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*The Iraq Marshes: Restoration Activities*

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June 15, 2004

**Abstract.** During the 1990s, Saddam Hussein drained approximately 90% of the Iraqi marshes. This action displaced 200,000 to 250,000 Ma'dan (Marsh Arabs) and severely harmed an important ecosystem. Efforts to rehabilitate the marshes have returned water to about 40% of the former marshland. However, re-flooding additional areas and providing for long-term marsh restoration requires actions to maintain the quantity and quality of water flowing through the marshes. To facilitate such efforts, nongovernmental organizations and U.S. contractors are working with Iraq's Ministry of Water Resources (MWR), Ministry of Environment, the newly established Center for Restoration of the Iraq Marshlands (CRIM), and local Iraqis to implement short-term action plans calling for ecological and socioeconomic studies. These draft studies and the associated monitoring and modeling activities will set the foundation for a long-term restoration management plan. Implementing the overall plan will include training and equipping Iraqi officials, managing water supplies, and negotiating international water agreements. Some of these efforts have already begun.

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## The Iraq Marshes: Restoration Activities

**June 15, 2004**

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# The Iraq Marshes: Restoration Activities

## Summary

During the 1990s, Saddam Hussein drained approximately 90% of the Iraqi marshes. This action displaced 200,000 to 250,000 Ma'dan (Marsh Arabs) and severely harmed an important ecosystem. Efforts to rehabilitate the marshes have returned water to about 40% of the former marshland. However, re-flooding additional areas and providing for long-term marsh restoration requires actions to maintain the quantity and quality of water flowing through the marshes. To facilitate such efforts, nongovernmental organizations and U.S. contractors are working with Iraq's Ministry of Water Resources (MWR), Ministry of Environment, the newly established Center for Restoration of the Iraq Marshlands (CRIM), and local Iraqis to implement short-term action plans calling for ecological and socioeconomic studies. These draft studies and the associated monitoring and modeling activities will set the foundation for a long-term restoration management plan. Implementing the overall plan will include training and equipping Iraqi officials, managing water supplies, and negotiating international water agreements. Some of these efforts have already begun.

Developing and implementing a restoration plan will depend on continued funding. Current estimates for restoration costs include \$10 million for developing a Sustainable Restoration Plan (the Iraq Foundation) and \$25 million in projects for three years under the Iraq Marsh Restoration Program Action Plan. The United States has provided support for ecosystem restoration and for assisting the Ma'dan through a \$4 million U.S. Agency for International Development contract and through the U.S. State Department's and the U.S. Army Corps of Engineers' support activities. In its FY2004 request for supplemental appropriations, the Coalition Provisional Authority asked for \$100 million for marsh restoration; Congress did not appropriate these funds and the President's FY2005 budget request does not include targeted marsh restoration funding. However, as stated in H.Rept. 108-312 (p. 19), such efforts may receive funding from international donors. This report discusses the status of restoration activities and funding. It will be updated as developments warrant.

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# The Iraq Marshes: Restoration Activities

## Introduction to the Iraq Marshes

The Mesopotamian Marshlands, which include the Central Marsh, the Al Hammar Marsh, and the Al Hawizeh Marsh, historically extended over 15,000 to 20,000 square kilometers (km<sup>2</sup>, 3.7-4.9 million acres) of interconnected lakes, mudflats and wetlands.<sup>1</sup> (See **Figure 1**.) Fed by floodwaters<sup>2</sup> and other inflows from the Tigris and Euphrates Rivers, these marshes became the largest wetland ecosystem in the Middle East and Western Eurasia. This wetland supported fish, rice, and water buffalo production that supported more than 350,000 people, known as Ma'dan or Marsh Arabs, for more than 5,000 years.<sup>3</sup> The marshes also provided important habitat for a number of endemic species, birds traveling the intercontinental flyway, and aquatic species supplying coastal fisheries.<sup>4</sup>

## Draining the Wetlands

While early inhabitants of Mesopotamia built structures to capture water from the rivers and to protect themselves from floods, plans to develop the marshes were not outlined until the middle of the 20<sup>th</sup> century.<sup>5</sup> Even with plans on the drawing board, large-scale water projects were constructed sporadically and the marshes remained relatively intact into the 1980s. During the 1980s and 1990s, large water projects in Iraq and upstream nations began affecting the Mesopotamian Marshes. Specifically, dams built on the Tigris and Euphrates in Turkey, Syria, Iraq, and Iran can store more than five times the rivers' average annual flows.<sup>6</sup> This storage capacity allows upstream users to effectively eliminate the spring floodwaters that historically maintained the marshes.

