

Managing Change in the Marshlands: Iraq's Critical Challenge



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Coordinated by United Nations Assistance Mission in Iraq and United Nations Educational, Scientific and Cultural Organization, this report is a joint effort of the seven agencies of the United Nations Integrated Water Task Force:



The above United Nations agencies are all members of the United Nations Integrated Water Task Force, chaired by the Deputy Special Representative of the Secretary General for Iraq, in line with the United Nations' commitment to uphold human rights, reduce poverty, and support Iraq's sustainable development. Through the integration of expertise within the United Nations Country Team and the United Nations Assistance Mission for Iraq, the United Nations is supporting the Government of Iraq to minimize and, where possible, reverse the impact of human water-related activities (diverting, polluting or wasting) that disrupt ecosystems and harm the natural environment.

The restoration of the Iraqi Marshlands is a vital environmental and development priority. The desiccation of the Marshlands has all but destroyed a unique habitat of importance to the regional and global environment and causes further rural-urban migration. This report was created to support the debate on the future of the Marshlands and provide assistance to the Government in Iraq in the way forward to address the challenges in the Marshlands region.

Managing Change in the Marshlands: Iraq's Critical Challenge

This report has been prepared to provide the Government of Iraq and all those responsible for and involved in the management of the Iraqi Marshlands region with a summary and evaluation of the findings of the United Nations Integrated Water Task Force for Iraq on the sustainability of the area.

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Foreword

The Marshlands are of fundamental importance to Iraq, a unique eco-system providing local inhabitants with an essential source of habitat and livelihoods. Not only are the Marshlands an important national heritage and ecological area, but they have also played a vital role in the economic and social advancement of the people of Iraq. At their peak the Marshlands were considered to be the largest wetland ecosystem in the Middle East, and they played an important role in global ecosystems by supporting rare wildlife and rich biodiversity.

Since the 1970s and up to 2003, however, over 90% of the original Marshlands area were drained or destroyed due to systematic over-exploitation, political reprisals against the inhabitants, and a lack of coordinated management. Some 175,000 of its people were forced to flee and relocate throughout Iraq and beyond. For those who have stayed, many live in poor conditions significantly worse than in the rest of the Southern region.

Following the 2003 change of regime in Iraq, a unique opportunity emerged to restore the Marshlands. Many communities, institutions and organizations have already begun to mobilize in support of the restoration of the Marshlands. Due to these efforts, roughly 40% of the area has been successfully rehabilitated, and dedicated work continues to restore Marshlands' biodiversity and livelihoods. The international community is committed to supporting this work. Through the combined expertise of the United Nations Country Team for Iraq and the United Nations Assistance Mission for Iraq, the United Nations Integrated Water Task Force for Iraq has developed this report to support the continued efforts for restoration and coordinated management of the Marshlands.

The report focuses on the importance of the Marshlands ecosystem services and the social, economic, and cultural benefits they provide to the Iraqi people, and the report shows the need to intensify the work being done for Marshlands revitalization and rehabilitation. However, revitalizing the Marshlands is more than just bringing back water, people, and biodiversity to the wetlands. The Marshlands' future depends on how successfully Iraq is able to strike a balance between national development, including the development of the oil industry infrastructure in the Marshlands area, and environmental conservation. Conservation of a unique ecosystem also needs to go hand in hand with social and economic development, ensuring sustainable livelihoods for the people of the Marshlands.

This report is intended to provide guidance to the Iraqi Marshlands stakeholders as well as the international community, to help build consensus on the desired future for the Marshlands. The report is thus intended to inspire discussion and the initiation of concrete follow-up action to effectively continue and enhance Marshlands restoration efforts. This report, in draft form, was a key input to the Marshlands Conference, 6 – 7 June 2011, hosted by the University of Basrah and the United Nations, bringing together central and local government, local stakeholders, the private sector and the international community to discuss a common vision for the Marshlands; and was endorsed by the conference participants.

Iraq is in an enviable position: it has the human and financial resources to protect and develop the Marshlands for the enjoyment and prosperity of future generations. The ultimate outcome will depend on the collective will to harness these resources and thereby secure the sustainable development of the Marshlands as a unique social, cultural and ecological system for the benefit of all Iraqis.



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Acknowledgements

In view of the importance of revitalizing the Marshlands to support human survival and economic livelihoods, as well as water needs of the ecosystems providing these services, the efforts of the United Nations Integrated Water Task Force for Iraq in preparing this report are gratefully acknowledged. The hard work of this dedicated group and their insightful contributions to this effort were the primary reason for its completion. The enthusiasm and perseverance of the members of this team made the preparation of this report possible, and sincere thanks go to all of them. We also thank all the participants of the Marshlands Conference for the deliberations and insights which inspired the finalization of this report.

Key Messages to Policy Makers

- » The Marshlands deliver a wide range of services that are critical to the existence and well-being of Iraqis, such as food, clean water and climate control.
- » Sustainable development of the Marshlands must recognize the need to manage and balance the benefits derived from the ecosystems rather than simply managing the natural resources themselves. Management efforts should therefore be based on a better understanding of the value of ecosystem services and the trade-offs associated with policies options.
- » Quality of water in the Marshlands is poor and generally not safe for human consumption in many areas. Water is also less suitable for agriculture and other economic uses.
- » The loss of permanent natural habitat and the diversity of life has degraded the overall health of the Marshlands ecosystems and diminished their capacity to support Iraqis.
- » Most of the people living in the Marshlands area are challenged by poor living conditions and a lack of opportunities. Marsh inhabitants are also generally more vulnerable than those living in other areas of the country.
- » The Marshlands area is subject to a range of pressures that are shaping the area, including upstream water management, climate change, competition over land and resources, economic development and key demographic trends. The ability to mobilize governance to manage these pressures will ultimately determine the future development of the Marshlands.
- » Changes to Marshlands are influenced by a diverse range of factors, both localized and distant. Addressing these drivers of change will require devising a policy framework that enables action at different levels and groups of actors.
- » Major policy decisions in the next decades will have to address trade-offs among current uses of the Marshlands and between current and future uses. Particularly important trade-offs involve those between agricultural production and water quality, land use and biodiversity, development of oil industry water use and aquatic biodiversity, and current water use for irrigation and future agricultural production.
- » Sustainable development of the Marshlands requires striking a balance between development at the national and local levels, including a just compromise between competing interests.
- » Further refinement of future scenarios is needed to improve analysis of strategic options for Marshlands management. Incorporating more up-to-date data, reducing uncertainty and linking actual government plans are paramount. The results of scenarios should be analyzed further to understand the trade off of policy choices and potential winners and losers.

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Introduction

1.1 Background

The Iraqi Marshlands were once the largest wetland in southwest Asia, extending across more than 20,000 km².¹ Vast in size and abundance of resources, the Marshlands represented an ecosystem of fundamental importance to natural and human life in the region, providing local communities with an essential source of habitat and livelihood. Host to an extraordinary biodiversity and cultural richness, the Marshlands used to provide a permanent settlement and migratory flyway point for numerous bird species, as well as a central habitat for the Gulf's freshwater fish. Historically, the Marshes filtered out the waste and other pollutants from the Tigris and Euphrates rivers, preserving a pristine ecosystem and preventing the degradation of the Gulf coast.² Beyond its environmental importance, the Marshlands hold a central place in the world's historical and cultural heritage. According to many scholars, the Iraqi Marshlands are considered to be the site of the biblical "Garden of Eden," and they have long served as the historic home to several hundred thousand Marsh Arabs – the Ma'dan tribes. The Iraqi Marshlands are also central to Iraq's relationships with its neighbors, not only as they span into neighboring territory of Iran; but also in terms of Iraq's dependency on water flow from contributing rivers.

Since the 1970s, over 90 per cent of the original Marshlands area has been desiccated through the combined actions of upstream damming and systematic draining. As a result, by 2000, the only remaining marsh was a portion of Al-Hawizeh on the southern border with Iran.³ The destruction of the natural wetland habitat has also had negative social implications. In the 1990s, much of the settlements and livelihoods of the Marsh Arabs were destroyed in organized attacks against the Marsh communities, forcing the majority of people to leave. It is estimated that more than 75,000 Marsh Arabs fled to Iran,⁴ with around 100,000 settling elsewhere in Iraq.

After the fall of the previous regime in 2003, some efforts have been made by a number of organizations to rehabilitate the Marshlands; however, overall these





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efforts have lacked coordination and consistency. The central government has mandated both the Center for Restoration of the Iraqi Marshlands (CRIM) at the Ministry of Water Resources and the Ministry of State for the Marshlands to focus on the restoration of the Marshlands. The Ministry of Water Resources has recently supported the completion of two major hydraulics projects to divert water from the Main Outfall Drain and the Euphrates River to the Al-Hammar Marsh. These two projects have had fair success in re-flooding significant sections of the Marshlands and, in restoring a portion of its biodiversity and livelihoods.

At the local level, the provincial councils and a number of organizations, both national and international, are involved in efforts to manage and restore the Marshlands areas. The three governorates that cover the Marshlands territory have developed strategies for their respective marshlands regions, and have each developed initiatives to address environmental and human development challenges. The organization of spontaneous re-flooding and revitalization of the area has allowed a small number of the displaced Ma'dan population to return to the Marshlands.

While today roughly 38 per cent of the original Marshlands area has been restored,⁵ most of the efforts that have been made to date remain fragmented, poorly coordinated, and with limited impact. The ability of the Marshlands to support the well-being of Iraqis has been impaired by public policy decisions which have failed to balance trade-offs between development and the environment, causing further degradation of the ecosystem. The region continues to struggle with basic human development challenges. Access to clean water and sanitation, high soil and water salinity, and water pollution are some of the key factors that hamper the

resumption of life in the Marshlands.

The purpose of this paper is three-fold. Firstly, this paper aims to provide a comprehensive overview and analysis of the current situation in the Marshlands region, focusing on both ecosystem and human development analysis. The paper will aim to identify specific gaps in the existing data and elaborate on the need for future actions, based on a range of possible development scenarios.

Secondly, this paper intends to direct the attention of policy-makers towards governance and management issues in the Marshlands, with view of advocating development of a single national vision for the Marshlands – one that addresses the region as one system, rather than a sum of its parts. The paper aims to provide a substantive basis for a policy-focused discussion on the future of the region.

Finally, the paper will serve as a base reference for the key stakeholders in the Marshlands – including international partners – to launch a specific set of initiatives to re-address the governance, human development and environmental challenges in the Iraqi Marshlands.

This paper has been prepared by the United Nations Integrated Water Task Force,⁶ under the leadership of the Deputy Special Representative of the Secretary-General for Iraq, and the United Nations Scientific, Educational and Cultural Organization (UNESCO) at the request of the Iraq Partners Forum,⁷ and within the context of the first United Nations Development Assistance Framework for Iraq (2011 – 2014).

Why Focus on the Marshlands?

The Marshlands are one of the world's largest ecosystems, serving as an indispensable source of essential services, not only to immediate surroundings, but to the entire region, including beyond Iraq's borders. Stretching across three Iraqi governorates, they exist with shared characteristics and challenges, and events that take place in one part of the Marshlands have a much broader impact beyond individual Governorate borders. In many ways, the challenges confronting the Iraqi Marshlands are a microcosm of all Iraq's challenges, and the way in which they are addressed has the potential to demonstrate, on a broader level, strategies to move forward Iraq's development agenda.

At the governance level, there is an overall lack of common, comprehensive understanding of the actual situation in the Iraqi Marshlands. Stakeholders at various levels – from central government to local authorities and civil society organizations – have varying and, in most cases, incomplete knowledge and information about the true state of the Marshlands ecosystem and its communities. While the Ministry of Water Resources has set a goal to restore the Marshlands to 75 per cent of its 1973 levels, there is uncertainty what that would require in terms of quantity of water, including the needs of the Marshlands population. This is reflective of Iraq's broader challenges in data collection and analysis, not only with respect to water resources management, but also in terms of overall evidence-based policy-making.

Furthermore, the information that is available is not regularly shared or utilized as basis to address the challenges facing the Marshlands in the most effective way. A number of universities in the region, including the University of Basrah and University of Thi-Qar, have collected and analyzed data on the Marshlands, the population and biodiversity. Similarly, several United Nations agencies and non-governmental organizations

have conducted surveys on access to basic services and the quality of life in the Marshes. This knowledge is only shared ad hoc and as needed, rather than being used as evidence to guide resource allocation and policies in the Marshlands governorates.

