

## **Part 8: Institutional Development**

**THE STUDY ON INTEGRATED MANAGEMENT FOR  
ECOSYSTEM CONSERVATION OF THE ANZALI WETLAND**

**FINAL REPORT  
Volume III      Supporting Report**

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## **CHAPTER 1 INTRODUCTION**

### **1.1 General**

The Study has investigated and defined a number of different types of environmental problem in the Anzali Wetland and its catchment, all of which are contributing to a gradual degradation of the wetland environment, and the consequent loss of its value both as a wildlife habitat and an economic resource. That degradation is largely due to numerous unwise human activities (some of which take place a long way from the wetland itself), and is partly due to human neglect of the wetland. The solution to this is better management of the wetland and its watershed; i.e. proper management of human activities, and integrated conservation of the fabric of the Anzali environment. Better management and improved integration are institutional challenges - such issues are often more difficult to address than purely technical issues.

### **1.2 Objective**

The critical importance of these institutional challenges is accepted locally, so the objective of the institutional study has been to find ways of improving management and conservation of the Anzali ecosystem by institutional means. That objective has a number of sub-texts, including:

- Improved efficiency and effectiveness of the relevant institutions.
- Integration of the efforts of the numerous institutions that have an interest in or responsibility for Anzali Wetland and its catchment.
- Introduction of a culture of planning for the future and monitoring of performance.
- Better engagement between institutions and the stakeholders they serve, including the general public and NGOs.
- Management for the sustainable utilisation of the natural resources of the wetland.

### **1.3 Institutional Study**

The present institutional study was initiated with the conduct of an institutional questionnaire survey, in which institutions provided information on their activities, plans, budgets, etc. This was followed up with numerous one-to-one meetings and then a series of three workshops on the subject of integrated management of the wetland and its catchment. These workshops stimulated lively dialogue on institutional development for wetland ecosystem management, which continued throughout the study period and concluded with official support for the establishment of an Anzali "Conservancy" body.

It should be noted that institutional development is an on-going process and a number of institutional changes and improvements have taken place during the course of the two-year study.

## **CHAPTER 2 CURRENT CONDITIONS**

### **2.1 Institutional Structure of Government**

#### **2.1.1 National**

The Islamic Republic of Iran has a centralised form of government, administered by the 19 Ministries (plus the Office of the President and the Judiciary Power) headquartered in Tehran. The Department of Environment (DOE) falls under the Office of the President, and the Head of DOE is a Vice President. Each ministry and department has a staff structure in each of the ostans (= provinces).

Three national level inter-sectoral oversight bodies are also of relevance. The Environment High Council (EHC) is chaired by the President and includes, inter alia, the Ministers of Jihad e Agriculture, Construction Industries, Interior, Housing & Urban Development, Health & Medical Education, along with the Director of the Management and Planning Organization (MPO) and the Director of DOE who serves as the secretary to the EHC. This council would need to approve any change in legislation affecting the environment. Moreover, it has the power to make new environmental legislation without reference to or approval from the Majlis. This is of great importance with reference to any new legislation that might be needed to establish a new body for the management of Anzali Wetland and its catchment (see 4.4.1 below concerning the proposed establishment of the Anzali Conservancy).

DOE also acts as the Secretariat of the Ramsar Sub-Committee of the National Council for Sustainable Development (NCSD), which reports directly to the EHC.

The Water High Council is chaired by the President and includes the Ministers of Energy, Jihad e Agriculture and Interior and the Directors of MPO and DOE. This council co-ordinates decision-making with respect to the provision, distribution and use of water.

The national Commission on Agriculture and Natural Resources (one of 22 parliamentary commissions) may also be of relevance.

#### **2.1.2 Provincial**

The provincial administrations, led by a centrally-appointed governor, are staffed by the provincial staff of the ministries, who are therefore answerable to both their HQ and their provincial Governor. A large proportion of provincial income, both taxes and government fees, is paid to central government, which then distributes a large proportion of the total back to the ostans for development. These proportions vary geographically, to provide financial support for the poorer ostans. The proportions have also been changing over time to give an increasingly greater provincial control over expenditure. All expenditure is budgeted and controlled, both centrally and provincially by (MPO).

The ostans are divided into shahrestans (=sub-provinces), which are usually centered on a large town or city. Guilan province has 16 shahrestans, six of which cover the study area, and



two cover the Anzali Wetland, Bandar-e-Anzali and Somehsara. The municipal authorities in the shahrestans are responsible for public services, development control, and development planning in liaison with the Housing and Urban Development Organization.

Water supply and sewage treatment are provided by nominally independent water companies at shahrestan level, with separate companies for the urban and rural areas (Guilan Water and Wastewater Company and the Rural Water and Wastewater Company of Guilan respectively).

## 2.2 Anzali Stakeholder Organizations

Numerous institutions have some responsibility for, or interest in, environmental management of the Anzali Wetland and its catchment. For the purposes of this study, we have concentrated on those institutions that were the subject of the institutional questionnaire survey, i.e. the following:

- Department of the Environment (DOE), Headquarters in Tehran
- Department of the Environment, Provincial Directorate in Guilan
- Department of the Environment, Water Quality Laboratory in Anzali
- Ministry of Jihad-e-Agriculture (MOJA), Headquarters in Tehran
- Ministry of Jihad-e-Agriculture, Provincial Directorate in Guilan
- Ministry of Jihad-e-Agriculture, Watershed Management Bureau<sup>1</sup> in Guilan
- Ministry of Jihad-e-Agriculture, Forestry and Rangeland Organization (FRO), Guilan.
- Ministry of Jihad-e-Agriculture, Fisheries (Shilat) General Directorate of Guilan
- Ministry of Industries and Mines (MOIM), Provincial Organization in Guilan
- Management and Planning Organization (MPO), Provincial Directorate in Guilan
- Ministry of Energy (MOE), Guilan Regional Water Company
- Guilan Water and Wastewater Company (GWWC) – urban systems.
- Rural Water and Wastewater Company of Guilan
- Ministry of Roads and Transportation (MORT), Provincial Directorate in Guilan
- Ports and Shipping Organization (PSO), Bandar e Anzali
- Government of Guilan Province
- Rasht Municipality
- Anzali Municipality
- Somehsara Municipality
- Iranian Travel and Tourism Organization (ITTO)<sup>2</sup>, Guilan Provincial Office
- Guilan University, Rasht
- Guilan Green NGOs Network

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<sup>1</sup> Note that responsibilities for watershed management are now being combined with forest and rangeland management under FRO.

<sup>2</sup> Note that the tourism responsibilities of ITTO have now been combined with those for culture and heritage within the new Culture, Heritage and Tourism Organisation (CHTO).

The scarcity of civil society organizations should be noted. The NGOs in the above-mentioned network are mostly very small low-profile groups of people. DOE continues to encourage the development of such “sabz” (=green) NGOs. However, it seems that there are not any associations or clubs to represent the usual amenity interest groups such as hunters, anglers, bird-watchers, water-skiers, etc.

## **2.3 Institutional Analysis**

### **2.3.1 Introduction**

The institutional survey was conducted using questionnaires tailored to the individual organizations concerned, and in-depth interviews with principal officers to elaborate on the information provided. The level of co-operation in this survey was generally good, with the exception of one organization which refused to participate. Whilst reliable informants were involved, the responses provided were coloured by personal views, which may not be totally representative of each organization as a whole.

### **2.3.2 General Observations**

The questionnaire responses demonstrate some interesting general patterns, as follows:

- Very few of the organizations were willing to provide any information about their funding and budgets.
- Few of the organizations have environmental specialists on their staff, or see a need for them.
- Most organizations defer to DOE in all environmental matters, including issues related to the Anzali Wetland. This is a very convenient approach, which enables them to neglect environmental issues themselves and take no responsibility for them.
- Similarly, most consider environmental education to be important, but the responsibility of DOE.
- There is very little public participation or communication involved in the work of most of the government agencies.
- The municipalities seem to have very little interest in or responsibility for Anzali Wetland. Their vision of environmental management is restricted to solid waste management, which is a continuing problem for each of them.
- There is a great disparity in the capability of the different organizations. Some appear to be “sleepy” and to have little initiative. By comparison, PSO comes over as a very “sharp” organization, with a clear understanding of its responsibilities and how to implement them properly. Moreover, it understands the wider environmental problems of the wetland and has ideas for their solution.

### 2.3.3 Specific Observations

The detailed results of the institutional survey are provided in the Data Book and are summarised below.

#### (1) DOE HQ Tehran

The HQ of DOE is conscious of problems in environmental management, particularly the poor co-ordination and lack of planning. Also noted are poor enforcement, inadequate / outdated legislation, a lack of influence over development, and a lack of national legislation to implement international environmental agreements. An interesting suggestion was to move the “brown” (Human Environment) responsibilities of DOE to the municipalities, and to combine DOE with the MOJA Forest & Range Organization (FRO) and the water section of MOE. As discussed below, this would have clear benefits in terms of co-ordination and effectiveness.

#### (2) DOE Provincial Directorate in Guilan

The DOE Rasht office is very well aware of the environmental problems of the wetland and its catchment, and is active in addressing them. However, the management is struggling to cope with overwhelming problems with too few technical staff. More time input of professional staff is needed and more work is required at a higher level, including planning. The enormous list of proposed additional resources required for management of Anazli and its catchment (including helicopter!), infers a separately funded organization. Currently, the technical staff is a small proportion of the total staff. This indicates the need for more efficient use of existing staff, and/or a change in the ratio of technical to other staff. The importance of enforcement is mentioned, but there is little evidence of the result of enforcement activity.

