

برنامه مدیریت جامع تالاب شادگان

Shadegan Wetland integrated management plan

«طرح حفاظت از تالاب های ایران»



فروردین ۱۳۹۰



سازمان حفاظت محیط زیست



UNDP/GEF Conservation of Iranian wetlands



Department of Environment

“Saving Wetlands, for People, for Nature”

Shadegan Wetland Management Plan

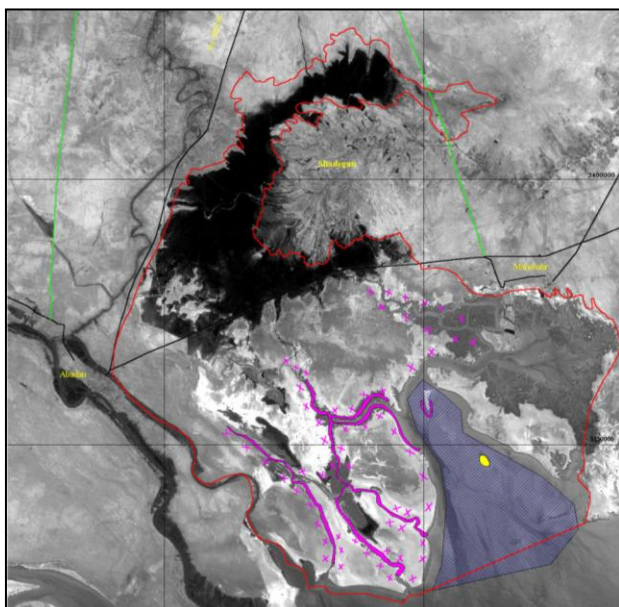
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Department of Environment



GEF



**Conservation of Iranian Wetlands in collaboration Governmental organizations,
NGOs and Local Communities of Shadegan Wetland
March 2011**

Preface

I hereby thank God for providing me with the opportunity of serving Khuzestan province since March 2005, which is of great importance in its natural environment due to existence of important rivers such as Karoun, Karkhe, Dez, Jarrahi, Zohre and etc... as well as Zagros range of mountains, productive plains and sensitive wetlands. Since the beginning I realized the province which contains more than half of the Iranian wetlands, has not received any part in Conservation of Iranian Wetlands Project. In 2007, after continuous follow ups and with the supports from CIWP, Shadegan wetland was selected as CIWP first replication site and afterwards -since the late 2008- it has been considered as the third pilot site of CIWP. CIWP with collaboration of DOE, UNDP and GEF has been under implementation since 2005, with the goal of elimination or sustainable mitigation of wetlands deteriorating factors/procedures and providing sustainable management for these valuable ecosystems and finally will be terminated in 2012. The important approach of CIWP is as follows:

“If local societies become aware of wetlands values and functions and get involved in the key managerial decision makings for the wetlands, they will support sustainable management of the wetlands.”

Hence, the whole components in CIWP are targeted for establishing a system for coordination, cooperation and knowledge enhancement among different stakeholders of wetlands management. Having the same approach, Khuzestan Environment Office intention is to develop and implement the Shadegan wetland integrated management plan through utilization of the experiences obtained from Parishan and Urmia wetland sites and collaboration of all stakeholders such as governmental and none governmental organizations and local societies. So far several studies have been carried out on Shadegan wetland and obviously Khuzestan Environment Conservation office with cooperation of CIWP and all stakeholders will develop Shadegan management plan by using existing reports and experiences. The following report is final version of Shadegan wetland management plan. The first draft was prepared by holding a two days workshop entitled “the initiative workshop of CIWP in Shadegan wetland” in November 2008 with the presence of different stakeholders, in which previous surveys on Shadegan wetland - in particular “ecosystem management of Shadegan wetland survey, 2002” - was utilized as baseline information and then the plan was distributed among all stakeholders for including their comments. After receiving comments from related groups, another advisory workshop was held in June 2009 and the result was again presented in September 2009 to representatives of all related groups for their comments. Ultimately it was the workshop of March 2010 in which the final version of the management plan was approved by the participants. Afterwards, the content of the management plan was ratified in planning council meeting of Khuzestan province in Dec. 2010. Consequently, the management plan was officially notified by the Khuzestan Governorship to all executive organizations at provincial level. Simultaneously preparations for managerial structures at provincial and local level were carried out.

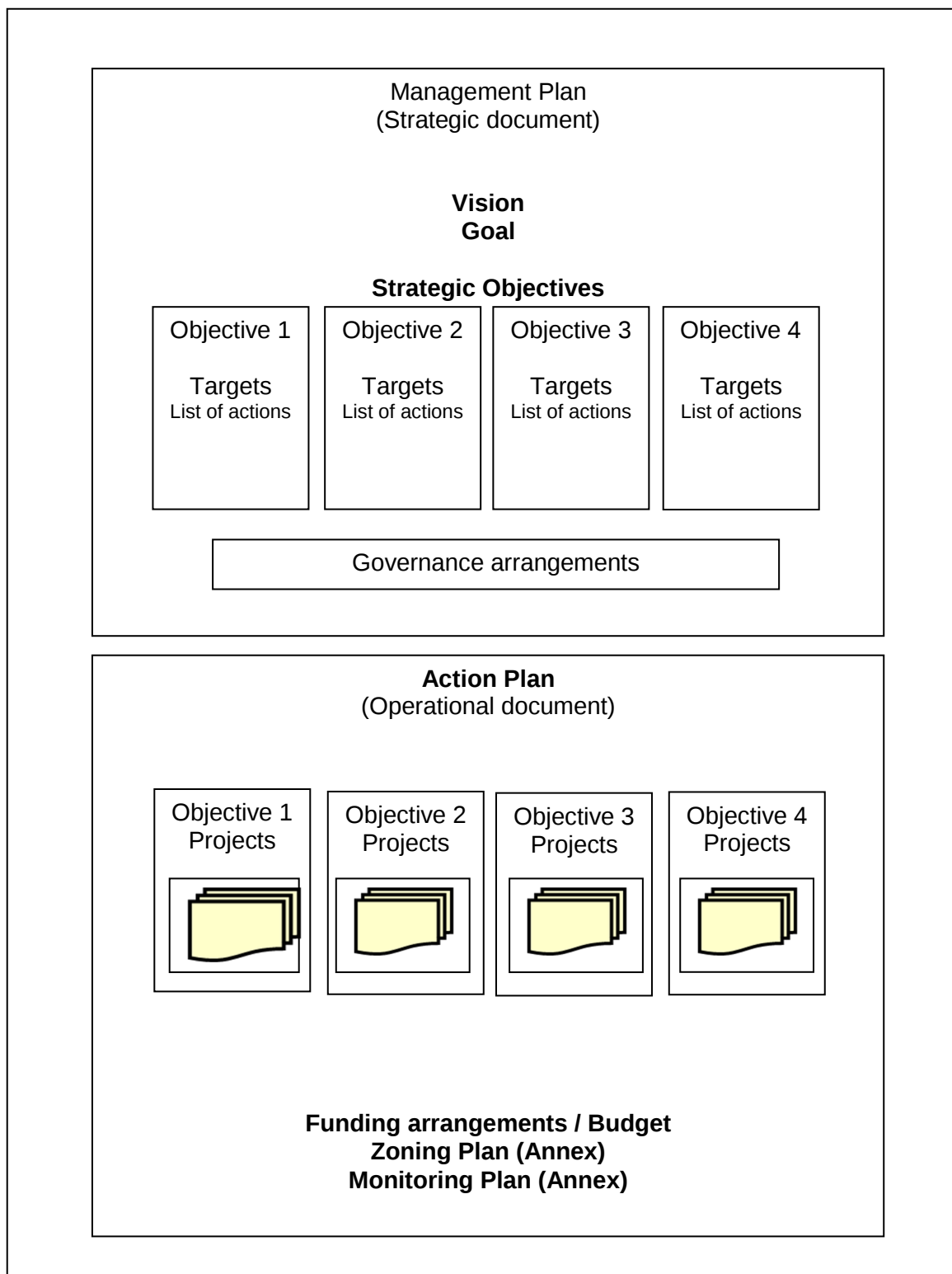
Last but not least I would like to extend my gratitude to all different stakeholders and local societies for their participation in the process and I do hope that further inter-sectoral cooperation and implementation of the principals of ecosystem approach and sustainable development, would facilitate conservation and sustainable use of the valuable ecosystem of Shadegan Wetland.

Hormoz Mahmoudi Rad
Khuzestan Former Director General of DoE

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STRUCTURE OF THE INTEGRATED MANAGEMNET PLAN



STRATEGY FOR THE CONSERVATION AND WISE USE OF SHADEGAN WETLAND

25 YEAR VISION

“BEING WELL KNOWN WORLDWIDE FOR ITS BEAUTIES AND VALUES, THE SHADEGAN WETLAND RECEIVES ADEQUATE WATER AND SUPPORTS RICH BIODIVERSITY FOR THE WELFARE OF LOCAL COMMUNITIES”

GOAL

“To conserve, restore and sustain the natural values of Shadegan Wetland for the benefit of current and future generations”

UNDP/GEF/DOE Conservation of Iranian Wetlands Project
In cooperation with
Khuzestan Environment Conservation Office

SUMMARY CHARACTERISTIC OF SHADEGAN WETLAND

Attributes	Description
Name and alternatives	Shadegan wetland
Location	30°, 00' - 31°, 00' N. and 48°,20' - 49°, 20' E.
Area of Wildlife refuge	3270 sq km
Area of north reed beds of the Shadegan road	800 sq km
Area of the wetland(Ramsar convention)	4000 sq km
Ecological area of the wetland	5377 sq km
Area of the catchment	24310 sq km
Elevation	5-0 m. amsl
Administration status	Administrated by Khuzestan Provincial Environmental Conservation Office (KECO), Different parts are under jurisdiction of Shadegan, Abadan and Mahshahr Environmental Conservation Offices. Shadegan Office is responsible for taking care of the entire wildlife refuge.
Conservation status	Part of the wetland is Wildlife Refuge, Protected since 1957 (No hunting area)
International designations	Ramsar site,
Land tenure	State owned,
Land use	Freshwater wetland, extensive reed bed, pasturelands, brackish tidal flats, Shoreline estuaries, Offshore islands
Main sources of water	Jarrahi river flows
Ramsar wetland Type	Palustrine, Estuarine, Marine
Main ecological values	Diverse habitat, Extensive reed beds, Rich faunal and floral diversity, Naturalness, Large scale of the wetland, 111 plant species in 17 communities 3 Critically endangered floral species, 174 bird species visiting the wetland The maximum units of existing birds 684000 (year 1975) 18 water birds with population above 1% Ramsar criteria 32 breeding bird species 13 Globally threatened bird species 36 fish species in the Marsh and 45 species in the shoreline 4 species of shrimps in the estuaries and shorelines 40 species of mammals
Wetland Products	Reed stick, Fodder, Fish, Bird hunt, Shrimp,
Wetland Functions	Biodiversity support, Landscape, Climatic moderation, Retention of dissolved pollutants and sediment, Flood control
Wetland Services	Tourism/eco-tourism, Recreation, Education, Training, Research, Cultural heritage.
Main ecological changes	The water inflow into the wetland has declined significantly, Saline drainage flows has affected the wetland. The release of the exotic species has affected the biodiversity of the wetland.
Source: Shadegan Wetland Environmental Management Project, Pandam Consulting Engineers, 2002,	