Management of the Marshlands region is characterized by poor and fragmented coordination between central and local level institutions. Central authorities lack an integrated approach to water resources management as a whole, while institutional capacity at all levels is weak. The Ministry of State for the Marshlands – the institution mandated with the management of the area – has limited capacities and does not appear to be sufficiently empowered to carry out its mandate and role. In addition, without a clear definition of Marshlands borders, there is no clarity on the overall jurisdiction of the Ministry. Furthermore, the project development and management capacities at the governorate level are weak, impacting the ability of the governorates to utilize their budgets and implement priority development initiatives in the region.

Planning and communication of policies that impact the Marshlands are considerably weak among the relevant line ministries and local stakeholders, including civil society. Leaders at the municipal, sub-district and district levels have expressed frustration that their concerns are not heard by those developing Marshlands policy in Baghdad, or even by those at the Provincial Council level. The constituents in the Marshlands communities feel marginalized and excluded from the planning processes that affect their lives.

At the governorate level, there have been instances of bilateral cooperation, such as the joint monitoring mechanisms between the Basrah and Missan Governorates for the Al-Hawziah Marsh. However, past attempts to establish a single coordination framework for the Marshlands have largely been unsuccessful.



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Management of the Marshlands is characterized by poor, fragmented coordination between central and local level institutions.

Emergence of new actors in the area, such as the oil industry, has made the issue of coordination even more critical and complex. The recent effort led by the Ministry of State for the Marshlands to define the borders of the Marshlands in cooperation with the three relevant Governorates is the first solid step toward the establishment of a common coordination structure and unified vision for the region.

The socio-economic conditions in the Marshlands and its fringe areas are considerably worse than in the rest of the southern region. The current situation is characterized by limited access to and delivery of basic social services, gender inequality, lack of employment opportunities and a significant number of internally displaced persons (IDPs) and refugees. Marsh communities generally lack sufficient access to basic social services, including health services, water and sanitation, and education and employment opportunities. Women living in the Marshlands have lower literacy rates than women living in urban areas and have a more limited access to essential services, including family planning. Women of the Marshlands often carry an even bigger burden to provide for their families, as their husbands are often unemployed. Given that population of the region is mainly concentrated in urban centers, local authorities tend to focus their attention away from the peripheral areas, where most of the Marsh population lives.

The issue of the Iraqi Marshlands is also one that goes to the core of Iraq's trans-boundary challenges with its neighbors. The revitalization of the Marshlands is largely dependent on the constant in-flow of fresh water, especially in those areas of high soil salinity. However, in addition to the local drainage structures, Turkey, Syria and Iran have constructed a number of dams on the Euphrates, Tigris and Karkeh Rivers and corresponding tributaries (such as the Caroon River), which is thought to have reduced the amount and quality of water reaching southern Iraq and subsequently increased the level of salinity in the Shatt Al-Arab. Local communities and authorities feel powerless to address the reduced flow and increased contamination of water coming into the Marshlands, and perceive the central authorities as not proactive enough in engaging with its neighbors in a constructive manner.

1.2 Approach and structure

This paper provides an analysis of the Marshlands through the ecosystem services approach. The ecosystem services approach analyzes the consequences of ecosystem change on human well-being, and establishes the basis for the sustainable management of ecosystems and their contributions to human well-being.⁸ The basic premise of the approach is that nature produces many of the necessities needed for survival and development, such as food and fresh water; and the less obvious benefits, such as storm protection, pollination, and cultural goods. These services are essential for the support of stable habitats, economic systems and human populations.

The ecosystem services approach was first developed and defined by the Millennium Ecosystem Assessment, United Nations - led global initiative that sought to "assess the consequence of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being." The assessment includes four broad categories of services: provisioning (food, water, timber, fiber); regulating (climate, floods, disease, wastes, water quality); cultural (recreational, aesthetic, and spiritual benefits); and, supporting services (soil formation, photosynthesis, and nutrient cycling).⁹ In the ecosystem services approach, people are viewed as an integral part of an ecosystem. Changes in human conditions drive changes in an ecosystem; and, in turn, ecosystem changes drive changes in human conditions.

This paper was developed in three stages. The first stage was done based on a literature review of the current information and analyses available through public sources, including documents authored by the Government of Iraq, international and national non-governmental organizations, the United Nations agencies, academic institutions and other research institutes. Following the development of a zero-draft, the United Nations Integrated Water Task Force engaged an expert from the United Nations Department for Political Affairs to work through the existing scenarios and identify specific data and analysis gaps in the existing research. In February 2011, a technical mission composed of the Office of the Deputy Special Representative of the Secretary-General and UNESCO visited the Marshlands region. During the mission, local government stakeholders, civil society organizations

Humans are viewed as an integral part of ecosystems. Changes in human conditions drive changes in ecosystems; and ecosystem changes drive changes in human conditions.

and academia provided additional data and inputs to the paper. The final draft of the paper served as the substantive basis for discussion at the National Conference on Revitalizing the Iraqi Marshlands, "Rethinking Strategies for a Sustainable Future," held in Basrah on 6 and 7 June 2011.

The paper is structured to provide a comprehensive overview and analysis of the main drivers of change in the Marshlands. Chapter 2 elaborates on the Marshlands ecosystem services and their linkages to national development goals. Chapter 3 provides an analysis on the information that is currently available on the Marshlands, including the physical properties of the area, the socio-economic status and governance arrangements. Chapter 4 looks at the key drivers of loss and change to the Iraqi Marshlands, both in terms of the natural drivers (e.g. competition over limited water resources) and man-made factors (e.g. urbanization and development of the oil industry). Chapter 5 provides an overview and analysis of the existing future scenarios for the Marshlands. Finally, Chapter 6 elaborates on the key strategic-level recommendations for the future development, management and governance of the region.

1.3. Defining the Marshlands

At present, there is no official definition for the area commonly referred to as the "Mesopotamian Marshlands of Southern Iraq." The Government of Iraq uses the term to refer to the flooded areas in the southern governorates of Basrah, Thi-Qar and Missan, and the dry zones that surround these wetlands, excluding urban areas. However, as of yet, there is no general consensus on where these areas officially begin and end.

The lack of officially designated boundaries is due to several factors. First of all, the natural environment is subject to constant change. Discussed in Chapter 4, events such as drought, the implementation of irrigation projects and the conversion of desiccated wetlands for other uses are constantly changing the Marshlands landscape, making demarcation difficult at any given moment in time. Defining an area that is always in flux must compromise rehabilitation with the reality that much of the original wetlands and associated ecosystems will never fully recover, even

under the best of conditions.

Secondly, there is some incongruity in the terms used to describe the area. The Ministry of Water Resources, for example, describes the area in terms of individual marsh units (eg. Hawizeh, Central and Al-Hammar Marshes, which altogether constitute an area of 5,560 km²). Iraqi environmental scientists attribute a much larger area of 35,600km² as the "Tigris Euphrates Alluvial Salt Marsh Eco-region." Alternatively, provincial authorities use the term "Marshlands" to describe their constituent Marsh communities, while the Marsh Arabs themselves consider their culture an intrinsic part of the area, regardless of their physical location or legal status.

The prospect of specifying the Marshlands boundaries also puts numerous interests at stake. A defined area will certainly assist in protecting sensitive environmental and economic zones, while increasing the scope of services to vulnerable groups. On the other hand, the farming communities that now occupy dried wetlands may lose productive cropland and a valuable source of income. Oil companies working in the area have similar interests to protect. The final boundaries of the Marshlands will also determine the scope of duties for relevant authorities to serve and appropriately administer specific communities within the area.

The Iraqi Government has recently created a committee to define the administrative borders of the Marshlands once and for all. The General Secretariat for the Council of Ministers is providing oversight to the committee, and the Minister of State for the Marshlands is acting as chair. Members of the committee include the Ministry of Water Resources (CRIM) and the three southern Provincial Councils (Basrah, Missan and Thi-Qar). The committee aims to have the final borders established by October 2011, in order to propose an official definition of the Marshlands to serve as a basis for the National Budget for 2012.

In the absence of an existing definition, this report and related analysis defines the Marshlands area along two strata: (a) a physical definition, and (b) an administrative definition. Both definitions are based on the principle that the definition should encompass all vulnerable groups and zones characteristic of the Marshlands area, and are intended to be used interchangeably according to context.

1.3.1 Physical definition

The current physical definition consisting of about 7,875km² (approximate to 1983 levels) corresponds with the Iraqi Government's proposed goal to restore 75 per cent of the 1973 area. This area comprises the permanent and seasonal marsh areas and marginal land that is within 5 km of current marshland zone, or about 35,600 km². The area is comprised of a network of 3 major marsh systems (Al-Haweza (1,377 km²); Central (2,420 km²); and Al-Hammar (1,762 km²)) and 8 minor marshes (including the Al-Sinnaf, Auda, Al-Ezz River marshes).

1.3.2 Administrative definition

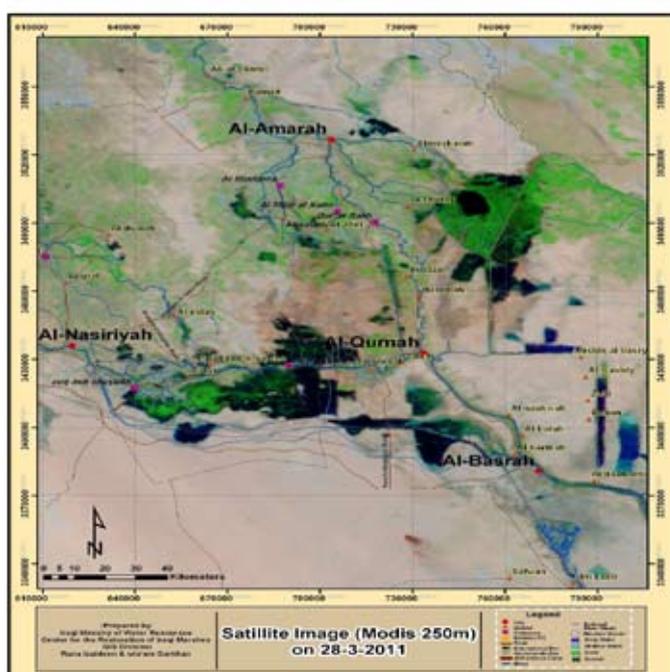


Figure 1.1. Physical Marshlands

Source: Ministry of Water Resources, CRIM, 28 March 2011.

The administrative areas encompassing the natural areas described above are distributed across the Missan, Thi-Qar, and Basrah Governorates, including 16 sub-districts.

It must be noted that the administrative definition is intended to assist in determining beneficiary populations and constituents; however, it may not account for some vulnerable populations such as former Marsh inhabitants that have been exiled abroad or displaced in Iraq.

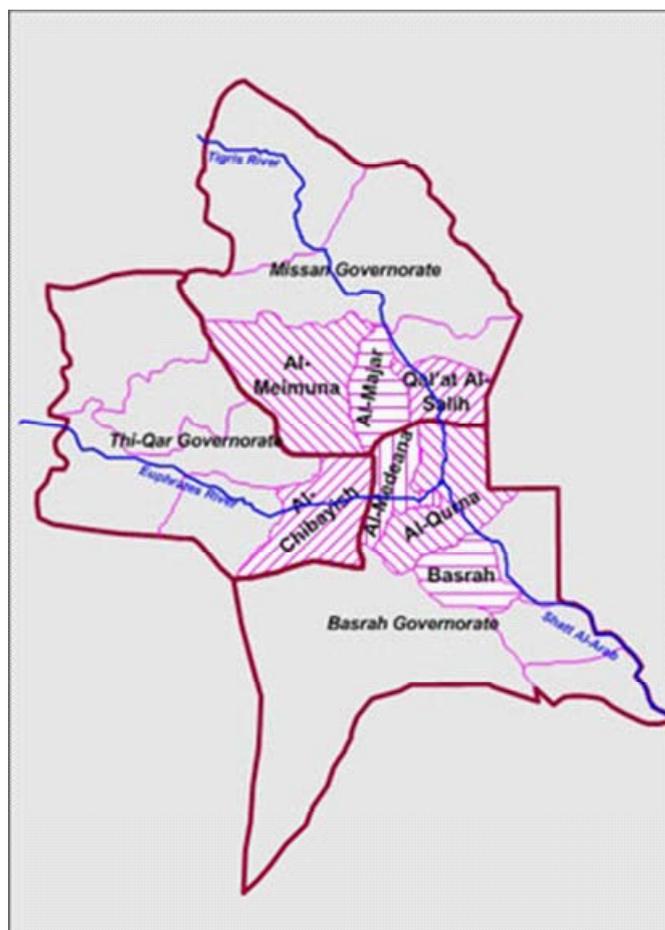


Figure 1.2. Administrative Marshlands

Source: UNEP

Thi-Qar Governorate

Al-Chibayish District

1. Al-Chibayish
2. Al-Fihood
3. Al-Hammar

Basrah Governorate

Al-Qurna District

4. Al-Qurna
5. Al-Theger
6. Al-Deer

Al-Medeanah District

7. Al-Medeanah
8. Al-Haweer
9. Telha

Basrah District

10. Al-Hartha (Germate Ali)

Missan Governorate

Al-Mejmuna District

11. Al-Salam
12. Al-Mejmuna

Al-Majjar District

13. Al-Majjar

Al-Kheir

15. Al-Adee

Qal'at Al-Salih District

16. Al-Uzeir

Nature's Services: Marsh Ecosystem and the Well-being of Iraqis



Main Messages

- » The health of the ecosystem of the Marshlands is inextricably linked to the health of the people of Iraq. The Marshlands ecosystem provide services ranging from food, to clean water and climate control, which are critical to the existence and well-being of Iraqis.
- » Policies that affect or promote the degradation of Marshlands ecosystem will ultimately have an adverse impact on Iraqis, just as policies that help to restore or sustain these ecosystems will have a positive impact.
- » Grasping the true magnitude of the degradation of the Marshlands that has taken place over the past 40 years will require an assessment of the full extent of services that Iraqis have lost as a result.
- » Maintaining the Marshlands' capacity to fulfill its services is likely to be less costly than replacing the lost functions.
- » Sustainable development of the Marshlands must recognize the need to manage and balance the benefits derived from the ecosystem rather than simply managing the natural resources themselves. Management efforts should, therefore, be based on a better understanding of the value of ecosystem services and the trade-offs associated with policy options.