#### (3) MOJA HQ Tehran

MOJA confirms the lack of an agriculture management plan for Guilan province. There is some understanding of the Anzali problems, and a good understanding of the need for an ecosystems approach to manage them. Much faith is placed in the new MOJA office for Environment and Sustainable Agriculture, and its replication in the provinces. (It is hoped that this will be able to introduce new approaches and will not just be another “silo” in the organization).

#### (4) MOJA Provincial Directorate in Guilan

MOJA appears to be doing a lot of work in the Anzali watershed, but it seems to have added more and more activities without an overall strategy or plan, e.g. watershed management and forestry have acted separately. (This is now being addressed by the merger of the Watershed Management Bureau and FRO. The merged organization will need to adopt a cross-cutting approach, perhaps using the protected watershed concept.) Again, much faith is placed in establishment of the new provincial office for Environment and Sustainable Agriculture.

(5) MOJA Watershed Management Bureau in Guilan

This is a potentially critical organization for protection of the downstream wetland, but has little connection with other organizations and little connection with the public. It considers that its need is for more heavy machinery, but better communication and co-operation with communities would be more effective in the long-term. It says that it does not have relations with DOE, NRG, MORT or MOE. This is very surprising given the watershed problems caused by MORT and the problems in some rivers under MOE responsibility. Public participation is (unfortunately) dealt with by the separate Extension and Public Participation Office of MOJA. The Bureau claims not to have any environmental specialists, which demonstrates a lack of understanding of the concept of the environment. (The more recent merger with FRO was clearly a much needed and timely reorganization.)

(6) MOJA Forestry and Rangeland Organization, Guilan

FRO seems to be doing a good job, and has provided interested, committed replies. It is noted that there have been conflicts of interest between FRO and both the Watershed Management and Agricultural divisions of the same parent ministry. An interesting suggestion made was that a Ministry of Natural Resources is needed to provide integrated environmental management. (Integration within MOJA itself should probably be achieved first, and the merger of the Watershed Management Bureau with FRO is a welcome first step in that direction). FRO appears to have a lot of useful mapped information, e.g. a Comprehensive Land Management Plan for Guilan, management plans for several areas around and near the wetland, land auditing maps, land classification maps and land tenure maps.

(7) MOJA, Fisheries (Shilat) General Directorate of Guilan

Shilat understands the environmental problems of Anzali, but sees them as a DOE responsibility, and is therefore content to focus on fisheries. There is overlap with DOE because Shilat is responsible for resource protection and fisheries management, whilst DOE is responsible for management and the issue of hunting and fishing licences within Anzali. Shilat has no environmental education or public awareness activities, which are conveniently seen as DOE's responsibility. There is co-operation with the Bony Fish Research Center on fish biology. It is very telling that Shilat states that "No space has been foreseen or allocated for Environmental Management in the organization chart". Shilat is funded by caviar sales.

(8) Ministry of Industries and Mines (MOIM), Industries and Mines Organization (IMO) in Guilan

The IMO defers to DOE in most technical affairs. It provides some Health and Safety (H&S) training and conducts factory inspections. It does not see industrial waste as having a direct effect on the water quality of Anzali Wetland. IMO recommends waste treatment for industry in Rasht Industrial City, but admits that the cost makes this impossible. It suggests the need for two environmental officers in IMO, but sees no need for organizational change, just closer co-operation with DOE.

(9) Management and Planning Organization (MPO), Provincial Directorate in Guilan

MPO understands the environmental problems of wetland and watershed, but has no direct interest in or concern for them. MPO relies on DOE at provincial level and its own HQ Environment Section at national level. Apparently, some national level environmental guidelines have been prepared. There is no requirement for Environmental Impact Assessment (EIA) of provincial development plans. Public participation is stated to be via district governors and local authorities “which in turn reflect public opinion”. MPO mentions that it could increase financial resources for environmental projects by use of the “Fund Allocation Mechanism”, but considers the amount needed for Anzali management would be so great that it would have to come from national resources.

(10) Ministry of Energy (MOE), Guilan Regional Water Company

The regional water company has an apparent disinterest in the environment, and lack of communication with other relevant organizations and communities. It is interesting to note that they identify their lack of environmental management plans for rivers as the reason for “uncertainty and delay in decision making”.

(11) Guilan Water and Wastewater Company (GWWC) – urban.

GWWC has great enthusiasm for environmental management and good relations with DOE and other Anzali stakeholders. They have some communications with their customers and the public at large. However, the main task of GWWC is as a service company, which is inevitably limited by its resources and its statutory duties. They believe that they need to establish an environmental section.

(12) Rural Water and Wastewater Company of Guilan

This is an engineering based utility trying to do its job with inadequate funds. It has no special environmental concern, but recognises the significance of its work to the improvement of water quality in Anzali Wetland. Some training / public awareness activities have been conducted in villages.

(13) Ministry of Roads and Transportation (MORT), Provincial Directorate in Guilan

MORT has refused to co-operate with the study. This is unfortunate as the road construction activities of MORT are a very significant contributor to the suspended solids load in the rivers. Engagement would be helpful to all, including MORT itself.

(14) Ports and Shipping Organization (PSO), Bandar-e Anzali

PSO is a serious and well organised institution, which seems to have port marine pollution issues well under control. It apparently has good regulations and enforcement thereof. Marine wastes are properly managed. PSO has an environmental specialist on its staff. PSO licences the tourist motor-boats. Owners of the boats are provided with some environmental education. It is interesting that they recommend that rehabilitation and management of Anzali Wetland should be undertaken by an independent government or private organization responsible for protection, maintenance and utilisation of the wetland.

(15) Government of Guilan Province

The provincial authority appears only to supervise others. It seemed to be unaware of the Provincial Committee on Land use, Population and Environment.

(16) Rasht Municipality

The municipality provides usual municipal services. It has not undertaken any special actions concerning Anzali Wetland. It has established a "Municipal Planning Study Center" with access to some part-time environmental expertise.

(17) Anzali Municipality

This is a simple municipality, doing its job without much regard for, or interest in environmental or wetland issues. However, it considers that it needs to add an environmental unit to its organization. Its main environmental concern is solid waste management. The budget of Anzali Municipality is only \$3.5 million per annum.

(18) Somehsara Municipality

Somehsara Municipality has no responsibility, interest or action in the environmental management of Anzali wetland, which is surprising given its location. It apparently has no relations with NGOs or communities.

(19) ITTO, Guilan Provincial Office

This office seems to be quite disconnected from the wetland. It sees ecotourism development and wetland protection to be the responsibility of the private sector and of DOE respectively. It relates to government departments, but apparently has no link with NGOs or local communities. Their classic statement is "We consider the wetland of no relation to us and therefore do not interfere and have no motivation in this regard". It seems a great shame that the ITTO office does not see Anzali Wetland itself as a major resource having potential for the development of tourism, particularly ecotourism. (However, Dr Sharif is more enthusiastic on behalf of ITTO).

(20) Guilan University, Rasht

The questionnaire responses of the university were not at all impressive or relevant.

(21) Guilan Green NGOs Network

This network is starting from a very low base. The NGOs are all small and are "interested" in the environment, rather than "active" in environmental issues. (This is similar to the situation in Europe 40 years ago.) The many small NGOs need to join together to form one or two substantial NGOs, which could then bid for project funding and get involved in project implementation work.

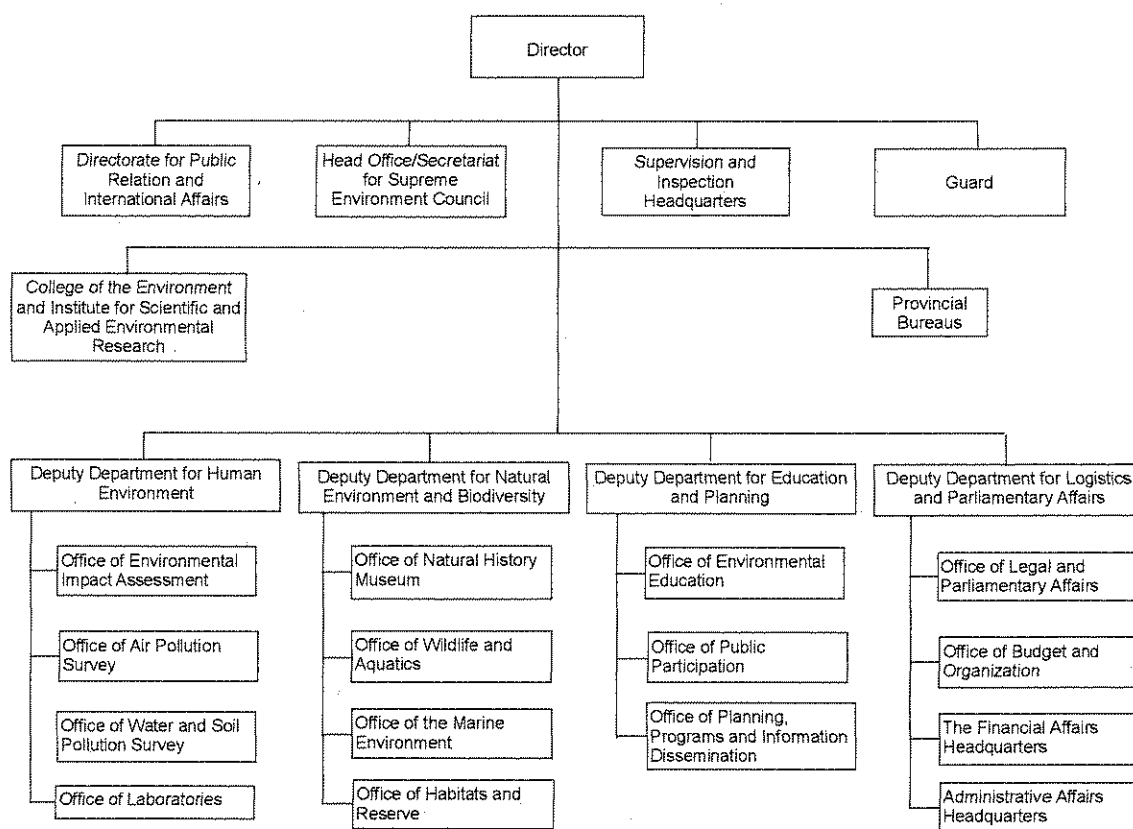
### 2.3.4 Institutional Structures

The organizational structures of the two major institutions involved in the management of Anzali Wetland and its catchment are summarised below.