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<sup>1</sup>Hassan Partow, *The Mesopotamian Marshlands: Demise of an Ecosystem* (Narobi, Kenya: U.N. Environmental Program, 2001). Available at [<http://www.grid.unep.ch/activities/sustainable/tigris/marshlands/mesopotamia.pdf>], visited Feb. 10, 2004. Hereafter referred to as UNEP, 2001.

<sup>2</sup> Inflows to the marshes varied widely both within and between years; however, most water enters the marshes during spring floods (UNEP, 2001).

<sup>3</sup> UNEP, 2001, p. 15. See also CRS Report 94-320 F, *Iraq: Marsh Arabs and U.S. Policy*, by Kenneth Katzman.

<sup>4</sup> For example, 40% of Kuwait's shrimp catch originated in the marshes (UNEP, 2001, p. 35).

<sup>5</sup> UNEP, 2001, p. 22.

<sup>6</sup> UNEP, 2001, p. 9.

**Figure 1. Change in Iraqi Marsh Area**

**Source:** Hassan Partow, *The Mesopotamian Marshlands: Demise of an Ecosystem* (Nairobi, Kenya: U.N. Environmental Program, 2001); and Eden Again, *Building a Scientific Basis for Restoration of the Mesopotamian Marshlands* (Washington, DC: The Iraq Foundation, Apr. 21, 2003).

While upstream dams may have diminished the marshes over time, they were not the immediate cause of marsh dessication. Beginning in the 1990s, the Iraqi government undertook a number of massive water projects that severely reduced the marshes' water supply. Through these efforts, Saddam Hussein drained approximately 90% of the marshes by 2000.<sup>7</sup> While the Iraqi government claimed that it built these dikes, dams, and canals to increase land reclamation and irrigation, others found no evidence that the water projects were used for development purposes.<sup>8</sup> Rather, Saddam Hussein drained the marshes to give his army access to the region and to remove a sanctuary where an estimated 9,000 Iran-backed Shiite guerillas and thousands of deserters lived.<sup>9</sup>

By 2000, the marshes had been severely diminished. Specifically the Central and Al Hammar Marshes were reduced to small secluded parcels. The largest remaining marsh, the Al Hawizeh Marsh, occupied a third (1,025 km<sup>2</sup>, or 253,000

<sup>7</sup> The bulk of the dessication occurred between 1991-1995 (UNEP, 2001. p. 32).

<sup>8</sup> CRS Report 94-320 F, *Iraq: Marsh Arabs and U.S. Policy*, by Kenneth Katzman.

<sup>9</sup> Ibid.

acres) of its previous area in western Iraq and eastern Iran.<sup>10</sup> Along with desiccating the marshlands, Saddam Hussein killed or relocated large numbers of Marsh Arabs. An estimated 40,000 of these Marsh Arabs sought refuge in Iran, while 200,000 to 250,000 are considered to be internally displaced.<sup>11</sup> Initial findings from a U.S. Agency for International Development (USAID)-funded census indicated that roughly 85,000 Ma'dan still dwell in or alongside the remaining marshes.<sup>12</sup>

Between 2000 and 2002 an additional 325 square kilometers dried, leaving about 7% of the marshes intact.<sup>13</sup> According to UNEP, "loss of the Mesopotamian Marshes stands out as one of the world's greatest environmental disasters."<sup>14</sup> The marshes were a major wintering ground for birds traveling the intercontinental flyway. Incomplete studies have recorded 134 bird species,<sup>15</sup> including 11 species of critical, endangered, or vulnerable birds.<sup>16</sup> The marshes also contained three species of endangered and vulnerable reptiles and mammals. These species are now in more critical condition, and may be extinct.

## Marsh Rehabilitation

A number of entities are working to restore the Iraq marshes. Even before President Bush announced the end of hostilities on May 1, 2003, reports and proposals for marsh restoration were developed by the U.N. Environment Program<sup>17</sup> and the Iraq Foundation,<sup>18</sup> with a \$200,000 grant from the U.S. State Department.

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<sup>10</sup>UNEP, 2001, p. 32. The Central Marsh lost 97% of its area and the Al Hammar Marsh was reduced by 94%. About 21% of the remaining Al Hawizeh Marsh is in Iran.

<sup>11</sup>UNEP, 2001, p. 33-34. See also Human Rights Watch, *The Iraqi Government Assault on the Marsh Arabs, A Human Rights Watch Briefing Paper* (Washington, DC, Jan. 2003).