2.1 Introduction

The Marshlands area is universally recognized for its ecological and cultural uniqueness. The role the area plays in supporting the daily lives of Iraqis, however, is less evident. A benign climate, soil fertility and cleaner water — foundations for better living — are easily taken for granted. The strong connection between the natural Marshlands and the well-being of all Iraqis means that decisions that impact the area will likely affect livelihoods. Therefore, striking a balance between development at the national level and conservation in the Marshlands will require leveraging the true value of the ecosystem and taking into account the potential trade-offs of relevant policy decisions.

This chapter seeks to demonstrate how the ecosystem of the Marshlands benefit the people of Iraq and to highlight the value of ecosystem services to national security and development. Conducting a comprehensive assessment of Marshlands ecosystem services is outside the scope of this chapter. Rather, the chapter makes the case that the future of the Marshlands will ultimately depend on how its ecosystem and related services are valued, and calls upon Iraqi decision-makers to design coherent policy frameworks that systematically respond to the value of Iraq's Marshlands.

2.1.1 Main challenges

Human activities, both calculated and unintended, have contributed to the degradation of the Marshlands services upon which local communities and the Iraqi society at large depend. As economic development in Iraq expands, the pressures put on Iraq's 'natural capital' are also expected to increase, putting the supporting capacities of Marshlands ecosystem at further risk. Iraq has run down its natural capital stock in the Marshlands without understanding the full value of what has been lost. The cost of these losses is felt on the ground, but can go unnoticed at the national level because the true value of the Marshlands' capital has not been accounted for.

2.2 Ecosystems services

The large network of interconnected wetlands comprising the Mesopotamian Marshlands provides a diversity of services vital for the well-being and alleviation of poverty of Iraqis (See Table 2.1). These can

be categorized as provisioning, supporting, regulating and cultural services.

2.2.1 Provisioning services

The Marshlands produce a wealth of provisions for Iraqis, including wild and cultivated sources of food and fuel, freshwater and valuable biochemical and genetic materials. Local communities traditionally use the marshes and land to harvest food grains such as rice and millet, vegetables and dates, and to raise livestock such as water buffalo. Wild animals such water fowl, boar and fish are supplemental to local diet. Buffalo milk yogurt and fish from the Marshlands were once a major portion of the national food economy. More recently, however, habitat destruction and overhunting have led to a mass reduction and loss of key populations of mammals, such as wild boar and water buffalo, as well as several species of fish. The extensive reeds are a vital source of materials for habitat construction, mats and fuel. Further to these immediate provisions, the reserves of crude oil found in the Marshlands area can also be considered as provisions of ancient marsh ecosystems. The region's rich biodiversity has long fueled the "production" of these services, supporting significant populations and species of wildlife.

Table 2.1. Ecosystem services provided by or derived from the Iraqi Marshlands

Provisioning services – the goods of products obtained from Marshlands’ ecosystem		
Food	Crops	Paddy rice, great millet, dates, vegetables and fruits
	Livestock	Asian water buffalo, cattle, sheep, water-buffalo milk and yogurt
	Capture fisheries	Shrimp, yellowfin sea bream, khishni
	Aquaculture	Cyprinids, grass carp, shellfish
	Wild foods	Wild boar, waterfowl (coot, teal), desert monitor
Freshwater		Freshwater for drinking, cleaning, cooling, and transportation (canoeing and boating)
Fiber and fuel	Fiber	Reeds for housing and mats; date palm wood
	Fuels	Reeds, crude oil, cattle dung
Biochemical		Potential use of Marsh flora extracts, native herbs for pharmaceuticals and pest control
Genetic materials		Resistance and breeding of native plant and animal species
Regulating services – the benefits obtained from the Marshland ecosystem’s control of natural processes		
Climate regulation		Moderation of the national rainfall patterns and control desertification and dust storms
Water regulation	Hydrological flows	Storage and retention of water flowing from Euphrates-Tigris system upstream and tidal flow downstream; Permeable clay and silt facilitates recharge of the Recent Alluvium aquifer
	Water purification and waste treatment	Removal of harmful pollutants from water by trapping metals and organic materials; soil microbes degrade organic waste rendering it less harmful
Erosion regulation		Reeds, grasses and estuarine vegetation retain soils and sediments
Natural hazard regulation		Marsh areas naturally absorb seasonal floods and tidal surges; moderation of drought at a local scale
Pollination		Habitat for bees and birds, the key pollinators of economically important crops
Cultural services – the nonmaterial benefits that Iraqis obtain from Marshlands ecosystem		
Ethical values		Customs, oral traditions, knowledge and rituals attached to the use of the land and rivers; Iraqi tangible and intangible cultural heritage; an area of global importance
Recreation and tourism		Canoeing, bird and wild-life watching, recreational fishing, archaeological site visitation, Marsh communities
Aesthetic		Globally significant natural beauty
Educational		Science, cultural awareness, specialized vocational training, public awareness of national, regional and global importance
Supporting services – the underlying processes that are necessary for the production of all other ecosystem services		
Soil formation		Retention of sediment, recycling and supporting the health of the ecosystem
Nutrient cycling		Returning phosphorus, sulfur and nitrogen to Iraq’s atmosphere, water and soils

Loss of biodiversity and ecosystem services may compromise Iraq's ability to meet national and international development goals.

2.2.2 Regulating services

The ecosystem of the Marshlands provide natural controls on the variations in climate and water flow and help purify wastewater and protect against natural hazards. The area has a mitigating force for desert sandstorms, helping to reduce erosion of soil and damaging effects on the Gulf. Temperatures and humidity in the wider region are moderated by the marsh climate, supporting agricultural productivity downwind. The Marshlands also serve to moderate seasonal droughts by providing a natural storage basin of water. The groundwater stored in the marshes has historically served as a mechanism to purify and desalinate soil in neighboring agricultural regions, ensuring better conditions for agriculture. This service has been hampered by decreased flow and groundwater recharge in recent decades. In addition, the bee population of the Marshlands also helps pollinate economically important crops in the region and support Iraqi food security.

2.2.3 Cultural services

The non-material benefits that Iraqis and others derive from the Mesopotamian Marshlands consist of a variety of inspirational, ethical, aesthetic and educational values. Mesopotamia has inspired the imaginations of civilizations for millennia as the birthplace of humanity and agricultural production. The customs and oral traditions of the Marsh tribes, as well as the hundreds of antiquity sites found in the area, represent valuable tangible and intangible heritage of Iraq. Such natural and cultural services hold universal value, drawing tourists and recreationists, and provide opportunities for education and research with global benefits.

2.2.4 Supporting services

Underpinning the aforementioned services are a number of underlying supporting processes. The formation of soils, through the recycling of organic matter and retention of sediments, helps to support the Marshlands environment. Similarly, the health of the natural marshes is sustained by the cycling of essential nutrients. Without such supporting services, the quality of air and water in Iraq would be compromised, affecting the wetland's direct services to Iraqis.

2.3 Links to well-being and poverty reduction

The Marshlands ecosystem play a fundamental role in supplying life-supporting services to Iraqis, and are critical to socio-economic development. Loss of biodiversity and ecosystem services, therefore, may compromise Iraq's ability to meet national and international development goals, such as the Millennium Development Goals (e.g. on eradicating poverty and hunger, women's empowerment, child mortality, maternal health, environmental sustainability) and economic development. On the other hand, protection of biodiversity and Marshlands services will promote the achievement of these goals.

2.3.1 How do Iraqis benefit?

Through the services described above, the Marshlands ecosystem contributes to the well-being of Iraqis by providing the basic materials for a good life, freedom of choice and action, health, social relations and security. Table 2.2 summarizes the range of experiences that Iraqis may have, either collectively or individually. For example, Iraqi farmers, in particular, are highly dependent on these supporting services for rich soils and proper nutrient cycling. Rich soils and proper nutrient cycling are prerequisites to productive farming in the non-inundated areas of the wetlands.

2.4 An ecosystem services approach for reconciling national development and Marshlands health

Policies that affect or promote the degradation of Marshlands ecosystem will ultimately have an adverse impact on Iraqis, just as policies that help to restore or sustain this ecosystem will have a positive impact. Sustainable development of the Marshlands should recognize the need to manage and balance the benefits derived from the ecosystems rather than simply manage the natural resources themselves. Grasping the true magnitude of the degradation of the Marshlands that has taken place over the past 40 years will require an assessment of the full extent of services that Iraqis have lost as a result. Management efforts should, therefore, be based on a better understanding of the value of ecosystem services and the trade-offs associated

with policy options. Furthermore, maintaining the Marshlands' capacity to fulfill its services is likely to be less costly than having to replace the lost functions.

There are several options for adopting an ecosystem services approach to managing the Marshlands within the context of national development. For example, one of the options is to map the connection between the value of the Marshlands ecosystem services, human well-being and national development goals. Such an assessment would identify and define the specific services provided by the southern Marshlands, and evaluate those services on a number of levels. Secondly, an assessment can be carried out on the value of the Iraqi Marshlands in economic, social and environmental terms.

Attributing a monetary value to the Marshlands ecosystem services would allow Iraqi decision-makers to assess "natural capital" and investment options to sustain them. For example, it is estimated that an investment of US\$33,000 to restore 1 hectare of Marshlands will reap a net economic benefit value of US\$171,300 over 40 years. Finally, ecosystem services approach can be mainstreamed into policy-making and development strategy. Entry points for ecosystem services occur at all levels of decision making, including: 1) national and sub-national policies, 2) economic and fiscal incentives, 3) sector policies, and 4) governance.



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Table 2.2. Components of Iraq's well-being derived from the Marshlands*

Security
<ul style="list-style-type: none"> » A safer environment » Greater resilience to the effects of disasters, such as drought, flood, pests and dust storms » Secure rights and access to ecosystem services
Basic material for good life
<ul style="list-style-type: none"> » Access to resources for a viable livelihood (including food and building materials) or the income to purchase them
Health
<ul style="list-style-type: none"> » Sustenance and nutrition » Avoidance of disease » Cleaner and safer drinking water » Cleaner air » Energy for comfortable temperature control
Good social relations
<ul style="list-style-type: none"> » Realization of aesthetic and recreational values » Ability to express cultural and spiritual values » Opportunity to observe and learn from nature » Development of social capital » Avoidance of tension and conflict over declining resource base
Freedom and choice
<ul style="list-style-type: none"> » The ability to influence decisions regarding ecosystem services and well-being » Opportunity to be able to achieve what an individual values doing and being

*Based on Linking Ecosystem Services and Human Well-being (Ch.3), Global Assessment Report, Millennium Ecosystem Assessment, 2004.