STRATEGY FOR THE CONSERVATION AND SUSTAINABLE USE OF SHADEGAN WETLAND

1. INTRODUCTION

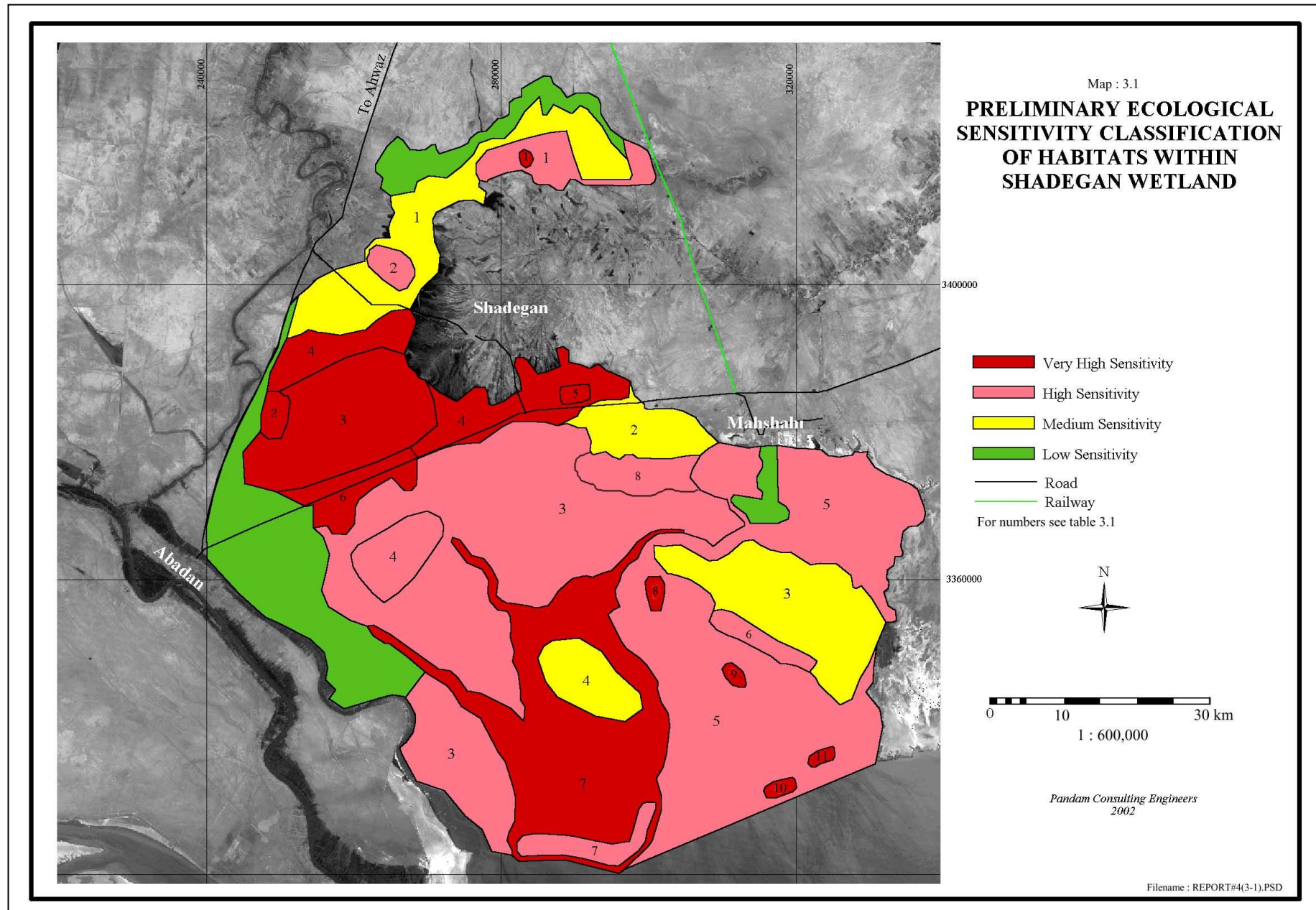
Shadegan wetland (5377 sq.km) is a vast environmental system comprising fresh and brackish wetlands, as well as the inter-tidal Khur Musa bay and off-shore islands. It lies at the downstream reach of the Jarrahi river catchment, in between the Shadegan, Abadan and Mahshahr cities in Khuzestan Province. At its downstream side, the wetland is connected to the Persian Gulf.

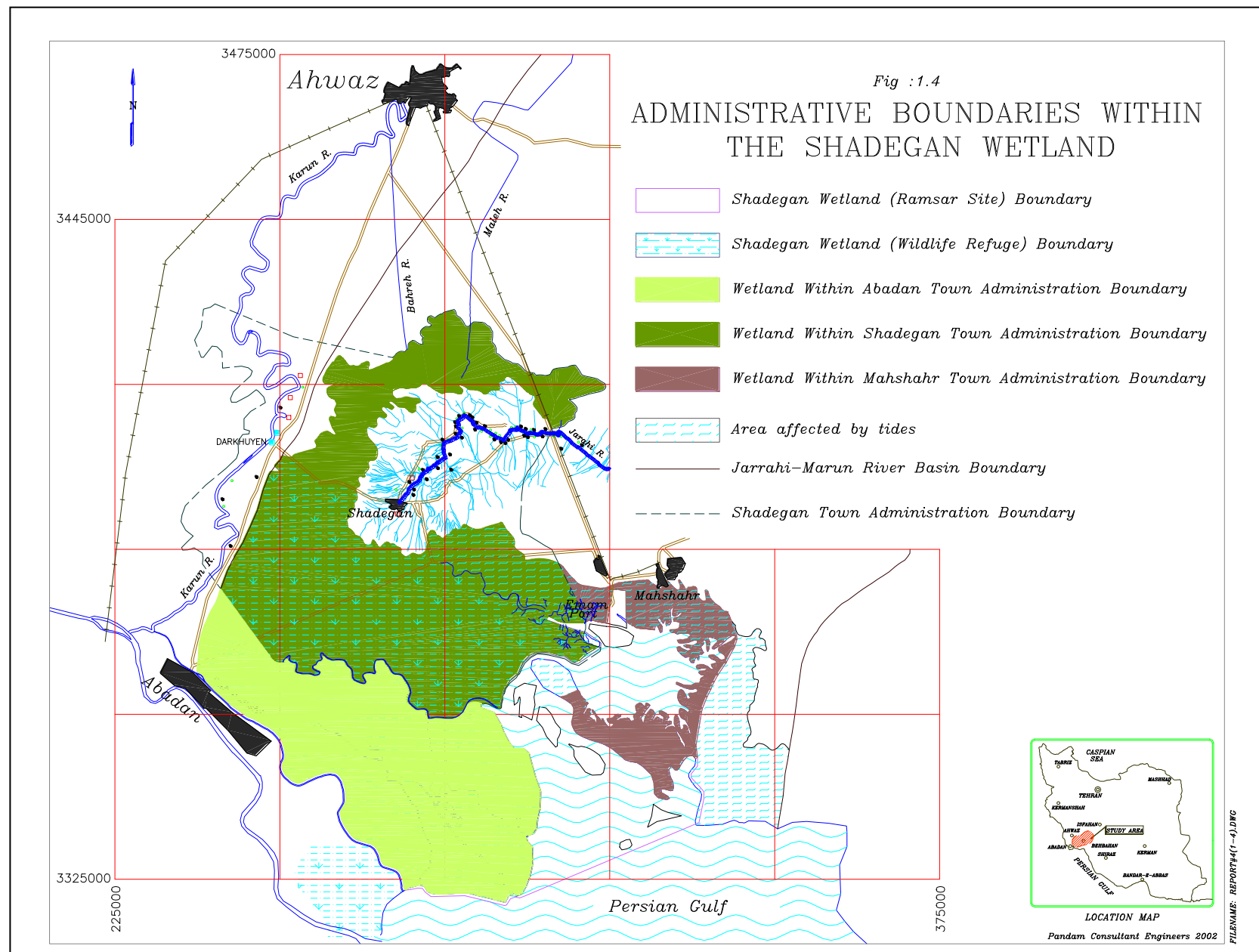
The wetland is the largest Ramsar site in Iran (designated since 1975), and has been recognized as an internationally important wetland that supports significantly rich biodiversity. The designated area of the wetland in Ramsar Convention is 400,000 ha, excluding marine and littoral areas in Persian Gulf. Part of the wetland with the area of 327000 ha (south to the Darkhuin-Shadegan road) is designated as Wildlife Refuge since 1974 and is protected as a no hunting area.

About 100,000 local people depend fully or partly on the resources from the wetland for their livelihoods. More than 80000 ha of the wetland reed beds in the north of Darkhuin-Shadegan road are in free zone. Hence the common activities such as harvesting reed, fishing, etc... are permitted and carried out by the locals. Nonetheless, in order to preserve the integrity of this management plan and considering whole ecological features, the area of 527000 ha, including the littoral and Khour mousa areas has been taken into account for planning Shadegan management. Obviously this area includes the entire protected areas as well as international territory of the wetland. About 100,000 local people depend fully or partly on the resources from the wetland for their livelihoods.

Shadegan wetland has been selected as a third site of Conservation of Iranian Wetlands UNDP/GEF/IRI. This project aims to demonstrate reduction of the major threats to the internationally important biodiversity of this wetland through promoting ecosystem-based management, coordinated through an integrated management plan.

During the last decade, the inflow into the wetland has continuously declined due to the upstream irrigation development, and the wetland is / will be subject to increasing damages due to increasing drainage inflows. These problems, exacerbated by a long period of drought, have already adversely affected the globally important biodiversity and the many benefits that the wetland provides to local communities.





2. PURPOSE AND CONTEXT

Article 67A of the 4th National Development Plan has given priority to development and implementation of management plans for sensitive wetlands. The Article states that:

“Ecological management plans need to be developed for all the sensitive ecological entities.... DOE in collaboration with MPO, MOE and MOJA will develop required executive regulations for implementation of this article to be ratified by the Board of Ministers (Cabinet).”

- The present exercise is therefore supporting provincial organizations to develop a high-level STRATEGY FOR THE CONSERVATION AND WISE USE OF SHADEGAN WETLAND which can be endorsed by the high level authorities addressed in Article 67A, as well as the provincial organizations. This STRATEGY will then be implemented through the following documents:
- An ACTION PLAN describing the specific actions under each objective and corresponding stakeholder group(s) through which the management plan would be implemented;
- A ZONING PLAN and Codes of Practice, which define the zones where different human activities may occur and the limits of sustainable use;
- A MONITORING PLAN, identifying key indicators, their baselines and monitoring protocols for each indicator.

Together, these documents would comprise the integrated management plan for the wetland. The purpose of this STRATEGY is to provide a long-term shared Vision and Approach for the sustainable management of Shadegan Wetland and its valuable ecosystem services. Specifically, it aims to improve the engagement of local people towards a wise use of the wetland's resources, to encourage inter-sectoral cooperation to achieve agreed objectives, and to raise awareness of the importance of the wetland.

The STRATEGY builds on the work of earlier studies in 2002, and was developed following three participatory workshops held in Ahvaz and in Shadegan during Nov. 2008 to Mar. 2010, involving representatives of the key stakeholder groups for Shadegan Wetland. This final version of the Management Plan includes almost all the comments presented during the consultation workshops and was approved in the last workshop in Mar, 2010.

3. METHODOLOGY APPLIED TO MANAGEMENT PLANNING

A participatory strategic approach is being used to prepare the integrated management plan. It will be built on existing studies and the preliminary management plan drafted in 2002. It will similarly use the experiences obtained from the pilot management planning exercises in Lake Uromiyeh and Lake Parishan Wetlands, and seeks to achieve a common approach towards a defined Vision, through the engagement and consultation of key stakeholders (particularly local communities). Participation of stakeholders ensures inclusion of the views, knowledge and interests of the involved parties in the planning. This enhances the sustainability of the plan and increases the likelihood of stakeholders support for and participation in its implementation. The management planning process requires identification of the values of and threats to the wetland, as well as the capacities of the main stakeholders to support the values and to resolve the

threats. It seeks to ensure that main management actions will focus on the priority objectives for achieving a common vision. This is the approach recommended by the Ramsar Convention for preparing wetland management plans.