#### (1) Department of Environment

##### 1) DOE Headquarters

Figure 2.2.1 shows the organizational structure of the Department of the Environment (DOE) headquarters in Tehran.



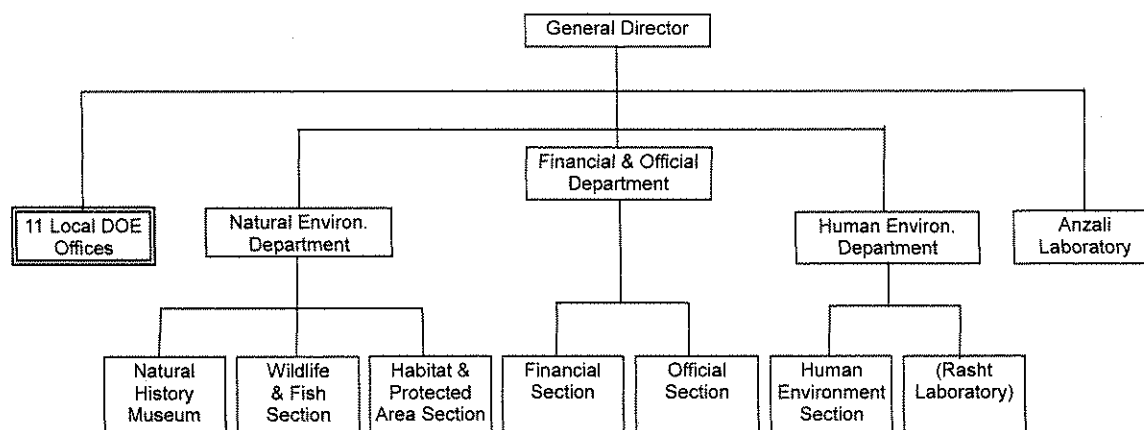
Source: DOE, 2002

**Figure 2.3.1 Organizational Structure of DOE Headquarters**

The headquarters of DOE is mainly responsible for policy making, development of laws and regulations, management of national projects, budget allocation to provincial bureaux, and technical support to the provincial bureaux.

##### 2) Provincial DOE

Provincial DOE bureaux are responsible for environmental management. Figure 2.2.2 shows the organizational structure of the DOE Guilan.



**Figure 2.3.2 Organizational Structure of DOE Guilan Bureau**

There are approximately 300 staff in DOE Guilan, of which about 80 are stationed in the main office in Rasht. DOE Guilan has three major departments, dealing with the Natural Environment, the Human Environment Department, and Financial and Official affairs. The management of the Anzali Wetland protected areas is under the responsibility of the Habitat & Protected Areas Section of the Natural Environment Department, which is also responsible for management of the protected forest (Shaft Siahmezig Protected Area).

The responsibility of the Human Environment Department is to control pollution and other aspects of the environment related to human activities (the so-called “brown environment”).

### 3) Local DOEs

The Provincial DOE Bureau has 11 local offices in the following locations: Rodsar, Langrod, Lahijan, Astaneh, Siahkal, Rodbar, Fuman, Somehsara, Talesh, Astara and Bandar Anzali<sup>3</sup>. The protection and patrol activities in Anzali Wetland fall under the jurisdiction of the Anzali and Somehsara DOE offices. There are 31 DOE guards on duty in the wetland, 21 from Anzali and 10 from Somehsara. A typical organizational structure of a local office is shown in Figure 2.2.3.

<sup>3</sup> The local DOE in Masal had established in October 2004.



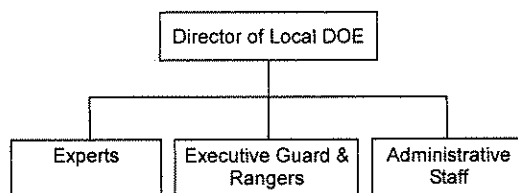


Figure 2.3.3 Organizational Structure of a Local DOE Office

## (2) Ministry of Jihad-e-Agriculture

### 1) MOJA HQ

The Ministry of Jihad-e-Agriculture (MOJA) is responsible for watershed management in the basin. In the headquarters of MOJA, the Deputies for Watershed Management, Forest & Rangeland and Watershed Management Organization are responsible for watershed management. In Guilan Province, the Deputy of Watershed Management of MOJA Guilan Provincial Office is responsible for soil erosion control and the Natural Resources General Office (NRGO) of Guilan Province is responsible for rangeland management and forest management. In addition, the Deputy for Cultivation and Agriculture is responsible for the management of agricultural land.

### 2) MOJA Guilan Office

The organization chart of MOJA Guilan is shown below.

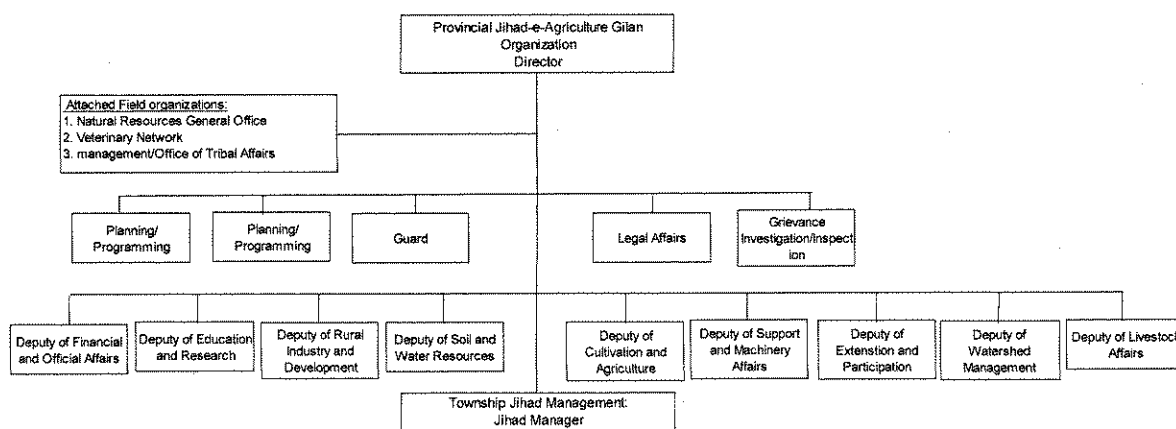


Figure 2.3.4 Organizational Structure of MOJA Guilan

### 3) NRGU Guilan Office

The organization of the NRGU Guilan Office is as follows:

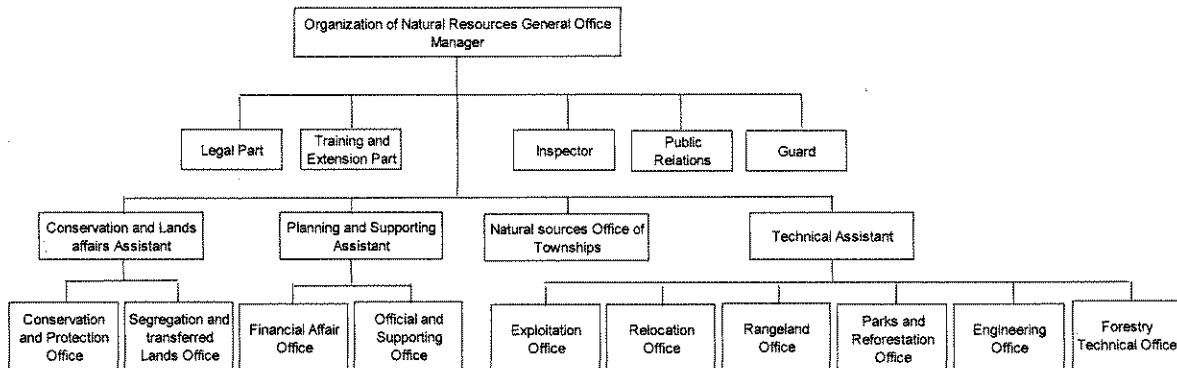


Figure 2.3.5 Organization Structure of NRGU of Guilan

The relationship between MOJA and agricultural producers is shown in the following figure. Some co-operatives are under the direct control of the MOJA and others fall within the private sector. Production co-operatives under MOJA provide technical assistance, education, fertilizers and agricultural chemicals, while township co-operative offices under the rural co-operative organization center provide agricultural materials, foods, etc.