Current Status of the Iraqi Marshlands

Main Messages

- » The Marshlands area has expanded by one-fifth since January 2010 to the current 45 per cent of its original size (1973). If this rate of recovery could be continued, the Government of Iraq's goal to restore the Marshlands area to 75 per cent would be achieved within 4 years.
- » Quality of water in the Marshlands is poor and generally not safe for human consumption in many areas. Water is also less suitable for agriculture and other economic uses.
- » The loss of permanent natural habitat and the diversity of life has degraded the overall health of the Marshlands ecosystems and diminished their capacity to support Iraqis.
- » Most of the people living in the Marshlands area are challenged by poor living conditions and a lack of opportunities. Marsh inhabitants are also generally more vulnerable than those living in other areas of the country.
- » Information on the state of the environment and human condition is generally lacking, fragmented and outdated.
- » Though there have been some successes and gains in restoration, current efforts to manage the environmental, social and economic aspects of the Marshlands remain uncoordinated and ad hoc.

3.1 Introduction

A key challenge to achieving a more sustainable future for the Marshlands area is to adequately consider the development issues as they concern the environment, economy and society. This chapter aims to describe the actual status of issues that impact development in the Marshlands area, including socio-economic development indicators. The chapter concludes with a look at the performance of current management capacities.

3.2 Environmental indicators

The Marshlands natural environment underpins the Iraqi economy, society and well-being. The steady loss of habitat in past decades and the array of government interventions to restore the area over the past years necessitate taking stock of the core indicators of the health of the Marshlands environment.

3.2.1 Current marsh size

The permanent marshes in 1973 measured more than 8,000 km².¹⁰ Following the desiccation in the 1980s and 1990s, the vast wetlands area of pre-1970 is today but a fragmented network of marsh units: three major marsh systems (Al-Hammar marshes, the Central marshes and

Al-Hawizeh) and a number of minor marshes including Auda Marsh, Dalmaj Marsh and Sinnaf Marsh.¹¹

The Government of Iraq's current goal is to restore the Marshlands to 75 per cent of the 1973 area. Restoration efforts have had mixed results since 2003. Re-flooding projects helped the area to recover nearly 50 per cent of its extent by 2006. By 2009, the re-flooded area fell to 2003-levels due to drought and reduced flow from Iran.¹² As of January 2011, the Marshlands area had recovered to 45 per cent.¹³ The recovery rate from January 2010 to January 2011 was as high as 21 per cent thanks predominantly to hydraulics projects undertaken on the Euphrates River in Thi-Qar and Basrah to divert water to the Al-Hammar Marsh. The Ministry of Water Resources is planning more similar projects on the Tigris and Euphrates.

3.2.2 Water volume

Relational to the extent of the marshes is the quantity of water flowing through and stored by the area, which has historically fluctuated both seasonally and annually. Recent surveys by the Ministry of Water estimate the Marshlands accounts for 6.5 BCM (billion cubic meters) per annum, or 45 per cent of the 1973 figure of 14.8 BCM, up from 5.5 BCM January 2010. While this is an improvement compared to 2002 low of approximately 2 BCM, it is far less than the 2006 high of over 9 BCM

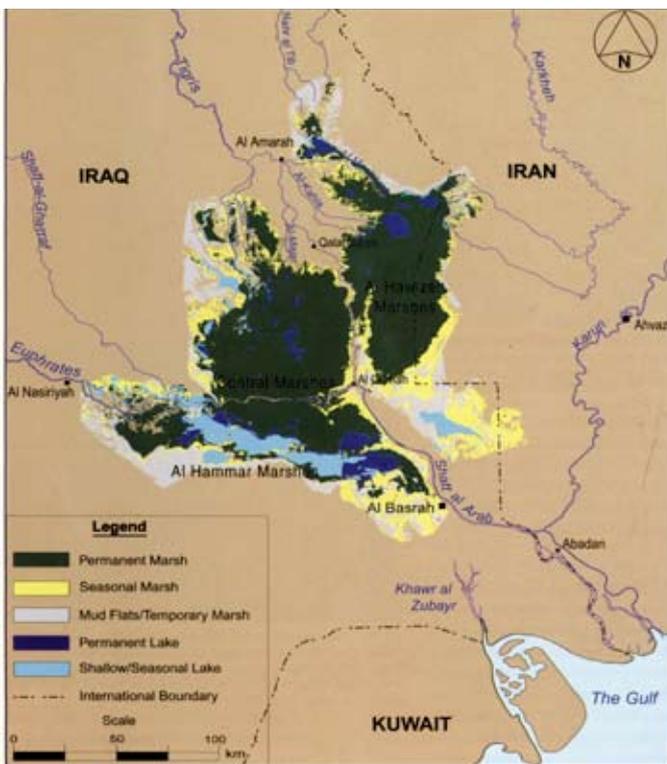


Figure 3.1. Marshlands land cover, 1973

Source: UNEP



Figure 3.2. Marshlands land cover, 2000

Source: UNEP

in the post-2003 recovery era.¹⁴ It is estimated that the groundwater reserves in the Marshlands have declined to 58 per cent of their capacity, and they have become highly saline and not suitable for human or agricultural purposes.

Most of the water input for the Marshlands is derived from rivers and streams, the majority originating in Turkey or Iran. Recent changes to the flow and quantity of river water have also reduced the seasonal pulses which naturally flush out the Marshlands. In the 25 years following the beginning of the heightened dam construction in 1973, the Euphrates decreased to only 36 per cent of its pre-dam flow. Seasonal flooding, key to maintenance of the Marshlands ecosystem, was also significantly tempered. While river water is less available, evapo-transpiration rates remain consistently high and precipitation levels have dropped significantly. The flow of the Tigris and the Euphrates is expected to decrease further by 2025, with the Euphrates declining by more than 50 per cent and the Tigris by more than 25 per cent.

3.2.3 Quality of water

Water in the Marshlands is becoming less safe for human consumption and unsuitable for agriculture and other uses. Its properties have become altered mainly through changes in quality and flow of the upstream rivers. The quality of the Tigris and Euphrates river system deteriorates as it flows southward into the Marshlands, accumulating numerous contaminants along the way, such as untreated domestic and industrial waste and pesticides. Recently water has become polluted with increased salinity levels, altered alkalinity, pollutants and bacteriological contaminants, such that pH values have been altered. High levels of

phosphorous have increased the presence of algae, which has a potentially negative impact on fish stock.¹⁵ Bacteriological contamination levels, at an average of 16 per cent,¹⁶ exceed WHO standards. Though naturally more saline than the upstream locations,¹⁷ water in the Marshlands has doubled in salinity in recent years.

3.2.4 Health of ecosystem

The reduction of area and the pressures put on water resources have resulted in a significant decline in overall health of marsh ecosystem. Both the diversity of species and the numbers among remaining populations have declined, impacting the status of hundreds of species of migratory birds, damaging the livelihoods of those who depend on fish stocks in the Marshlands and in the Gulf, and threatening a number of species found solely in the marshes.

Species of great ecological, economical and cultural importance could be lost forever, including the 18 globally threatened species of fish, mammals and insects found in the Marshlands. Moreover, as no comprehensive survey of all flora and fauna in the Marshlands has been undertaken thus far, losses would not only be immeasurable, but unknown for many species.

While much of the areal extent has been lost, the partial recovery of the Marshlands in 2006 has indicated that some of the biodiversity and species services of the marshes might be saved by restoration efforts. Their protection, through appropriate conservation and management practices is, therefore paramount, as is further study and research where knowledge gaps remain.

Table 3.1. Marsh extent (non-seasonal), January 2011

Marsh Systems	Governorate	Area (km ²)		%
		1973	Jan 2011	
Hawzieh Marsh	Missan	1,055	714	68
	Basrah	322	19	6
Central Marsh	Missan	1,230	198	16
	Basrah	155	41	26
	Thi-Qar	1,035	320	31
Al-Hammar	Basrah	563	337	60
	Thi-Qar	1,200	887	74
Total		5,560	2,516	45

Source: Center for the Revival of the Iraqi Marshes (CRIM), Ministry of Water Resources, February 2011.

Table 3.2. Available figures on Marshlands species*

Faunal group	Number of species	Year of data
Plants	371 ⁱ	1972-1975 ¹⁸
Fish	54 ⁱⁱ	1996 ¹⁹
Birds	159 ⁱⁱⁱ	2005-2008 ²⁰
Amphibians and Reptiles	>15	1992 ²¹
Mammals	>11	2009 ²²
Macro-invertebrates	72 ^{iv}	2007 ²³
Insects	40 ^v	2007 ²⁴

* Includes most recent available figures and is not intended to present a comprehensive overview of the current status of biodiversity in the Marshlands

ⁱ Not the sum of the species from all habitats because some species occur in multiple habitats

ⁱⁱ Found in the Tigris-Euphrates basin

ⁱⁱⁱ Species include resident breeders, and winter and summer visitors

^{iv} Macro-invertebrates include snails, insects, shrimp, annelids, mussels, spiders, crabs, isopods, amphipods and cerripeds

^v Insects are also included in the total number of species listed for macro-invertebrates

3.3 Socio-economic indicators

The human condition and local economy of the Marshlands has been greatly challenged by the changing environment. Hundreds of thousands of Iraqis have either been forcefully displaced by the former regime or with the intentional desiccation of the Marshlands during the past two decades. More than 90 per cent of the inhabitants of the Marshlands fled, leaving only 20,000 people.²⁵ Further desiccation has put the shrinking community at risk of malnutrition and poverty.

The Marshlands have historically had unique and rich traditions which are deeply embedded in the lives and livelihoods of the local community. However, most areas in the Marshlands suffer from poorer access to basic services compared to the rest of Iraq. Further socio-economic development has the potential to put an additional strain on environmental resources, including contamination of the air, soil and groundwater. Inadequate access to services and further environmental degradation could potentially lead to an increase in the rate of migration away from Marshlands and lead to further socio-economic and cultural decline.

3.3.1 Population dynamics

The total population of Marshlands is estimated to be between 350,000 and 410,000, with most (59 per

cent) of the population living in rural or semi-rural areas. The population is concentrated in the Basrah Governorate (65 per cent), with 30 per cent in Missan and the remaining 5 per cent in Thi-Qar.²⁶ The Central Organization for Statistics estimates that 59 per cent of the population in rural areas of Basrah, Missan and Thi-Qar is under 20 years old (the same as the figure for Iraq overall).²⁷ Many of the official figures are based on 1997 figures, which may not take into account migration resulting from socio-economic, environmental or conflict factors since.²⁸

Displacement remains a key concern. After 1993, many people left the Marshlands and many have not returned, leaving villages unoccupied, particularly in "deep" areas.²⁹ Those who left the "deep" areas may have become accustomed to the lifestyle of the areas to which they moved. Those that have returned after 2003 may therefore have chosen to return to the borders or outskirts of the Marshlands and have not re-embraced the former Marshlands way of life.³⁰ More recently, 1.6 million people were displaced Iraq-wide between 2006 and 2007, including around 11,000 people – 1,884 families – displaced to or within the Marshlands. Almost half (45 per cent) live in Al-Chibayish and Al-Hammar sub-districts (Al-Chibayish district), and a further 19 per cent live in Al-Mejar Al-Kabir. Some 72 per cent of families intend to remain in the destination of their displacement.³¹

3.3.2 Human development, livelihoods, and access to services

Due to the unavailability of sub-district human development indicators for the Marshlands, the current assessment is being made based on the data available for the three Marshlands governorates (Basrah, Missan and Thi-Qar). The overall health indicators in the relevant governorates are generally consistent with national averages. Residents of Thi-Qar and Basrah can expect to live slightly longer than the national average of 58.2 years, while residents of Missan can expect to live slightly less. Infant mortality and mortality rates for children under 5 are lower than the national average, while the chronic malnutrition rates at 31 per cent are higher than the national average of 22 per cent.³² Education and literacy levels in the Marsh districts are among the lowest in Iraq, especially in terms of women's primary school enrolment and literacy.³³ Some 40 per cent of villages in the Marshlands do not have primary schools.³⁴ The Marshlands region also experiences higher unemployment and poverty rates than in the rest of the country, especially among women and the IDP communities.³⁵

Livestock and fisheries have been the pillars of the local economy of the Marshlands. However, due to the draining of the Marshlands in the 1990s, total fish production in Iraq dropped from 36,935 tons to 25,600 tons between 1997 and 2001. The fish production

levels have been decreasing ever since to the current levels of 4 kg/ha per year. Prior to 1990s, 60 per cent of the fish consumed in Iraq came from the Marshlands; while today, that number is only 10 per cent. Due to high salinity of surface water, the variety of species also decreased from 70 to only 10. The same is true for the large stocks of buffalos, the most important animal in the Marshlands, whose numbers decreased drastically from a high 80,000 to a current meager number of around 5,000.