The process for management planning proceeded through the expertise available in the provincial authorities with technical support from CIWP. Thus it is expected that the relevant provincial organizations themselves will facilitate and follow different steps towards implementation of the plan..

4. CHARACTERISTICS OF SHADEGAN WETLAND

4.1 Existing Information

Good information is available on Shadegan Wetland characteristics and the changes which are occurring within its boundary as well as within its catchment area. This information has been compiled in different reports and dissertations available in KECO and KWPA, Provincial Office of Shilat, Azad University, and Aquaculture Research Institute of Southern Iran.

4.2 Physical Characteristics

The Shadegan wetland lies at the downstream of the Jarrahi river basin in Khuzestan Province, south-west Iran. The basin occupies 24,310 sq.km comprised of three major sub-basins namely Marun, Alla and Jarrahi. Marun and Alla river catchments include in majority the mountainous territories in the upstream sections in Kuhgiluyeh Province, while Jarrahi river encompasses the flat territories in Khuzestan Plain.

On each of the Marun and Alla rivers a storage dam is controlling water for irrigation development in downstream areas in Khuzestan Province. These dams will seriously impact water supply to the wetland as follows:

- The storage dams control flood flows which are the main source of recharge of the wetland;
- Irrigation developments consume additional water on the cost of less water inflow into the wetland;
- Irrigation development will release drainage flows which directly or indirectly flow into the wetland and causes different levels of various contaminations in wetland's water resources.

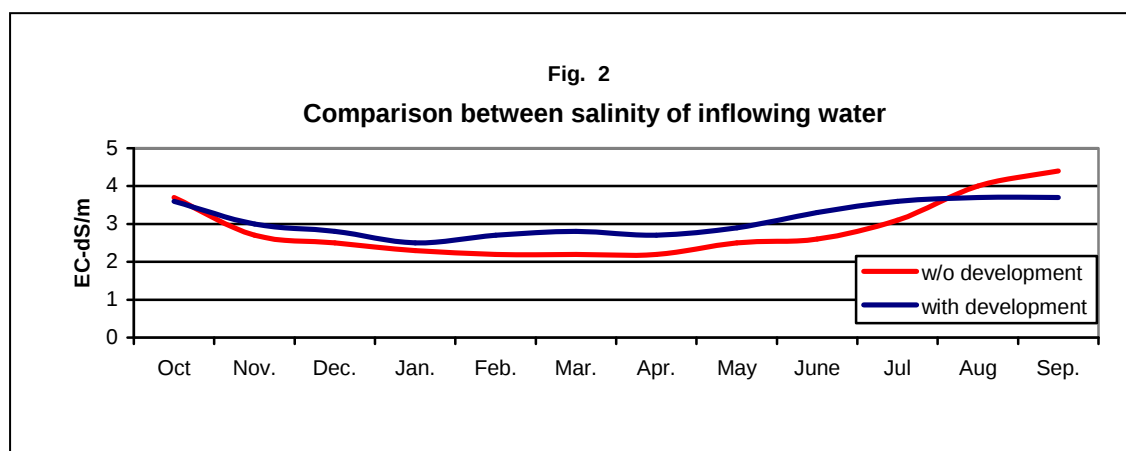
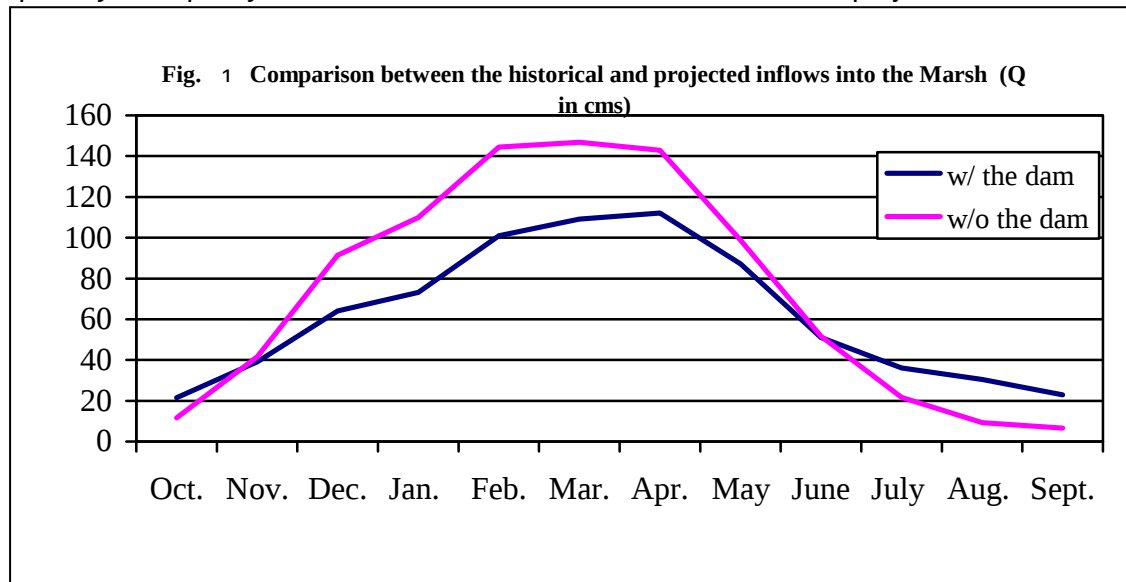
In addition to Jarrahi River, the Wetland historically receives water from Karun river spills, and / or return flows from areas that basically are supplied from Karun river. The share of these sources comprises only 10% of the total flows into the wetland.

The climate of the basin is characterized with hot, long and dry summers and short, mild winters. The average annual precipitation of the basin varies from 160 mm in the southern coastal areas to more than 900 mm in the higher altitudes of northern mountains. The main part of precipitation occurs during late fall through early spring seasons. The mean annual temperature varies between 20.9 C° in northern higher altitudes to 24.8 C° in the southern lower altitudes. July and August are the warmest and January and February are the coldest months of the year. The annual average pan evaporation in the basin varies between 1900 in the northern upstream mountainous area to 3500 mm in the southern coastal area.

The water supply to the wetland is historically mainly provided from Jarrahi river flow (90%), and occasional spills from Karun River (10%). Groundwater has almost no role in recharging or discharging the wetland. The average annual inflow into the wetland is estimated at 2.4 BCM which varies from 0.4 to more than 6 BCM per year. A considerable part of the wetland in the south, the tidal flat, is subject to tidal effects from Persian Gulf.

The quality of water in the wetland varies from fresh water in the northern part which directly receives river flows, and Sea water in the southern estuaries and Khur Musa. In between the two, a mixed water wetland is formed where fresh water and sea water mix to create a brackish water wetland.

The historical water supply regime to the wetland has been subject to significant changes in quantity, quality and seasonality due to implementation of several large irrigation developments in the upstream river catchments. Not only these developments use additional water from the river system but also release more drainage flows containing pollutants into the system. Figures 1 and 2 provide comparison of historical quantity and quality of water inflow into the wetland with those of projected future.



Construction of several development projects such as roads, power plants, power transmission lines, oil and petrochemical industries, steel industries, oil transport pipelines, etc has greatly affected the quality of the wetland. Drainage flows from sugar cane factories has significantly negatively affected the vegetation cover of the wetland.

4.3 Natural Environment

Shadegan wetland is one of the most important and valuable wetlands in the country. The size of the wetland, its naturalness, high diversity in fauna, flora and habitats, provides unique significance to Shadegan wetland. The spatial extension of reed bed (*Phragmites* and *Typha*) in the northern wetland provides, in addition to its ecological values, an outstanding landscape which in turn is highly valuable.

The 2002 studies identified 17 major plant communities comprised of 110 plant species within the wetland boundary including the offshore islands. The most extensive plant community is *Typha*+*Scirpus* which cover almost whole wetland north of Abadan-Mahshahr road. Different limnological features of the wetland have brought about this high biological diversity, which in turn attracts diverse fauna at different seasons and thus provides an outstanding ecological diversity to the wetland which is of very high conservation importance.

The wetland is very important and internationally well known for its faunal diversity. Following is a list of such diversity:

-	Amphibians	3	species
-	Reptiles	9	species
-	Fish in the Marsh	36	species
-	Fish in the bay	45	species
-	Shrimp in the bay	4	species
-	Birds	174	species
-	Mammals	40	species

The wetland is particularly significant for its diversity in fish and birds. It hosts high populations (sometime as high as 150,000) of migratory birds during the winter season which use the wetland for wintering, feeding and breeding. *Phalacrocorax carbo*, *Phoenicopterus ruber*, *Tadorna tadorna*, *Fulica atra* and different species of ducks and gulls are among the more numerous species. 32 bird species have been observed in breeding condition among which different species of waders, terns, gulls, egrets and *Recurvirostra avosetta* are the most abundant.

The wetland is also an important ground for spawning, nursery and feeding of different aquatic species.

4.4 The Human Environment and Administrative Structure

The catchment of the Jarrahi River encompasses 11 cities and more than 2100 villages with a total population of 880,000 inhabitants (1995 census). Almost all the population is Shiite Muslim. Populations in the northern parts of the basin are Lurs while those in the central and southern parts are Fars and Arabs respectively. The main source of income for the population in the catchment is agriculture and animal husbandry. Industries have little part in the employment particularly in the middle and northern catchment. Instead, water control and irrigation development projects are the main activities in these areas.

The total amount of water used in the catchment area is growing due to the population increase and the need for crop production at national level. It is estimated that with irrigation developments within the catchment area, annually about 1200-1500 MCM/yr of river water resources will be used for crop production. This is more than twice the amount of water use during the 1990s and results in a significant reduction in the inflow into the wetland. Such developments are currently going on but would take another

decade before they are fully completed. At full development about 300-500 MCM/yr of agricultural return flows will deliver, directly or indirectly, considerable amount of contaminating chemicals into the wetland. According to estimates, more than 50,000 tones of chemical fertilizers and 200 tones of different pesticides and herbicides would be used for crop production which is very close to about twice the present uses.

There are two villages inside the wetland, 3 cities (Shadegan, Abadan and Mahshahr) and several villages in its close vicinity. Major part of the population in these cities and villages are Iranian Arabs with crop and date growing and animal husbandry as their main source of occupation and income.

The population in Shadegan city and its affiliated villages are historically to different extents dependent on the wetland for their livelihood. Animal husbandry (water buffalo), fishing, hunting, reed and, fodder harvesting are among the benefits the local people earn from the wetland.

The first industrial development in the region was the establishment of the Abadan Oil Refinery in 1905. Construction of roads and installation of oil pipes was followed by construction of the Petrochemical industries in the Mahshahr area in 1975 and the steel and pipe-rolling factories in Ahvaz. During the last decades the area has experienced accelerated industrial developments, most of them with different impacts on the ecology of the Wetland. Development of sugar cane units, construction of power plants, steel factories, transmission lines, oil pipelines, and different infrastructures are among such developments.

5. PRELIMINARY EVALUATION OF SHADEGAN WETLAND

The important and unique attributes of Shadegan Wetland are its vast size, its naturalness, its habitat diversity, and the role it plays in livelihood of local population. The following tables describe the values of and threats to the wetland,

5.1 Values

The values (functions, services and products) provided by the wetland are identified as follows.

The significance of these values implies maintaining the wetland itself. The economic worth of these values has not yet been estimated, but the consequences of degradation of the wetland are obviously very considerable.