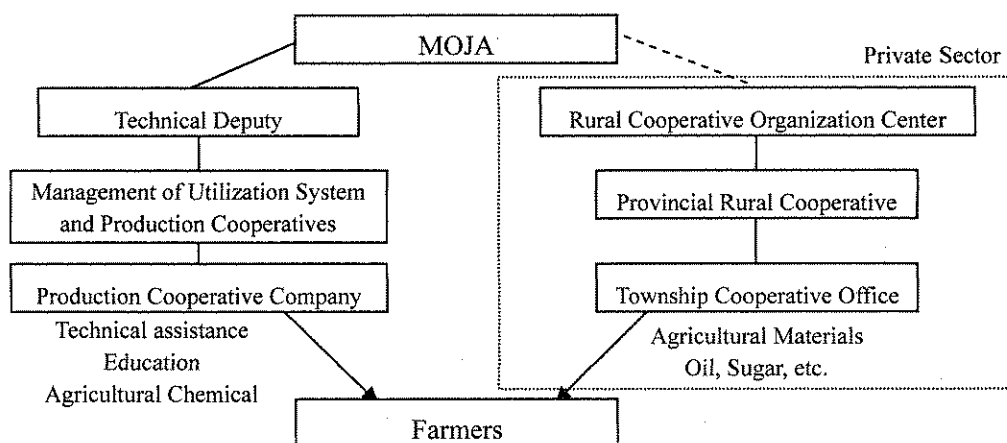


Figure 2.3.6 Relationship Between MOJA and Producers

## 2.4 Existing Co-ordinating Body

Poor co-ordination has been identified as the principal constraint to good environmental management of Anzali Wetland and its catchment. There has therefore been a strong imperative within the institutional study to improve co-ordination and integration. If possible, it would be preferable to improve co-ordination by means of existing channels and institutions. There is already a Thematic Working Group on Land use and Environment (and Population), for which MPO provides the secretariat. The membership of this Working Group is as follows:

**Table 2.4.1 Membership of the Land use & Environment (and Population) Working Group**

No.	Member
1	The Governor (Chairman)
2	Head of Provincial Management & Planning Organization (Secretary)
3	Head of Provincial Housing & Urban Planning Organization
4	Head of Provincial Roads & Transportation Organization
5	Head of Provincial Department of Environment
6	Head of Provincial Jihad & Agriculture Organization
7	Representative of Ministry of Defense (Designated by the Minister)
8	Managing Director of the Regional Water Company
9	Head of Provincial Mine & Industries Organization
10	Head of the Islamic Housing Foundation of the province
11	General Director of the Provincial Cultural Heritage Organization
12	Head of the Provincial Tourism Organization
13	General Director of the Provincial Natural Resources Organization
14	General Director of Provincial Tribal Affairs Bureau
15	Director of the Provincial Education and Training Organization
16	Managing Director of the Provincial Water & Wastewater Company
17	General Director of the Technical Office of the Provincial Government
18	Managing Director of the Industrial Areas of the Province
19	Director of the Economic Planning Office of the Provincial Government
20	Director General of the Provincial Social Affairs Organization
21	Director General of the Provincial Intelligence Bureau
22	Official representative of Provincial NGO Network (Without Vote)
23	Other co-opted non-voting members (Mayors, University Professors, Head of Provincial Islamic Council)

The Land use & Environment (and Population) Working Group is one of the Thematic Working Groups under the Provincial Council for Planning and Development (chaired by the Governor), which are listed in Table 2.3.2 below, each of which also has technical Working Groups. The Thematic Working Group on Water, Agriculture and Natural Resources, is also of relevance to Anzali.

**Table 2.4.2 Thematic Working Groups of the Provincial Council for Planning & Development**

No.	Working Group
1	Administration Promotion Planning
2	* Infra-structure & Development
3	* <b>Water, Agriculture and Natural Resources</b>
4	* Industry & Mine
5	* Fuel Wise Use
6	* Urban Development & Architecture
7	* <b>Land use &amp; Environment (and Population)</b>
8	* Tourism & Cultural Heritage
9	* Employment & Investment
10	Export Development
11	* Research, Statistics & IT Technology
12	Education & Training
13	* Social Affairs
14	* Hygiene, Health Care & Social Security
15	Culture, Arts & Physical Education
16	Women & Youth

Notes: The Director General of Guilan Province DOE is a member of the Thematic Working Groups (WG) asterisked \* above.

Decisions of Thematic Working Groups are implemented if approved by the Council.

Such decisions must be sent to the Council's Secretariat within one week.

The Secretariat of each WG resides within the organization of which its Secretary is a member.

It could be argued that the Provincial Working Group on Land use, Environment and Population is the right forum for integration between Anzali stakeholders. However, the Working Group has shortcomings in this respect as follows:

- this Working Group is not specific to Anzali or its catchment,
- it is a forum for discussion and decision-making, rather than a body responsible for continuous management, and
- it does not meet very often (only once during the two years of the study).

The latter point is the most relevant, in that it is a working group in name alone. It therefore does not currently provide an adequate co-ordinating mechanism to address the principal institutional problem identified above.

## **CHAPTER 3 MAIN ISSUES**

### **3.1 Issues to be Addressed by the Environmental Management Institutions**

All institutions consulted agreed that the physical problems that need to be addressed are as presented in other parts of this report, which can be summarised follows:

- Eutrophication of water in the wetland due to inputs of untreated domestic effluent, livestock effluent, fertilisers and eroded soil.
- Excessive growth of floating water-weeds and seasonal fish-kills, due to the eutrophication.
- Pollution of watercourses due to inputs of industrial effluents, pesticides and municipal waste.
- Littering of the wetland due mostly to a lack of municipal waste management in the catchment, and also direct discharges of solid waste to the rivers and wetland.
- Sedimentation in the wetland due to soil erosion in the catchment, caused by severe over-grazing, careless road construction and high altitude deforestation.
- Degradation of the physical fabric of the wetland due to encroachment and development (e.g. the Anzali Ringway road).
- Threats to the biodiversity of the wetland due to poaching, over-fishing and pollution.
- Disturbance of the protected areas in the Ramsar site and conflicts of interest between, for example, motor-boating, hunting, fishing, canoeing, tourism, conservation, etc.
- Risks to the wetland due to the immediate proximity of the usual hazards of a major port and industrial town (e.g. potential for oil spill, chemical tank rupture, fire, explosion, etc.).

### **3.2 Institutional Problems of Environmental Management**

Legislation is available to address most of the above physical problems, and whilst each of the organizations takes action to fulfill its own duties, they are undertaken sectorally. Issues of environmental and resource management are very broad, and the present administrative system is not able to address them in an integrated fashion. The environmental problems of management of the Anzali Wetland and its catchment are therefore largely organizational and institutional in origin, and can be summarised as follows:

### 3.2.1 Poor Inter-organization Co-ordination

Most of the responsible bodies feel that they are addressing the problems correctly in their own domains, but there is an almost universal recognition that the primary problem is inadequate communication and co-ordination between the various responsible bodies<sup>1</sup>.

### 3.2.2 Poor Intra-organization Co-ordination

In fact, the lack of integration seems to be more serious than is recognized, because it applies within the major organizations as well as between them. For example, the MOJA Watershed Management Bureau has not had close relations with the MOJA Forestry and Range Organization (FRO). This is despite the fact that forestry is one of the most effective means of protecting watersheds<sup>2</sup>. Similarly, the overall relationship between agricultural development and watershed management is not well appreciated.

### 3.2.3 Unclear Responsibilities

It seems that the responsibilities of different government institutions are often either unclear or overlap. This is partly due to changes in the structure of government, which have not been followed up with amendment of management responsibilities and clear instructions for implementation (e.g. the merger of the Ministries of Jihad and Agriculture) or where the implications of structural change have not been anticipated at the time of re-organization. Of course, this contributes to the inadequate co-ordination between and within organizations mentioned above.

### 3.2.4 Inadequate Budget

Most organizations believe that they could do a better job if they had a larger budget. For many this is undoubtedly true, given the historical lack of investment (and lack of expectation) in public services such as waste disposal and sewage treatment. The recent rapid growth in population means that the capacity of public services and infrastructure has been overwhelmed, and will not be able to cope unless there is significant new investment. However, in many cases, performance could be improved with better organization and management.

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<sup>1</sup> This could be partly addressed by the proposed merger of NRGO, DOE and the Water Department of MOE, which has been approved by Government, but so far has been rejected by the Majlis (this may change over time).

<sup>2</sup> This is currently being addressed by moving watershed management responsibilities to fall under the FRO, but it is symptomatic of a more general problem.

### 3.2.5 Need for Ecosystem Approach

There is not a good appreciation of the need for an ecosystem approach to management of the wetland and its watershed. For example, the Watershed Management Bureau states that it does not have any environmental specialists on its staff, yet its whole *raison d'être* must actually be environmental management of watersheds<sup>3</sup>.

### 3.2.6 Inadequate Planning

Another indication of this lack of a broad integrated management approach, is the fact that the main institutions do not have a plan or Master Plan for the Anzali catchment (with the exception of the "Comprehensive Land Management Plan" of the FRO, which has not yet been published). Whilst many "good works" are undertaken by the individual organizations, there seems to be an ad hoc approach to the selection of their activities.

### 3.2.7 Lack of Pro-active Management in the Wetland

DOE Guilan diligently carries out its statutory duties in the enforcement of regulations (re fishing and hunting) and the protection of gazetted protected areas. However, it has not undertaken much other pro-active management of the wetland. This is beginning to change as funding is put into physical works e.g. restoration of the channel around Selke. However, such works should be planned as part of an overall long-term plan for management of the wetland.

### 3.2.8 Lack of Implementation

It is clear that Anzali Wetland and its catchment have been the subject of numerous studies over the years, including the 1989-1991 FAO study and the comprehensive study conducted by Guilan University during 1995-1999, with similar objectives and methods to the present study. These studies have resulted in relatively little action. There appear to be two reasons for this. Firstly, there is a general institutional inertia, which prevents any new work or direction (other than reorganizations). Secondly, given that there is no single body responsible for the wetland (and its watershed), everyone assumes that it is the responsibility of someone else to initiate action.