Access to essential services is also limited. Over 91 per cent of Marshlands villages do not have a health centre.³⁶ Furthermore, sanitation practices in Marshlands areas are poor, resulting in significant health problems. Solid waste management services rarely reach rural areas in the Marshlands, leading the residents to dump waste on the nearest available land.³⁷ There are no specific controls for disposal of industrial waste,³⁸ and many cities, including Amara, Nassiriyah and Najaf, discharge untreated waste water into marsh tributaries.³⁹ More than one-third of villages use untreated river or marsh water for drinking,⁴⁰ and outbreaks of water-borne diseases have been prevalent.⁴¹ In 2007, 12 per cent of villages were not connected to the general electricity network. For those connected to the network, the supply is unreliable, with scheduled power cuts reducing supply to less than 6 hours per day in many areas.⁴²

Table 3.3. Health Indicators for the Marshlands

Governorate	Infant Mortality Rate	Under 5 Mortality Rate	Maternal Mortality Rate	Life expectancy
Thi-Qar	31/1000	35/1000	84-86/100,000	60.4
Missan	32/1000	35/1000		56.7
Basra	27/1000	34/1000		60.5
National average	35/1000	41/1000	192/100,000	58.2

Source: Iraq Multiple Indicator Cluster Survey Final Report, 2006, and Iraq Living Conditions Survey – ILCS, 2004.

Table 3.4. Education indicators in the three Marshlands Governorates

Governorate	Illiterate (over 10 years old)	Illiterate (females)	Children aged 6-11 enrolled in school in rural areas	Girls aged 6-11 enrolled in school in rural areas
Thi-Qar	23%	46%-71%	73%	62%
Missan	31%		52%	39%
Basra	16%		83%	81%
National average	19%	75%	77%	70%

Source: World Bank/COSIT/KRSO Iraq Household Socio-Economic Survey 2007.



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3.3.3 Cultural value

The original inhabitants of the Marshlands, commonly known as the Ma'dan, Beni Hassan,⁴³ or "Marsh Arabs," were estimated to be around 350,000 to 500,000 individuals. While largely homogenous, the population's ethnic composition has been influenced by immigration from and intermarriages with the Persians to the east and the Arab Bedouins to the west. Unique communities such as the Sabeans, peoples of African descent, descendants of vanquished armies, and other minorities also populated the Marshlands.⁴⁴ The majority of Marshlands inhabitants are Muslim Shiites, a factor which played a key role in Saddam Hussein's destruction of the marshes in the early 1990s. Only seven "deep" villages continue to utilize the traditional way of life in the Marshlands.

The Marshlands are an area of major historical, religious and cultural significance. Many regard it as the likely site of the "Garden of Eden," the "Great Flood," and the birthplace of the patriarch of the three monotheistic religions, Abraham. It was once the home to civilizations such as the Sumerians, Akkadians, Babylonians, Assyrian and Chaldeans, and the site of the legendary Epic of Gilgamesh.⁴⁵ The remnants of these civilizations remain today, both in the physical artifacts and mounds hidden throughout the Marshlands and through the cultural heritage of the Marshlands peoples themselves. The mudhif, the primary architectural construction in the marshes, is made of reeds and was depicted in Sumerian plaques dating back 5,000 years, while the technique of weaving reeds and the construction of marsh boats likely had roots in similar Sumerian practices.⁴⁶ Despite the continuity of such traditions, this knowledge has been endangered with the mass exodus of Marsh

inhabitants from their home lands and can disappear in less than a generation.⁴⁷ Moreover, some are against the return to their traditional way of life, as they have shifted to agriculture or a more urban lifestyle.⁴⁸

The intangible heritage of the Marshlands inhabitants, such as oral traditions, performing arts, social practices, rituals and festivals, remains largely undocumented. The tangible, physical heritage of the Marshlands also remains largely unexplored. In 1970, the number of known archeological sites within the Marshlands totaled 798,⁴⁹ and world-renowned sites including Ur, Uruk, Legash and Nina dotted the fringe of the marshes. However, most of the sites within the Marshlands have never been excavated, and the recent desiccation of the marshes has actually revealed a number of previously unknown sites.

3.4 Management status

The current management of the Marshlands spans across several institutions and stakeholders at both the central and local level. At central level, a number of line ministries are involved in the management of the area, including the Ministry of Water Resources, Ministry of Environment, Ministry of Planning and Development Cooperation, Ministry of Education, Ministry of Higher Education and Scientific Research, Ministry of Health, Ministry of Labor and Social Affairs, Ministry of Agriculture, and the Ministry of Municipalities and Public Works.⁵⁰ Within the Ministry of Water Resources, the Center for Restoration of the Iraqi Marshlands (CRIM), established in 2003, is tasked with the coordination of the Marshlands' restoration and economic development.⁵¹ In addition, the Ministry

of State for the Marshlands was established in 2006 to provide oversight and coordination for the marsh restoration activities, and establish a comprehensive long-term development and management plan for the region. Acting as the primary ministry for Marshlands residents, the Ministry of State for the Marshlands has been tasked with defining the extent of the Marshlands as a basis for restoration efforts. At the legislative level, the Council of Representatives' Standing Committee on Agriculture is mandated with monitoring and implementation of the water resources policies and distribution, revitalization of the marshes, their natural and human habitat, and cultural heritage.⁵²

At the local level, the three Governorates and Provincial Councils have their own management structures, including through the Provincial Council Committees and the presence of different General Directorates of the line ministries. Since 2003, national and international organizations have initiated specific activities in the region, along with the members of the Marsh communities.

3.4.1 Governance

Prior to 2003, there was a general lack of a policy framework for the governance and management of the Marshlands, especially with respect to mitigation of the draining consequences. Since 2003, the main policy framework for the Marshlands has evolved through a number of incarnations. The central government only initiated the planning for the long-term development of the Marshlands between 2005 and 2006,⁵³ focusing on human development and governance issues. Other Marshlands-specific frameworks have been supported by outside actors, such as CRIM's Master Plan for the Southern Marshes (USAID supported 2003); Master Plan for Integrated Water Resources Management (Nature Iraq, 2006); and the National Water Resources Management Plan, Phase I (Ministry of Water Resources 2007). Recently, the 2011-2014 National Development Plan specifically references the issues of the Marshlands in terms of the preservation of cultural heritage in the context of urbanization policies. In addition, the National Development Plan considers the broader issue of water resources management as one of Iraq's development priorities.

The land use strategy for the Marshlands, developed by the Ministry for Water Resources, and based on the 1973 boundaries,⁵⁴ designates the existing agriculture and oil land. According to the strategy close to 22

per cent of the former Marshlands are now occupied by agricultural land, whose re-flooding would initially have a negative economic impact.⁵⁵ The strategy specifies the Government of Iraq's goal for revitalization of the original Marshlands surface to 75 per cent of the 1973 borders. At the local level, all three governorates have developed individual Marshlands development strategies, with focus on revitalization of the Marshlands habitat and livelihoods.⁵⁶

At present, there is no single, unified plan for the development of the Marshlands. An earlier attempt was made by the Ministry of State for the Marshlands to develop a single strategic plan for the area that would underpin the establishment of an Integrated Marshlands Development Action Plan. This never materialized due to a number of issues faced by the Ministry, including: the lack of institutional demarcation of mandates between the different line ministries with vested interests in the area; lack of a clear definition of the geographical boundaries of Marshlands, which in turn impacted land ownership and trans-boundary relations; lack of an agreement on the communities that are considered as being the "local stakeholders" of the Marshlands; influence of oil industry and the lack of clarity on land ownership issues with respect to oil fields in the Marshlands region; and finally, a number of security-related issues, including mine fields and unexploded ordinances, present in the Marshlands area.

3.4.2 Restoration and development efforts

For at least two decades before 2003, no significant developments projects were designed for the Marshlands, apart from limited agricultural activities in areas which were drained. This trend changed in 2003, with the local communities' attempts to remove some embankments to allow the water to re-flood parts of the Marshlands. In addition to the initiatives to increase the flow of water into the area, institutions like CRIM, the Ministry of State for the Marshlands and the local provincial councils initiated a number of project to respond to the humanitarian and development needs of the Marsh communities, including health, education, electricity and infrastructure. Between 2006 and 2010, 88 projects on health services alone were implemented in the Marshlands area, including construction of 58 health centers, provision of 12 mobile clinics and 10 ambulances for use by the Marsh communities.

While these projects have had some success, most of the initiatives have been invariably ad-hoc and loosely coordinated. Furthermore, the persistent weak

Future action will require the adoption of a more global vision of the environment, comprised of ecosystems, their functions and services, and the human society depending on them.

institutional capacity and poor budget execution remain two key issues that hamper a more effective response to the needs of the Marsh communities and habitat. For example, in the Missan Governorate in 2010, 178 government projects were approved for implementation in the Missan Marshlands areas, but only three were finalized, all related to problems with electricity. The other 175 projects have faced slow implementation due to poor coordination and cooperation between the Marshlands Revival Committee of the Missan Provincial Council and the Ministry of State for Marshlands. The example of Missan is very much reflective of the challenges faced by all three governorates, and the issues posed by lack of coordination and unified approach to the marshes.

The non-governmental sector, both within Iraq and the participating international organizations, as well as the United Nations, has also been active in efforts to restore the Marshlands and improve the living conditions of the population in the region. Given their research interests in the region, the universities have served as a repository of important information and data on the Marshlands. The local civil society organizations often serve as implementers of donor projects; but more importantly provide access to local knowledge and ownership with respect to the management and development of the Marshlands. The United Nations have been actively engaged in the Marshlands for many years, although the current direct interventions in the Marshlands are limited.

The need for enhanced conservation efforts to address specific damage to the environment was formally recognized in Iraq in 2003 with the establishment of the Ministry of Environment, and was further supported by the 2009 ratification of the Convention of Biological Diversity and the creation of a National Environment Strategy. Since then, the Government and other agencies have, jointly and individually, engaged in concerted action to monitor and address environmental damage and rehabilitation of the Marshlands. The UNEP Iraqi Marshlands Observation System (IMOS) played a critical role in providing remote-sensing data on marshland recovery in Iraq, while the United Nations' Local Area Development Programme acted to improve living conditions and contribute to sustainable poverty reduction in a number of areas, including the Marshlands. Other projects, such as those by the Canada-Iraq Marshlands Initiative (CIMI) and

New Eden, work to fill current data gaps in biodiversity and ecosystems information.

While conservation efforts have been ambitious, they have also suffered from numerous challenges that have prevented full implementation and realization of their goals. The development of the Hawizeh Marshlands (Ramsar Site) Management Plan and the Key Biodiversity Area Project were both important biodiversity-related activities that have not been completed due to lack of capacity, funding resources, and conflicting interests with other sectors, among others. Future action will require coordination between various ministries and other actors, and the prioritization of conservation efforts, as well as the adoption of a more global vision of the environment, comprised of ecosystems, their functions and services, and the human society depending on them.

The Iraqi Marshlands are currently in the process of being nominated as a World Heritage site. Joining more than 60 sites in the Arab region, it would be the first Mixed Heritage Site in Iraq based on both cultural and natural criteria. However, while preservation of the tangible and intangible heritage must be a priority, policy makers and conservationists should also consider the desires of the Marsh inhabitants and what they deem important. One of the most challenging aspects of the development of this area will be ensuring the delicate balance between improving the standard of life locally and respecting the traditional way of life of the inhabitants of the Marshlands.

Drivers of Change: The Forces Shaping the Future of the Iraqi Marshlands

MAIN MESSAGES

- » The Marshlands are subject to a range of pressures that are shaping the area, including upstream water management, climate change, competition over land and resources, economic development and key demographic trends. The ability to mobilize governance to manage these pressures will ultimately determine the future development of the Marshlands.
- » Changes to Marshlands are influenced by a diverse range of factors, both localized and distant. Addressing these drivers of change will require devising a policy framework that enables action at different levels and groups of actors.
- » A variety of interests are competing for the use of the Marshlands land and water, raising the potential for long-term or even irreversible changes to the landscape.
- » The view that all of the Marshlands area can be exploited for economic use is unsustainable. Sustainable development of the Marshlands requires striking a balance between development at the national and local levels, including a just compromise between competing interests.



4.1 Introduction

The complex and fragile interdependence between the Marshlands and Iraqis is impacted by a diverse set of internal and external factors. A major concern is whether the changes occurring, or those that have already occurred, and the driving forces behind them can be managed in a comprehensive, integrated manner so as to balance development needs at various scales. As the future of the Marshlands unfolds, there is a need to understand the main forces shaping it, and devise a framework of policies that improves governance of the Marshlands within the greater context of national and regional development.