5.1.1 Functions

Functions	Description
Support to biodiversity	The diverse habitat types in the wetland and their different functions are supporting a wide range of biodiversity. It is a host to tens of thousands of internationally important migratory birds who visit the wetland for wintering, feeding, breeding and staging. Tens of aquatic species most of them of high ecological and economical value reside, feed, spawn and grow in the wetland. It also supports a rich floral diversity some of which are unique in the Persian Gulf coastal region.
Climatic moderation	The large surface area of the wetland contributes to regulating microclimate of the area (temperature and humidity), making it more suitable than surrounding areas.
Flood control	The Wetland absorbs the flood waters of the Jarrahi river before endangering the downstream cities and rural settlements.
Defense	The wetland acted as a natural barrier to Iraqi invaders during the Iraqi attacks in 1980s
Sediment and contaminant retention	The Wetland traps sediment and contaminants delivered by the Jarrahi river inflows into the wetland, preventing them from spreading over a wider environment.
Landscape	The Wetland is famous for its beautiful landscape and scenery.

5.1.2 Services

Services	Description
Tourism / Ecotourism / Recreation	There is a huge potential for ecotourism development. Such potentials have not yet been utilized.
Cultural heritage/ values	Indigenous people have established strong mutual feeling with the wetland and have adopted their life style according to wetland's attributes.
Research and training	Different aspects of the wetland's characteristics have been / and still are subject to university research works, dissertations, field and training works.
Education	The Wetland provides extensive areas for education of natural resources both at high school and university levels. Presently universities are using this potential better than high schools.
Transport	In the older time the wetland used to be the most common transport route to the Persian Gulf and even to Mesopotamian wetlands. Today only some of the southern estuaries are used by fishermen for accessing the Persian Gulf.
Aqua-culture	Shilat recharges the fish resources of the wetland through propagation of local species.

5.1.3 Products

Products	Description
Fish and shrimp	Fish from the Marsh and Fish+ shrimp from the estuaries and shoreline are an important source of livelihood for local people in Shadegan, Abadan and Mahshahr.
Grazing for water buffalo	Several thousands of water buffalos graze in the Marsh
Pastures for domestic animals	Local people use fodders from the Marsh to feed their domestic animals
Reeds for construction and handicrafts	Reeds from the Marsh are widely used for constructing traditional shelters, roofing of rural houses, and for handicrafts etc.
Hunting of water birds	Birds hunted in the wetland are widely presented for sale in the Shadegan Bazaar

5.2 Threats

Similar to the values, the management plan of IIP studies of 2002 identified several significant threats to the wetland. After a quick review in the 2008 workshop sessions, the following were listed as the main threats to the Wetland.

5.2.1 External Threats (arising outside the wetland but influencing it)

Threats	Description
Competition in water resources use /allocation	- Agricultural, industrial and residential developments increasingly compete with water allocation to the wetlands.
Increasing drainage inflows	- Drainage flows from irrigation developments (Sugar cane, Khalaf abad and Shadegan) and from fish culturing developments (Azadegan fish culturing) directly enter into the wetland while similar flows from upstream developments indirectly enter (through river channel) the wetland. - Drainage flows from salt leaching projects
Contamination of water	- Increase in discharge of agro-chemicals residues from entire watershed, - Residue of poisons sometimes used for fishing in the upstream watershed - Increase in industrial waste waters and residential sewages. - The influx of leachate produced from Shadegan garbage. - The direct discharge of untreated domestic and hospital sewage.
Reduced flood inflows	- Construction of flood controlled projects (storage dams) in the upstream catchments, - Occurrence of droughts and climate change has affected water resources of the catchment and of the wetland.
Climate changes/ prolonged drought	- Occurrence of dry hydrological periods is quite common. However, climate change seems to have exacerbated the cases.
Alien species introduction	- Fish-culturing activities in the upstream catchments cause introduction of alien species that compete with the indigenous species in the wetland.

5.2.2 Internal Threats (arising inside the wetland)

Water quality degradation	- Use of poisons for fishing; - Garbage leachate flow into the wetland - Direct discharge of untreated domestic sewage
Disturbance to wildlife	- Construction of roads and traffic inside the wetlands - Gun shooting
Pressure on resources	- Over-harvesting of wetland resources (fish, birds, fodder)
The introduction of exotic species	- stocking of the wetland with exotic fish species
Set fire on reed beds	- occasional burning the reed beds by local people
The leakage of petroleum materials from pipes	- the leakage of petroleum material form oil transferring pipe

6. VISION, GOAL, AND OBJECTIVES

The key elements of the Management Plan are a shared Vision for what the Wetland should be like in 25 years time, a common Goal for achieving that Vision, and a number of measurable Objectives that can be implemented through Actions of the key stakeholders. As already mentioned, these were derived through participatory stakeholder consultation workshops.

6.1 A 25 Year Vision for Shadegan Wetland

A common wish expressed by stakeholders reflecting their Vision is compiled as follows:

25 Year Vision for Shadegan Wetland

“Being well known worldwide for its beauties and values, the Shadegan Wetland receives adequate water and supports rich biodiversity for the welfare of local communities. “

6.2 Overall Management Goal

The over-arching Goal already defined in the workshop of October 2002 was reconfirmed in the inception workshop of December 2008. This is defined as follows:

GOAL

“To conserve, restore and sustain the natural values of Shadegan Wetland for the benefit of current and future generations”

All the stakeholders agreed on the necessity to sustain the wetland for the benefit of the existing and future generations.

The proposed ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is the primary framework for action under the Convention on Biological Diversity and comprises 12 principles. All around the world, the ecosystem approach is increasingly being adopted as a framework for the management of protected areas. Application of the ecosystem approach to the management of Shadegan Wetland involves the following main considerations:

- Shadegan Wetland should be managed in the context of its catchment resources, since activities throughout the catchment will have impacts on the Wetland. This means that a common approach needs to be set between the main water consumers of the Basin.
- The management objectives for Shadegan Wetland should be set for the long-term, but must recognize that change is inevitable. People should be at the heart of setting those objectives.
- Management should be decentralized to the lowest appropriate level. Management must involve all key stakeholder groups, particularly local communities, both at planning and implementation stages. A preliminary list of the stakeholders in the Shadegan Wetland Management is provided in Annex 1.

- The conservation of ecosystem structure and functioning to maintain the ecosystem goods and services (Values) provided by the Wetland should be a top priority. An appropriate balance needs to be set between the conservation and sustainable use of the Wetland's natural resources, based upon the capacity of the system.
- Management should take account of the economic context - reducing market distortions that might damage ecosystem functioning (e.g. lack of water-pricing), and supporting activities for sustainable use and biodiversity conservation.
- Management should be evidence-based (including traditional local knowledge).

A further key element is that management will not succeed unless people are aware of the values provided by the wetland, and the threats to it. Raising public awareness must therefore be given high priority. Similarly, those responsible for management will need to develop the required capacity to carry out their work.

6.3 Management Objectives

Based on conclusions derived from the recent workshop discussions, the following objectives have been identified as high level strategic objectives that are essential for achieving the Goal and Vision. Following the objectives, example tables indicate the objectives, issues, and the targets, actions and organization(s) that are anticipated to be responsible for undertaking the actions relevant to each issue. These tables are going to be completed through the outcomes of discussions in forthcoming consultation workshops, and subsequently will constitute the main part of the management plan.

Objective 1. To raise awareness of the values of and threats to the wetland, and to enhance public participation in their management

If the managers and decision makers as well as local communities are aware of the values, threats and sensitivity of the wetlands, they will cooperate more adequately in the management process. Accordingly, public awareness regarding sustaining and management of Shadegan wetland is quite important. Consequently, there is a call for raising awareness regarding the values and threats of the wetlands, their important role in livelihood of the local societies, their influence on ecosystem and local climate. Furthermore, there is a call for raising awareness with regards to the ways that human activities can influence sustaining the functionality of the wetlands and vice versa.

Raising awareness should also effectively introduce the wetland to the national and international communities and thus open new opportunities and resources for enhancing its management. This can also act as a resource for additional economical benefits to the local people and improve their sensitivity in better sustaining the wetland.

Experiences worldwide indicate that sustainability of wetlands depends primarily on the extent to which local communities are active in their management. Local communities should therefore be fully engaged in the conservation and management of the Wetland.

Priority issues in this objective coming out from the consultation workshop are:

- Awareness of the politicians and decision makers of the wetlands' values and the threats that hamper it's functioning.

- Awareness of the peoples inside and around the wetland of its capacities and the ways of sustainable utilization of these capacities.
- Participation of local people in wetland's management.

Objective 2. To assure adequate water supply to the wetland

The quality and quantity of water supply to the wetland is probably the most important factor affecting the sustainability of its ecological and economical functioning. However both factors are subject to increasing impacts due to human activities including constructing dams and developing irrigation and agricultural projects in the upstream catchment. Increasing use of water and agro-chemicals are obvious consequences of such developments that reduce the quantity and quality of water supply to the wetland. Increasing inflows to the wetland from untreated drainage resources containing residues of harmful substances would be another crucial concern that implies careful management of water resources at catchment level if the wetland is to remain healthy. Industrial developments around the wetland also have the potential to release additional harmful wastewater into the wetland.

The top priority issues in this objective which was agreed-on in the consultation workshop are:

- To ensure an adequate quantity of water supply to sustain the wetland.
- To ensure an adequate water quality

The strong political support for economic and social developments in the basin and the crucial requirement for sustaining the wetland and its ecological functioning require careful planning for an integrated water and land use management within the context of the Jarrahi river catchment.

Objective 3: Conservation of biodiversity and sustainable use of the wetland resources

This objective aims to improve and restore the biodiversity of the wetland through conservation of habitats and species and enhancing its ecological functioning. It focuses specifically on improving the habitats for nationally and internationally important water birds and aquatics. In order to achieve this objective, the threatening factors which the wetlands are facing must be pinpointed and be managed appropriately. The wise use of these resources is essential for conservation of the wetlands, which also involve raising awareness of the stakeholders in addition to other managerial activities.

The priority managerial issues in this regards are:

- Conversion of land use in wetlands habitats
- Contamination/ deterioration of wetland's habitats by low quality inflows
- Uncontrolled hunting of waterfowl birds.
- Inappropriate collection and disposal of the municipal waste.

Objective4: Improvement of local societies' livelihood.

The unsustainable utilization of wetland resources could be in direct correlation with economical conditions and restricted income resources of local people. Deterioration of the wetland would leads to more restrict income resources, hence worsen the livelihood of the local people. Thus, this objective is addressing sustainable utilization of all sorts of the wetland resources (fishing, hunting, grazing and reed harvesting) and support provision of alternative opportunities for employment and income resources outside and/or inside the wetland(promoting ecotourism and industries related to

wetlands productions). Fortunately the wetland itself offers diverse opportunities for enhancing livelihood of local population. As the first priority, the opportunity addressed in the consulting workshop was “Eco-tourism” which has great potential as an alternative source of income for the local people.

The priority issues to be addressed are therefore:

- Sustainable fishery
- Sustainable use of vegetation resources (grazing, reed-cutting etc)
- Development of ecotourism potential (boating and bird watching)
- Improving livelihoods through “green” development initiatives (e.g. industries related to reeds)

Objective 1: To Raise awareness of the values of and threats to the wetland and to enhance public participation in their management			
Priority Issues	Targets	Priority actions	Responsible agent (R) Partner agent (P)
Awareness of the politicians and decision makers	Long term (25 years): Provincial authorities have obtained full knowledge regarding the wetland and its features. Hence, they are committed to sustainable conservation of the wetland. Short term (5 years): Conservation of Shadegan Wetland is embedded as a priority in provincial policy making and planning	1.1 Develop summary baseline report of the current condition of the wetland (including the values, importance, sensitivities and the threats) along with emphasizing on the role of decision makings on the function of the wetland for presenting to the politicians and decision makers. 1.2 Hold seminars for elaborating the condition of the wetland and need for considering the priority activities necessary for the wetland including legal measures 1.3 Organize group visits to sensitive and important areas.	R: DoE- Khuzestan P: KWPA P: MOJA P: Shilat-Khouzestan and The Aquaculture Research Center of The South P: Khuzestan Organization of Industries and Mines P: Provincial TV P: Literacy didactic Movement
Awareness of the people inside and around the wetland	Long term (25 years): Local societies become self-ambitious in raising general information regarding wetlands. Short term (5 years): Local societies gain optimum knowledge of the wetlands' values, sensitivities and threats.	1.4 Offer face to face and promotional trainings to the Local societies regarding the sensitivities of the wetlands and the methods of reducing the threats. 1.5 Teach the role and importance of the wetlands to the students in elementary and high school levels by distributing educational brochures. 1.6 Produce educational programs for public media broadcasting in provincial levels regarding Public awareness.	P: Local Societies and NGOs
Participation of local people in wetland's management	Long term (25 years): Local communities are responsible for managing Shadegan Wetlands resources through co-management agreements with provincial authorities Short term (5 years): Consumers have designed and agreed codes of practice for sustainable use and zoning.	1.7 Make local people aware of DoE's decision regarding local people involvement in decision making and management of the wetlands. 1.8 Determine the assured capacities of wetlands in order to obtain sustainable use. 1.9 Teach the methods of sustainable management (elaborate the wise use definitions). 1.10 Review the codes of practice and regulations regarding the participation of local societies in wetland management implementation. 1.11 Codify new codes of practice for managing wetland by local societies.	