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<sup>3</sup> The recent establishment of an Office for Environment and Sustainable Agricultural Development in MOJA's HQ, and its eventual replication in the provinces, is a very welcome development in the right direction. It is to be hoped that this will be able to introduce a cross-cutting ecological approach to agriculture, rather than simply adding yet another "silo" to the MOJA organization.

### 3.2.9 Lack of Motivation

Virtually all government officers undertake private work in the afternoons, which is often more profitable than their government salary. This means that they may lack motivation to undertake their official duties, and may even be diverted from their duties by the greater interest in their private work. It also means that they may look for opportunities to “privatize” parts of their official duties. This is a problem that occurs in all countries which pay unreasonably low salaries to government officers, and which can also lead to corruption. Elsewhere, this has been addressed by reducing the number of government officers whilst increasing their pay (part of “Structural Adjustment”). This national problem cannot be addressed in the present study.



## CHAPTER 4 INSTITUTIONAL PLAN FOR IMPLEMENTATION

### 4.1 Introduction

It can be concluded from Chapters 2 and 3 above that, whilst several government organizations are doing good work in both the wetland and its catchment, overall management is not good. This is because:

- the concept of integrated environmental management is not well developed, and
- there is poor communication and co-ordination, both within and between government organizations.

### 4.2 Objectives

Given the problems referred to above, the objectives of institutional development can be summarised as follows:

- Improve inter- and intra-organization co-ordination, and clarify environmental management responsibilities.
- Improve the efficiency of service provision
- Develop a culture for the planning of future activities, and the monitoring and evaluation of implementation.
- Increase pro-active management, particularly in the wetland.
- Develop the management capacity and commitment of staff.
- Encourage civil society to play a more active role in environmental management.

### 4.3 Strategy

The present study cannot solve all of the above institutional problems for each of the organizations surveyed, and cannot solve the funding problems of those organizations and services which may genuinely need larger budgets to operate properly. However, it may be possible to make progress with both their integration and their effectiveness. At national level, this might need significant institutional change. For example, it has been suggested that the co-ordination of watershed management activities would be improved if the MOJA Forest and Range Organization (NRGO) and the water quality section of MOE were united with DOE<sup>1</sup>. Such national institutional matters are considered to be outside the remit of the present study.

At the Anzali Wetland level, improved integration would require a recognized forum of stakeholders, and improved effectiveness of management would require a body that can execute the decisions of the forum, as described in the proposed arrangement below.

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<sup>1</sup> This proposed merger was approved by Government some years ago, but so far has been rejected by the Majlis.

## 4.4 Outline of the Institutional Plan

### 4.4.1 Establishment of the Anzali Conservancy

Given the size of the government machine, the establishment of a yet another new body should always be avoided if possible. However, existing institutional arrangements are not providing the degree of co-ordination and integration needed for the proper environmental management of Anzali Wetland and its catchment. In the circumstances, a body referred to as a “Conservancy” has therefore been proposed, and has been agreed at various meetings of Anzali stakeholders during the course of the study. Moreover, the proposal was accepted at the first meeting of the provincial Thematic Working Group on Land use and Environment (and Population) held on 23rd June 2004. This was chaired by the Governor of Guilan Province, who asked the General Director of DOE Guilan to prepare a paper on implementation of the Conservancy proposal, for further consideration.

UK experience indicates that the conservancy model can be very effective in managing multiple-use coastal wetland Ramsar sites which fall within more than one existing administration. (An example of a conservancy in the UK, which was visited by staff of DOE Guilan as part of the present study, is described in Appendix 1).

A conservancy is run by a committee of stakeholders (delegated by provincial council, local councils, representatives from NGOs, representatives from conservation bodies, etc), and it also has a full-time staff which acts as the implementing executive, and also provides the secretariat of the committee, as indicated in Figure 4.1 below. A conservancy therefore acts both as a representative body and as a management agency having powers to make regulations, collect fees, undertake works, etc.

Section 4.4.6 below describes a very similar arrangement, adapted for application in Iran, which has already been proposed and agreed for Lake Uromiyeh, and will be applied in the implementation of the three current Uromiyeh lake and watershed management initiatives. The establishment of the conservancy committee under the authority of the provincial environment committee, therefore seems to be an institutional model that can be accommodated within the Iranian administrative system (see also section 4.4.2 below). In the case of Anzali, the initial staff could be established relatively easily by transferring existing staff from DOE, and possibly other relevant organizations. (See section 4.4.8 below, which describes the way in which DOE could initiate the functions of the Conservancy in advance of its formation).

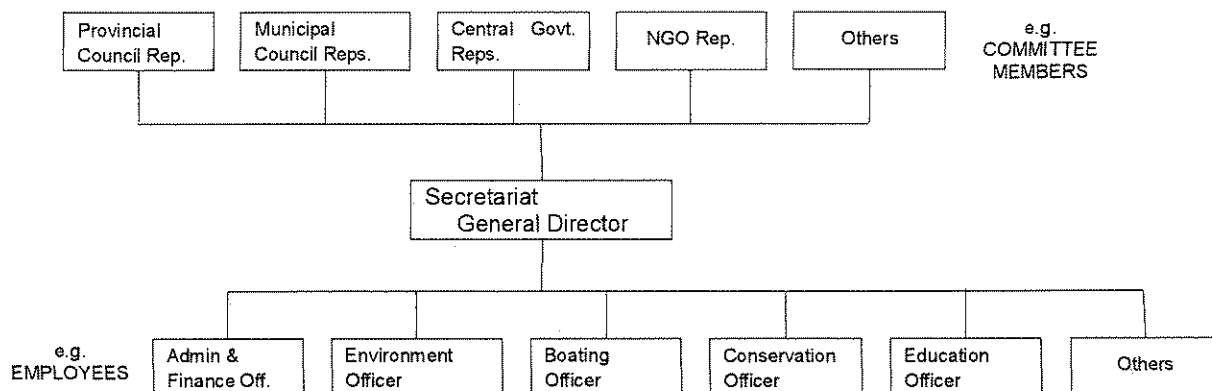


Figure 4.4.1 Structure of a Typical Conservancy

A conservancy body is involved in conservation, environmental protection/improvement, environmental research/monitoring, environmental education, control of navigation, and is also responsible for Ramsar issues, etc. A conservancy is established legally and may be funded by a combination of: payments from local authorities, grants from central government agencies, boat licensing fees, and various research grants, international funds, etc. (One benefit is that once a legal body has been established, it can request financial support from funding agencies, foundations, etc.) Once established, a conservancy is recognized as the official guardian of the wetland, and will be consulted as such by developers, government agencies, the public, etc.

Section 3.2 above has outlined nine institutional problems. The establishment of a conservancy would address these problems as follows:

**Table 4.4.1 Problems to be Addressed by the Conservancy**

No.	Problem	Conservancy Solution
1	Poor Inter-organization Co-ordination	The committee of the Conservancy will provide the forum for co-ordination between stakeholder organizations.
2	Poor Intra-organization Co-ordination	The single body responsible for management will be small enough for continuous and effective internal communication.
3	Unclear Responsibilities	The responsibilities of the conservancy will be clearly set out in the legislation used to establish it.
4	Inadequate Budget	The conservancy will inherit the income-generating functions related to the responsibilities it takes on from existing organizations. Moreover, as a legal entity, it will be able to apply for Iranian and international grants, etc., for specific projects and programs of work.
5	Need for Ecosystem Approach	The Conservancy will be related to a specific ecosystem, the wetland (and its catchment) rather than a government department.
6	Inadequate Planning	The conservancy will be responsible for implementation of the Wetland Ecological Management Plan and its regular up-dating.
7	Lack of Pro-active Management	The conservancy will have specific pro-active responsibilities, which will be defined in its founding legislation.
8	Lack of Implementation	The past lack of implementation has been largely due to the fact that the many provincial councils and working groups have committees but no executive staff. The conservancy will be set up with full-time professional staff, who will be responsible for implementing the decisions of the committee.
9	Lack of Motivation	The conservancy staff will be a small group of well-paid professional staff, who would be selected for their enthusiasm and commitment.

#### 4.4.2 Legal Position of the Conservancy

Clearly, any new body would need to fit within the Iranian legal and administrative system, so a small Steering Committee was formed to take the actions necessary to promote and initiate a new body. This Steering Committee met for the first time on 11th October 2003 and determined the characteristics of the new body, which were then conveyed to the Governor of Guilan Province. The conclusions were as follows:

- All the members agreed with the establishment of an effective guidance and management body for Anzali Wetland and its Watershed.
- This proposed body should be supported by the law.
- Members believe that this management body must have enough power to make decisions and to execute them.
- This independent body (a quasi-governmental body) should have an independent budget, in order to be able to use all possible legal regional (Anzali Wetland and its watershed) and national funds. This new body must be able to utilise other financial resources within the observation of the law.
- In order to make and execute decisions, the new management body should be made up of representatives of the various relevant organizations and NGOs. It could also use the management of the private sector.
- In the case of urgent need, this body could make use of different governmental and private organizations, in order to help make decisions.

- This management body would consist of an independent officially determined structure (the new body would have a committee and an executive with a head, staff, etc.)
- The execution of all affairs and projects related to governmental and non-governmental organizations in the Anzali Wetland and its Watershed should be by the permission of the body.
- The above agreements will first have to pass the necessary legal steps. After their approval, the Steering Committee members (as the representative of all related organizations) will be informed of the conclusions by DOE Gilan.

This proposal was subsequently considered and positively received by the Provincial Working Group on Land use, Environment (and Population) on 23rd June 2004. Depending upon the ultimate outcome of further discussions, the body could be a consultative committee established at provincial level, or a more independent body established at national level. If the latter were selected, the details of the new body would have to be considered and agreed upon at the time the proposal is being prepared for legal approval by the Majlis. For example, the specific functions of the conservancy would have to be determined. These would be restricted to those matters that all partners agree would best be handled by the Conservancy. The existing authorities would not lose their other powers in the wetland.