<sup>12</sup>Gordon West Acting Assistant Administrator, Asia and Near East Bureau and Dr. John Wilson, Senior Environment and Agriculture Specialist, Asia and Near East Bureau, U.S. Dept. of State, *Written Testimony*, hearing on the United States and the Iraqi Marshlands: An Environmental Response for the House International Relations Committee, Subcommittee on the Middle East and Central Asia (Feb. 24, 2004), p. 3.

<sup>13</sup> U.N. Environment Program *Desk Study on Environment in Iraq* (Switzerland, 2003), p. 43.

<sup>14</sup>UNEP, 2001.

<sup>15</sup> According to UNEP, the Persian Gulf (Kuwait, Iraq, Eastern Saudi Arabia and Western Iran) has over 400 bird species (UNEP, *Desk Study on Environment in Iraq*, p. 48).

<sup>16</sup>The Iraq Foundation, *Building a Scientific Basis for the Restoration of the Mesopotamian Marshlands: Findings of the International Technical Advisory Panel Restoration Planning Workshop, February 2003, convened by Eden Again Project, the Iraq Foundation* (Washington, DC, Apr. 21, 2003), p. 64. Hereafter referred to as Iraq Foundation, 2003.

<sup>17</sup> UNEP, 2001.

<sup>18</sup> The Iraq Foundation is nonprofit organization intended to help bring a democratic government to Iraq (Iraq Foundation, 2003).

Since the spring of 2003, UNEP, the Iraq Foundation, USAID,<sup>19</sup> the U.S. Army Corps of Engineers, and the U.S. State Department have worked to support Iraq's ministries and its new Center for Restoration of the Iraq Marshlands (CRIM) in implementing proposals for marsh restoration. Marsh rehabilitation efforts include re-flooding and monitoring; research; planning; training and capacity-building; and establishing international agreements. Further, some entities are working on projects to increase the prosperity of the marsh dwellers.

**Re-flooding and Monitoring.** Re-flooding has been undertaken through breaching dams and embankments, opening sluice gates, and stopping pumping. In some cases, these activities have been undertaken by the U.S. Army Corps of Engineers, at the direction of the Ministry of Water Resources (MWR); in others, areas were re-wetted without consultation with the MWR. Above-average rainfall and releases of water from Iran have also contributed to re-flooding marshlands. As of June 2004, up to 40% of the former marshlands had been re-wetted.<sup>20</sup>

Restoration is not as simple as re-wetting former marshlands. According to the Iraq Foundation, vegetation has not returned to all of the re-wetted areas. In order to understand how best to pursue further restoration, entities are monitoring some of the re-flooded areas. Monitoring demonstration projects is the first step in the Iraq Foundation's three-step process toward developing a sustainable restoration plan. They are pursuing this step with grants from Italy to monitor the re-vegetation and re-habitation process at one of the recently flooded sites (the Abu Zarag Marsh) and to examine ways to increase the amount of water available for marsh rehabilitation. The Iraq Foundation has also received \$140,000 from USAID/DAI to monitor additional sites. Initial reports from these monitoring efforts include the return of 45 bird species, two of which are on the endangered list. UNEP also plans to monitor and assess the environmental character of changes taking place. Since UNEP officials are not present in Iraq based on U.N. security policies, they will monitor by collecting and analyzing satellite data.

**Research.** Planning the rehabilitation of a major wetland requires specific information on the former wetland site (e.g., soil salinity, vegetation, and development) and on the quantity and quality of available water. Prior to the fall of the Hussein government, marsh data was limited primarily to satellite imagery. Therefore, a major component of rehabilitation efforts is gathering site-specific information. In June 2003 and February 2004, teams of independent experts from DAI, Duke University, the Iraq Foundation, the International Resources Group, the Iraq Ministry of Water, the AMAR Foundation, and the University of Basra collected data on soil, water quality, seed banks, and other characteristics of the former marshlands. The June trip revealed extensive re-flooding and lower than expected salinity in most areas. The Iraq Foundation has conducted monthly field surveys since August 2003.

In addition to examining the status of the former marshlands, efforts are underway to understand the region's hydrologic system (the system that supplies

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<sup>19</sup> USAID's work is through subcontractor Development Alternatives, Inc. (DAI).

<sup>20</sup>Personal communication with Suzie Alwash, The Iraq Foundation, Apr. 24, 2004.



water to and removes water from the marshes). USAID/DAI hired the Corps to conduct marsh studies and to develop a water management model for the Tigris and Euphrates Rivers. This model is currently in development.<sup>21</sup> The Iraq Foundation and the Danish Hydraulics Institute (DHI) are also working on marsh models. DHI is working on pilot areas in Al Hawizeh and Al Hammar Marshes and a river model from Baghdad south to the Arabian Gulf. The Iraq Foundation is working on models of the Central Marshes. These models will help clarify the quantity and quality of water available for the marshes.