Objective 2: To Assure adequate water supply to the wetland			
Priority Issues	Targets	Priority actions	Responsible agent (R) Partner agent (P)
To ensure adequate quantity of water supply to sustain the wetland	Long term (25 years): The minimum water demand of the wetland is guaranteed and supplied. Short term (5 years): Any new water exploitation projects from the Jarrahi river water resources must be conditioned to securing the water demands of Shadegan wetland through modified water consumption patterns, upgrading on the farm water management and saving water in the upstream areas.	2.1 Investigate to determine the minimum water requirement of the wetland 2.2 Investigation, identification and control of illegal water exploitation in the upstream catchment of the basin. 2.3 Establishment integrated water resources management in the catchment area 2.4 Review the development projects in the upper lands of the basin by taking into account the water requirements of the wetland. 2.5 Manage and reform the water consumption in the upstream basin of Jarrahi river (modifying the cultivation patterns and enhancing irrigation efficiency) 2.6 Equip water level gauging stations and monitor the process of supplying water demands of the wetland. 2.7 Provide legal enforcement with regards to securing water demands of the wetland. 2.8 Ensure conducting EIA as an obligatory measure for all the projects, which are under planning in the upstream basin.	R: KWPA P: DoE-Khouzestan
			R:MOJA –Khouzestan P:KWPA
			R:DoE-Khouzestan P:KWPA
To ensure adequate quality of water to sustain the wetland	Long term (25 years): WQI get computed over 70 %. Short term (5 years): WQI get computed at least by 60%.	2.9 Define appropriate standards for quality of the Shadegan wetland. 2.10 Plan and coordinate for industrial pollutants management. 2.11 Establish an observation network for monitoring water quality and quantity. 2.12 Develop a plan and create facilities for emergency reactions on water status. 2.13 Develop a plan and coordinate for management of agrochemical consumption in the upstream basin.	R: DoE-Khouzestan P: Organization of Industries and Mines P: KWPA P: MOJA P: Disaster head quarters

Objective 3: To Conserve biodiversity of the wetland			
Priority Issues	Targets	Priority actions	Responsible agent (R) Partner agent (P)
Conversion of wetland habitats for other uses	Long term (25 years): Complete suppression of Wetland use alternation/conversion Short term (5 years): Restraint of evitable wetlands use conversions	3.1 Prepare wetland's zoning maps 3.2 Prepare the map of current situation of the wetland's land use 3.3 Develop obligatory regional instructions in order to prevent wetland's land use conversion 3.4 Regular monitoring of activities in the wetland which might leads to land use conversion 3.5 Determine exemptions for wetlands use conversions. 3.6 Involves local people in controlling of wetland conversions. 3.7 define and delineate the wetland territories	R: DoE- Khouzestan P: KWPA P: Juristic Authorities P: MOJA P: Natural Resources Department
			R: KWPA P: DoE-Kjouzestan P: MOJA- Land Affairs
Disturbance in the habitat	Long term (25 years): Thorough control of aquatic ecosystems Short term (5 years): diminish and suppression of factors having impact on progress of disturbance	3.8 Produce and restore the information regarding deteriorated wetlands. 3.9 Identifying disturbing factors and preventing disturbance occurrence development 3.10 Raising awareness and training regarding the damages to habitats due to disturbance and the methods to reduce them. 3.11 Review the recovery methods for deteriorated habitat 3.12 Planning and implementation of deteriorated habitat recovery programmes.	P: DoE-Khouzestan
Uncontrolled hunting of water birds	Long term (25 years): Hunting only happens in permitted places. Short term (5 years): Control of excessive hunting	3.13 Raising awareness and training local hunters in order to reduce excessive hunting 3.14 control and penalize illegal hunting 3.15 Promote alternative livelihood for hunters 3.16 Request assistance from local people for controlling illegal hunting	R: DoE-Khouzestan P: Juristic Authority P: Cooperative Organization
Intrusion of alien species	Long term (25 years): diversity of the species is completely under control Short term (5 years): reduce further elimination of endemic species	3.17 Assess and identify the genetic diversity of aquatics(fishes) 3.18 Control of alien fish species 3.19 Captive breeding of endemic species for releasing into the wetland.	P: DoE-Khouzestan R: Shilat R: Aquaculture Institute of South

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Objective 4: To enhance livelihood of the indigenous communities			
Priority Issues	Targets	Priority actions	Responsible agent (R) Partner agent (P)
Sustaining fishery industry	Long term (25 years): Reaching highest levels for fish harvesting in the wetland and coast by considering ecological board and biodiversity, which will be determined by Fishery Department and DoE. Short term (5 years): Determining highest levels for fish harvesting in the wetland and coast by considering ecological board and biodiversity, which will be determined by Fishery Department and DoE.	4.1 Assessing exploitable stock of wetland's aquatics species. 4.2 Identify the appropriate and legal zones for fishing 4.3 Artificial breeding of endemic fish species and releasing into the wetland 4.4 Organizing fisheries cooperatives in the wetland and coastal regions	R: DoE-Khouzestan : Shilat P: Khouzestan Cooperative Organization
Sustaining harvest of wetland vegetation resources	Long term (25 years): reaching highest levels for reed harvesting as determined by research works Short term (5 years): reaching safe levels for reed harvesting as determined by research works	4.5 Determine grazing and reeds/feed harvesting capacity of the wetland 4.6 Identify appropriate legal zones for grazing and harvesting reeds	R: DoE-Khouzestan -
Development of eco-tourism	Long term (25 years): Utilization of all identified ecotourism's potentials of the wetland Short term (5 years): Implementation of the first ecotourism plan	4.7 Identify the current traditional potentials and capacities and develop appropriate plans for ecotourism development (boating, bird watching and ecotourism) 4.8 Identify, promote and support local people participation in tourism development.	R: DoE-Khouzestan P: Cultural Heritage and Tourism P: Cooperative organization
Other "green" development initiatives	Long term (25 years): Utilization of capacities as an effective economical resource for the village families. Short term (5 years): Establishment of the first handicraft cooperative.	4.9 Identify potentials for handicraft development 4.10 Identify, promote and support occupation o local people in handicraft business 4.11 Identify, support establishment and development of reed related industries.	R: DoE-Khouzestan P: Cultural Heritage and Tourism P: Cooperative organization

7. MECHANISMS FOR PLANNING AND IMPLEMENTATION OF THE SHADEGAN WETLAND MANAGEMENT PLAN

The discussions in the workshop declared that a mechanism is required to manage the process of the “Shadegan Wetland Management Planning”, and to follow up for its implementation. This is particularly crucial because the processes are envisaged to proceed through Khuzestan provincial authorities themselves. Thus two committees i.e. one provincial and another local committee need to be established with appropriate participation of key stakeholders and a comprehensive TOR to effectively follow up the processes. Since the Management Plan needs to be strongly supported by politicians and decision makers, the membership of Governor General in the management plan would be very crucial.

It is of worth to mention that according to DOE's records two boundaries could be defined for Shadegan Wetland. One is that recorded as Ramsar Site which includes the entire reed bed area in between the Darkhoyen-Shadegan and Abadan-Mahshahr roads in addition to the tidal flat south of Abadan-Mahshahr road. This area accounts for about 400,000 hectares. While the entire wetland including the reed beds north of Darkhoyen-Mahshahr and Khur Musa bay, shoreline wetlands and four offshore islands are practically part of the Shadegan Wetland that totally exceed 570,000 hectares. On this basis while this management plan has to be applied to the entire wetland area (i.e. 570,000 ha), during the initial stages may focus on the Ramsar Site area and then by increasing its capacities would provide facilities to extend its influence over the entire wetland area.

The members of the provincial committee were suggested to be composed of fixed representatives from the following Khuzestan authorities.

- Governor General (Chairman)
- Environmental Conservation Office (Secretary)
- Water and Power Authority
- Jihad Agriculture Organization
- Natural Resources Department
- Shilat (Fishery Department)
- Cultural Heritage, Tourism and Handicrafts
- Shadegan governorship
- University
- Local communities

The TOR of provincial committee is envisaged as follows:

- Provide Assistance regarding integrating management plan activities in provincial organization.
- Review the progress and obstacles in the inter-sectoral coordination.
- To make assure of planning and provincial budget allocations for management plan activities.
- To confirm annual workplan of technical working groups, local committee and approval of previous annual reports.
- Revise the activities and existing threats in the site and presenting appropriate solutions.

Furthermore, the Shadegan wetland local committee will be comprised of fixed representatives from the following organizations, who would cooperate with the provincial committee.

- Shadegan governorship (head of committee)
- Shadegan-DoE (Secretary)
- Representatives from Abadan and Mahshahr governorship
- Shadegan Fishery Office

- Land affairs Office (MOJA)
- Water Authority of Shadegan, Mahshar and Abadan
- Shadegan Jihad Agriculture Office
- Village Cooperative office
- Shadegan Cultural heritage office
- Representatives from local societies and Islamic Councils of Shadegan, Abadan and Mahshahr.
- NGOs
- Universities

In addition to above organizations, according to the meetings' agenda, Shadegan wetland management committees have the right of inviting other organizations to temporarily participate in the meetings. Some of these organizations are as follows:

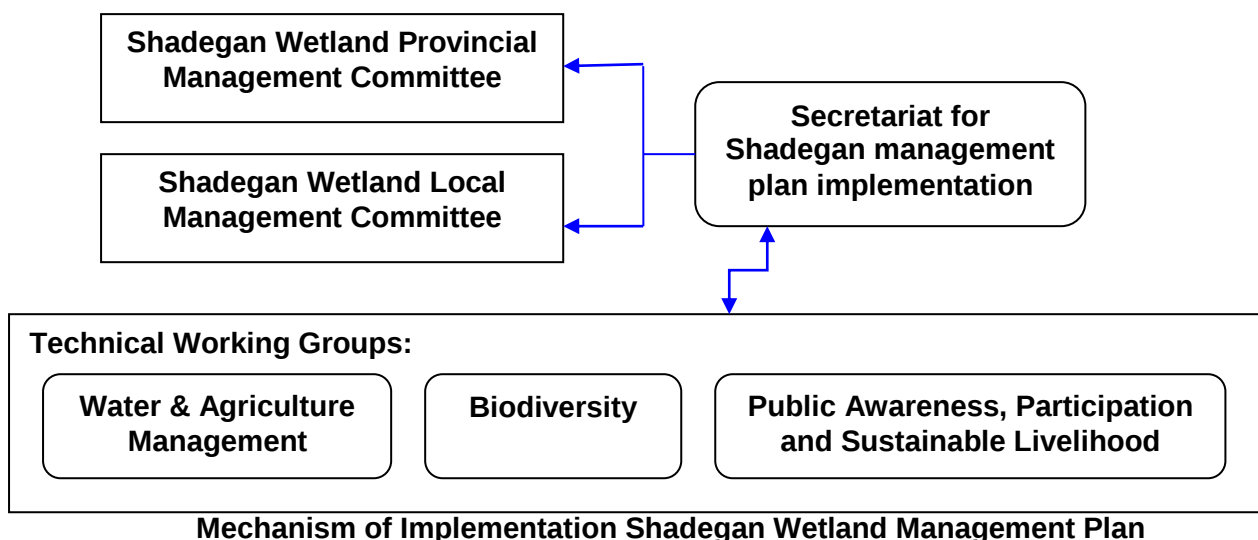
- Khuzestan Cooperative Organization
- Abadan Refinery (Pipelines management and Abadan Telecommunication)
- Provincial Mines and industries
- Oil Company
- Road and Transportation Organization
- Ports and Maritime Organization
- Training and Education Organization
- Khuzestan Media
- Jihad Agriculture of Abadan and Mahshar
- Health and medication network
- Villages Water and Waste Water Organization
- Other organizations...

