the marshes by its local people. It would seek to protect and maintain biological diversity, promote sound management practices for sustainable production purposes, and provide a continued flow of natural products and services to meet local community needs.

Recommendation #36. Maintain the Hawizeh Habitat Monitoring Program established by Nature Iraq to assess the ongoing ecological character of the marshes, water quality, its habitats and biodiversity year-to-year taking into consideration recommendations from the September 2007 Nature Iraq Ecological Monitoring Peer Review Panel (see Section 6.1).

Recommendation #37. Create an ecological research initiative with Iraqi and Iranian academic institutions to study the ecological character of Hawizeh Marsh, establish benchmark conditions for each habitat which can act as ecological reference sites, and identify targets for restoration.

Recommendation #38. Prepare habitat restoration and recovery strategies for species at risk and for those species of economic importance, especially commercial fish.

### **Management of Water Resources**

#### **Water Quantity and Quality Management**

Management Objective #4: To improve and protect the water quality of the site and manage water resources for the wide spectrum of water users in the Hawizeh Marsh in such a way as to preserve water quality and quantity for all current and future users.

Actions needed:

#### **Water Quantity**

Recommendation #39. Complete the installation of the hydrological monitoring equipment procured by Nature Iraq within the New Eden project in 2007. A total of 10 stations were delivered to the Center for the Restoration of the Iraqi Marshes (CRIM) in January 2008. One station is supposed to be placed on the Kassarah River and one on the Swaib. One additional station was installed along the Kahla'a River in 2006.

- Recommendation #40. Complete the preparation of the rating curves for all tributaries and estuaries entering the Hawizeh Marsh from Iraq and Iran. This action could be undertaken by CRIM by using the various monitoring equipment procured by Nature Iraq through the New Eden project.
- Recommendation #41. Establish a long-term, real time monitoring of the water elevation at two separate locations within Hawizeh Marsh (one on the northern part and the other on the southern part).
- Recommendation #42. Implement the water management actions drafted by the New Eden Master Plan (Iraq Ministry of Environment *et al.* 2006).
- Recommendation #43. Negotiate water releases, the flow of water and opening of the border dyke with Iran to increase water inflows at predefined times as soon as possible.
- Recommendation #44. Revise target curves according to stakeholders' recommendations.

#### Water Quality

- Recommendation #45. Assess all water quality data currently available from recent studies in the Hawizeh Marsh to determine sites of good to poor water quality. A data bank that would include all raw data is required that can then be screened for quality assurance purposes.
- Recommendation #46. Identify all current and potential threats to the water quality of the Marsh including: (a) salinization, (b) sustainability of water flow availability from Iranian and Iraqi sources, (c) pollution sources from agriculture, municipalities and industry, and (d) maintenance of water levels in the Marsh.
- Recommendation #47. Develop an Action Plan to address all current threats to the Hawizeh Marsh taking into account water users, and planned and future impacts (such as oil exploration, fisheries and agricultural expansion, agricultural irrigation, cultural and traditional uses, tourism and transboundary flows with Iran).
- Recommendation #48. Complete the installation of the real time monitoring system procured by Nature Iraq. Such equipment will enable continue monitoring of the basic water quality parameters (pH, Salinity, Water Temperature, Dissolved Oxygen) for the water flowing in and out of Hawizeh Marsh from the Iraq side.
- Recommendation #49. Ensure that similar monitoring practices are established also at the Iranian side along the discharge points of the Kharkeh River into Hawizeh Marsh.
- Recommendation #50. Establish long-term water quality monitoring programs at the tail end of the Teeb and Dwarij rivers.

#### **Sustainable Development-Infrastructure Planning (Water Structures, Bridges, Roads, Dykes)**

**Management Objective #5: To maintain the current level of human use of the Hawizeh Marsh and improve water circulation and connectivity at various locations.**

Actions needed:

- Recommendation #51. Implement both the Kassarah and Swaib head water regulators according to the detail design provided by the New Eden Group to the Ministry of Water Resources in December 2007.
- Recommendation #52. Provide further evaluation on the impact of internal roads and embankments to the general pattern of water circulation inside Haiwzeh Marsh.
- Recommendation #53. Establish an infrastructure plan for opening and modifying roads and embankments so as to enhance water circulation inside Hawizeh Marsh and water exchange between the Hawizeh and Al Azim marshes.
- Recommendation #54. Evaluate the possibility of removing/modifying the Iran/Iraq embankment so as to increase water exchange between Iraq and Iran.

## *Management of Cultural and Social Issues*

### **Maintaining Cultural Heritage**

Management Objective #6: To protect and restore sites of cultural, historical and archeological significance in the area of Hawizeh Marsh.

Actions needed:

Recommendation #55. A reconnaissance survey by competent national and international authorities of the current status of archeological, cultural and historic sites in the vicinity of Hawizeh Marsh is needed.

Recommendation #56. A review of the current status against a national antiquities data base is needed with a program to ensure ongoing site security and restoration of sites if resources permit.

Recommendation #57. Create an institution to gather local photographs, books, songs, art, etc to promote workshops on traditional knowledge, methods and materials and awareness, research, media interest and higher education reflecting the vitality of local cultural heritage..

### **Promoting a Land Tenure System**

Management Objective #7: To identify traditional and disrupted patterns of human use, ownership and occupation of lands in the area of Hawizeh Marsh, establish an operable land tenure system, and promote mechanisms for peaceful resolution of land tenure disputes.

Actions needed:

Recommendation #58. Study the mechanisms of the land tenure system within the Hawizeh Marsh area.

Recommendation #59. Map the current land tenure and related activities carried out by the tenants over the Hawizeh area.

Recommendation #60. Provide guidance for land tenure regulation.

### **Creating a Legislative, Policy and Planning Framework**

Management Objective #8: To put into place effective regulatory and planning tools that can be successfully implemented in cooperation with, and in the interest of, local peoples.

Actions needed:

Recommendation #61. It is important to encourage the continued return of the local peoples to this area, ensuring that the increasing human settlement is provided the basic services all Iraqis expect, including necessary infrastructure services. Local councils have repeatedly asked for electricity, dairy barns, veterinary services, human health clinics and construction of more secure buildings.

Recommendation #62. Basic land use planning in the Hawizeh area remains almost totally lacking and must be introduced.

Recommendation #63. Healthy, secure water resources in sufficient quantity are needed to support human settlements in the area and to ensure chances for economic development.

Recommendation #64. Development planning for sustainable use of wildlife including mammals, fish and birds and domesticated cattle and water buffalo are also urgently needed.

Recommendation #65. The continued use and new development of local resources must be a feature of the cultural fabric of this area, building on traditional uses but mindful of new requirements for environmental protection and economic fairness to benefit local peoples.

Recommendation #66. A land use planning framework and digital map base of Hawizeh Marsh is urgently needed. It should include delineation of wildlife and fish protection or special management zones, community development areas, agricultural lands, border security areas, mine fields, and water management units.

### **Managing Border Issues with Iran**

Management Objective #9: To promote a normalized state of affairs for the Hawizeh border wetlands, in which the Governments of both Iraq and Iran take an active, cooperative role in facilitating good governance of wetland resources in this area.

Actions needed:

Recommendation #67. Iranian and Iraqi organizations need to develop joint, cooperative ecological research on the marshes on mutually agreed themes of interest.

Recommendation #68. Discussion on joint management of water management structures, dyke maintenance, allowance for cross-border water flows on a seasonal basis and establishment of water transfers as needed to prevent flooding or infrastructural damage on both sides of the border is desirable.

Recommendation #69. Designation of Hor Al Azim as a Ramsar Site in Iran and encouragement of a joint approach to a transborder Ramsar Sites regime are desirable.

Recommendation #70. A Joint Management Committee for the transboundary marshes, a Joint Border Commission, or a Regional Management Board of some kind are all models that should be considered to promote shared responsibility and improved management of the Iran-Iraq border wetland resources.

### **Understanding Stakeholder Demands, Involvement and Needs**

Management Objective #10: To incorporate in all plans and activities the needs and requirement of local and regional stakeholders (residents, fisherman, hunters, farmers, local civil servants, military and border officials, oil developers, etc.) who live, work and/or utilize the Hawizeh Marsh and the surrounding lands.

Actions needed:

Recommendation #71. Establishment of a Stakeholder Advisory Group or similar citizen policy board is needed that represents the broad range of interests represented by the community. Representation on the advisory group should:

- include representatives of relevant government agencies, non-governmental organizations, trade groups, private landowners and developers, community and other interest groups and general citizens
- be defined, in terms of size and stakeholder sectors, Iraqi National Marshes and Wetlands Committee with the goal of encouraging diversity of perspectives and representativeness. Appointment of individual members should be decided by the stakeholder groups involved (e.g. internal selection procedures by agencies, NGOs and other interest groups and/or by selection of the existing membership of the group).
- have a membership that changes over time and elects its own leadership.

Recommendation #72. Allocation of funds and conducting of a workshop are needed on the draft Hawizeh Marsh Management Plan for the Advisory Group members. This will provide the advisory group with sufficient financial and logistical support to conduct regular meetings to develop their recommendations and make revisions to the Plan.

Recommendation #73. A series of public meetings are required, organized by the Advisory Group, on the revised Hawizeh Marsh Management Plan to take additional input and build consensus around the management actions defined by the Plan.

Recommendation #74. The Advisory Group should finalize its input to the Hawizeh Marsh Management Plan and present it to the Iraqi Interministerial Ramsar Committee for their consideration and approval.

Recommendation #75. On a yearly basis, the Advisory Group should meet to review and update the plan and address management issues regarding the Hawizeh Marsh Ramsar site.

## *Management of Economic Opportunities*

### **Managing Agricultural Development and Impacts**

Management Objective #11: To ensure, with local community support, that appropriate lands for agricultural use are maintained and proper environmental and economic management of wastewater, salinization of soils and waters, water buffalo and cattle, and crop production are followed.

Actions needed:

Recommendation #76. A survey of the state of agriculture on the borders of the Hawizeh Marsh should be undertaken. This survey should highlight the soil and water conditions, in particular in regard to the salinity issue. Moreover, the outcome of this survey should describe the potential of agriculture integrated to the marshes environment.

Recommendation #77. Rehabilitation of the drainage system of the agricultural areas around the Hawizeh Marsh is needed.

Recommendation #78. Completion of all major outfall drains should be a priority to enable the construction of proper drainage systems with avoidance of dumping of polluted water into the marshes.

Recommendation #79. Introduction and promotion of best practices for an efficient use of water for irrigation is needed.

Recommendation #80. Development of local marshes agricultural cooperatives to strengthen the sector is needed. These “marsh cooperatives” would technically support marsh farmers during their agricultural activities.

Recommendation #81. Promotion of the local marshes agricultural business sector is needed.

### **Fisheries Restoration and Development**

Management Objective #12: To restore sustainable fish populations of marketable quality and size and create economic opportunity for fishing in the Hawizeh Marsh.