**Planning.** The primary purpose of the various research and modeling efforts is to provide for a comprehensive marsh restoration and management plan. Over the past year, teams of experts have met to discuss restoration planning. In February 2004, “a team of 71 experts from 6 countries,<sup>22</sup> joined together to work on an action plan focusing on integrated marsh management,” for USAID’s Iraqi Marsh Restoration Program.<sup>23</sup>

USAID/DAI’s proposal for working to develop an Integrated Marsh Management Plan supports the broader work of the new Center for Restoration of the Iraq Marshlands (CRIM).<sup>24</sup> According to the Iraq Foundation, CRIM’s goal for the next year is to prepare a Sustainable Restoration Plan. To prepare the plan, the Iraq Foundation’s International Technical Advisory Panel has recommended three actions: “1) implement demonstration projects to observe how the ecosystem responds to re-hydration; 2) conduct a series of comprehensive environmental surveys, to be accomplished by Iraqi scientists with the assistance of international experts, to provide a scientific basis for making wise land-use decisions; and 3) obtain input from stakeholders to allow for decision-making through a participatory process within Iraq.”<sup>25</sup> The Iraq Foundation has begun some of these activities with \$2 million from Italy, but estimates that CRIM will need \$10 million to complete this process and prepare the plan.<sup>26</sup> USAID/DAI’s Iraq Marsh Restoration Program includes some funding for these activities. For example, it includes \$350,000 towards strategic and comprehensive planning activities and \$520,000 for integrated marshland management.

**Training and Capacity-Building.** Carrying out restoration actions and implementing a long-term management plan require trained Iraqi officials and well functioning ministries. Therefore, entities are working to provide Iraqi ministries

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<sup>21</sup>The U.S. Geological Survey is helping the Corps with this model.

<sup>22</sup> The countries include Iraq, the United States, the United Kingdom, Jordan, Australia, and the Czech Republic.

<sup>23</sup> U.S. Agency for International Development, *Strategies for Assisting the Marsh Dwellers and Restoring the Marshlands in Southern Iraq. Interim Status Report* (Sept. 2003).

<sup>24</sup> CRIM was established in Jan. 2004.

<sup>25</sup> Testimony of Azzam Alwash, *Director of the Eden Again Project, Iraq Foundation, Member of the Steering Committee, Center for Restoration of the Iraqi Marshlands* for the House Committee on International Relations, Subcommittee on the Middle East and Central Asia (Feb. 24, 2004).

<sup>26</sup> Ibid.

(particularly the Ministry of the Environment, Ministry of Water, the Ministry of Agriculture, and CRIM) with the tools and training necessary to manage their waters and maintain the marshes. USAID/DAI, through the U.S. Army Corps of Engineers, has trained two senior Iraqi engineers at the Corps modeling center in California. They are also helping to set up a soil and water lab for the MWR and to train Iraqi staff. Other entities are also involved in training efforts. The Canadians, who have pledged \$2 million (US), are supporting the training of Iraqi academics and UNEP is supporting capacity-building activities.

**International Agreements.** Even with plans in place and trained Iraqi staff, sustaining the marshes will be difficult, if not impossible, without international cooperation. Much of the potential marsh-water originates in, and flows through the Tigris and Euphrates Rivers in, Turkey, the Syrian Arab Republic, and Iran (see **Table 1**); dams in these countries can hold back five times the rivers' annual flows. Since the quantity and quality of water available for the marshes depends on foreign water management, UNEP and other organizations have been involved in promoting regional dialogue on the restoration of marshlands. Specifically, UNEP is promoting bilateral dialogue between Iran and Iraq to identify potential areas of technical cooperation for the shared marshlands of Al-Hawizeh/Al-Azim.<sup>27</sup> In May 2004, UNEP hosted a technical meeting between Iran and Iraq on the shared marshlands, and the countries agreed to attend a follow-up meeting in October 2004, which will aim to identify specific areas of cooperation.<sup>28</sup> Similar meetings have not occurred with Turkey or Syria; however, Turkey is aware of the Iraq-Iran meetings and is providing water data to the Corps for its modeling effort.

**Table 1. Contribution of Each Country to the Water Potential of the Tigris and Euphrates Rivers**

River	Turkey	Syrian Arab Republic	Iraq
Euphrates	88.7%	11.3%	0.0%
Tigris	51.9%	0.0%	48.1%

**Source:** U.N. Educational Scientific and Cultural Organization, World Water Assessment Program, *Water Sources in Iraq*. Available at [<http://www.unesco.org/water/wwap/news/iraq.shtml>, visited] June 14, 2004.