The TOR of Shadegan wetland local community is envisaged as follows:

- Finalizing and enforcement of management plan
- Supervision and Monitoring of the management plan implementation
- Evaluation of managerial performance
- Producing annual and five year workplan for wetland management
- Facilitating inter-sectoral co ordinations
- Planning and budgeting
- Integrating the programs of the management plan into those of the provincial organizations
- Make decision regarding topic and TORs of specific an specialized sub-committees
- Cooperate with national Committee of wetland management
- Review and approval of annual reports

The provincial as well as local committees are envisaged to arrange monthly meetings during the first 6 months. Afterwards, they may decide on longer intervals, e.g. quarterly meetings. DOE of Khuzestan would act as the secretariat of the committee, with the following TOR:

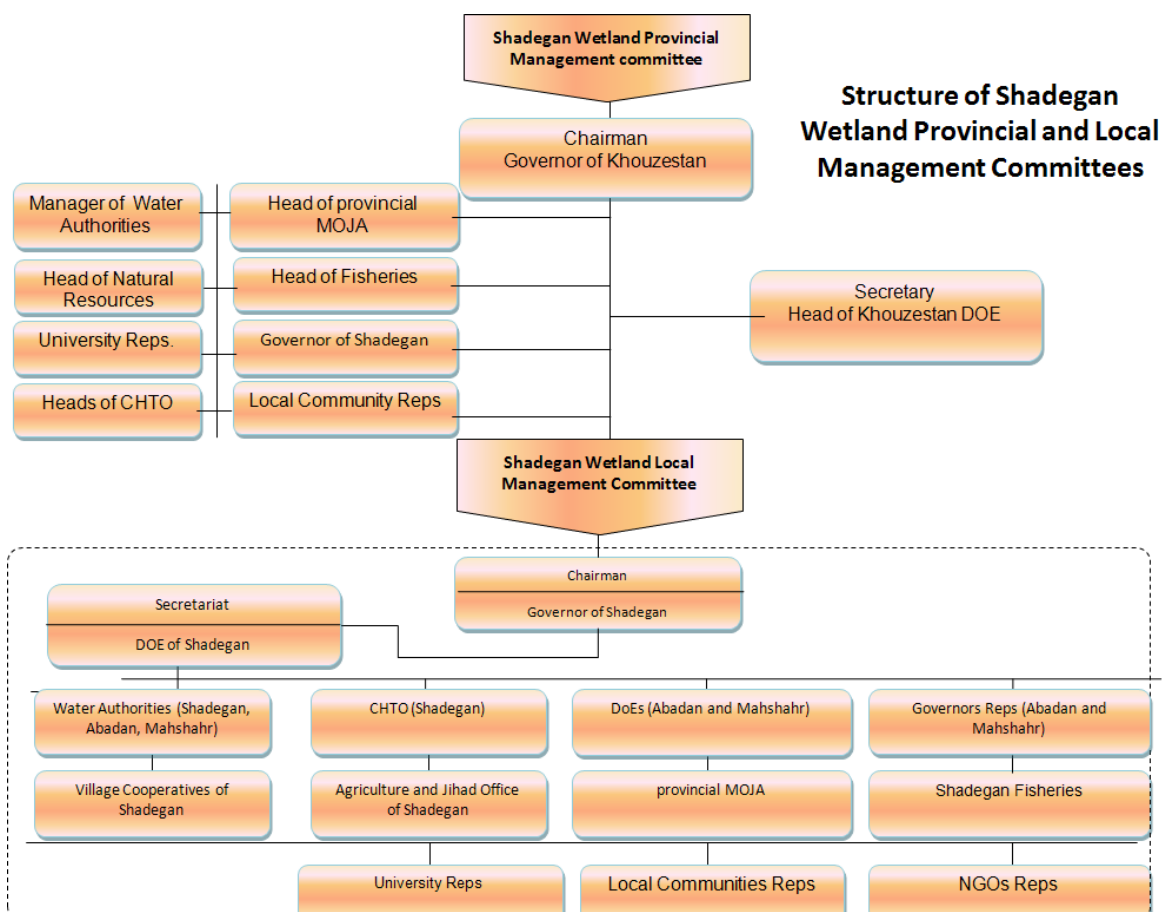
- Follow up for organizing the office of secretariat;
- Supporting implementation of management actions
- Effectively supporting the research and monitoring works on the Wetland;
- Establishing a monitoring / supervisory system on the wetland management;
- Facilitating communication with and among stakeholders;
- Supporting, coordination and monitoring the development of wetland Eco-tourism;
- Supporting, coordination and monitoring the establishment of a system for public awareness and transfer of information with research centers at national and international level
- Prepare annual report



Furthermore, three different processes were discussed for the provision of financial resources for implementation of the management plan as follows:

- One particular national budget to be allocated to provincial organizations;
- One particular provincial budget to be allocated to provincial organizations;
- To provide new budgetary source to be directly allocated to each organization.

Discussion in the group led to proposing alternative “B” as the most appropriate approach since it better fits with the general governmental political inclinations towards allowing more power for making decisions to the Provincial Government Offices. The budget for the management plan will be defined for the 5 Year Action Plan. Each activity in the portfolio of projects will have a defined budget and lead organization. When combined, these will result in an overall annual and 5 year budget.

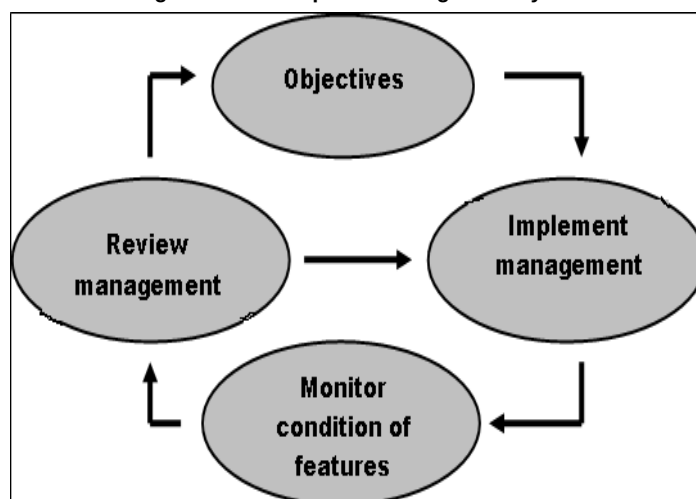


Annex 1: Shadegan Wetland Monitoring Program

I. Introduction to Wetland Monitoring

Wetland management in Iran has received more and more attention in recent years. In many instances this effort is being held back by a lack of relevant information on the nature of issues facing management, the cause of the problem and the effectiveness of management procedures and actions in resolving the problem. Effective monitoring programs can help overcome such shortcomings. Monitoring is the systematic collection of data or information over time in order to ascertain the extent of compliance with a pre-defined standard or position. An effective monitoring program is not necessarily complex or expensive. Effectiveness is gauged by the relevance and timeliness of the data or information collected. Simple approaches to monitoring can be effective if they are well designed. However, even a well designed and implemented monitoring program could have little value if the information that is collected is not utilized or does not influence the management processes for that locality or site. Ideally, the locality or site will be subject to an interactive and holistic management plan that provides the means of responding to the information obtained from monitoring program. This can be termed an “adaptable management cycle.”

Figure 1: The adaptable management cycle



Essentially, monitoring provides the means of measuring the output of the management procedure that is, it provides the means of measuring the (observed) state of the environment and the extent to which it may have been altered. Ideally, a monitoring programme should be established before a particular management activity is implemented, or at a minimum, baseline information should be available. If monitoring is conducted before a particular management decision is taken it is essential that the information collected is then used to influence the management activities.

The key to a useful monitoring program is a “good design”. Monitoring programmes that are data rich and information poor are not effective management tools and this is further reduced if the program provides misleading information. Ideally the development of a monitoring program should be a straightforward and cooperative process between managers (who make decisions), scientists (who provide expert advice and interpret data), and other relevant stakeholders such as local community members (who often have excellent knowledge of local conditions).

II. A Framework for Designing a Monitoring Plan

The present Monitoring Plan was drafted based on results of the consultation workshops held by water and agriculture, biodiversity and public awareness, and livelihood working groups. In these workshops, the basics for monitoring programming and developing monitoring protocols were briefly presented by CIWP consultants and then the monitoring plan and protocols were developed through a participatory process.

As already indicated, the success of a management system in accessing its defined targets is measured through a monitoring process. Ideally a monitoring program is one which collects all the information / indicators that is required for evaluation of the management performances and the degree at which the defined targets are reached. Such information needs to be consistent, organised, updated and should reflect the changes incurred through management processes. A monitoring program would adapt management through the cycle indicated in figure 2.

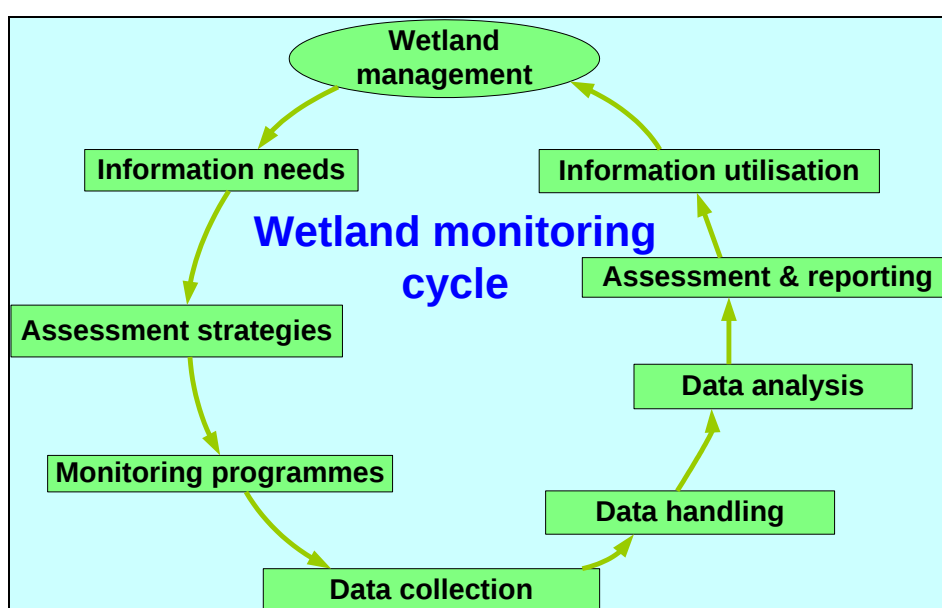


Figure 2. Wetland monitoring cycle

III. Monitoring Plan for Shadegan Wetland

In total six protocols for biodiversity features, three protocols for hydrological features and two protocols for socio-economical features of Shadegan Wetland have been devised. Tables from 1 to 3 illustrate a summary of these protocols, which address following managerial indicators:

1) Biodiversity by using the following indicators (population and distribution):

- 1-1) Flamingo
- 1-2) Marble teal
- 1-3) Diversities of wintering and breeding birds
- 1-4) Wetland's mammals with emphasize on Otter, wild cat and dolphin species
- 1-5) Fish communities
- 1-6) Plankton and benthic communities

2) Water by using the following indicators

- 2-1) Water quality
- 2-2) Water quantity
- 2-3) Land use

3) Socio-economical by using the following indicators:

- 3-1) Raising awareness on threats to wetlands and enhancing community participation
- 3-2) Improving livelihoods of local communities

Table 1- Biodiversity Monitoring Programme

Biodiversity Managerial objectives	Parameters	Locations for sampling	Timing of sampling	Lead Agency (Monitor + Report)	Time of reporting	Storage of data	Budget required (annual)** - Total - Government - CIWP
Flamingo	The number of species in the area, the area of distribution and presence of the species in the wetland	1- The western and southern part of the wetland 2- Abadan-Mahshar road	Monthly in the first two years and twice a year later on	Khouzestan DoE- Shadegan DoE	The reports will be submitted quarterly in the first two years of the programme and later on annually	Khouzestan DoE, Wetland Data bank and biodiversity Working group	National and provincial budgets and DoE
Marble teal	The number of matured population, The number of immature population, The area of distribution and presence of the species	1- Southern and western area of the wetland 2- Abadan-Mahshahr road	In spring and winter every 15 days, for the rest of the year monthly	Khouzestan DoE- Shadegan DoE	The reports will be gathered monthly and will be submitted quarterly	Khouzestan DoE, Wetland Data bank and biodiversity Working group	National and provincial budgets and DoE
The diversity of wintering and breeding birds	The whole population of wintering and breeding birds in the area, The counts of nests, chick and eggs, Identify the locations of hatching along with map projection	The whole area if possible including the islands located in Khore-e-mousa	Monitor the whole area every 15 days, in the first 6 months of each year	Khouzestan DoE- Shadegan, Abadan and Mahshahr DoEs, enthusiastic people	The reports will be gathered monthly and will be submitted Annually	Khouzestan DoE, Wetland Data bank and biodiversity Working group	National and provincial budgets and DoE
Wetland's mammal with the emphasize on Otter, Wild cat and Dolphin	Counts through Field visits using: footprints, trap Cameras, , Direct counts of Dolphins,	Shadegan Wetland and Khor-e-mousa	For Otter and Wild Cat the traps should be installed and checked daily within the year, For Dolphins in springs and summers	Khouzestan DoE- Shadegan, Abadan and Mahshahr DoEs,	The report should be prepared and submitted annually	Khouzestan DoE, Wetland Data bank and biodiversity Working group	National and provincial budgets and DoE

Table 1. cont'd- Biodiversity Monitoring Programme

Biodiversity Managerial objectives	Parameters	Locations for sampling	Timing of sampling	Lead Agency (Monitor + Report)	Time of reporting	Storage of data	Budget required (annual)** - Total - Government - CIWP
Wetland's mammal with the emphasize on Otter, Wild cat and Dolphin	Counts through Field visits using: footprints, trap Cameras, , Direct counts of Dolphins,	Shadegan Wetland and Khor-e-mousa	For Otter and Wild Cat the traps should be installed and checked daily within the year, For Dolphins in springs and summers	Khouzestan DoE- Shadegan, Abadan and Mahshahr DoEs,	The report should be prepared and submitted annually	Khouzestan DoE, Wetland Data bank and biodiversity Working group	National and provincial budgets and DoE
Fish societies monitoring	The level of surface and volume of the wetland, Population measurement (determining abundance, biomass) and morphometrical and meristical studies and stock assessment	After identifying the desired range in the wetland, the stations will be determined (inflows and outflows, shallow and deep areas), this area should include fresh, brackish and saline water. Basically the amount of budgets and how and when the budget could be allocated are decisive factors.	The monitoring should be done in a year, which after including the time needed for gathering data, analysing and achieving results would be around 18 months. The frequency depends on the level of changes should be annually or biannual	Khouzestan Shilat with the collaboration of Aquaculture centre of the south	Once in very three months in the monitoring period	Khouzestan DoE, Wetland Data bank and biodiversity Working group and Aquaculture centre of the south	The national fund allocated to environmental crisis, The provincial budgets with the responsibility of Shilat and Aquaculture centre of the south
Planktons and benthic societies	Determining surface level and volume of the wetland, identifying the species and determining the density of different phytoplankton (floating and periphyton), Determining grain size and organic matters of the sediments	Shadegan wetland in the area of fresh and saline water	Two years data assessment	Khouzestan Shilat with the collaboration of Aquaculture centre of the south	biannual	Khouzestan DoE, Wetland Data bank and biodiversity Working group and Aquaculture centre of the south	The provincial budgets with the responsibility of Shilat and Aquaculture centre of the south

Table2- Water and Sediment Monitoring Programme

Water Monitoring	Parameters	Locations for sampling	Timing of sampling	Lead Agency (Monitor + Report)	Time of reporting	Data storage	Budget required (annual)**
Water Quality							
Jarrahi River	Water turbidity, depth, temperature, color, scent, EC, salinity, pH, BOD, COD,DO, anions, cat ions, total hardness, TSS, TDS, heavy metals (including: Arsenic, Nickel, Mercury, Chromium, Zinc, Iron,...) Phosphate, total phosphorous, Ammonium, Nitrate, Nitrite, Silicate, Total organic and ammonia Nitrogen(TKN), Total organic carbon(TOC), Total inorganic carbon(TIC), sulfate, detergent(ABS), total alkalinity (AT), a chlorophyll, chloride, TPH, total coliform, fecal coliform, Streptococcus	The stations includes: 1- Gor Gor station (quality, quantity, online): the station is available at the moment, in which Debbie and water height digits are measured. 2- Khorusi station (quality, quantity, online): the station is available at the moment, in which Debbie and water height digits are measured. 3- Jerahi River (quantity, quality, online): prior to the river split into two branches	Online and monthly	DoE with collaboration of Khouzestand Water Authority and Shilat	A- results: - The report of sampling results at site, immediately after measurement B- The report of physico- chemical and microbial sampling result, 10 days after sampling B- Analysis: 6 month report along with comparison with available standards	DoE, wetland data bank, Khouzestana DoE, Khouzestana Water and Power Authority	
Shadegan Wetland	Water turbidity, depth, temperature, color, scent, EC, salinity, pH, BOD, COD,DO, anions, cat ions, total hardness, TSS, TDS, heavy metals (including: Arsenic, Nickel, Mercury, Chromium, Zinc, Iron,...) Phosphate, total phosphorous, Ammonium, Nitrate, Nitrite, Silicate, Total organic and ammonia Nitrogen(TKN), Total organic carbon(TOC), Total inorganic carbon(TIC), sulfate, detergent(ABS), total alkalinity (AT), a chlorophyll, chloride, TPH, total coliform, fecal coliform , Streptococcus	Saline water: 6 station Fresh water: 2 station	Online and monthly	DoE with collaboration of Khouzestand Water Authority and Shilat	A- results: - The report of sampling results at site, immediately after measurement B- The report of physico- chemical and microbial sampling result, 10 days after sampling B- Analysis: 6 month report along with comparison with available standards	DoE, wetland data bank, Khouzestana DoE, Khouzestana Water and Power Authority	

Table2- Water and Sediment Monitoring Programme

Water Monitoring	Parameters	Locations for sampling	Timing of sampling	Lead Agency	Time of reporting	Data storage	Budget required (annual)**
streams	Water turbidity, depth, temperature, color, scent, EC, salinity, pH, BOD, COD,DO, anions, cat ions, total hardness, TSS, TDS, heavy metals (including: Arsenic, Nickel, Mercury, Chromium, Zinc, Iron,...) Phosphate, total phosphorous, Ammonium, Nitrate, Nitrite, Silicate, Total organic and ammonia Nitrogen(TKN), Total organic carbon(TOC), Total inorganic carbon(TIC), sulfate, detergent(ABS), total alkalinity (AT), a chlorophyll, chloride, TPH, total coliform, fecal coliform , Streptococcus	4 stations: Streams of Bahre, Maleh, Mard and Salmaneh	Monthly	DoE with collaboration of Khouzestand Water Authority and Shilat	A- results: - The report of sampling results at site, immediately after measurement B- The report of physico-chemical and microbial sampling result, 10 days after sampling B- Analysis: 6 month report along with comparison with available standards	DoE, wetland data bank, Khouzestana DoE, Khouzestana Water and Power Authority	
Drainages	Water turbidity, depth, temperature, color, scent, EC, salinity, pH, BOD, COD,DO, anions, cat ions, total hardness, TSS, TDS, heavy metals (including: Arsenic, Nickel, Mercury, Chromium, Zinc, Iron,...) Phosphate, total phosphorous, Ammonium, Nitrate, Nitrite, Silicate, Total organic and ammonia Nitrogen(TKN), Total organic carbon(TOC), Total inorganic carbon(TIC), sulfate, detergent(ABS), total alkalinity (AT), a chlorophyll, chloride, TPH, total coliform, fecal coliform , Streptococcus	4 stations: Sugar cane Development drainages (2 station), 10 hectares drainage and irrigation network of Shadegan (2 station)	Monthly	DoE with collaboration of Khouzestand Water Authority and Shilat	A- results: - The report of sampling results at site, immediately after measurement B- The report of physico-chemical and microbial sampling result, 10 days after sampling B- Analysis: 6 month report along with comparison with available standards	DoE, wetland data bank, Khouzestana DoE, Khouzestana Water and Power Authority	
Sediments	Grain size, heavy metal, total organic carbon, phosphate, TPH	All of the river and wetland stations	seasonal	DoE with collaboration of Khouzestand Water Authority and Shilat	A- results: - The report of sampling results at site, immediately after measurement B- The report of physico-chemical and microbial sampling result, 10 days after sampling B- Analysis: 6 month report along with comparison with available standards	DoE, wetland data bank, Khouzestana DoE, Khouzestana Water and Power Authority	

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Water Monitoring	Parameters	Locations for sampling	Timing of sampling	Lead Agency	Time of reporting	Data storage	Budget required (annual)* *
Water Quality							
Jerahi River	- Water balance - Current - Catchment usages	The stations includes: Gor Gor station (quality, quantity, online); the station is available at the moment, in which Debbie and water height digits are measured 2- Khorusi station (quantity, quality and online); the station is available at the moment, in which Debbie and water height digits are measured	Daily (twice a day)	Water and Power Authority	Monthly analyzed statistics and information +monthly and annually synthesis reports	DoE, Wetland Data bank, Khuzestan DoE, Water and Power Authority	
Shadegan Wetland	- water balance - inflows -outflows - evaporation	Saline water: 6 stations Fresh water: 2 station	Daily (flooding seasons) and Weekly(non-flooding seasons)	Water and Power Authority	Monthly analyzed statistics and information +monthly and annually synthesis reports	DoE, Wetland Data bank, Khuzestan DoE, Water and Power Authority	
Streams	-inflows and outflows	The streams of Shavoli, Gahen, Aboudi, Soudi, Masir, Jaafari, om al Sakhr (in case not blocked), Toopchi, Mansoureh, Mandovan, Abshar, Jahangiri, Khorusi	Daily	Water and Power Authority	Monthly analyzed statistics and information +monthly and annually synthesis reports	DoE, Wetland Data bank, Khuzestan DoE, Water and Power Authority	
Drainage	- Current	4 station (similar to quality stations)	Daily	Water and Power Authority	Monthly analyzed statistics and information +monthly and annually synthesis reports	DoE, Wetland Data bank, Khuzestan DoE, Water and Power Authority	
Land Use							
Shadegan Wetland Land use	- Present land uses - the factors influencing land use conversion - Land use conversion licensing	All areas of Shadegan Wetland under approval of Ramsar Convention including: the area cover wetland's vegetation in the north of Abadan –Mahshahr road- Tidal lads in the south of Mazbour road, estuaries, 4 islands at the mouth of Khor mousa, coastal area at the vicinity of Perian Gulf	Data gathering and documentation along with implementation of the management plan -Field visit on every 6 months (August- March)- the comprehensive report regarding land use (once in every five years)	The main responsible party for monitoring wetland land use is Water and Agriculture working group with the leading role of DoE, Water and Power Authority and natural resource department of Khuzestan	Field visit reports (every 6 months), impact assessment report + managerial recommendations annually, The comprehensive reports regarding the condition of the wetland land use (at least once in every 5 years)	DoE, Wetland Data Bank, Doe of Khuzestan, Water and Power Authority	