#### 4.4.3 Representation on the Conservancy

The stakeholder institutions to be represented on the committee of the Conservancy would probably include DOE, MOJA, CHTO, provincial authorities, relevant municipalities, and representatives of the NGOs and interest groups such as boat-owners and hunting/fishing. Each would each have one seat on the committee.

#### 4.4.4 Functions of the Conservancy

There are many issues to be addressed in the wetland. Some of them are already being managed effectively by existing institutions. Some are not being managed at all. An overview of the whole management picture indicates that the issues which could best be handled by a single wetland management body are as follows:

- Designation of new Protected Areas, or expansion of existing PAs.
- Revision of the Ramsar Information Sheet (RIS) and revision of the boundaries of the Ramsar site, if necessary.
- Revision of the Zoning Plan, as necessary.
- Conservation activities in the protected areas.
- Protection, restoration and enhancement of the environment (e.g. tree-planting, shore protection, path-laying, dredging, litter collection, etc.).

- Elaboration of regulations or guidelines on water-related activities (e.g. zoning for bird-watching, water-skiing and wind-surfing, speed limits for motor boats, etc.).
- Tourism development (e.g. cycle paths, boardwalks, jetties, car parks, events).
- Environmental education and public awareness (e.g. education center, interpretation boards, events, etc.).
- Information and communication (signboards, newsletter, website, notices to mariners, etc.).
- Licensing issues (numbers of hunters, fishermen, boats, seasons, locations, etc.).
- Enforcement / patrolling / guarding.
- Navigation (channel markers, lights, dredging, etc.).
- Moorings, jetties and other boating facilities.
- Safety (emergency planning, emergency services, life-saving, etc.).
- Radio communications.
- Transport (marine and terrestrial).
- Waste management (including collection/disposal of used boat oil and batteries).
- Oil spill contingency plan (risk assessment, preventive measures, response planning, clean-up equipment, etc.).
- Promotion of cottage industries, traditional crafts, handicrafts, etc.
- Agriculture (control of pesticide and fertilizer use, control of encroachment).
- Development planning and development control, including implementation of zonation.
- Boundary issues.

#### 4.4.5 Relationship with Other Plans in the Master Plan

The staff of the proposed Conservancy would be directly responsible for some of the activities proposed in the Master Plan, e.g. implementation of the Wetland Ecological Management Plan, the wetland element of the Environmental Education Plan, waste management in the area of the wetland, wetland monitoring, etc. For the other parts of the Master Plan, the Conservancy will provide the “voice” of Anzali Wetland. The broad membership of the committee of the Conservancy will provide an appropriate conduit for integration.

#### 4.4.6 Experience of Other Iranian Wetlands

For the Lake Uromiyeh wetland, a National Co-ordination Committee, a Provincial Stakeholders Co-ordination / Management Committee and a local Lake Uromiyeh Secretariat, have been proposed. The combination of the Stakeholders Management Committee (representative body) and the Lake Uromiyeh Secretariat (management agency) is very similar to a “conservancy” as previously described in 4.4.1 above. Implementation arrangements have been approved by the Higher Council on Environment and have gone forward for approval by the Majlis followed by funding within the next Five-year Plan.

Similar committees and a Shadegan Environmental Conservation Office were also previously proposed for integrated management of the Shadegan Wetland on the Iranian coast of the Persian Gulf. As far as is known, none of these committees is yet fully functional. In the case of Anzali, it is proposed that DOE Guilan should take some preparatory steps in advance of establishment of the conservancy, to effectively create an “interim conservancy”, as described in section 4.4.8 below.

Given that other Iranian wetlands have similar institutional problems and the same constraints to addressing them, communication with the managers of such wetlands would be beneficial. This would not only provide for the exchange of experiences, but it would also be crucial for the further recognition and formalization of environmental management procedures for Iranian wetlands and their catchments. It will also be worthwhile keeping in contact with other watershed management projects, such as the World Bank’s forthcoming Alborz Integrated Land and Water Management Project, which is situated in the adjacent watershed.

#### 4.4.7 Management of the Anzali Watershed

The present Study is taking an integrated watershed management approach to the conservation of Anzali Wetland. Such an approach is recommended for all wetlands by the Ramsar secretariat and IUCN (the World Conservation Union), and is recognized by wetland specialists as the most logical and effective approach. However, the resulting Master Plan includes a Wetland Ecological Management Plan and a separate Watershed Management Plan. This is because, even within the watershed management approach, there will be some matters that directly affect the wetland and must be managed at a local level, e.g. protected areas within the wetland, waste and effluent discharges into the wetland, tree-planting, tourism promotion, coastal development control, etc.

If the Anzali Conservancy is formed, it will be necessary to decide the physical area of its responsibility. For a typical conservancy, this is usually the wetland itself and an area of surrounding land which may be referred to as the “buffer zone”. The conservancy would therefore be responsible for implementation of the Wetland Ecological Management Plan. However, in order to integrate this with the Watershed Management Plan it would be preferable to give the conservancy both executive powers in the wetland, and formal consultative / advisory responsibilities in the whole catchment, which would accord with the watershed management approach.

This would not be the complete answer to the challenge of improving environmental management in the watershed. Further co-ordination of the various institutions in the catchment is needed, along with integration of their work. This could, perhaps, be done through the more effective use of the two previously described Working Groups on Land use, Environment & Population, and Water, Agriculture & Natural Resources. However, the evidence so far is that the Working Group system, as currently conceived, is not being used in a way that can support routine environmental management. On-going institutional change at

national level (e.g. establishment of MOJA's Office for Environment & Sustainable Agricultural Development, and the amalgamation of MOJA's NRGD and watershed management organization) will hopefully improve the co-ordination of management activities in the watershed. The preliminary steps described below could also be a promising stimulus for integrated watershed management. [Other institutional changes, which would have to be made at national level, are outside the scope of the present study.]

#### 4.4.8 Preparatory Steps

##### (1) Introduction

The concept of the Anzali Conservancy has been developed, discussed and refined during the two-year course of the present study. Whilst this has been a slow process, acceptance of the concept at provincial level in June 2004 has given some confidence that the conservancy will eventually be established. However, as establishment of the conservancy may also be slow, it is recommended that some preparatory steps should be taken as outlined in (ii), (iii), (iv) and (v) below. These would both achieve some of the objectives of the conservancy in the short term, and help the process of establishing the conservancy when the time comes.

##### (2) DOE Guilan in the Wetland

DOE currently provides the most noticeable government presence in Anzali Wetland, and it has the staff, facilities and equipment to make that presence felt even more strongly. It has been suggested above that the initial staff of the conservancy could be created by transferring existing staff from DOE. As a preparatory step, the executive part of the conservancy could effectively be established as a new "Anzali Department" of DOE Guilan. Indeed, given that DOE has been such a close partner throughout the present two-year JICA study, establishment of a DOE Anzali Department could be expected as the minimum legacy of the study. The new department should be tasked with introducing and taking forward a new "Anzali Initiative", which would have a strong public awareness focus. However, in those circumstances, DOE Guilan would have to improve its management efficiency (possibly by increasing its technical staff at the expense of non-technical staff) and would need to spend more time on higher-level work such as strategic planning and pro-active management for Anzali Wetland. At the field level, a greater attention to efficiency would also make for better use of the existing investment (e.g. the several guard stations and the many boats and outboard engines of the DOE fleet).

If DOE ultimately continues to be the main organization involved in management of the wetland, then it must operate according to a clear long-term plan for the wetland (see Wetland Ecological Management Plan), which includes specific physical and organizational activities, and which is subject to an annual implementation review and plan up-date. Integration with other organizations is a fundamental requirement, e.g. it would be impossible to implement the Zoning Plan without integration with those bodies responsible for long-term physical planning and development control. Integration here does not just mean co-ordination or co-



operation between organizations, but joint work with a fundamental singleness of purpose.

It is noted that there is still the view at high levels within DoE Guilan, that there must be something(s) that can be done to “save the Anzali Wetland”. It should be emphasised that there is no “quick fix”, and no single project or physical works that can solve the whole complex of well-known problems. Good environmental management is the only answer. DOE Guilan has capable staff and reasonable resources. What is needed is good planning, a determination to implement what is planned, and a commitment to integrate the work of other organizations into the plans of action. DOE would do well to adopt the type of key concepts and wetland management planning principles that have been used successfully elsewhere (see Appendix 1).

In addition, a new approach to the enforcement of existing legislation is needed. Matters such as the casual disposal of solid waste to rivers, and effluent discharges which exceed national standards, are the fundamental causes of pollution and eutrophication in the wetland, which could be addressed by concerted enforcement. It is a principal of any policing activity that it should preferably be conducted by persuasion and with the consent of the public. However, in the absence of compliance, the taking of well-publicised prosecutions is a good method of creating the required public awareness. (DOE Guilan operates throughout the province, so this rigorous and determined approach can be applied to management of the Anzali catchment as well as the wetland.)

### **(3) MOJA Guilan in the Catchment**

Whilst DOE currently provides the most noticeable government presence in Anzali Wetland, its equivalent in the Anzali catchment is MOJA, in particular, the (merged) NRGO and Watershed Management Department. This combined organization will deal with most of the management problems of the Anzali watershed, including soil erosion control, rangeland management, grazer resettlement, agricultural practices and forestry. In the upper catchment, this leaves only the conservation of natural forests and biodiversity, and the protection / management of rivers to be addressed. The previous Government proposal to merge NRGO with DOE and the Water Department of MOE can therefore be seen to be a highly beneficial institutional change. Such an organization could give greater strength and implementation to the concept of a “Protected Catchment” for Anzali, which could be run in parallel with the “Anzali Initiative” proposed for DOE. The Study therefore endorses the proposed amalgamation, and urges the Majlis to accept this recommendation of the Government.