4.2 The dimensions of change in the Marshlands area: macro vs. micro

Understanding the scale at which certain factors influence change will enable Iraqi decision-makers to identify policies needed to better manage them. Macro-level factors, such as upstream water usage, climate change and drought, are driven by factors external to or at scales much greater than the Marshlands. Micro-level factors, on the other hand, such as marsh population dynamics or conversion of wetlands to accommodate other uses, have a more localized scope.

This dichotomy of scale distinction can help guide thinking on Marshlands governance, particularly when considering which actors should be involved in addressing specific drivers. Macro-level factors like national-scale management of water resources are generally a concern for national and regional governance actors, such as authorities in the Central Government, Kurdish Regional Government and governments of neighboring countries. Micro-level factors—implicating local governance actors—are generally more of a concern for Marshlands communities, the three Provincial Governments (Missan, Basrah, Thi-Qar), and the local non-governmental stakeholders.

4.3 Key factors influencing change in the Marshlands area

The major factors that currently impact development of the Marshlands area include:

4.3.1 Upstream water withdrawals and diversions

Without upstream water supplies, the Marshlands would not exist. This essential life source is diminished as water is withdrawn, stored in dams or diverted upstream. Iraq's drainage policies caused the dramatic transformation of the Marshlands over the past 40 years. However, these activities are continuing today in Northern and Central Iraq, the neighboring countries and even in the immediate Marshlands area. The cumulative impact of these hydraulic works on the Marshlands has been enormous, affecting the quantity, quality and timing of the water. While dams have limited the flow of water to the Marshlands, they have also disrupted its ecological systems by nearly eliminating seasonal flood periods.

Besides requiring a huge investment of capital, water diversion and dam projects have also resulted in the resettlement or displacement of local people impacted by the change in water flow. With 15 dams planned for construction in Iraq, and several more in riparian countries, control over the hydrological system that feeds the Marshlands will only continue to increase, as will its impact on the ecological system and its inhabitants. The current plans to expand irrigation canals in the Marshlands area will certainly change water usage. Recent projects that diverted water into the Marshlands, such as the project that diverted wastewater in the Main Outfall Drain into the Al-Hammar Marsh, are examples of interventions trying to influence positive change.

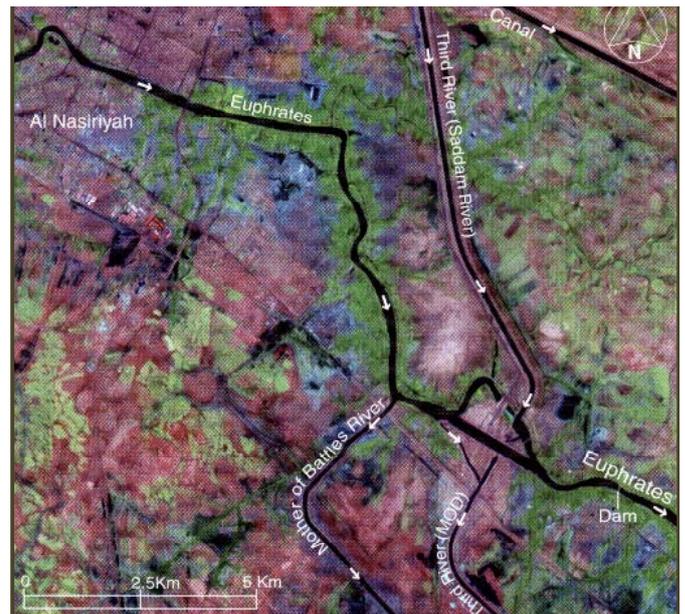


Figure 4.1. Diversion of Euphrates waters downstream of Al Nasiriyah, May 2000

Source: UNEP

An integrated approach to managing water and land resources needs to be taken - one which mitigates the impacts of land conversion and balances economic development with marsh protection.

4.3.2 Disruption of tidal flows

The Marshlands relies on the ebb of tidal flows and its ecosystems to filter out an estimated 105 million tonnes of pollutants and sediment per annum.⁵⁷ This important natural function is being disrupted by natural and human actions. A recent growth in aquatic plant populations (macrophytes) and dams and dykes built along the channels leading to the area have contributed to a cumulative reduction of the water flowing into and out of the Marshlands and into the Gulf. Suspended particles are settling in the Marshlands' sedimentation bed, though a large amount of this sediment will now be trapped behind dams, further reducing the load.⁵⁸

There is also a concern that disrupting tidal flow is contributing to changes in the natural properties of Marsh water and soils. Higher salinity levels, as well as a decrease in plankton and organic carbon levels, appear to be reducing soil fertility and threatening freshwater for drinking, agriculture and human consumption.⁵⁹

4.3.3 Climate change

Changes occurring to the regional climate are a compounding factor for development in the Marshlands area. Notwithstanding the Marshlands' role in regulating temperatures, humidity and sandstorms, the variability and intensity of precipitation occurring not only in other parts of Iraq, but also in Turkey and Iran, are impacting Marshlands' water security and constraining socio-economic development. The recent drought has placed a burden on the vulnerable Marsh communities, the limited rehabilitation efforts and the constrained agricultural and oil production in the area. Management of climate change should, therefore, aim to encourage adaptation capacities of these stakeholders and promote the strengthening of the Marshlands' climate regulatory processes.

4.3.4 Pollution

Industrial waste, sanitation practices, agricultural runoff and remnants of past military operations all contribute to higher pollution levels in the Marshlands. Some 31 large industries distribute wastewater directly into the Tigris and Euphrates which ultimately passes through the Marshlands. A majority (57 per cent) of all big industries do not have wastewater treatment facilities. Additionally, a lack of waste management infrastructure

serving the Marshlands communities means that the polluted water is discharged into the marshes. Amara, Nassirya and Najaf all discharge untreated waste directly into tributaries flowing into the marshes.⁶⁰ As a result, E. coli levels have increased to levels unsuitable for human consumption. Development of the Marshlands area is also constrained by a legacy of military debris, toxic and radioactive material, contaminated soils and demolition waste, and human and animal remains.⁶¹ The United Nations estimates that it would take 18 years to rid Iraq of unexploded mines, many of which are likely buried in the Hawizeh marshes.⁶²

4.3.5 Competition over land and water

The landscape of the Marshlands, rich in natural resources, is an attractive prospect for development. A variety of actors and interests - including Marsh Arab communities, oil companies and farmers - are competing for the use of the Marshlands land and water, raising the potential for long-term or even irreversible changes to the landscape:

Urbanization – Towns and communities on the fringe of the Marshlands, such as Chibayish, Suq Ash Shuyukh and Al-Mudaina, are expanding to cope with population movements to the area, encroaching upon sensitive ecological areas. Though the full scope of urbanization is not known, the additional pressures put on the Marshlands environment, such as an increase in demand for local water and loss of natural habitat for infrastructure and housing, can be anticipated.



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Agricultural development – Farming and other agricultural activities are one of the biggest competitors for the Marshlands' natural resources both in terms of its use of land and water. In the 1990s, the Iraqi

government converted 400 km² of drained wetlands to agricultural cropland.⁶³ While some of this land has since been recovered, approximately 22 per cent of the former Marshlands remain agricultural lands.⁶⁴ Additionally, some 1.2 million ha of land in Iraq are irrigated with waters from the Tigris-Euphrates Basin.⁶⁵ In 2006, water drawn from the Marshlands served 232,000 ha for the production of cereal grain, rice, dates and vegetable gardens.⁶⁶ The same year, planned agricultural development was estimated to require nearly 23 MCM for Thi-Qar, Missan and Basrah alone, and the agricultural area was expected to double.⁶⁷ Agriculture is also contributing to pollution and contamination.⁶⁸ The Marshlands and agriculture have been portrayed as mutually exclusive; however, it is imperative to note that sustainable farming relies on healthier marshes.



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Petroleum industry development – One-third of Iraq’s oil reserves lie under or within close proximity of the Marshlands area, some of which have begun to be developed since the 1960s. The government’s push to rapidly expand national oil production in the area is a veritable competing factor for the Marshlands landscape and natural resources. The coming years hold great potential for changes to the area, with many of the oil fields at the beginning stages of production and the infrastructure for piping, processing and exportation underdeveloped. Production is expected to increase, from 45,000 to 1.8 million barrels per day at Majnoon,⁶⁹ and from 3,100 to 535,000 barrels per day at Halfaya.⁷⁰ Production is very water-intensive, and recent shortages in water have already resulted in declining output. Oil companies are now building water injection infrastructure to use sea water to increase pressure;⁷¹ however, the impact on ground water and soils of these new techniques have not been fully assessed.

The potential impact that land competition related to oil production activities can have on local communities and the natural environment is a concern. Many of the international oil companies have taken measures to

reduce potential negative impacts, offering jobs to local communities undertaking environmental assessments and partnering with others to implement corporate social responsibility projects.



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Cultural and ecotourism – The outstanding universal value embodied by the Marshlands’ aesthetic properties and cultural capital provides an incentive for developing the land to support tourism in the area. The benefits that ecotourism is expected to bring to the local Marshlands’ economy must be balanced with conservation and protection. Principles for sustainable tourism and associated infrastructure should be developed to ensure a light footprint of such activities. The newly planned National Park in the Marshlands, as well as other planned protected areas, such as the UNESCO World Heritage Site, should incorporate these principles of sustainable land use.



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Competition for land and water appears heightened and the true long-term impact on ecosystems and communities is largely unknown at this point in time. Any future rehabilitation must acknowledge these competing sectors and strike a balance between development and restoration. A major concern emanating from competition is water scarcity. Future development plans must include better water management practices and increased efficiency. Iraqi officials have said that poor management of water contributes to Iraq’s water deficit, and with more

efficient usage there would be a water surplus for all users.⁷²

An integrated approach to managing water and land resources in the Marshlands needs to be taken – one which mitigates the impacts of land conversion and balances economic development with marsh protection. Institutional tools such as the Ministry of Water Resources’ Strategy for Water and Land Resources of Iraq (SWLRI), Center for Restoration of the Iraqi Marshlands , and the ongoing audit of the Ministry of State for the Marshlands to determine the Marshlands geography should strive to incorporate a set of common principles for land and water use in order to minimize the impact of competing uses on the Marshlands area.

4.3.6 Socio-economic conditions

Population and access to services – With the desiccation of the Marshlands in the past twenty years, those who remain and those who might return are encountering new challenges. The risk of illness and disease has increased, and for many their former livelihoods are no longer available. In addition, the extent of the impact of these populations on the Marshlands and their own health and security, is yet to be assessed. The poor living conditions in the Marshlands combined with the lack of opportunities for advancement and jobs threaten to perpetuate poverty and ill-health.

Stewardship – Some local patterns of the use of Marshlands environment continues to be a concern for the future sustainability of the Marshlands. Some local populations discharge untreated wastewater directly into the Marshlands.⁷³ Fishing practices, such as using an electric rod to charge the water, poison and explosives, also harm the ecosystem.⁷⁴ Further

education and regulatory supports are needed to foster more sustainable, best management practices.

4.3.7 Insecurity

The lack of security posed by sectarian violence, crime, smuggling of illicit drugs and products, and unexploded mines is a formidable obstacle to future development in the Marshlands area. While the future of the Marshlands is very much dependent on factors of governance, capacity and coordination, security trends will continue to define the rate at which all stakeholders will be able to work toward improved quality of life in the region. Previous restoration projects have been delayed, amended or derailed due to security implications across Iraq.⁷⁵ Operational and logistical solutions to serving communities and ensuring a safe environment are paramount to addressing the overarching development concerns in the area.

4.3.8 Governance

Underpinning all development concerns are the governance capacities, which are currently insufficient to manage the changes occurring in a comprehensive, integrated way. As discussed above, coordination among Marshlands stakeholders and decision-makers is fragmented. Stakeholders are not sufficiently empowered to take up their role and duty to engender positive change. The future of the Marshlands depends on the ability to strengthen overall governance capacities, including those of institutions and stakeholders.



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Exploring the Future Scenarios of the Marshlands

Main Messages

- » There is a consensus among existing models that the Marshlands will gradually disappear in all but a brackish area south of Basrah if current trends in water management continue.
- » The current goal of the Ministry of Water Resources to restore the Marshlands to 75 per cent falls within the range of feasible scenarios.
- » Further refinement of future scenarios is needed to improve analysis of strategic options for Marshlands management. Incorporating more up-to-date data, reducing uncertainty and linking actual government plans are paramount. The results of scenarios should be analyzed further to understand the trade-off of policy choices and potential winners and losers at different scales.