Table 3. Socio-economical monitoring programme

Objectives of Management Plan	Parameters	Locations for Sampling	Timing of Sampling	Lead Agency (Monitoring & Reporting)	Time of Reporting	Storage of Data	Budget Required (annual)
Raising awareness on threats to wetlands and enhancing community participation	– Awareness on threats and public participation; – Decision markers and senior managers' attitude to ecosystem approach and participatory management; – Quality of awareness raising and public participation programs	Local and Provincial levels	– Quarterly (in main villages); – Biannually (in other selected villages and cities)	Provincial DoE/Local DoE/Provincial Governor's Office/Local Governor's Office	– Biannually (to 'Raising Awareness...' Working Group); – Annually (to 'Secretariat...')	– Provincial DoE; – National Wetland Databank	
Improving livelihoods of local communities	– Impact of livelihood programs on rural communities and sustainability of natural resources	Local and Provincial levels	– Quarterly (in main villages); – Biannually (in other selected villages and cities)	Provincial DoE/Local DoE/ Local Ministry of Cooperatives, Labor and Social Affairs	– Biannually (to 'Raising Awareness...' Working Group); – Annually (to 'Secretariat...')	– Provincial DoE; – National Wetland Databank	

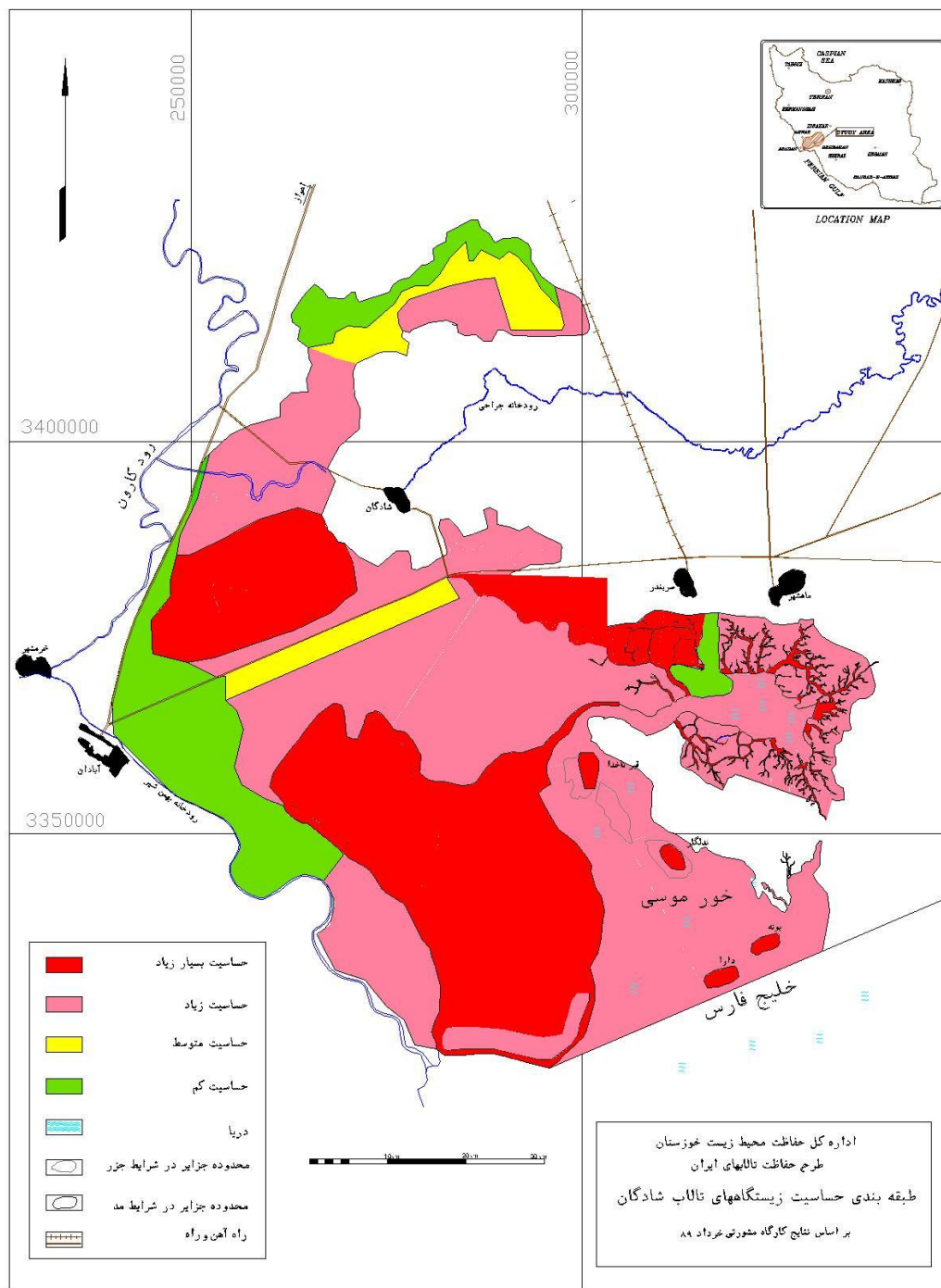
IV. Implementation Measures:

- **Team Work:** Monitoring is a collaborative effort. When one organization is assigned as responsible for monitoring, it means that this organization is in charge of planning the program and achieving results but close collaboration of other key organizations is crucial to successful implementation of the monitoring plan. Thus successful implementation of this Monitoring Plan implies close collaboration and good coordination between DoE, Water Authority, Shilat at provincial levels as well as MoAJ, DoE Shadegan, local communities and NGOs at local level. Strong support from the Governor's Office is also an indispensable requirement.
- **Data Collection and Storage:** To avoid putting extra burden on any particular organization for monitoring, all involved organizations need to follow up their own routine monitoring work with and let the data available to other key stakeholder organizations. Databases need to be established in the agencies involved in monitoring, and mechanisms developed for data sharing, preferably through the internet. A central database is under preparation to be established at DoE, who will be responsible for revising the Management Plan based on the monitoring data.
- **Methodologies/Procedures:** A good monitoring plan will produce good data and will help in taking informed management decisions. It is necessary that all procedures for monitoring are developed in details and published in each responsible organization. CIWP/ DOE would provide funding and expertise for revising these procedures and standardizing them. Also CIWP/DOE would support some of the key baseline studies.
- **Funding:** As monitoring programmes are costly, each responsible organization will provide its own funding (through national and provincial budgets), however, funding for expert advice, training, equipment and establishing databases may be available through CIWP/DOE.
- **Reporting:** A single integrated monitoring report should be produced annually by DoE Khuzestan which would summarize all the results obtained from monitoring to be used as a key source for giving feedback to the Management Plan. This should be an annual monitoring report entitled "State of the Environment of Shadegan Wetland in Year XXXX" that summarises monitoring results at site level. It should be made widely available in hard copy and on the web. Also in 5 years intervals a comprehensive analytical report would evaluate the overall conditions, activities and achievements.
- **Capacity Building:** In general it seems that the expertise for monitoring is adequate except training needs for use of new equipment or new techniques. However, the number of experts available is far below the required level and there needs to be a comprehensive training programme for implementing the Monitoring Plan. CIWP/DOE would help in this regard especially with training local communities for collaboration in monitoring efforts. Also, capacity for engaging local communities and interpretation of data needs to be acquired by DoE Shadegan.
- **Mitigating risks associated with implementation of the Monitoring Plan:** Risks associated with implementation of the Monitoring Plan fall into two main categories: those that hamper implementation of the monitoring, and those risks

posed to the environment by implementing monitoring. These risks, plus ways for their mitigation, are provided in Table below:

No.	Risks	Mitigation approach
Risks hampering monitoring		
1	Sudden climatic changes (extreme hot and cold seasons)	Be prepared for general trends of climatic changes at local, regional, national and global levels by sharing experience and exchanging information
2	Lack of budget (lack of equipment, insufficient personnel/experts)	Be prepared by preparing proposals beforehand to ask provincial and national government for necessary budgets (for example, assess the needs for new equipment and personnel and include them in the budget proposals)
3	Lack of participatory approach (lack of cooperation between various stakeholders, misinformation from officials, misinformation from local communities)	1. Get necessary training for using participatory approach in decision-making to open up new opportunities for collaboration between agencies and various stakeholders (hold multi-stakeholder meetings)
4	High turnover rate of officials	Document as much as possible and openly share documents between officials in the same organization to facilitate the integration of new officials into the process
5	Local communities not available in certain seasons	Train more than just a limited number (including volunteers from NGOs or CBOs)
6	Unreliable data (no quality control)	Seek expert advice at national and international levels for quality control (revising the existing procedures)
7	Delay in implementation of monitoring (or in producing monitoring reports)	Establish a monitoring team within DoE and provide necessary training (assign responsibilities) and make sure An Integrated Monitoring Report is produced every year – starting in 2009.
Risks posed to the environment by the monitoring		
1	Monitoring activities result in disturbance to sensitive wildlife (e.g. waterbird breeding colonies) or habitats.	Do not closely approach breeding colonies or roosting areas, but monitor from a distance. Avoid making unnecessary noise, do not wear brightly coloured clothing or use brightly coloured equipment. Avoid making sudden movements near wildlife. Limit the number of samples or sampling points. Do not move through sensitive habitats but around them as much as possible.
2	Accidental introduction of exotic species or diseases.	Observe hygiene when handling wildlife (e.g. use gloves, clean trays), and when entering sensitive areas.

Annex 2: SW Zoning Map For Sensitive Habitats



Annex 3: Shadegan Wetland Main Stakeholders

Stakeholders	
	Agriculture, animal husbandry, fisheries
1	Fishers in the Marsh
2	Fishers in the sea
3	Bird hunters
4	Animal breeders
5	Reed harvesters
6	Fish culturing units
7	Fishery's cooperative
8	Farmers and Gardeners around the Marsh
	Large industries
9	Steel factories
10	Oil Industries
11	Petrochemical Industries
12	Power plant
	Small and Rural industries
13	Boat manufacturers
14	Reed mat producers
15	Producers of fishing equipment
	Governmental organizations
16	Khuzestan Planning and Management Organization
17	Government of Khuzestan
18	Government of Shadegan, Abadan and Mahshahr
18	Animal husbandry office of KJAO
19	Veterinary division of KJAO
20	Jihad Agriculture Organization
21	Fishery Department and its research centre
22	Natural resources department of MOJA
23	Universities
24	Health and medical organization
25	Water supply and waste water disposal office
26	Khuzestan Environment Conservation Office and affiliated offices
27	Khuzestan Water and Power Authority
28	Municipalities of Ahvaz, Shadegan, Abadan and Mahshahr
29	Khuzestan Housing Organization
30	Khuzestan Roads and Transportation Office
32	Ahvaz Agricultural Research Centre
33	Sugar cane Development Company
	NGOs
34	NGOs in Abadan, Mahshahr and Shadegan