Actions needed:

Recommendation #82. Comprehensive studies concerning food and feeding studies should be conducted to evaluate to what extent the restored marshes can provide productive feeding grounds for fish. Food partitioning and diet overlap among different species needs to be considered.

Recommendation #83. There are also critical information needs in the area of economically-important fisheries including:

- a) stock assessment of the marketable commercial fisheries in Hawizeh Marsh;
- b) determining basic requirements for oxygen, temperature, water clarity, etc. for important fish species and how species impact each other;
- c) site selection for aquaculture activities including artificial propagation of the locally important fishes;
- d) studies on the migration of species in the Marsh; and
- e) determination of feeding relationships, particularly competition on food resources by carnivorous fish species.

Recommendation #84. The Marsh is now dominated by invasive fish and two introduced carp species. Therefore, the marshes require immediate mitigation and restoration of fish stock. Bunni restocking actively may be the fastest and most effective manner in which to accomplish this objective as Bunni remain the premium priced and most desired fish.

Recommendation #85. Enhancement of fisheries in the southern marshes may be possible through selection of valuable endemic species and carrying out artificial breeding to produce fry and fingerlings.

Recommendation #86. Training sessions to introduce sustainable fishing practices with local communities and education are urgently needed as a means of discouraging the use of unsustainable fishing practices (such as electro-shocking, explosives and poison).

Recommendation #87. Fishing controls and moratoriums to sustain and ensure the viability of the Hawizeh fisheries may become a necessity in the future but these actions should be based on the scientific assessments discussed above.

### **Facilitating Oil Development**

Management Objective #13: To plan for operations and opening of the Majnoon Oil Field south of Hawizeh Marsh to ensure sustainability of the ecological character of the marsh, through use of new investments and new technologies such as lateral drilling.

Actions needed:

Recommendation #88. Consultations with the Iraq Ministry of Oil are required to define development needs and areas for potential production fields in and around Hawizeh Marsh.

Recommendation #89. The need to protect the ecological character of the Marsh must be considered in environmental assessment of the introduction of oil and gas developments including use of modern lateral drilling techniques to minimize environmental impacts.

Recommendation #90. Consultations with the Oil Ministry in Iran is desirable to establish guidelines that minimize cross-border impacts to both nations.

### **Consideration of Future Tourism Opportunities**

Management Objective #14: To project and plan for future activities in the Hawizeh Marsh that can create economic opportunities, such as tourism, for local peoples and institutions and in which all Iraqis can take advantage of and be proud.

Actions needed:

Recommendation #91. Research and analysis are required of tourism assets and issues (e.g. environmental assets and attractions; public sector infrastructure available and needed; community assets and attitudes; visitor demands and requirements; industry and economic impacts; and public sector resources and funding).

Recommendation #92. Development is needed of a *Tourism Strategic Plan* that is updated yearly in collaboration with the Iraqi Ministry of Tourism, Stakeholder Advisory Group, and other related agencies and organizations. This plan should address local authority's planning, stakeholder involvement, and tourism industry and infrastructure planning. It should include the following: a statement of goals, objectives and guidelines which will govern tourism development in the Hawizeh Ramsar site; a list of planned projects and their design; a list of requirements and regulations that will govern such projects; specific procedures for the appraisal and evaluation of projects under a collaborative framework that specifies clear jurisdiction and authority for approval, management and oversight of such projects; and funding mechanisms utilized for development of such projects.

Recommendation #93. A mechanism needs to be put in place to evaluate the impacts of tourism development on four key areas: visitors, industry, community and the environment and provide comprehensive feedback into the *Tourism Strategic Plan*.



# Management Plan for the Hawizeh Marsh Ramsar Site, Iraq

## 7.0 Detailed Discussion of Recommended Management Actions

This section proposes actions that, if implemented, could facilitate management of the environmental, social and cultural, and economic development issues facing the Hawizeh Marsh. This section considers the fourteen management objectives presented in Volume 1 (Section 4.3), divided into four groups:

### Management of the Environment

1. Responding to the Peer Review Process
2. Conservation of Natural Heritage
3. Environmental Monitoring and Protected Areas

### Management of Water Issues

4. Water Quality and Quantity Management
5. Sustainable Development -Infrastructure Planning (Bridges, Roads, Dykes)

### Management of Cultural and Social Issues

6. Maintaining Cultural Heritage
7. Promoting a Land Tenure System
8. Creating a Legislative, Policy and Planning Framework
9. Managing Border Issues with Iran
10. Understanding Stakeholder Demands, Involvement and Needs

### Management of Economic Opportunities

11. Managing Agricultural Development and Impacts
12. Fisheries Restoration and Development
13. Facilitating Oil Development
14. Consideration of Future Tourism Opportunities

### Management of the Environment

The October 2008 review by stakeholders of the Second Draft of this Plan indicated the environmental management issues below were of interest. These were ranked by meeting participants as high, moderate or low in terms of priority for action:

#### High Priority for Action:

- Monitor water quality and character;
- Establish a development approvals/permit process led by the MOE;
- Manage non-sustainable fishing and wildlife hunting methods;
- Create water treaties with the Tigris and Euphrates River Basin nations; and
- Create a national law for parks establishment and management.

#### Moderate Priority for Action:

- Control alien and invasive species introductions;
- Control dumping of industrial and solid wastes;
- Promote an environmental awareness media campaign and a school campaign;
- Cooperate and engage local and national NGOs; and
- Ensure local environmental laws are effective;

#### Low Priority for Action:

- Create an interagency environmental cooperation process;
- Establish and improve environmental regulations; and
- Promote eco-friendly technologies.

In various ways, most of these issues are considered in the recommendations below.

### 7.1 Responding to the Peer Review Process

Management Objective #1: To obtain an independent review and recommendations for action regarding major components of the Hawizeh Marsh environmental monitoring and management program.

In September 2007, Nature Iraq established an independent Peer Review Panel to assess its New Eden Again Plan for the management and monitoring of the hydrological components of the southern marshes including Hawizeh Marsh (Nature Iraq 2007b). The Panel consisted of several of the World's leading experts on wetland ecology, large basin wetland restoration programs, and Ramsar site planning. The Panel members were drawn from the United States of America, Botswana and the People's Republic of China. A summary of the key recommendations of the Panel follows. The full set of the Panel's recommendations are presented in more detail in Annex 4 in Volume 1.

The Peer Review Panel recommended ten actions, including:

Recommendation #1. The New Eden Plan, as an ambitious and generally well-focused wetland restoration program, should be supported by the Iraqi government and the international community.

Recommendation #2. A rigorous, yet strategic program of monitoring of hydrology, water quality, biota, and soils/sediments for the restored marshes should be established.

Recommendation #3. A joint water management process such as a commission for the Euphrates and Tigris Rivers encompassing the Governments of Turkey, Syria, Iran and Iraq should be established.

Recommendation #4. Efforts should be made in Iraq to establish a joint water commission that includes the relevant government departments and other stakeholders where national water management issues can be dealt with in a holistic way.

Recommendation #5. In the management of natural resources in the marshes, efforts should be made to involve local users/stakeholders.

Recommendation #6. A review of all water chemical analytical procedures, especially for phosphorus and nitrogen, should be done for the monitoring effort and a comparison (e.g. inter-calibration) with one or several established laboratories should be done as well.

Recommendation #7. A one-year water sampling program should be implemented with emphasis on nitrogen and phosphorus.

Recommendation #8. Data on cadmium concentrations are high and of concern. New samples should be taken and analyzed by an established laboratory with experience with this element. If confirmed, remedial actions and damage control must be implemented. Release of the water into the Gulf should be avoided. The use of part of the wetland complex as a deposit is in this context preferable until the source has been identified and remedial actions taken.

Recommendation #9. All efforts should be made to investigate old studies.

Recommendation #10. This plan of the Marshlands restoration is generally robust and it is recommended that it be implemented promptly. The Panel felt it will provide the following benefits:

- flood control, drought moderation, and provision of microclimate;
- nutrient management (e.g. N, P, K, Na) and pollution control (heavy metals, organic contaminants, etc.) for the downstream Gulf;

- soil management including erosion prevention, soil salinity and soil quality;
- habitat regeneration for fish, birds and other wildlife;
- improvement in overall sustainability and quality of life in the area; and
- carbon sequestration.

The Panel also commented on the management of the proposed National Park in Central Marsh in Iraq and its relationship to the Hawizeh Marsh Ramsar Site. They noted that the proposed National Park and the Hawizeh Ramsar Site should have their objectives focused on solving six current and major problems of these wetland areas today: (1) loss of biodiversity; (2) salinization of water and soil; (3) pollution; (4) overgrazing; (5) illegal fishing and hunting; and (6) spreading of settlements without appropriate land planning. Primary objectives they felt should include: (a) restoration of the marshlands ecosystem; (b) protection of endangered species; and (c) conservation of cultural heritage.

**Monitoring Programs:** The Panel made additional recommendations on the monitoring of the hydrology of the marshes.

Recommendation #11. Monitoring the hydrology should include continuous records of the hydroperiods (water levels over time) in several locations and an accounting of the surface inflows and outflows.

Recommendation #12. If done properly, this should include stage measurements in the centre of each wetland basin and flow measurements at key inflow and outflow positions where possible.

Recommendation #13. Monitoring organisms of the wetland should mainly include identifying and monitoring the important components of biological diversity, and characterizing life histories of key species and necessary habitat conditions.

Recommendation #14. Field monitoring for the National Park and the Hawizeh Ramsar projects is proposed on a schedule of 14 sites every three months.

Recommendation #15. The Panel recommended that the wetland classification system used by Ramsar be investigated for its appropriateness in this situation.

## 7.2 Conservation of Natural Heritage

Management Objective #2: To maintain the biological diversity of the Hawizeh area and restore and protect populations and habitats of species at risk while ensuring sustainable harvest of wild species for human needs.

### 7.2.1 Plants

The indigenous peoples of the Hawizeh Marsh area have made use of the vegetation in the marsh for millennia; indeed, their culture cannot survive without this unique resource. The primary useful plant species is the common reed (*Phragmites australis*). Reeds are used in construction of dwellings and in weaving of reed mats (see Figure 28), which were traditionally sold to provide crucial income. Other plants that are important for construction include Bulrush.

Water buffalo in the marshes feed on common reeds by grazing as well as on reeds cut by their owners, which were once also cut and sold as fodder to buffalo and cattle/sheep owners in cities. This provides another source of income to the marsh dwellers (see Section 7.11.3 for a discussion on water buffalo management). In addition, some marsh vegetation is directly eaten as food by local people. Pollen from Bulrush was processed into a yellowish cake locally called “khurait” and is consumed by marsh dwellers and sold in the market. Other marsh vegetation that was traditionally eaten includes rushes, flowering plants, cress, herbs and “thorn grapes”.



Figure 28: Traditional construction of reed mats in the marshes of Iraq

Phragmites was also once used as material for a paper mill located near Amarah. However, the mill remains idle due to looting and war damages. The economic viability of the paper mill is in doubt. Further exploitation of this marsh resource for paper production is not easily recommended without proper environmental safeguards on the processing of effluent from the plant.