5.1 Introduction

Scientific models are a valuable tool for decision-making by providing plausible simulations of what may happen when certain variables and assumptions are considered. A few attempts have been made in recent years to develop models for forecasting the future scenarios of the Marshlands. This chapter attempts to summarize the storylines of these scenarios and provide some guidance for their utilization.

5.2 The future of the Marshlands as seen through the lens of 3 recent models

Scenarios for the recovery and future of the Marshlands in ecological and human terms have been developed in three major projects over the past five years:

- » New Eden Master Plan for Integrated Resources Management in the Iraqi Marshlands, (2006)
- » US-UNESCO-led Water Systems Planning Model (WSPM) of the Strategy for Water and Land Resources in Iraq (SWLRI), (2008)
- » Canada-Iraq Marshlands Initiative (CIMI), (2010)

These projects adopted different methodologies for scenario development and analysis, and collectively concluded that a continuation of the current trends in water management and development will result in the gradual disappearance of the Marshlands in all but a brackish area south of Basrah. The scenarios illustrate different policy and development choices facing the Government of Iraq and highlight the implications for the Marshlands. The approaches and results from these three projects are briefly summarized below.

5.2.1 The New Eden Master Plan

The New Eden Master Plan (2006) provides an analytical tool to comprehensively assess the socio-economic and ecological consequences of varying degrees of Marshlands conservation. Running simulations of four scenarios, the New Eden Master Plan recommends that the conservation objective should be between 50 and 75 per cent of the 1973 extent of the Marshlands. Furthermore, it suggests utilizing international conventions, such as Ramsar and Agenda 21, as a means for generating more support for Marshlands restoration and sustainable development planning as a framework for marshland recovery.

Scenario 1: Recovery: 0% - 25%

Area restored: Equal to 2000-2002 conditions.

Total recovered area: 0 - 2,400 km²

Steps required: Significant investments required in order to rehabilitate some of the existing drainage structures.

Limitations: This rate of recovery will likely only be visible during very dry years and this scenario assumes that there is no effort from the Government of Iraq to restore the Marshes.

Scenario 2: Recovery: 25% - 50%

Area restored: Equal to 2005 conditions.

Total recovered area: 2,400 - 4,800 km²

Steps required: (a) Modernize agriculture at local and national scale; (b) Assure adequate volume and timing of water releases for agricultural irrigation and Marshlands agriculture; (c) Control releases of seasonal water flow variations.

Methodology: Best practices in local agriculture, correct water management, limited infrastructure construction, and development of scheduled flow release plans.

Limitations: Some areas will remain as seasonal marshlands; hydraulic connectivity between marshes would not be fully achieved. Additional areas should be inundated to allow for full achievement of the benefits of marshland restoration.

Scenario 3: Recovery: 50%-75%

Area restored: Equal to 1990 conditions.

Total recovered area: 4,800 - 7,200 km²

Steps required: (a) Modernize agriculture at local and national scale; (b) Timing of water releases to marshes to minimize water losses due to evaporation and optimize water use for agriculture; (c) Agreements must be made with neighbouring countries for the necessary water allocations.

Methodology: Implement best practices in local and national agriculture, correct water management, construction of significant infrastructure for water control, development of scheduled flow release plans to allow for optimum marshland recovery.

Scenario 4: Recovery: 75%-100%

Area recovered: Equal to 1970s conditions.

Total recovered area: 7,200 - 10,000 km²

Steps required: (a) Modernize agriculture both at local and national scale; (b) Reconvert some areas currently used for agriculture and petroleum back to marshes; (c) Secure agreements with neighbouring countries for increasing water requirements.

Methodology: Implement best practices in local and national agriculture, correct water management, construction of large infrastructure for water control, development of scheduled flow release plans to allow for best marshland recovery, reclamation of large portion of land.

Limitations: Achievable only during extreme flood conditions, and is the least likely; would receive serious resistance from local farmers.

5.2.2 Water Systems Planning Model (WSPM) for the Strategy for Water and Land Resources in Iraq (SWLRI)

The first phase of the ongoing SWLRI project developed a basin wide water quantity and quality planning model for the Tigris and Euphrates Basin. The model is composed of sub-models that address trans-boundary conditions, surface water, agriculture, municipal and industrial utilization, and marsh restoration. It is a complex model, with over 680 user defined variables including provision of water to the Marshlands ranging from 0 to 100 per cent of the viable Marshlands restoration (estimated by CRIM and New Eden to be approximately 75 per cent of the Marshlands extent in 1973). The model projects water quantity and quality conditions into the future for 40 years. By adjusting variables such as flow, salinity, dam construction, trans-boundary water, climate change, pollution, agriculture and marsh targets, users of the model can explore the implications of alternative policy options and attempt to optimize the achievement of multiple water management objectives including the restoration of the Marshlands.

For example, a Marshlands conservation scenario based on full upstream development of dams and agriculture with 10 per cent loss to climate change achieves 60 to 75 per cent marsh conservation provided that 80 per cent of conveyance canals are lined (achieving 90 per cent loss reduction) and reservoirs are operated to meet

Marshlands demands on a monthly basis after meeting municipal, industrial, and agricultural demands.

The project also investigated the projected salinity of water in both the Tigris and the Euphrates where they enter Iraq with “no new development” upstream and with “full development” upstream scenarios. Under the full development scenario the salinity of the water in the Euphrates exceeds drinking water standards by 2015 and reaches a concentration of 1800 ppm by 2040.

5.2.3 Canada-Iraq Marshlands Initiative (CIMI)

CIMI developed three scenarios: 1) one based on the work of CRIM, 2) one based on the condition of the marshes in 2008 (38 per cent of Marshlands extent in 1973) and 3) one based on the current trends towards declining Marshlands’ conditions as of 2009 (likely resulting in 3 per cent of 1973 extent). CIMI identified the key factors affecting marsh size and quality and proposed Management Objectives and Actions to address each of the factors and provided examples where similar actions have been implemented elsewhere in the world. CIMI proposed a classification system for marshes in order to prioritize management interventions and protect areas, as well as treat wastewater and pollution as a key factor in Marshlands’ conditions.

Scenario 1 – 70% of the 1973 level

CRIM used the 1973 boundaries of the Marshes as a starting point to develop a land use scenario for the future. CRIM then subtracted existing land uses – such as agriculture, oil lands and settlements – from the original boundaries and then designated the remaining area as “Marshlands.” Depending on the amount of land designated as agriculture (the CRIM strategy is still being formulated), the extent of the Marshlands could be up to 70 per cent of the 1973 level, regardless of whether there is enough water to actually restore this area to wetlands.

Scenario 2 – 38% of the 1973 level

In 2009, the extent of the Marshlands decreased due to drought conditions throughout Iraq, so maintaining even the 2008 level will require a concerted effort to increase water flow to the marshes. Marsh extent would be 38 per cent of 1973 level during times of high water. Key factors to address include agreements with upstream countries, regulations on discharge to the major rivers and redirecting treated water from

the Main Outflow Drain into the Marshes (which has already begun). The overall extent of the Marshlands will continue to fluctuate based on yearly rainfall and the health of the region will remain variable.

Scenario 3 – 0-10% of the 1973 level

Existing levels of effort would be maintained, but the size and health of the Marshlands would continue to deteriorate. The lack of upstream flow and periodic flood pulses would result in the eventual drying of the Marshlands. Although there might be some freshwater marshes present following winter rains, the only permanent marshes would be brackish-water marshes in the Basrah Governorate.

5.3 Conclusions

Considering water security to be at the core of Marshlands management, all three models place a focus on water as the dominant variable. The results show that the future of the Marshlands is largely dependent on water management decisions of the government, with a strong influence from upstream development. If the current management direction and

agricultural infrastructure is maintained the marshes will essentially disappear. Improvements in water use efficiency in the agricultural sector and prioritizing water for the Marshlands can potentially achieve 60 to 75 per cent of the CRIM plan even under the full upstream development scenario. The models indirectly confirm that the government's official goal of restoring the Marshlands to 75 per cent is within the realm of feasibility. The models do not address socio-economic issues in the Marshlands, particularly community well-being and the status of the Marsh Arabs displaced by the previous regime. Options for improving community well-being and returning displaced persons need to be examined in terms of the relationship to marsh quality and extent and socio-economic conditions recognizing that the CRIM plan excludes settlement, agriculture and petroleum development sites.

Further refinement of future scenarios is needed to improve analysis of strategic options for Marshlands management. Incorporating more up-to-date data, reducing uncertainty and linking actual government plans are paramount to improving modeling tools. The results of scenarios should be analyzed further to understand the trade-off of policy choices and potential winners and losers at different scales.

Recommendations and Strategic Options



In the context of the changes influencing the future Marshlands area and the specific development challenges facing its environment and inhabitants, this chapter considers and recommends a range of strategic-level options to secure a more sustainable future for the Marshlands. The suggested responses involve a wide range of actors, including government and other stakeholders, and focus on local, national, regional and international levels and at various time scales.

I. Overall management and governance

- 1. Establish a National Vision for the management and governance of the Marshlands,** containing the fundamental principles upon which the future of the Marshlands will be based, and to which all the key stakeholders can commit and adopt. A National Vision for the Marshlands, with set achievable, measurable goals and targets for economic, social and environmental development of the Marshlands is crucial in supporting the Government's planning processes for the region's future. A common national vision can also serve as basis for multi-stakeholder partnerships, addressing some of the key coordination challenges in the area.
- 2. Elaborate an official definition of the "Marshlands,"** including the physical, administrative and cultural attributes of the area. An official definition of the Marshlands, together with an agreement of which groups or claimants are attributed to the area, can serve as basis to assess the economic and non-economic values of the Marshlands, and determine the priorities for large-scale interventions (eg. rehabilitation, investments). A clear definition of the area is also a starting point for developing of a roadmap for the future of the Marshlands, and an assessment of the precise capacities and resources needed for its implementation.
- 3. Strengthen governance capacities,** including clarification of the mandate, vision and

responsibilities of the Ministry of State for the Marshlands vis-à-vis other government agencies. Strong governing and management institutions for the Marshlands will contribute to adequate planning, monitoring and evaluation of the region's development; as well as for reinforcement of appropriate regulations. Strengthened institutional capacities will nurture the conditions for stakeholder ownership and participation in Marshlands management, including budget management and project execution, knowledge and information sharing, awareness raising, partnerships and stakeholder engagement.

- 4. Mobilize revenues for the sustained development of the Marshlands**, including elimination or reduction in subsidies that promote actions that are destructive or counterproductive to Marshlands development and reconstruction efforts. The Government of Iraq, Provincial Councils, international oil companies, non-governmental organizations, United Nations, and other bilateral and multilateral donors offer opportunities for technical and financial partnerships that can support implementation of a comprehensive strategy and vision for the Marshlands.

II. Water resources management policies

- 5. Adopt an integrated approach to managing water resources**, including integrating the full extent of water needs of the Marshlands into trans-boundary water management strategies, and adopting tributary-scale management methods for effective water management. Water security represents a unifying element in achieving a sustainable future for the Marshlands and the nation as a whole. Utterly dependent upon sufficient quantity and quality of water for its survival, the Marshlands must be managed as an integral part of overall watershed management. This will include the need to balance adequate flow, timing and quality standards for water with other developmental benefits that can be shared with riparian countries; as well as engaging in knowledge and experience exchange with the relevant neighboring countries on water resources management and Marshlands management.
- 6. Manage the demand for water**, including establishment of cross-sectoral water needs, minimum requirements for supply, quality and timing. The ongoing Strategy for Water and Land

Resources in Iraq should be adapted to account and plan for adequate amounts of water for the future of the Marshlands. This will include analysis of water requirements for wetland ecosystems and services, water for Marsh communities, water for food, and water for the oil industry and other uses. Managing the demand for water and determining the sectoral demands will provide additional support to the development of the national water budget and the Marshlands water budget. Managing the demand for water will also contribute to the national-level efforts to improve water efficiency, including through provision of economic incentives.