### **(4) Municipalities**

In the lower catchment, land use planning, development control and waste management are of greater importance, and are unfortunately poorly developed. These are matters in which MOJA is not involved, and for which the municipalities are responsible. Whilst increased funds are needed, there is also a need for improved management. This is a situation in which DOE should use its greater technical expertise to provide the municipalities with capacity-building in environmental management, not as a provider of workshops and seminars, but as a partner in technical development.

#### (5) Provincial Committee

The strengthening of DOE management and further integration within MOJA would not necessarily help to facilitate the participation of all relevant stakeholders, as would occur within the proposed conservancy body. In preparation for the conservancy, such participation could, perhaps, best be achieved at provincial level, through the Provincial Thematic Working Group on Land use, Environment and Population (WGLEP).

As described in section 2.3 above, this has not been functioning as an active committee, and only held its first meeting in June 2004. The challenge would be to convert this into an effective body for co-ordination between stakeholders, and for management of the wetland and its catchment. This would certainly require the establishment of both a secretariat and technical working groups for the wetland and the catchment.

It seems that such committees can become moribund unless they have a stimulus and a specific function. One method of providing the required stimulus is to return to an idea suggested in Progress Report (1), i.e. to run an annual "Forum on Anzali Wetland and its Catchment", at which all stakeholder organizations can report on their progress over the previous year, and their plans for the forthcoming year. At the same time an annual "State of the Anzali Environment Report" could be published, so that progress can be monitored and publicised. However, it is emphasised that this would only be a stimulus for the WGLEP – it will still be necessary to have an agreed implementation program for the Master Plan, a Secretariat, integration meetings, technical working groups and action on the ground by the concerned stakeholders. A theme that could be used to motivate this annual Anzali Forum, is the concept of a "protected watershed". This has no substance in Iranian law, but it is easily understood and could be used to bring together the actions of many different actors for the benefit of Anzali Wetland and its catchment.

#### 4.4.9 Capacity Development of Stakeholders

##### (1) Within the Anzali Wetland Conservation Study

Whilst many stakeholders understand the institutional problems outlined above, there tends to be resignation to the fact that the problems cannot be overcome. It is therefore necessary to encourage managers to "think outside the box", i.e. to apply lateral thinking to problems, in order to come up with new solutions which are also practical and feasible within the Iranian institutional system.

The three institutional workshops conducted within the Study have stimulated the discussion of new management approaches, including the "conservancy" concept which is now going forward. However, it is obvious that people find it difficult to envisage how different institutional arrangements could operate. The best capacity development for such stakeholders is to expose them to examples of successful institutional models in operation elsewhere. The month-long JICA training visits to Japan for five Iranian counterparts provided them with such demonstrations. A further group of four Iranian counterparts from

DOE and MOJA will receive similar training in Japan during October-November 2004. Two DOE environmental managers and one NGO representative have also visited the UK under British Council funding, which enabled them to see at first-hand wetland management in action (including a successful conservancy).

These visits were also opportunities to make personal linkages with sister organizations overseas, upon whose experience the participants will hopefully continue to draw in the future.

## (2) Future Capacity Building

### 1) National

Most of the professional staff of the organizations concerned with environmental management in the Anzali basin are trained and knowledgeable technical people. However, many of them seem to be locked within their own technical “silos”. The distinct separation of responsibilities has created a culture in which people learn not to explore the responsibilities of others. This is inimical to environmental management which, by definition, must take a broad and integrated view.

The individual organizations do provide training for their own staff, e.g. DOE provides short courses on a number of technical topics, both locally and in Tehran. However, in some ways, this reinforces the “silo” approach. What is needed is “mix and match” training, in which staff from several different parts of government (and also from outside government) are brought together for environmental management training, to include working together on practical planning and management case studies. This **cross-sectoral training** would be in relation to specific aspects of wetland management and watershed management. Such training needs to start by ensuring that participants have a real understanding of environmental management, and appreciate the nature of an ecosystem approach to planning and management. This topic will be developed more fully within the Environmental Education Plan

There will be a continuing need for internal training, particularly to build up the knowledge base of new recruits. Those who have worked in the wetland as guards and ecologists over many years, have an “institutional memory” which is extremely valuable. A concerted effort must be made, using on-the-job training or “apprenticeship”, to ensure that this institutional memory is not lost when experienced staff retire. For example, Mr Ismaeli, the retired DOE ecologist / ornithologist, has an unparalleled knowledge of the birds of Anzali Wetland. Whilst he is fortunately able to continue in a consultancy role, now is the time to train a replacement, and Mr Ismaeli would be the best person to provide the necessary field training.

### 2) International

As mentioned above, overseas capacity-building visits have been made by Iranian counterparts during the study. A continuing program of **exchange** visits (i.e. in which members of overseas wetland organizations also visit Iranian counterparts in

Guilan) would help to continue the processes of confidence-building and capacity-building.

## CHAPTER 5 COST ESTIMATE

### 5.1 Price Level and Exchange Rate

The following conditions/assumptions are used for estimating costs of the institutional plan.

- 1) The project costs in the project period from 2005 and 2019 are estimated based on June 2004 constant prices in the Iranian Rials (IRR).
- 2) The exchange rate of USD 1 = IRR 8,652 (as of 30 June in 2004) is applied.
- 3) Tax and fee: The value added tax (VAT) for all cost components and import tariffs for imported equipment are included in the cost estimation.

### 5.2 Cost Components

If a new "Conservancy" body is formed, it would need to have adequate and sustainable statutory sources of funding. The core funding would probably come from central government via MPO, along with contributions from the municipalities. The exact cost of implementation will depend upon the structure that is finally adopted. There will be some setting-up costs (c. \$200,000), and the cost of administration could be expected to be about \$380,000 per annum (see Table 5.1 below). The same investment and administration costs would be expected if DOE establishes an Anzali Department and engages in the preparatory steps recommended in section 4.4.8 above.

In addition, it would be expected that various existing sources of income would be transferred to the Conservancy, thus making it self-sufficient. (It is recommended as a matter of policy that institutional improvement in wetland management should largely be achieved by improved efficiency rather than new expenditure.) Some or all of: the existing boat licensing fees (PSO), the DOE hunting and fishing licence fees (325 million Rials p.a. and 125 million Rials p.a. respectively), and DOE "abandan" rental fees (225 million Rials p.a.) could also be directed to the conservancy, if all agree to this at the setting-up stage. A local tourism tax could also be possible.

In addition, an Executive Byelaw of 1989 requires 0.1% of the gross sales income of all factories to be assigned to environmental conservation works. Each of these works has to be approved by the provincial DOE. The total annual expenditure of factories in Rasht and Anzali on such environmental works must be a very considerable sum (estimated at USD 250,000). DOE is able to amalgamate the contributions from individual factories to implement larger environmental works for the public good, and these could be executed by the Conservancy. If correctly applied, such contributions from local industries could therefore become a very significant source of Conservancy funds.

**Table 5.2.1 Cost Estimate for Institutional Plan**

Proposed Projects/Measures	Project Cost (million Rials)	O&M Cost	
		Overall (million Rials)	Annual Average (million Rials/year)
<b>I. Establishment of Anzali Wetland Conservancy</b>			
(1) Establishment of Anzali Wetland Department	890	33,360	2,224
(2) Formation of Anzali Sub-Group of WGLEP	0	870	58
(3) Annual Anzali Forum	0	1,005	67
<b>2. Capacity Development</b>			
(1) In-country cross-sectoral training	0	2,685	179
(2) DOE "apprenticeship" training	159	0	0
(3) Overseas exchange visits	270	0	0
<b>Total</b>	<b>1,319</b>	<b>37,920</b>	<b>2,528</b>

Source: JICA Study Team

## CHAPTER 6 IMPLEMENTATION PROGRAM

### 6.1 Summary of Proposed Institutional Plan and Executing Organizations

The executing organization responsible for implementation of the proposed measures are summarized in Table 6.1.1.

Table 6.1.1 Summary of Proposed Institutional Plan

Sum-Components	Proposed Projects/Measures	Executing Organizations
Establishment of Anzali Wetland Conservancy	(1) Establishment of Anzali Wetland Department (2) Formation of Anzali Sub-Group of WGLEP (3) Annual Anzali Forum	DOE, MOJA, NRGO, MOE, CHTO, MORT, WGLEP, Municipalities, and NGOs
Capacity Development	(1) In-country cross-sectoral training (2) DOE "apprenticeship" training (3) Overseas exchange visits	

### 6.2 Prioritization of the Proposed Measures

#### 6.2.1 Criteria for Prioritization

The proposed elements of the Institutional Plan are required to meet two primary criteria as follows:

- To improve communication, co-ordination and integration between stakeholders.
- To improve the efficiency and effectiveness of provision of government services in relation to management of the wetland and its catchment.

In addition, the proposed elements of the Institutional Plan should contribute to the following physical outcomes:

- Stabilization of the fabric of the Anzali catchment.
- Reduction of the various forces of degradation acting upon Anzali Wetland.
- Improved conservation of this internationally important Ramsar site.
- Sustainable utilization of the natural resources of the wetland and its catchment.
- Increased non-consumptive use of wetland resources (tourism, education, etc.)

The institutional plan must also be practicable in terms of implementation, support and cost.

The scoring system for the above and other criteria is indicated in Table 6.2.1 below.