The medicinal use of marsh vegetation in Iraq is not very well-known or documented. Several of the plants found within the marshes have medicinal value, but it is not known if they are used for medicinal purposes by the marsh dwellers of Hawizeh. Some of these plants are grown commercially outside Iraq. The Euphrates Poplar (*Populus euphratica*) has anti-inflammatory and fever-reducing properties. Knotweed (*Polygonum salicifolium*) can be used as a diuretic and laxative. Extracts of *Bacopa monneria* are sold commercially as nutritional supplements to aid in cognitive skills. Extracts of White Water Lily (*Nymphaea alba*) are sold commercially as a natural painkiller and as a “shamanic” substance. Wild Caper (*Capparis spinosa*) grows around the marshes; this is a potentially cultivatable crop. Both Bulrush (*Scirpus litoralis*) and Cattail (*Typha domingensis*) also have potential medicinal uses.

The critical information needs relative to macrophytes are focused on the immediate need to restore and maintain the Marsh for the local peoples and the environment that they depend on. Higher biodiversity results in a more stable ecosystem. The marsh dwellers, not being

nomadic, may benefit from such stability. The current diversity of plant species in Hawizeh is expected to increase somewhat as restoration and reflooding measures continue. Some plant species formerly found here have not yet reestablished in the reflooded marsh areas.

**Actions needed:**

Recommendation #16. Basic research is needed on the value and importance of plant species that may serve specific, unique, and useful purposes in the marshes.

Recommendation #17. Reestablishment of these species in the marshes is needed.

Recommendation #18. Identification of economic species of concern, such as native marshland plants that could be cultivated would provide additional income sources for the marsh dwellers. This might include Brahmin, White Water Lily, and Capers.

Recommendation #19. Study of the role and impact of invasive plants in these marshes would evaluate the effect of the last several decades of impacts and restoration.

Recommendation #20. The effects of increased salinity on the marsh habitats needs to be evaluated, to see if there may be applications of the water flows from the main outfall drain to augment water and revive larger areas of the various southern marshes.

Recommendation #21. Marsh plants provide a unique opportunity to research the progress of environmental restoration in general. Scientific research is a low-impact, appropriate use of the marsh that could provide some income streams for the marsh dwellers (as guides, laborers and research technicians).

### 7.2.2 Reptiles and Amphibians

Amphibians and reptiles are important components of the Hawizeh ecosystem and serve many functions. Regrettably, at this time little is known about the status of these species in the area. Obviously, drainage would have had a disastrous affect on amphibians such as frogs and salamanders, also the soft-shelled turtle, as they are dependent on water bodies for survival; some of the reptile species may have fared better during desiccation.

Surveys specifically for reptiles or amphibians have not been conducted in this area. The information provided below is therefore based largely on published information for the Iraqi marshes, supplemented by casual observations made during fieldwork and reports from local marsh dwellers. Frogs have returned in great abundance in the reflooded marshes, but they have not been identified to the species level.

**Actions needed:**

Recommendation #22. A baseline survey for presence/absence of species and a study of the habitat requirements of reptiles and amphibians are needed in the Hawizeh Marsh.

Recommendation #23. A simple publication for use by local schools on these species would assist in building public awareness of which species are rare and why they are important elements to retain in the Hawizeh ecosystem.

### 7.2.3 Birds

Understanding the extent of diversity and populations of birds in the Marsh is important as it allows assessment of their conservation status, importance for species of conservation concern, and the sustainability of harvest of birds as a food source for local people. It is also tied to the future ecotourism potential in this region as birds are a major draw for bird watchers. This has associated economic opportunities. Therefore, it is important to protect and conserve the populations of indigenous and migratory birds in the area.

**Actions needed:**

Recommendation #24. Studies of the critical habitat needs for birds are needed for species of conservation concern so that informed decisions can be made in the ongoing restoration process.

Recommendation #25. Identification of important breeding colonies is required to assess protection measures and establishment of biological reserves.

Recommendation #26. The importance of avian flu, and vectors for possible transmission of this disease to other birds as well as humans, requires interministerial and international cooperation. It is a serious public and wildlife health issue.

Recommendation #27. The sustainability of all wildlife hunting, especially for birds, requires assessment. This could be translated into local community-based hunting initiatives, with training and investment in hunting associations and guidelines or regulations if needed.

Recommendation #28. Educational campaigns to support sustainable hunting and use initiatives are needed at all levels to educate the general population on the importance of protecting threatened, endangered and vulnerable bird species.

#### 7.2.4 Mammals

No recent comprehensive surveys of mammals exist for the Hawizeh area. However, the Nature Iraq staff and the New Eden Project did discuss these species in its 2006 reports (Iraqi Ministry of Environment *et al.* 2006) and is now undertaking mammal data collection as part of its habitat initiatives. Knowledge of the diversity of mammals in the area is very limited. This reflects the lack of specialized surveys for small mammals (rodents and bats), the paucity of large mammals, the restricted access for wildlife studies - both by area and by time of day, and severe hunting pressure. For example, few night visits have been possible, which would provide an opportunity to survey nocturnally active mammals (which are the majority).

##### Actions needed:

Recommendation #29. Surveys should be expanded to document the status of mammals, to identify their numbers and where their critical habitats occur in the Hawizeh Marsh, and to verify if additional species have moved into the Marsh since 2003.

Recommendation #30. The feeding relationships and life habits of these mammals should be studied to achieve a better understanding of the overall ecosystem so that the effect of further restoration of Hawizeh Marsh can be evaluated.

Recommendation #31. Once wildlife surveys have been established, ecological reserves and managed hunting zones should be established.

Recommendation #32. Local inhabitants and communities should be given instruction in managing local wildlife stocks to promote sustainability and economic opportunity inherent in the existence of these populations.

Recommendation #33. The establishment of wildlife corridors between other southern marshes in Iraq and Iran to facilitate reestablishment of wildlife should be promoted as part of regional sustainable development planning.

### 7.3 Environmental Monitoring and Protected Areas

Management Objective #3: To establish protected zones through regulation or planning mechanisms and, where appropriate, refugia in the interest of ensuring sustainable wildlife and fish harvesting as well as species at risk populations re-establishment.

Hawizeh Marsh was designated as an Important Bird Area by BirdLife International (Evans 1994), and surveys under the Nature Iraq Key Biodiversity Areas (KBA) survey indicate that the area is still an important site for birds as well as other species of plants, fish and mammals. In addition, due to the fact that the Hawizeh Marsh is the only marsh system to remain largely intact during the period of extensive drainage that occurred during the 1990s, Hawizeh acted as an important refugia for many of Iraq's unique wetland species. However, until today, no conservation measures have taken place and the area has remained largely unprotected. The one small protected area, the Assaffa Wildlife Park, described in Section

2.10, needs to be considered in planning what portions of the Hawizeh Marsh might otherwise also be analyzed for protected areas status such as for a national park, ecological reserves or local community management zones. National and governorate-level legislation need to be reviewed to see if they are adequate to encourage environmental conservation and wise use objectives.

The KBA program objective is to develop a national inventory of sites which are of significance to biological diversity and to recommend such sites for protection, conservation action and continued monitoring. As an IBA and a candidate KBA site, the Hawizeh Marsh requires protected area status at the national level. In addition, proactive action should be taken to help restore those areas of the Marsh that have been degraded and continued monitoring and scientific research is necessary to help inform that effort.

**Actions needed:**

Recommendation #34. Securement of key or ecologically representative areas including the Assafia Wildlife Park, in proper protected areas status, through:

- active tribally-based stewardship actions to ensure species management and wise use,
- legislative means, and
- creation of ecological reserves, parks, including seasonal fish and wildlife management zones.

Recommendation #35. Manage the Hawizeh Marsh and its adjacent lands as an IUCN Category VI *Managed Resource Area*. This will recognize that the ongoing interaction of local peoples and wildlife has created a culturally, aesthetically and economically distinct character. This internationally recognized protected areas management concept would permit ongoing wise and sustainable use of natural resources and promote traditional uses of the marshes by its local people. It would seek to protect and maintain biological diversity, promote sound management practices for sustainable production purposes, and provide a continued flow of natural products and services to meet local community needs.

Recommendation #36. Maintain the Hawizeh Habitat Monitoring Program established by Nature Iraq to assess the ongoing ecological character of the marshes, water quality, its habitats and biodiversity year-to-year taking into consideration recommendations from the September 2007 Nature Iraq Ecological Monitoring Peer Review Panel (see Section 7.1).

Recommendation #37. Create an ecological research initiative with Iraqi and Iranian academic institutions to study the ecological character of Hawizeh Marsh, establish benchmark conditions for each habitat which can act as ecological reference sites, and identify targets for restoration.

Recommendation #38. Prepare habitat restoration and recovery strategies for species at risk and for those species of economic importance, especially commercial fish.

### **Management of Water Resources**

The October 2008 review by stakeholders of the Second Draft of this Plan indicated the water management issues below were of interest. These were ranked by meeting participants as high moderate or low in terms of priority for action:

#### **High Priority for Action**

- Control contaminated water sources;
- Examine all relevant studies on hydrology and water balance;
- Construct water quality and quantity measuring stations and ensure a stable water balance in the long-term for Hawizeh Marsh;
- Maintain the Marsh's water balance through installation of water regulators at the Swaib and Kasarah rivers; and
- Modernize water irrigation techniques and more efficient use of existing water for agriculture through the Ministry of Agriculture.

#### Moderate Priority for Action:

- Complete studies by the Ministry of Municipalities and Public Works (MMPW) on water pollution sources and risks; and
- Undertake research on impacts of incoming Iranian sourced waters.

#### Low Priority for Action:

- Require environmental assessment of water entering Hawizeh in terms of sources and risks;
- Treat waters incoming from Iran;
- Use phytotechnology for local wastewater treatment;
- Create opportunities for training of water managers;
- Establish a Hawizeh Water Management Board through the Ministry of Water Resources (MOWR); and
- Implement the results of the Missan water salinity study.

In various ways, most of these issues are considered in the recommendations below.

### **7.4 Water Quantity and Quality Management**

Management Objective #4: To improve and protect the water quality of the site and manage water resources for the wide spectrum of water users in the Hawizeh Marsh in such a way as to preserve water quality and quantity for all current and future users.

Hawizeh represents the most pristine portion of wetlands that remains in Iraq. Hawizeh is fed by water contribution from Iraq and Iran. Maintaining or enlarging the existing marsh will require action from both countries.