III. Marshlands environment management policies

- 7. Adopt ecosystem services approach to Marshlands management.** The ecosystem services approach can serve as the basis for an overall strategy to reconcile national development with Marshlands health. Such an approach can be utilized as a mechanism to assess the values of Marshlands ecosystem services, including the full extent of services lost as a result of Marshlands degradation and trade-offs associated with different policy options.
- 8. Strengthen the knowledge base and its utilization in policy and decision-making.** Additional knowledge and scientific information, including a full comprehensive inventory of biodiversity and endemic species and research on environmental quality standards can be crucial in supporting evidence-based policy making for the Marshlands.
- 9. Combine protective management policies with restoration of degraded areas**, including enhanced pollution control and sustainable intensification of agriculture and oil production. Such an approach will promote mitigation measures against environmental degradation in the area, including monitoring the impact of re-flooding programmes. Furthermore, as the expansion of agriculture and oil sectors continues to be a major driver of change to the Marshlands area, the use of technologies and methodologies that could increase production efficiency more sustainably, without harmful trade-offs related to excessive consumption of water or use of pollutant pesticides, would significantly lessen

pressure on the area. Protective management policies would also lead to the incorporation of the Marshlands into the national strategies on climate change, desertification, disaster risk reduction as well as other relevant environmental protection frameworks and instruments. The adherence and use of international environmental agreements to which Iraq has committed is essential, as these agreements are a useful framework for environmental policies and collaboration with neighboring countries.

IV. Socio-economic development

10. Develop and define human development goals for the Marshlands populations, including a comprehensive economic development plan for the Marshlands, with specific focus on

those communities outside of the Marshlands urban areas. Such an approach would allow for development of policies that expand social service delivery mechanisms into the fringe Marshlands communities, establish focused employment and health programmes for vulnerable groups in the Marsh communities, and preserve the Marshlands' cultural heritage (tangible and intangible). The human development situation and opportunities of the small Marshlands communities on the outskirts of the region would require special attention with considerations of their potential to intake returnees and provide access to essential social services, including employment. The range of non-governmental stakeholders present in the region, namely the civil society and the private sector, has a significant potential to contribute to the improvement of the socio-economic conditions in the Marshlands.



Endnotes

Chapter 1: Introduction

- ¹ Azzam et al. 2004. Iraq's Marshlands - Demise and the Impending Rebirth of an Ecosystem. Iraq, Nature Iraq.
- ² Richardson, C.J. and Hussain, N.A. 2006. "Restoring the Garden of Eden: An Ecological Assessment of the Marshes of Iraq." *Bioscience*, 25(6).
- ³ Ibid.
- ⁴ Ibid.
- ⁵ Ibid.
- ⁶ The United Nations Integrated Water Task Force aims to ensure an integrated approach for the United Nations in Iraq on all aspects of water resource management as articulated through the United Nations Development Assistance Framework (UNDAF) for Iraq, 2011 – 2014.
- ⁷ The Iraq Partners; Forum provides an active information sharing and consultative environment for discussion on strategic issues related to international development cooperation in Iraq, in line with the Paris Principles and promoting the quality of partner engagement with government and civil society.
- ⁸ Millennium Ecosystems Assessment. 2005. *Ecosystems and Human Well-being: Wetlands and Water: Synthesis*. Washington, DC, World Resources Institute.
- ⁹ Ibid.

Chapter 3: Current Status of the Iraqi Marshlands

- ¹⁰ Richardson, C. J. and N.A. Hussain (2006). "Restoring the Garden of Eden: An Ecological Assessment of the Marshes of Iraq." *Bioscience*, 25(6).
- ¹¹ Ministry of Environment. 2010. *Iraqi Fourth National Report to the Convention on Biological Diversity: Draft*. Iraq: Republic of Iraq.
- ¹² Canada-Iraq Marshlands Initiative. 2010. *Managing for Change – The Present and Future State of the Marshes of Southern Iraq*. Canada: Canadian International Development Agency.
- ¹³ Data available through the Center for Restoration of the Iraqi Marshlands (CRIM), 18 January 2011.
- ¹⁴ Canada-Iraq Marshlands Initiative. 2010. *Managing for Change – The Present and Future State of the Marshes of Southern Iraq*. Canada: Canadian International Development Agency.
- ¹⁵ Italian Ministry for the Environment and Territory and Free Iraq Foundation Nature Iraq. 2006. *New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area: Volume II– Book 6, Planning Scenarios*. Italy: New Eden.
- ¹⁶ Survey of the Department of Environment in ThiQar, Missan and Basrah, 2010.
- ¹⁷ The Iraq Foundation. 2003. *Draft Report: Physical Characteristics of Mesopotamian Marshlands of Southern Iraq*. Iraq: Iraq Foundation.
- ¹⁸ Garstecki, T. and Amr, Z. 2010. *Biodiversity and Ecosystem Management in the Iraqi Marshlands – Screening Study on Potential World Heritage Nomination*. Iraq: IUCN.
- ¹⁹ Coad, B.W. 1996. "Zoogeography of the fishes of the Tigris-Euphrates basin." *Zoology in the Middle East*, 13(0): 51-70.
- ²⁰ Salim, S.M et al. 2009. "A summary of birds recorded in the marshes of southern Iraq, 2005-2008." *BioRisk*, 3: 205-219.
- ²¹ Townsend, C.C., Guest, E. et al. 1968. *Flora of Iraq*. V. 9. Gramineae. Baghdad, Ministry of Agriculture, and Levinton, A.E. et al. 1992. *Handbook of Middle East Amphibians and Reptiles*. Oxford, Ohio, USA, Society for the Study of Amphibians and Reptiles.
- ²² Haba, M.K. et al. 2009. "Mesopotamian marshland mammals." *Marsh Bulletin*, 4(2): 179-189.
- ²³ Ali, A.H. et al. 2007. "Abundance, occurrence, seasonal change and species composition of macroinvertebrates in the restored Iraqi marshes." *Marsh Bulletin*, 2(1): 80-95.
- ²⁴ Ibid.
- ²⁵ Ghadiri, H. and Ghadiri, M. 2005. "Marshlands of Mesopotamia and the Rivers that Feed Them."
- ²⁶ Population data, Central Organization for Statistics and Information Technology (COSIT). 2007.

- ²⁷ Ibid.
- ²⁸ Canada-Iraq Marshlands Initiative. 2010. Managing For Change: the Present and Future State of the Marshes of Southern Iraq. CIMI estimates that the population was once around 500,000 people (no date given, but it is implied that this is the peak population), which was reduced to 80,000 by 2002. It should be noted that the CIMI estimate is reduced due to the shrinking size of the Marshlands area according to the CIMI definition of the Marshlands, which is an ecological definition that does not take into account administrative boundaries
- ²⁹ UNEP. 2007. Survey on Demographic, Social and Economic Conditions of Marshlands in the South of Iraq: Summary Report.
- ³⁰ Ibid.
- ³¹ IOM. 2010. Iraq displacement monitoring and needs assessments.
- ³² WFP/COSIT/KRSO. 2007. Comprehensive Food Security and Vulnerability Analysis.
- ³³ Ibid.
- ³⁴ UNEP and Thi-Qar University. 2007. Survey on Demographic, Social and Economic Conditions of Marshlands in the South of Iraq.
- ³⁵ WFP/COSIT/KRSO. 2007. Comprehensive Food Security and Vulnerability Analysis. IOM Monitoring and Needs Assessments. 2011.
- ³⁶ UNEP/Thi-Qar University Survey on Demographic, Social and Economic Conditions of Marshlands in the South of Iraq. 2007.
- ³⁷ UNEP. 2007. Survey on Solid Waste Management in the Southern Governorates.
- ³⁸ Ibid.
- ³⁹ Canada-Iraq Marshlands Initiative. 2010. Managing for Change – The Present and Future State of the Marshes of Southern Iraq. Canada: Canadian International Development Agency.
- ⁴⁰ UNEP. 2009. Support for Environmental Management of the Iraqi Marshlands: 2004 to 2009. <http://marshlands.unep.or.jp/> (Accessed 20 Jan 2011).
- ⁴¹ Ibid.
- ⁴² UNEP and Thi-Qar University. 2007. Survey on Demographic, Social and Economic Conditions of Marshlands in the South of Iraq.
- ⁴³ Touili, R. and A. Al-Hamdani. "Survey of Bibliography: Cultural Heritage of Iraqi Marshlands." 2009.
- ⁴⁴ Partow, H. 2001. The Mesopotamian Marshlands: Demise of an Ecosystem: Early Warning and Assessment Technical Report. Kenya: UNEP.
- ⁴⁵ Ibid.
- ⁴⁶ Touili, R. and A. Al-Hamdani, A. "Survey of Bibliography: Cultural Heritage of Iraqi Marshlands." 2009.
- ⁴⁷ Ghadiri, H. and Ghadiri, M. "Marshlands of Mesopotamia and the Rivers that Feed Them." 2005.
- ⁴⁸ Ibid.
- ⁴⁹ Ministry of Culture and Information of the Republic of Iraq, Directorate of Antiquities (1970). Atlas of Archaeological sites in Iraq.
- ⁵⁰ Report: Workshop on Institutional Support to the Ministry of State for Marshlands Affairs. United Nations Development Programme and Government of Iraq. December 2008.
- ⁵¹ Ibid.
- ⁵² Government of Iraq, Council of Representatives, Rule of Procedure, 2006. <http://www.parliament.iq/manshurat/nizamen.pdf>.
- ⁵³ Report: Workshop on Institutional Support to the Ministry of State for Marshlands Affairs. United Nations Development Programme and Government of Iraq. December 2008.
- ⁵⁴ Canada-Iraq Marshlands Initiative. 2010. Managing for Change – The Present and Future State of the Marshes of Southern Iraq. Canada: Canadian International Development Agency.
- ⁵⁵ Ibid.
- ⁵⁶ Missan Provincial Council, Missan Provincial Development Strategy; Thi-Qar Provincial Council, Development Strategy of the Dhi-Qar Province: Strategic Plan 2007-2009; Basrah Provincial Council, Provincial Development Strategy: Basrah Province 2007-2009.

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- ⁵⁷ Partow, H. 2001. The Mesopotamian Marshlands: Demise of an Ecosystem: Early Warning and Assessment Technical Report. Kenya: UNEP.

- ⁵⁸ Hussain , N.A. and S.A. Grabe (2009). "A Review of the Water Quality of the Mesopotamian (Southern Iraq) Marshes Prior to the Massive Desiccation of the Early 1990s." *Marsh Bulletin*, 4(2) 98
- ⁵⁹ Partow, H. 2001. *The Mesopotamian Marshlands: Demise of an Ecosystem: Early Warning and Assessment Technical Report*. Kenya: UNEP.
- ⁶⁰ Canada-Iraq Marshlands Initiative. 2010. *Managing for Change – The Present and Future State of the Marshes of Southern Iraq*. Canada: Canadian International Development Agency.
- ⁶¹ Italian Ministry for the Environment and Territory and Free Iraq Foundation Nature Iraq. 2006. *New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area: Final Report*. Italy: New Eden.
- ⁶² Ibid.
- ⁶³ Ibid.
- ⁶⁴ Canada-Iraq Marshlands Initiative. 2010. *Managing for Change – The Present and Future State of the Marshes of Southern Iraq*. Canada: Canadian International Development Agency.
- ⁶⁵ Armelle Braun, "The Mega-Project of Mesopotamia," *Ceres: FAO Review*, March 1994, 26.
- ⁶⁶ Italian Ministry for the Environment and Territory and Free Iraq Foundation Nature Iraq. 2006. *New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area: Executive Summary*. Italy: New Eden.
- ⁶⁷ Italian Ministry for the Environment and Territory and Free Iraq Foundation Nature Iraq. 2006..*New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area: Final Report*. Italy: New Eden.
- ⁶⁸ Italian Ministry for the Environment and Territory and Free Iraq Foundation Nature Iraq (2006). *New Eden Master Plan for Integrated Water Resources Management in the Marshlands Area: Main Report*. Italy: New Eden.
- ⁶⁹ Royal Dutch Shell press release (17 Jan 2010), http://www.shell.com/home/content/investor/news_and_library/2010_media_releases/majnoon_contract_17012010.html (Accessed 26 January 2011)
- ⁷⁰ Total press release (28 January 2010), <http://www.total.com/en/about-total/news/news-940500.html&idActu=2280> (extracted 26 January 2011).
- ⁷¹ Salahedden, S. (2011). "Iraq's oil expansion plans face major challenges," *Associated Press*, January 14, 2011.
- ⁷² Shatab, A. (2011). "Iraq to ask Iran to pay for tackling salty water inflows," *Al-Zaman*. January 15, 2011.
- ⁷³ UNEP (2009). *Support for Environmental Management of the Iraqi Marshlands: 2004 to 2009*.
- ⁷⁴ Canada-Iraq Marshlands Initiative (2010).*Managing for Change – The Present and Future State of the Marshes of Southern Iraq*. Canada: Canadian International Development Agency.
- ⁷⁵ UNEP (2009). *Support for Environmental Management of the Iraqi Marshlands: 2004 to 2009*.