In addition to bilateral discussions, entities have also been working to develop broader regional collaboration for restoring the marshes. For example, the UNEP is encouraging collaboration with the Regional Organization for the Protection of the Marine Environment to highlight the connection between the marshes and the marine environment and to build support for restoration. Furthermore, USAID, through DAI, is examining the possibility of getting the Mesopotamian Marshes listed as a World Heritage Site.

<sup>27</sup>Personal communication with Hassan Partow, UNEP, June 3, 2004.

<sup>28</sup>This is the first time the two countries have met to discuss shared water resources in 29 years.

**Socioeconomic Activities.** Along with ecosystem restoration activities, USAID/DAI and other entities have been working to improve the socioeconomic condition of the marsh dwellers. USAID, with its development mission, is working through its contractors and subcontractors on a number of agricultural programs. For example, DAI has facilitated the planting of 1,000 date palms at one site and is planning planting at five more sites. DAI is also involved in aquaculture, and is helping to improve the health of water buffalo by planting alfalfa and setting up veterinary facilities. DAI has also subcontracted with another nonprofit, the AMAR Foundation, to conduct socioeconomic surveys of the Ma'dan and to start health clinics.

## Restoration Funding

In addition to its general agency oversight responsibilities, the major issue facing Congress concerning the restoration of the Iraqi marshes is whether to appropriate funds for their rehabilitation. In a supplemental appropriations request for FY2004, the Coalition Provisional Authority requested \$100 million for the Iraq marshes.<sup>29</sup> Congress did not appropriate these funds. However, as stated in H.Rept. 108-312, other nations may contribute to the marsh restoration effort. This report describes the status of project funding to indicate how any additional U.S. appropriations might be utilized.

**Projects.** In February 2004, DAI convened a team of 71 experts from six countries to design an action plan “focusing on integrated marshlands management through ecosystem management and restoration and social and economic assistance.”<sup>30</sup> During February 2004, teams examined opportunities for marsh management, agriculture, livestock, fishing, public health, and constructed wetlands. This work identified a set of tasks DAI proposes to complete by December 31, 2004, with its \$4 million budget from USAID. The team also proposed \$7.1 million in additional tasks for year one; these tasks are currently unfunded. Unfunded priorities include \$3.5 million for a master plan for water resources in Iraq, \$450,000 for marsh monitoring, and \$250,000 for a soil and water lab. The group also identified \$13.9 million in additional projects, which are currently unfunded, for years two and three.

**Funding.** The U.S. State Department, the Iraq Foundation, UNEP, and other entities are working to solicit funding for marsh restoration projects. As of June 2004, the United States, Italy, Japan, Canada, Australia, Denmark, and Great Britain had pledged support for the marshes and Marsh Arabs. Denmark funded a river navigation strategy. Italy provided \$2 million for water modeling, environmental assessments, and water budgeting through the Iraq Foundation. Great Britain funded technical experts through UENP and Australia provided technical experts. As noted earlier, the United States, through USAID, contributed \$4 million in funding, split between ecosystem restoration and development activities. Japan pledged \$11 million, through UNEP, most of which will fund water and sewage treatment projects within the marshlands area. The United Kingdom has also pledged funding to UNEP

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<sup>29</sup> *Coalition Provisional Authority Request to Rehabilitate and Restore Iraq* (Sept. 2003).

<sup>30</sup> U.S. Agency for International Development, *Iraq Marshlands Restoration Program Action Plan* (April 2004) Forward Task Order, Water Indefinite Quantity Contract.

for environmental initiatives in Iraq. Italy contributed more than \$2 million in funding through the Iraq Foundation. Canada has pledged \$2 million for the marshes and will be participating in a conference to determine where best to direct that money.

**Project Funding Conclusions.** In total, nations have pledged around \$18 million; some, but not all, of this funding will directly target marsh restoration. It will also fund projects with a less direct relationship to restoration (e.g., sanitation, water supply, and economic development for the Ma'dan) and other environmental projects in Iraq. This funding is insufficient to undertake the projects currently identified by USAID/DAI and the Iraq Foundation. Overall, a USAID report identifies projects that it estimates would cost approximately \$25 million over three years. The Iraq Foundation stated that CRIM will need approximately \$10 million to prepare a Sustainable Restoration Plan, and additional projects are likely to be identified over the next year as CRIM develops a management plan for the marshes.