Human actions (e.g. construction of dams, desiccation structures and embankments) has deeply modified the water regime into the marsh in the past thirty years. To implement a good water management strategy according to human and natural necessities, it is very important to understand how the water balance in the marsh has changed. A possible alternative for implementing best practices in water control management for these marshes can be summarized as follows:

- Water level variation during time is of paramount importance to guarantee the development of a healthy marsh system. By changing the water level, according to a predefined target stage hydrograph, marsh dynamics must meet the important requirements of maintaining flow movement and initiating wetting and drying processes. Identification of a specific stage hydrograph (or “Target Curve” – TC) strongly influences water demand for large and complex marshes such as Hawizeh. At the same time, identification of such a curve requires a lengthy stakeholder involvement process, aimed at finding the best compromise among parties who typically have conflicting goals and objectives.
- Water inflows and outflows in the marshes must be fully controlled to allow for the water level to vary at the desired rate. By controlling the inlets and the outlets of the marshes, it is possible to reduce water losses due to evaporation and optimize water utilization. Currently, the Iraqi Ministry of Water Resources (MOWR) is planning for the construction of two head regulators to enable full control of water levels inside Hawizeh Marsh at the Kassarah and Swaib outlets.

A complete restoration of Hawizeh will not be possible unless adjustments are made along several embankments and canals delimiting the area. The security embankment along the Iran-Iraq border is still under construction by Iran and will prevent vital water from entering Hawizeh Marsh. This construction must be stopped and the embankment removed or modified to allow for water to move safely from Iran to Iraq.

Nevertheless, water quantity alone will not guarantee the long-term management of Hawizeh Marsh as water quality is equally important. A baseline hydrological investigation is required in order to establish a long-term management plan of water quality and quantity conditions for Hawizeh Marsh.

#### Actions needed:

##### Water Quantity

Recommendation #39. Complete the installation of the hydrological monitoring equipment procured by Nature Iraq within the New Eden project in 2007. A total of 10 stations were delivered to the Center for the Restoration of the Iraqi Marshes (CRIM) in January 2008. One station is supposed to be placed on the Kassarah River and one on the Swaib. One additional station was installed along the Kahla'a River in 2006.

Recommendation #40. Complete the preparation of the rating curves for all tributaries and estuaries entering the Hawizeh Marsh from Iraq and Iran. This action could be undertaken by CRIM by using the various monitoring equipment procured by Nature Iraq through the New Eden project.

Recommendation #41. Establish a long-term, real time monitoring of the water elevation at two separate locations within Hawizeh Marsh (one on the northern part and the other on the southern part).

Recommendation #42. Implement the water management actions drafted by the New Eden Master Plan (Iraq Ministry of Environment *et al.* 2006).

Recommendation #43. Negotiate water releases, the flow of water and opening of the border dyke with Iran to increase water inflows at predefined times as soon as possible.

Recommendation #44. Revise target curves according to stakeholders' recommendations.

##### Water Quality

Recommendation #45. Assess all water quality data currently available from recent studies in the Hawizeh Marsh to determine sites of good to poor water quality. A data bank that would include all raw data is required that can then be screened for quality assurance purposes.

Recommendation #46. Identify all current and potential threats to the water quality of the Marsh including: (a) salinization, (b) sustainability of water flow availability from Iranian and Iraqi sources, (c) pollution sources from agriculture, municipalities and industry, and (d) maintenance of water levels in the Marsh.

Recommendation #47. Develop a Risk Management Assessment to address these threats taking into account water and natural resources users, and planned and future impacts (such as oil exploration, fisheries and agricultural expansion, agricultural irrigation, cultural and traditional uses, tourism and transboundary flows with Iran).

Recommendation #48. Complete the installation of the real time monitoring system procured by Nature Iraq. Such equipment will enable continue monitoring of the basic water quality parameters (pH, salinity, water temperature, dissolved oxygen) for the water flowing in and out of Hawizeh Marsh from the Iraq side.

Recommendation #49. Ensure that similar monitoring practices are established also at the Iranian side along the discharge points of the Kharkeh River into Hawizeh Marsh.

Recommendation #50. Establish long-term water quality monitoring programs at the tail end of the Teeb and Dwarij rivers.

## **7.5 Sustainable Development-Infrastructure Planning (Bridges, Roads, Dykes)**

Management Objective #5: To maintain the current level of human uses of the Hawizeh Marsh and improve water circulation and connectivity at various locations.

### 7.5.1 New Roads and Embankments

Roads and embankments could be an obstacle to water circulation in Hawizeh Marsh. Existing and future management plans of the Hawizeh area must consider the impacts of new roads in marsh hydrodynamics. As a general guideline, it is desirable to limit the construction of new roads, consider the opportunity of removing existing road embankments, and build culverts or other structures across these structures to allow water exchange across the marshes. A map showing the existing roads in the Hawizeh area is shown Figure 29. Secondary roads are transitable only during the water shrinking period, otherwise these roads are flooded by water in the Marsh.

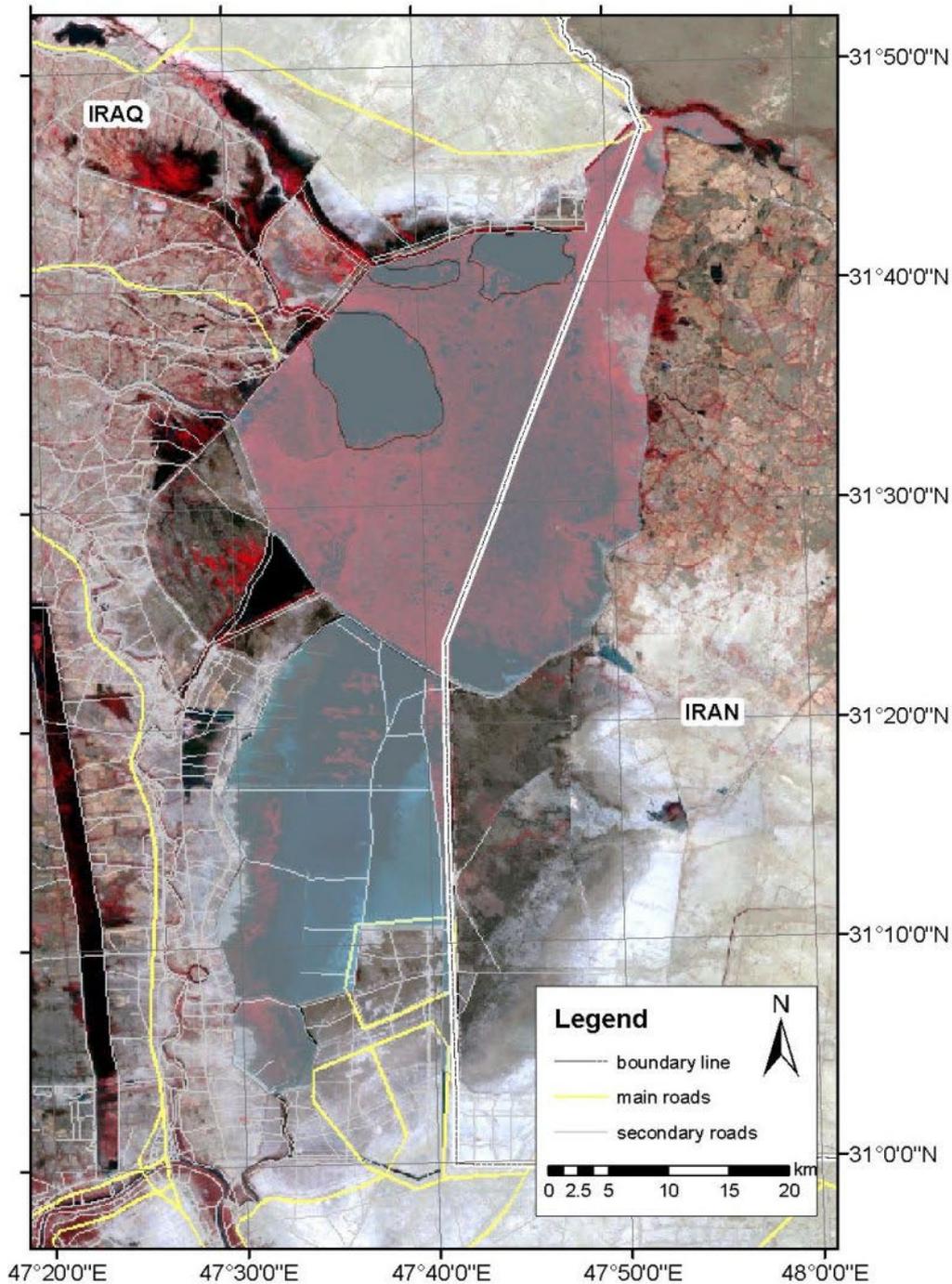


Figure 29: Existing roads in the area of Hawizeh Marsh

Actions needed:

Recommendation #51. Implement both the Kassarah and Swaib head water regulators according to the detail design provided by the New Eden Group to the Ministry of Water Resources in December 2007.

Recommendation #52. Provide further evaluation on the impact of internal roads and embankments to the general pattern of water circulation inside Haiwzeh Marsh.

Recommendation #53. Establish an infrastructure plan for opening and modifying roads and embankments so as to enhance water circulation inside Hawizeh Marsh and water exchange between the Hawizeh and Al Azim marshes.

Recommendation #54. Evaluate the possibility of removing/modifying the Iran/Iraq embankment so as to increase water exchange between Iraq and Iran.

### 7.5.2 Dyke Maintenance

To encourage efficient management of Hawizeh Marsh, it is necessary to limit the construction of new dykes and embankments and, wherever feasible, to remove the existing obstacles to water circulation (see Figures 30 and 31). If the complete removal of these obstacles is not possible, it will be necessary to provide for the construction of a culvert system.

The dyke along the Iran-Iraq border is still under construction by Iran and will prevent vital water from entering Hawizeh Marsh. This construction must be stopped and the embankment removed or modified to allow for water to move safely from Iran to Iraq. Similarly, several other existing embankments currently divide Hawizeh Marsh in two parts. They are a constraint preventing the marsh from expanding westward and southward.



Figure 30: Dyke with roadway separating reflooded and unflooded zones.

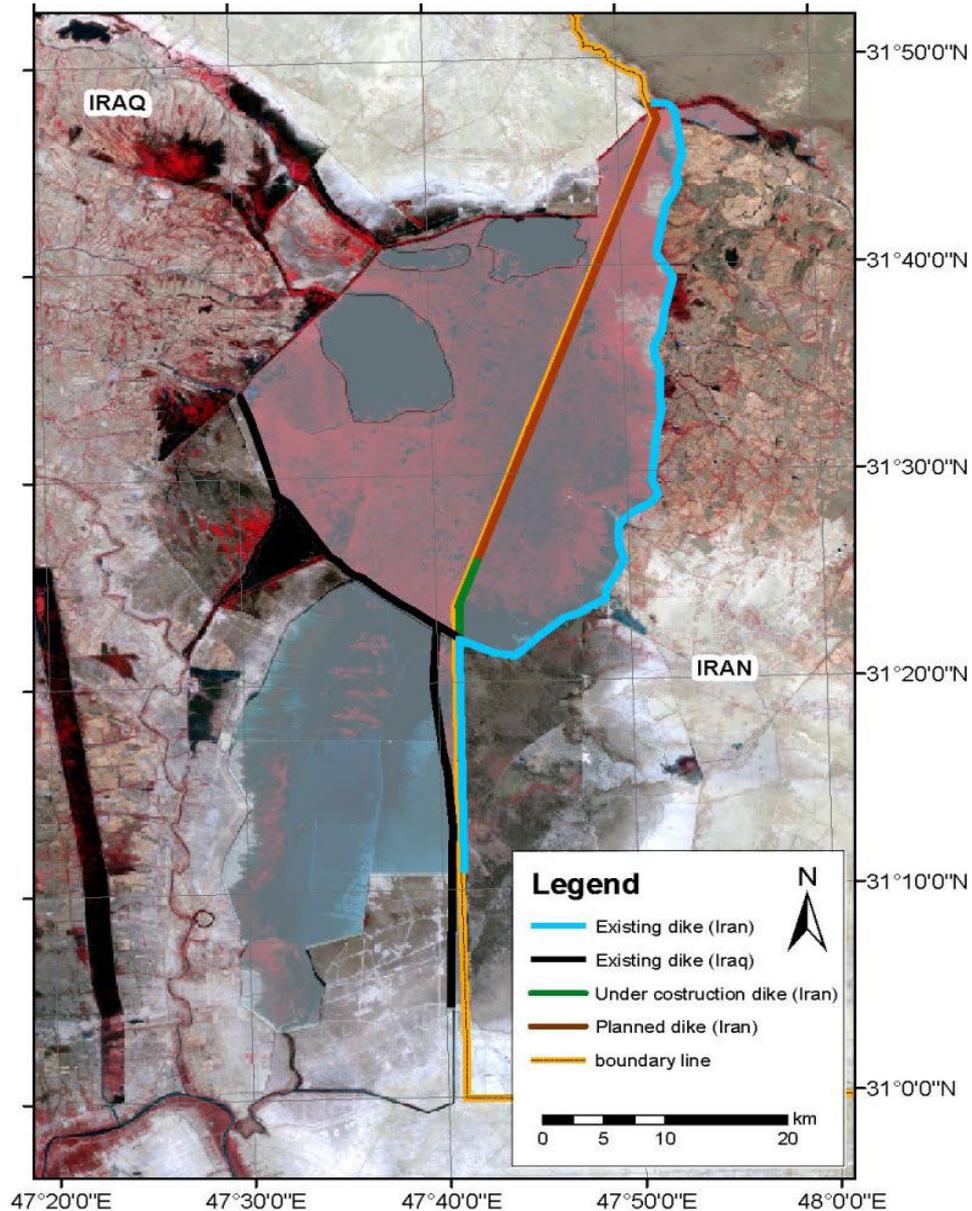


Figure 31: Existing dykes and those under construction (2008)

### 7.5.3 Water Structures and Access

Based on results of the New Eden Master Plan in 2006, the Iraq Ministry of Water Resources agreed on the design of two water control structures to be built at the outlet of the Kassarah and Swaib rivers. These structures are designed to regulate water levels inside Hawizeh Marsh.

The Hawizeh Marsh would achieve optimal water management and prevent high water losses due to evaporation by allowing only a certain amount of water to flow in and out of the Marsh depending on the month of the year and the hydrological conditions in dry, normal or flood years.

Based on these considerations, the MOWR set the total peak inflow water requirements for Hawizeh Marsh in the amount of  $210 \text{ m}^3/\text{s}$ . The hydrological analyses prepared by the MOWR and subsequently verified by the New Eden Group also defined that, prior to reaching

the Kassarah and Swaib outlets, such a flood wave would be reduced to half its size or approximately  $100 \text{ m}^3/\text{s}$ . Based on these results, the MOWR concluded that the Kassarah regulator should be designed to operate at  $35 \text{ m}^3/\text{s}$  and be able to pass a 100-year design flood of  $125 \text{ m}^3/\text{s}$ , whereas the Swaib regulator should be designed to operate at  $65 \text{ m}^3/\text{s}$  and be able to pass a 100-year flood of  $200 \text{ m}^3/\text{s}$ .



Figure 32: Illustration of the proposed Kassarah regulator

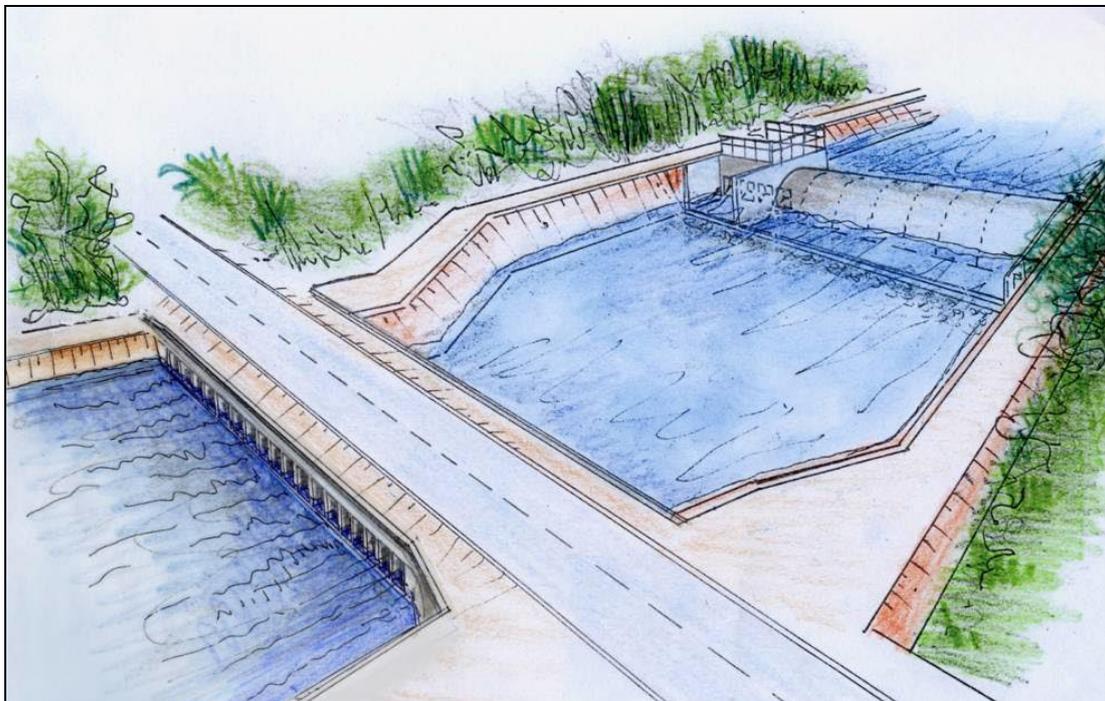


Figure 33: Illustration of the proposed Swaib regulator

According to these design parameters, the detailed design of both structures was completed by the New Eden Group in December 2007 and a final copy of the project designs was delivered to the MoWR. With this information, the MoWR is now in the position to tender the

construction of both structures which are considered critical for the long-term management of Hawizeh Marsh. Two sketches of the proposed water control structures at Kassarah and Swaib are illustrated in Figures 32 and 33 and their locations noted in Figure 34.

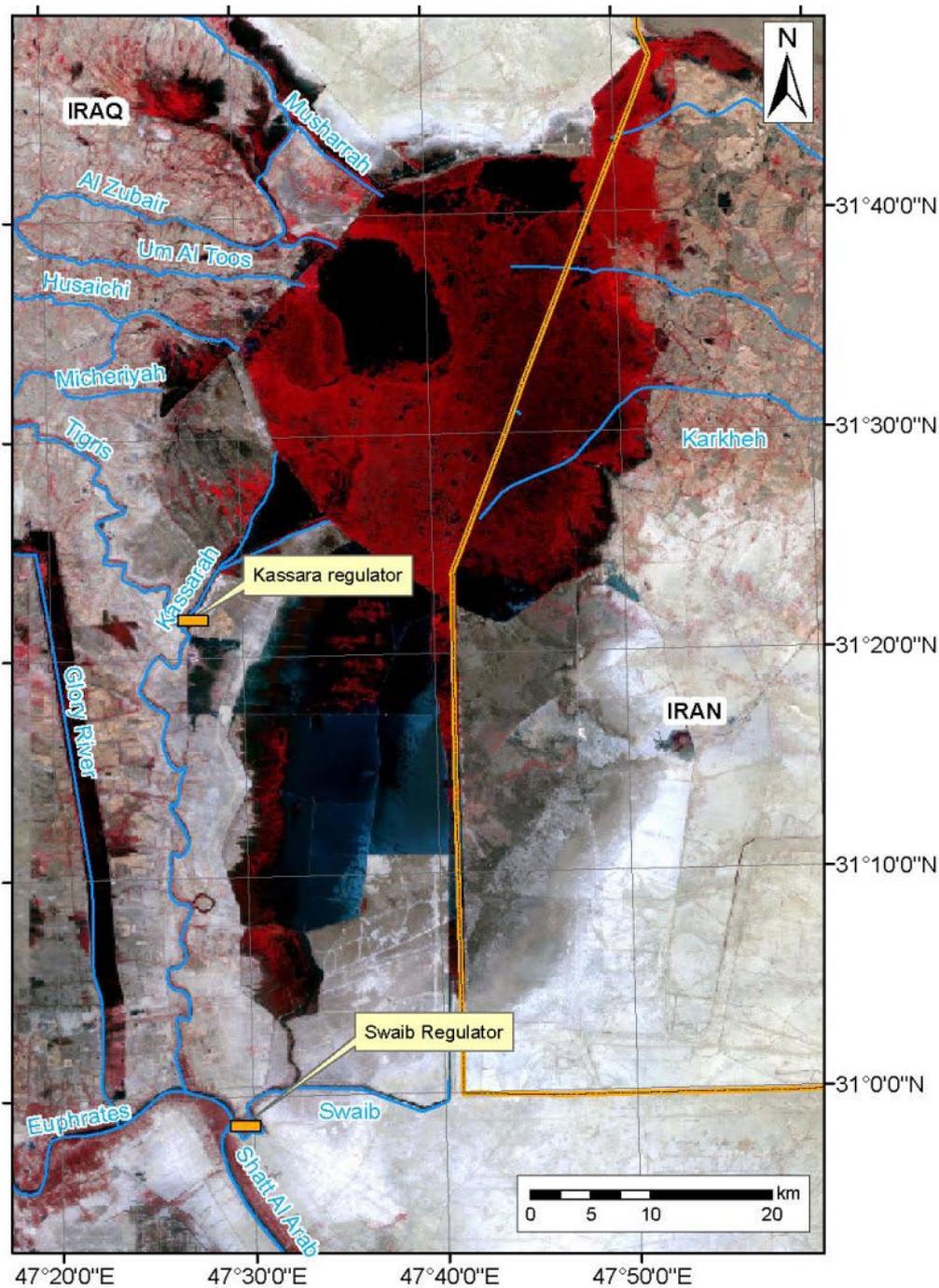


Figure 34: Position of the proposed Kassarah and Swaib regulators

### **Management of Cultural and Social Issues**

The October 2008 review by stakeholders of the Second Draft of this Plan indicated the cultural and social issues below were of interest. These were ranked by meeting participants as to high, moderate or low in terms of priority for action:

**High Priority for Action:**

- Protect the unique cultural and social heritage of the Marsh; and
- Improve the dignity of the local people (such as by reducing poverty, establishing local voting rights).

**Moderate Priority for Action:**

- Encourage use of traditional construction methods and reed materials (e.g. for boats, shelters, mats, houses, etc.);
- Invite writers and the media from inside and outside Iraq to promote marsh stories.
- Establish training workshops on the use of traditional knowledge and methods; and
- Establish a museum with a library to collect books, maps, historical records, and photographs for history and archaeology.

**Low Priority for Action:**

- Encourage research on traditions (e.g. dialects, literature, singing, art, etc.);
- Establish university programs in traditional art and methods;
- Map the borders of the Marsh;
- Improve life for women; and
- Create training courses in literacy for men and women .

In various ways, most of these issues are considered in the recommendations below.

## **7.6 Maintaining Cultural Heritage**

Management Objective #6: To protect and restore sites of cultural, historical and archeological significance in the area of Hawizeh Marsh.

There have been no recent archaeological surveys to locate and check the status of the archeological sites of major and minor importance inside and near the boundaries of the Hawizeh area. However, a survey of this type was conducted in 2007 by Nature Iraq in the area of the proposed National Park in the Central Marsh. There are archeological sites around the Hawizeh area mostly belonging to the Sassanian and the Islamic cultural periods. For security reasons, the existence and precise locations of these sites are not appropriate for this public document, remaining known by appropriate experts. All data collected in the field on archeological sites cannot be published without the permission of the General Directorate of Antiquities, Baghdad.

The *Archeological Map of Iraq* (Directorate General of Antiquities. Baghdad, 1967) indicates the presence of several significant archeological sites in the general area of Hawizeh Marsh (see Table 17).

Table 17: Archeological Sites Near Hawizeh Marsh

Archeological Site	Cultural Period
Abu Shubaicha	Chaldean (Neo-Babylonian) 625-539 BC
I'ran	Parthian (248 BC to 226 AD)
Abu Edham	Sassanian (226-636 AD)
Kishk Al-Basri	Sassanian (226-636 AD); Islamic (636 AD to present)
Al-Madhar	Islamic (636 AD to present)

**Actions needed:**

Recommendation #55. A reconnaissance survey by competent national and international authorities of the current status of archeological, cultural and historic sites in the vicinity of Hawizeh Marsh is needed.

Recommendation #56. A review of the current status against a national antiquities data base is needed with a program to ensure ongoing site security and restoration of sites if resources permit.

Recommendation #57. Create an institution to gather local photographs, books, songs, art, etc to promote workshops on traditional knowledge, methods and materials and awareness, research, media interest and higher education reflecting the vitality of local cultural heritage..



Figure 35: A traditional mudhif in the marshes

## 7.7 Promoting a Land Tenure System

Management Objective #7: To identify traditional and disrupted patterns of human use, ownership and occupation of lands in the area of Hawizeh Marsh, establish an operable land tenure system, and promote mechanisms for peaceful resolution of land tenure disputes.

Nearly all land in Iraq is owned by the government. In the farmland areas, each farmer has an interest in and controls the land that they cultivate or occupy. The interest is similar to a fee but not exactly; the interest can be bought, sold or passed on to heirs. Grazing occurs on the cultivated lands after harvest and on lands that are fallowed in the current year.

Each village owns an interest in and controls the lands surrounding the village. Uncultivated lands are usually free of private interests and are grazed by livestock to the extent that they are physically accessible. There is no government control over these lands; no fee is paid to the government, no permit is obtained, no use supervision occurs by the government, no carrying capacity is established, no strict season of use exists, and no preference exists from the government.

In the Hawizeh Marsh area, there is currently no control over the land ownership. The land tenure system is ruled by the local tribes, but there are currently no written acts or laws. The name of this kind of ownership is called *billazmah*.

There is a need to have a comprehensive understanding of the land tenure over the Hawizeh Marsh area. This particular land tenure system should also be characterized according to the activities that are carried out within this area.

Actions needed:

Recommendation #58 . Study the mechanisms of the land tenure system within the Hawizeh Marsh area.

Recommendation #59 . Map the current land tenure and related activities carried out by the tenants over the Hawizeh area.

Recommendation #60 . Provide guidance for land tenure regulation.

## 7.8 Creating a Legislative, Policy and Planning Framework

Management Objective #8: To put into place effective regulatory and planning tools that can be successfully implemented in cooperation with, and in the interest of, local peoples.

Actions needed:

Recommendation #61 . It is important to encourage the continued return of the local peoples to this area, ensuring that the increasing human settlement is provided the basic services all Iraqis expect, including necessary infrastructure services. Local councils have repeatedly asked for electricity, dairy barns, veterinary services, human health clinics and construction of more secure buildings.

Recommendation #62 . Basic land use planning in the Hawizeh area remains almost totally lacking and must be introduced.

Recommendation #63 . Healthy, secure water resources in sufficient quantity are needed to support human settlements in the area and to ensure chances for economic development.

Recommendation #64 . Development planning for sustainable use of wildlife including mammals, fish and birds and domesticated cattle and water buffalo are also urgently needed.

Recommendation #65 . The continued use and new development of local resources must be a feature of the cultural fabric of this area, building on traditional uses but mindful of new requirements for environmental protection and economic fairness to benefit local peoples.

Recommendation #66 . A land use planning framework and digital map base of Hawizeh Marsh is urgently needed. It should include delineation of wildlife and fish protection or special management zones, community development areas, agricultural lands, border security areas, mine fields, and water management units.

## 7.9 Managing Border Issues with Iran

Management Objective #9: To promote a normalized state of affairs for the Hawizeh border wetlands, in which the Governments of both Iraq and Iran take an active, cooperative role in facilitating good governance of wetland resources in this area.

Actions needed:

Recommendation #67 . Iranian and Iraqi organizations need to develop joint cooperative ecological research on the marshes on mutually agreed themes of interest.

Recommendation #68 . Discussion on joint management of water management structures, dyke maintenance, allowance for cross-border water flows on a seasonal basis and establishment of water transfers as needed to prevent flooding or infrastructural damage on both sides of the border is desirable.

Recommendation #69. Designation of Hor Al-Azim as a Ramsar Site in Iran and encouragement of a joint approach to a transborder Ramsar Sites regime are desirable.  
 Recommendation #70. A Joint Management Committee for the transboundary marshes, a Joint Border Commission, or a Regional Management Board of some kind are all models that should be considered to promote shared responsibility and improved management of the Iran-Iraq border wetland resources.

## 7.10 Understanding Stakeholder Demands, Involvement and Needs

Management Objective #10: To incorporate in all plans and activities the needs and requirement of local and regional stakeholders (e.g. residents, fisherman, hunters, farmers, local civil servants, military and border officials, oil developers, etc.) who live, work and/or utilize the Hawizeh Marsh and the surrounding lands.

A stakeholder involvement process is the early and extensive engagement of stakeholders in the process of planning, decision-making and implementation of any policies and actions. There are three main objectives that are achieved with effective stakeholder involvements: resolving conflicts; developing a shared vision; and creating collaborative solutions to management issues.

It is important to begin stakeholder involvement early in the process before interests become entrenched. Identifying stakeholders in the Hawizeh Management process can be assisted by a community profile, but this should be driven by common sense and inclusiveness, providing all participants with equal status. In addition, extra care should be taken to include groups such as women and low-income and other disadvantaged peoples who traditionally are under-represented in planning efforts.

Stakeholders in Hawizeh Marsh management are those people that can affect change to the Marsh and, in turn, are those affected by activities in the Marsh. For example, this will include fisherman who earn an income from fishing in the Marsh but, in turn, their activities and fishing methods affect future fish stocks of the Marsh.

Thus, these stakeholders need to be properly identified in the Hawizeh area in order to develop a group with sufficient authority to apply collaborative learning and conflict resolution techniques and formulate effective and acceptable decisions. Their direct engagement in planning and project design and implementation is critical to the successful implementation of the management plan.

Actions needed:

Recommendation #71. Establishment of a Stakeholder Advisory Group or citizen policy board is needed that represents the broad range of interests represented by the community. Representation on the Advisory Group should:

- include representatives of relevant government agencies, non-governmental organizations, trade groups, private landowners and developers, community and other interest groups and general citizens
- be defined, in terms of size and stakeholder sectors, Iraqi National Marshes and Wetlands Committee with the goal of encouraging diversity of perspectives and representativeness. Appointment of individual members should be decided by the stakeholder groups involved (e.g. internal selection procedures by agencies, NGOs and other interest groups and/or by selection of the existing membership of the group).
- have a membership that changes over time and elects its own leadership.

Recommendation #72. Allocation of funds and conducting of a workshop are needed on the draft Hawizeh Marsh Management Plan for the Advisory Group members. This will

provide the advisory group with sufficient financial and logistical support to conduct regular meetings to develop their recommendations and make revisions to the plan.

Recommendation #73 . A series of public meetings are required, organized by the Advisory Group, on the revised Hawizeh Marsh Management Plan to take additional input and build consensus around the management actions defined by the plan.

Recommendation #74 . The Advisory Group should finalize its input to the Hawizeh Marsh Management Plan and present it to the Iraqi Interministerial Ramsar Committee for consideration and approval.

Recommendation #75 . On a yearly basis, the Advisory Group should meet to review and update the plan and address management issues regarding the Hawizeh Marsh Ramsar site.

### **Management of Economic Opportunities**

The October 2008 review by stakeholders of the Second Draft of this Plan indicated the economic opportunities below were of interest. These were ranked by meeting participants as moderate to low in priority for action:

Moderate Priority for Action:

- Ensure participation of all stakeholders including those from other nations in the Tigris-Euphrates-Kharka Basin at key meetings about the Plan;
- Build a dairy factory in the area;
- Create local fishing/hunting organizations to promote their involvement and interests;
- Direct some of the benefits of oil development to support local needs; and
- Invest in local NGOs to promote local business interests.

Low Priority for Action:

- Standardize terminology and definitions in all sectors to promote common understanding of issues including translation of the Ramsar Convention text into Arabic;
- Create a GIS planning data base on physical, economic, social and population information for the Hawizeh area;
- Support projects to develop a local handicraft industry to employ women in meaningful actions;
- Develop tourism and oil development strategies, as both will need long-term regulation;
- Evaluate re-activation of local tourism industry; and
- Promote effective methods for aquaculture.

In various ways, most of these issues are considered in the recommendations below.

## **7.11 Managing Agricultural Development and Impacts**

Management Objective #11: To ensure, with local community support, that appropriate lands for agricultural use are maintained and proper environmental and economic management of wastewater, salinization of soils and waters, water buffalo and cattle, and crop production are followed.

Historically, agriculture and marshlands were viewed as not compatible. Thus, marshlands were drained and destroyed to make way for croplands and development. But this philosophy was found to be deeply flawed and today more holistic, sustainable approaches which recognize the give and take between fields for agricultural crops and marshlands agriculture are gaining ground. Marshlands have proven to be vital and equal partners in agricultural development. In Iraq, agricultural development does not need to compete with marshland restoration but they can work together cooperatively.

### 7.11.1 Land Drainage for Agriculture

Suitable areas for agriculture need to be maintained around and downstream of Hawizeh Marsh. Those areas need to have a proper drainage system that will allow achievement of the following objectives: (a) removal of water-logging and seepage waters from irrigated fields, and (b) maintenance of the saline water table below the root zone.

Drainage waters can be reused for environmental purposes according to their quality and the point of collection. Small units of constructed wetlands can be fed by those drainage waters, in order to clean them before their disposal for other purposes.

The soils that were produced through unmanaged draining of the marshlands are today generally not adequate for agriculture. This means that the soil has no higher structure and forms a loose mud when hydrated. These soils have very poor water and nutrient retention capability, are very difficult to work mechanically, and are highly susceptible to wind and water erosion. This lack of structure is due predominantly to low organic matter content in the soil. To provide the structure necessary to optimize the silt/clay alluvial soils for agriculture, a significant increase in organic material, particularly humic material (degraded lignin and cellulose), must be achieved. The most economical means to increase the organic carbon content is through prolonged periods of constant inundation. In this manner, some of Iraq's marshlands today can become intensive agricultural lands of tomorrow.

### 7.11.2 Soil Salinization

Soil salinization around the marsh area has been the consequence of the combined actions of the drainage of these wetlands and of mismanagement of the water resources dedicated to agriculture (see Figure 36). Drainage practices have dramatically increased the salinity of soils through evaporation and a concentration of salts that created salt pans over the drained marshes soils. In addition, this mismanagement has caused the salinization of soils through bad drainage and waterlogging.



Figure 36: Example of soil salinization due to waterlogging in the area around the marshes.

The rewatering and restoration of the marshlands will reverse soil salinization in three important ways:

- (a) Inundation will solublize the salt pans. This will result in a temporary increase in water salinity as the salt is flushed into the Gulf. However, once the existing salt pans are gone, the salinity will return to normal levels, and the areas of the original salt pans will become productive once again.

- (b) Saturation of the upper soil horizons will reverse the water flow, allowing percolating surface water of limited salinity to recharge the shallow groundwater, which tends to be of higher salinity. This not only will reduce local soil salinization, but will also improve the quality of the shallow groundwater, potentially to a point where it may again be used for agricultural irrigation.
- (c) Rehydration of the bentonite-based soils will result in the swelling of the clay layers, thereby inhibiting the migration of shallow groundwater to the surface in regions that are inundated only seasonally. This potentially will allow the expansion of agriculture to the seasonal upland areas of the marshlands.

Best practices for an efficient use of water should be strongly recommended around the marsh area.

### 7.11.3 Water Buffalo

No studies exist of water buffalo specific to the Hawizeh Marsh but a survey and recommendations for water buffalo management was conducted in Missan and Thi Qar Governorates and in the Chubayish area of the proposed National Park in the Central Marsh in 2006 (Fazaa 2007, Nature Iraq 2007c).

The survey that covered Missan and Thi Qar covered the period from May to February in 2007, for all the marshes of Thi Qar and most of the marshes of Missan. It was found that the total number of buffalo was 40 008 divided almost equally between the two governorates, but numbers varied widely between individual stations. Of this number, about 83% were females, with equal female percentages in the two governorates. About 72% of female buffalos were more than two years old, the age of fertility and milk productivity, with relatively equal distribution in the two governorates. The number of lactating cows in Thi Qar was 4424 head, producing up to 22 055 liters of milk daily, with milk production per cow ranging between 3-7 liters/day. The number of lactating cows in Missan was higher at 7394 head, producing up to 35 994 liters of milk daily, but with milk production per cow somewhat lower, ranging between 2-5 liters/day.



Figure 37: A herd of water buffalo in a Marsh Arabs village

The number and productivity of water buffalo in this portion of the overall southern marshes of Iraq is encouraging, though much better results could probably be obtained when broader areas of marshland are restored and better nutritional and veterinary services are provided for the water buffalo (see Figure 37).

#### 7.11.4 Overgrazing

Overgrazing occurs when plants are exposed to livestock grazing for extended periods of time or without sufficient recovery periods. It reduces the usefulness of the land and is one cause of desertification and erosion. Overgrazing is also seen as one cause of the spread of non-native plants and the increase of soil erosion. Reduced soil depth, organic matter and fertility hurt the land's future productivity. Soil fertility can be corrected by applying appropriate amounts of lime and fertilizers. However, the loss of soil depth and organic matter takes years to correct. Their loss is critical in determining the soil's water-holding capacity and how well pasture plants do during dry weather.

#### 7.11.5 Wastewater Management

Agricultural practices produce effluents that must be carefully managed in order to prevent the pollution of neighbouring environments. This process happens generally through the dissemination of pollutants by the drainage of the wastewaters originating from crops and animal husbandry activities. First of all, the intensive use of pesticides and fertilizers should be avoided to limit the sources of pollution. Then, wastewaters should be collected and treated with sound methods, integrated to the marshes environment. Constructed wetlands have demonstrated their effects on the treatment of agricultural wastewaters, and should be promoted in the area.

##### Actions needed:

Recommendation #76. A survey of the state of agriculture on the borders of the Hawizeh Marsh should be undertaken. This survey should highlight the soil and water conditions, in particular in regard to the salinity issue. Moreover, the outcome of this survey should describe the potential of agriculture integrated and compatible with the marshes environment.

Recommendation #77. Rehabilitation of the drainage system of the agricultural areas around the Hawizeh Marsh is needed.

Recommendation #78. Completion of all major outfall drains should be a priority to enable the construction of proper drainage systems with avoidance of dumping of polluted water into the marshes.

Recommendation #79. Introduction and promotion of best practices for an efficient use of water for irrigation is needed.

Recommendation #80. Development of local marshes agricultural cooperatives to strengthen the sector is needed. These "marsh cooperatives" would technically support marsh farmers during their agricultural activities.

Recommendation #81. Promotion of the local marshes agricultural business sector is needed.

## 7.12 Fisheries Restoration and Development

Management Objective #12: To restore sustainable fish populations of marketable quality and size and create economic opportunity for fishing in the Hawizeh Marsh.

The desiccation of the marshes in the 1980s and 1990s altered the fish communities of most southern marshes in Iraq, including those at Hawizeh Marsh. This directly affected fish stocks often due to reduction and degradation of the productivity of aquatic plants and

phytoplankton, leading consequently to changes in secondary productivity of zooplankton, the main food source for many fish species.

Prior to desiccation of the marshes, the specialization and low diet overlap between the fish species reflected the wide range of diversity and the richness of the marshes that provided for good prey selection. The local information on fish abundance in Iraqi marshes during the 1980s indicated that *Barbus sharpeyi*, *Cyprinus carpio*, *Liza abu*, *Barbus luteus*, *Silurus triostegus* and *Liza subviridis* were the most abundant species. The less abundant species were likely the most sensitive to the environmental changes that occurred in the marshes in the 1980s and 1990s, particularly due to the increasing salinity.

After more than a decade of desiccation and the diversion of the Tigris and Euphrates waters from the marshes, the marsh fish assemblages have been significantly altered. The present data reveal that the fish assemblages are dominated numerically by *Barbus luteus*, *Carassius carassius*, *Liza abu*, *Aspius vorax* and, by weight, *Silurus triostegus*, with different percentages in each marsh. Estuarine and marine species are present in low numbers. In general, the fish caught are of small sizes below the maximum lengths recorded previously, except for *Silurus triostegus*. Unsustainable fishing practices, most notably electro-shocking and the use of poisons, are having an ongoing and serious impact on the fish populations in the marshes. Electro-shocking of fish is currently being used in almost all of Iraq's marshlands.

Annex 3 (in Volume 1) lists freshwater fish species in Iraq of economic and conservation concern as proposed in Coad *et al.* (In preparation). These data may be useful in defining fisheries management priorities in Iraq.



Figure 38: A day catch of fish in the marshes

**Actions needed:**

Recommendation #82. Comprehensive studies concerning food and feeding studies should be conducted to evaluate to what extent the restored marshes can provide productive feeding grounds for fish. Food partitioning and diet overlap among different species needs to be considered.

Recommendation #83. There are also critical information needs in the area of economically-important fisheries including:

- a) stock assessment of the marketable commercial fisheries in Hawizeh Marsh;
- b) determining basic requirements for oxygen, temperature, water clarity, etc. for important fish species and how species impact each other;
- c) site selection for aquaculture activities including artificial propagation of the locally important fishes;
- d) studies on the migration of species in the Marsh; and
- e) determination of feeding relationships, particularly competition on food resources by carnivorous fish species.

Recommendation #84. The Marsh is now dominated by invasive fish species and two introduced carp species. Therefore, the marshes require immediate mitigation and restoration of fish stock. Bunni restocking actively may be the fastest and most effective manner in which to accomplish this objective as Bunni remain the premium priced and most desired fish.

Recommendation #85. Enhancement of fisheries in the southern marshes may be possible through selection of valuable endemic species and carrying out artificial breeding to produce fry and fingerlings.

Recommendation #86. Training sessions to introduce sustainable fishing practices with local communities and education are urgently needed as a means of discouraging the use of unsustainable fishing practices (such as electro-shocking, explosives and poison).

Recommendation #87. Fishing controls and moratoriums to sustain and ensure the viability of the Hawizeh fisheries may become a necessity in the future but these actions should be based on the scientific assessments discussed above.

### **7.13 Facilitating Oil Development**

Management Objective #13: To plan for operations and opening of the Majnoon Oil Field south of Hawizeh Marsh to ensure sustainability of the ecological character of the marsh, through use of new investments and new technologies such as lateral drilling.

The Majnoon Field, discovered in 1977, is a super-giant oilfield lying below and to the southeast of Hawizeh Marsh. Approximately 30 000 ha of the marshlands were subsequently drained to accommodate the footprint of its proposed production facilities. Today these areas remain drained. The Ramsar site as designated specifically does not include this area to assure development of this important area for Iraq's future strategic economic interests.

The same environmental concerns exist for ongoing development of the Azadegan Oilfield across the border in Iran. Its development can affect the character of the Hawizeh Marsh directly through surface impacts and subsurface through drilling methods.

**Actions needed:**

Recommendation #88. Consultations with the Iraq Ministry of Oil are required to define development needs and areas for potential production fields in and around Hawizeh Marsh.

Recommendation #89. The need to protect the ecological character of the Marsh must be considered in environmental assessment of the introduction of oil and gas developments including use of modern lateral drilling techniques to minimize environmental impacts.

Recommendation #90. Consultations with the Oil Ministry in Iran is desirable to establish guidelines that minimize cross-border impacts to both nations.

## 7.14 Consideration of Future Tourism Opportunities

Management Objective #14: To plan for tourism activities that adequately protect and promote the restoration of the Hawizeh Marsh, ensure the rights of other users and activities in the Marsh, and provide a source of income and infrastructure development for local communities.

Wetlands support a large number of human activities, of which tourism can be a significant part, but the success of these activities depends directly on the proper functioning of the wetland ecosystem. Activities such as tourism, which contribute to the national product and to the welfare of local people, are totally dependent on the maintenance of the ecological character of the wetlands.

Tourism activities include (but are not limited to): boating, swimming, picnicking, bird watching, sport fishing, hunting, camping and general sightseeing. The tourist industry can develop into one of the most important activities in the Hawizeh Marsh in terms of income and employment generation. Tourism can be a driving force in the development of infrastructure and services in the area in the form of new road construction, communications, power and water, and the building of hotels, restaurants, and places for tourism activities. The Hawizeh Marsh Ramsar site could potentially attract a large number of tourists annually, bringing important revenue to the area.

It is important to balance the development of tourism in this Ramsar site by putting in place strong measures to protect the site from over-exploitation. For example, construction of hotels in sensitive areas and/or over-use of freshwater resources by tourism could lead to loss of biodiversity, disturbance to wildlife, degradation of natural resources and irreversible changes to the ecosystem. Disturbances tend to peak during certain times of the year when tourism is heavily affecting a site and this may coincide with important periods of fish spawning or bird migration. This could lower reproductive success and increase mortality rates of those species.

The development of tourism thus could place considerable pressure upon the Hawizeh Marsh. Developers have been known to come in quickly before protective measures (such as proper legislation, zoning laws and management plans) are put into place. Their focus is often on short-term benefits and they might have no long-term concern for the impacts on water quality, biota, or social or cultural values of the Marsh.

To address these issues, there should be careful planning in advance of tourism development so that the ecological impacts are taken into account and properly mitigated. Planning will protect the ecosystem and its biota. If done successfully, this will ensure the attraction and viability of the site for future tourism activities. Even though security concerns at the present time do limit tourism development, planning for future development should proceed so that adequate protection measures are put in place now. The final results should be a plan that creates "a harmonious pursuit of complimentary activities" as noted by Davies (1993). This includes tourism, fishing, agriculture, water buffalo breeding, etc. that maintains and protects the underlying ecosystem.

Actions needed:

Recommendation #91. Research and analysis are required of tourism assets and issues (e.g. environmental assets and attractions; public sector infrastructure available and needed; community assets and attitudes; visitor demands and requirements; industry and economic impacts; and public sector resources and funding).

Recommendation #92. Development is needed of a *Tourism Strategic Plan* that is updated yearly in collaboration with the Iraqi Ministry of Tourism, the Stakeholder Advisory Group, and other related agencies and organizations. This plan should address local authority's planning, stakeholder involvement, and tourism industry and infrastructure planning. It should include the following: a statement of goals, objectives and guidelines which will govern tourism development in the Hawizeh Ramsar site; a list of planned projects and their design; a list of requirements and regulations that will govern such projects; specific procedures for the appraisal and evaluation of projects under a collaborative framework that specifies clear jurisdiction and authority for approval, management and oversight of such projects; and funding mechanisms utilized for development of such projects.

Recommendation #93. A mechanism needs to be put in place to evaluate the impacts of tourism development on four key areas: visitors, industry, community and the environment and provide comprehensive feedback into the *Tourism Strategic Plan*.

## **8.0 Management Plan Governance**

### **8.1 Iraqi National Marshes and Wetlands Committee**

The Iraqi National Marshes and Wetlands Committee (INMWC) is described in Section 3.6 in Volume 1. This Committee will take on the primary leadership role for Ramsar and other wetlands activities in Iraq including the completion, implementation and any ongoing revisions over time of this Management Plan for the Hawizeh Marsh. It may also facilitate use of this plan in the consideration of the management needs for additional, future Ramsar sites and other protected or special environmental management areas in Iraq.

Iraq's National Authority Office functions for the Ramsar Convention currently rest with the INMWC. It will be the direct day-to-day linkage of Hawizeh Marsh governance and management to the wealth of global expertise. This is available from the Ramsar Convention Secretariat in Switzerland, other states and interests in the Middle East, and other nations or international organizations. They all could assist Iraq in its efforts to implement the Convention and a Hawizeh Marsh Management Plan (see Sections 3.5 and 3.6 in Volume 1).

### **8.2 Options for Shared Border Wetlands Management**

A Joint Management Committee for the transboundary marshes, a joint Border Commission, or a Regional Management Board of some kind are all models suggested in Section 7.9 that could be considered to promote shared responsibility and improved management of the Iraq-Iran border wetlands of Hawizeh Marsh and Hor Al Azim.

### **8.3 Community-Based Management Opportunities**

Local stewardship of the Hawizeh Marsh wetlands through monitoring of local wetland resources, wildlife and waters; wardening of wildlife; servicing future ecotourism opportunities; establishment of economic development of fish, hunting, plants, etc., are all examples where a community-based approach to managing the Hawizeh Marsh could benefit local people. It could be specific to individual villages or tribal groups. This approach can also be the mechanism that training initiatives for sustainable fishing and hunting techniques, governance systems, and environmental assessment and monitoring methods can be brought to local interests in cooperation with local tribal, municipal council, elders' and sheiks' cooperation and leadership.

Many examples of community-based approaches to marsh management providing local economic development opportunities have been identified at other Ramsar sites, including

examples in neighbouring states such as Syria and Jordan. This could prove instructive in the design of similar projects in Iraq.

## 9.0 Training Needs

A wide array of training needs are needed to support this Management Plan's implementation. Specific suggestions, subject to careful design and resources becoming available, include:

- (a) Training of local fishermen and hunters in sustainable use of wildlife resources.
- (b) Community-based training in wildlife, water and marsh monitoring and wardening through local stewardship initiatives, creation of new local stewardship organizations, or adoption of stewardship responsibilities by existing local organizations.
- (c) Senior and intermediate management staff in the Ministry of Environment and Ministry of Water Resources would benefit from training in national program design and management including environmental assessment, policy development, budgeting, partnership programs implementation and stewardship concepts.
- (d) The Ministry of Water Resources would benefit from staff training that will be needed for the installation and operation of hydrological monitoring equipment such as the proposed stations in Hawizeh Marsh.
- (e) Adoption of new regulations with training in legislative development at the national to local levels (laws, local regulations and wardening) is needed.
- (f) Training in basic and advanced field and scientific techniques will benefit appropriate ministry staff in headquarters and in the ministry's governorate-level units, non-government organizations and local technicians. This should include establishing the concepts of community citizen science, rapid environmental assessment, and ongoing monitoring of indicators of marsh health and stability.

## 10.0 Implementation Issues

### 10.1 Constraints

There are a host of major constraints to the acceptance and implementation of this Plan. These include but certainly are not limited to:

- There is not yet a clear enough identification of all the stakeholders in the future of Hawizeh Marsh and their responsibilities. Most of the actions that are recommended in this Plan would be undertaken in the long-term. Consequently, their success or failure may depend on the implementation mechanisms that arise.
- A high level of coordination is needed and may not, in practice, be possible.
- Security remains an over-riding concern. Thus, many aspects of implementation will remain difficult to achieve within the current security environment in southern Iraq.
- Governance of this initiative will remain difficult until clarity on the precise division of constitutional authorities for major sectors such as natural resources management and economic development, between federal, governorate and local levels of government, is achieved and accepted by all stakeholders. This remains in a state of ongoing development at this time.
- Non-government organizations at all levels can greatly facilitate the implementation of this Plan but ongoing mistrust between government and these NGOs is still a barrier.
- Regrettably, there still appears to be significant mistrust across professional disciplines and agencies within government ministries and universities in Iraq that has, in past, virtually institutionalized barriers to cooperation, data sharing and joint program delivery – all of which are critical to successful implementation of a Management Plan of this nature.
- Defining resources to implement any single project suggested herein, or indeed those related to the broad set of management needs in the Hawizeh area, will result only

through extensive consultation, agreement and commitment. None of these is currently possible as there is not yet endorsement of this Plan or clarity on what the priorities for action should be.

## 10.2 Resources

Marshes restoration efforts in Iraq since 2003 have received significant contributions of expertise and financial resources. This has included projects funded by donors such as the United States Agency for International Development (USAID), the Canadian International Development Agency (CIDA), the Italian Ministry of Environment, Land and Sea (IMELS), and the Japanese International Cooperation Agency (JICA). Efforts to create a coordination mechanism for the spectrum of marshes restoration activities through three “Task Management Groups – TMGs” (water management, environmental management, and social-infrastructure development) were proposed by UNEP in 2005 but failed to attract donor support. Donor contributions have been complemented by ministerial allocations from the Iraq Ministry of Water Resources, the Iraq Ministry of Environment, and other ministries in Iraq.

Meaningful new allocations from any source will depend on broad-based endorsement of a new series of projects. While a set of “First Step Projects” are recommended in this report, it is not yet possible to quantify their cost in detail as too many unknowns still exist. However, two approaches may prove useful to consider:

- (1) Discuss and achieve consensus with a sufficient partnership for a limited set of projects and bring these to the attention of government leaders and donors; and
- (2) With a single donor, seek a significant financial commitment over five years towards the key aspects of this Plan, and design implementation of a limited suite of projects that will wisely apply these funds to a key set of priority projects.

A significant investment by the Government of Iraq in partnership with international donors would be needed to initiate the ten recommended “First Step Projects” outlined in this report in the 2009-2010 period.

## 11.0 Conclusions

This two-volume report, *Management Plan for the Hawizeh Marsh Ramsar Site of Iraq*, provides recommendations for actions that are needed to bring this Plan forward to an operational condition. These respond to 14 management objectives outlined in Section 7.0 of Volume 2, in four groups of recommendations:

### Management of the Environment

- 1) Responding to Peer Review Panel recommendations
- 2) Conservation of natural heritage
- 3) Environmental monitoring and protected areas

### Management of Water Resources

- 4) Water quantity and quality management
- 5) Sustainable development-infrastructure planning (bridges, roads, dykes)

### Management of Cultural and Social Issues

- 6) Maintaining cultural heritage
- 7) Promoting a land tenure system
- 8) Creating a legislative, policy and planning framework
- 9) Managing border issues with Iran
- 10) Understanding stakeholder demands, involvement and needs

*Management of Economic Opportunities*

- 11) Managing agricultural development and impacts
- 12) Fisheries restoration and development
- 13) Facilitating oil development
- 14) Consideration of future tourism opportunities

Of the 93 recommendations made in this report, ten are identified as potential “First Step Projects” that could energize the broad-scale implementation of many elements of this Management Plan. A significant investment by the Government of Iraq in partnership with international donors would be needed to initiate these First Step Projects starting in 2009-2010.