**Table 6.2.1 Scoring of Implementation Criteria**

Rank	Contribution to Management		Physical outcomes	Ease of implementation	Support of Executing Organizations.	Costs
	Communication, co-ordination & integration	Efficiency & effectiveness				
A (Score = 2)	Achieves required level of communication, co-ordination & integration.	Achieves significant improvement in efficiency & effectiveness	Will result in all physical outcomes listed above.	Implementation possible within short-term (c. one year)	Fully supported by the Executing Organizations	Low
B (Score = 1)	Contributes to improvement in communication, co-ordination & integration.	Contributes some improvement in efficiency & effectiveness	Will result in at least two of the physical outcomes listed above.	Implementation possible within medium-term (c. five years)	Supported by most Executing Organizations	Medium
C (Score = 0)	Does not contribute to improvement in communication, co-ordination & integration.	Does not contribute to improvement in efficiency & effectiveness	Will not address any of the physical outcomes listed above.	Implementation difficult or impossible	Not supported by Executing Organizations	High

## 6.2.2 Results of Prioritization

The results of the prioritization are given in Table 6.2.2.

**Table 6.2.2 Evaluation of Proposed Measures according to Implementation Criteria**

Proposed Projects/Measures	Contribution to Management		Physical outcomes	Ease of implementation	Support of Executing Organizations.	Costs	Total Evaluation
	Communication, co-ordination & integration	Efficiency & effectiveness					
Establishment of Anzali Wetland Department	A	A	A	B	A	B	10
Formation of Anzali Sub-Group of WGLEP	A	A	A	B	B	A	10
Annual Anzali Forum	A	B	B	A	A	A	10
In-country cross-sectoral training	A	A	B	B	B	A	9
DOE "apprenticeship" training	C	A	B	A	B	A	8
Overseas exchange visits	C	C	C	B	A	C	3

Note: scoring A=2, B=1, C=0

Source: JICA Study Team



### 6.3 Implementation Schedule

The implementation schedule for the proposed institutional development measures is indicated by the bar chart in Table 6.3.1 below. It is suggested that the proposed measures are implemented in the following manner.

**Table 6.3.1 Proposed Implementation Schedule of Institutional Development Plan**

Proposed Measures		Fourth 5-year Plan Period					Fifth 5-year Plan Period					Sixth 5-year Plan Period				
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>INSTITUTIONAL DEVELOPMENT PLAN</b>																
1. Establishment of Anzali Wetland Conservancy																
(1)	Establishment of Anzali Wetland Department															
(2)	Formation of Anzali Sub-Group of WGLEP															
(3)	Annual Anzali Forum															
2. Capacity Development																
(1)	In-country cross-sectoral training															
(2)	DOE "apprenticeship" training															
(3)	Overseas exchange visits															

#### (1) Short-Term (2005-2009)

Establishment of the Anzali Conservancy (or similar cross-sectoral committee and management body) is considered to be the critical first step, upon which all further actions will depend. It cannot be predicted how long the official process of forming the Conservancy will take. However, the transfer of some existing staff and equipment into a new Anzali Wetland Department of DOE Guilan, is a preparatory step which could be taken quickly, without a net increase in the number of government employees.

It is assumed that DOE Guilan is able to make such management decisions on its structure without delay. In the circumstances, it is recommended that DOE Guilan should go ahead with the establishment of an Anzali Wetland Department, which would act as the "Interim Conservancy" *pro tem*. This will be able to initiate the work expected of the executive part of the Conservancy until such time as the Conservancy is formally and legally established.

A part of that work would be to provide environmental capacity-building for the municipalities, as a partner in technical development (addressing issues such as waste management, water quality protection, and development planning).

Similarly, it should be possible for the Provincial Thematic Working Group on Land use, Environment and Population (WGLEP) to make a prompt decision to form an Anzali Sub-Group, which can then meet frequently to co-ordinate and integrate the work of the various stakeholders in the wetland and the watershed. The various departments of MOJA will inevitably take the lead in environmental management of the watershed, but the advent of a WGLEP Anzali Sub-Group should provide the opportunity for improved co-ordination and integration between all stakeholders.

Once formed, the Conservancy should quickly establish its authority by holding its initial committee meetings, drawing up a workplan, appointing the initial staff and making itself “visible” to the public, both physically and through the media. All of these initial actions ought to be completed within four months of official establishment of the Conservancy.

The first years of operation should then be taken up with intense activities to reinforce the presence of the new body. Preparation of the annual State of the Anzali Environment Report and holding the annual Anzali Forum would be the easy part. A dynamic and well-regarded Director General will be needed to maintain the momentum of integration, training, development, conservation, field studies and enforcement. Each senior staff member should be responsible for driving forward an individual workplan in their field of responsibility, i.e. education, conservation, environmental protection, eco-tourism, navigation, etc.

In the last six months of the first five-year period, a *post hoc* evaluation of the work of the Conservancy should be undertaken, and consequent workplans made for the second period.

#### (2) Medium-Term (2010-2014)

The second five-year period should be a period of consolidation, during which longer-term activities can be initiated. These would include, for example, physical works which may have been identified as appropriate during the first five years of field studies. Indeed, no major works should be undertaken without adequate studies as part of an Environmental Impact Assessment (EIA). The regular work of monitoring, consultation, reporting, training, etc., would be continued. In the last six months of the second five-year period, a *post hoc* evaluation of the work of the Conservancy should be undertaken and consequent workplans made for the third period.

#### (3) Long-Term (2015-2019)

During the third five-year period, the regular work and responsibilities of the Conservancy should continue. However, at the start of the period there should be an environmental audit of Anzali Wetland and its catchment. This will draw upon the monitoring results of the previous ten years to determine:

- whether or not the various elements of environmental degradation have been halted / reversed, and
- whether the Conservancy has made a significant difference to environmental management and environmental quality.

The results of this audit will then be used to determine whether any re-orientation of the Conservancy or its program is needed.

#### **6.4 Priority Projects**

The priority projects were selected based on the results of the prioritization. The proposed priority projects (see Chapter 4 above for the details) are:

- Establishment of Anzali conservancy
- WGLEP Anzali Sub-Group Meetings
- Annual Anzali Forum, and DOE Technical Support for Municipalities

## APPENDIX-1

### CHICHESTER HARBOUR CONSERVANCY, U.K

#### Introduction

Chichester Harbour is a natural harbour and tidal wetland on the south coast of England. It falls within two county administrations, Hampshire County Council and West Sussex County Council, and parts of it are within two municipalities, Chichester District Council and Havant Borough Council. Chichester Harbour was previously administered by two separate harbour authorities (Chichester and Emsworth). Prior to the establishment of a conservancy, this caused various administrative problems, including the application of different byelaws in different parts of the harbour. The harbour authorities were only responsible for navigational issues.

#### Legislation

Chichester Harbour Conservancy was created by an Act of Parliament in 1971 as the statutory harbour authority for the whole natural harbour. The Act lays down the responsibilities of the Conservancy for the management of both the harbour and the amenity area, which broadly coincides with the Chichester Harbour Area of Outstanding Natural Beauty (AONB), a protected area designation of the harbour and its surrounding land, which was established in 1964.

The official functions of the Conservancy are to take steps for the maintenance and improvement of:

- a) the harbour
- b) the amenity area (for the purposes of leisure, recreation and nature conservation).
- c) the harbour facilities (including navigational facilities).

In fulfilling its functions, the Conservancy is required to conserve the natural beauty and amenity of the countryside, and avoid interference with fisheries.

Since its inception, the Conservancy has acted as the Joint Advisory Committee (JAC) for the AONB, and consequently has an official consultative role within the planning and development control system. It also has a role in relation to nature conservation legislation, as a result of the various national and international designations that apply to the harbour. These include designation as a national Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA) under the European Community Birds Directive (79/409/EEC), part of the Solent candidate Special Area for Conservation (cSAC) under the European Habitats Directive (92/43/EEC) and as a Wetland of International Importance under the Ramsar Convention.

#### Administration

The Conservancy is the decision-making body for Chichester Harbour and provides the formal partnership between the local authorities and the local interest groups through the

Conservancy's main Committee and an Advisory Committee. These two Committees provide the Conservancy with the framework and policy for the integrated management of Chichester Harbour, in terms of its role both as the Harbour Authority and the steward of nature conservation. Together they form the Joint Advisory Committee (JAC) for the AONB.

The Conservancy has a comprehensive staffing unit with the professional and technical expertise required to carry out its varied roles, including specialists in the fields of conservation, environment, education, navigation, etc. The Conservancy is also actively supported by several non-governmental organizations (NGOs).

### **Funding**

Effective and long-term management of Chichester Harbour is reliant on adequate funding. Current sources of funding received by Chichester Harbour Conservancy are as follows:

- Local tax via the West Sussex and Hampshire County Councils, for core management of the AONB and the staff offices.
- Central government grant aid funds from The Countryside Agency for the AONB core staff unit and for projects and initiatives carried out annually within the AONB.
- From 2004 to 2007, the Heritage Lottery Fund through the "Rhythms of the Tide" project.
- Smaller contributions from the Friends of Chichester Harbour (NGO) and others.

Boat users pay for the Conservancy's core harbour management duties, which are:

- marking and removing hazards to navigation
- implementing the harbour Byelaws
- ensuring the safe enjoyment of the harbour
- licensing, regulating and maintaining moorings.
- patrolling and other statutory harbour functions

Funds for these harbour management duties are raised through:

- Harbour Dues (fees) levied on every vessel that uses or visits the harbour.
- Charges made for the licensing of private moorings sites.
- Charges made for the hire of private moorings sites.
- Charges made for the hire of moorings maintained by the Conservancy.

### **Key Concepts**

Chichester Harbour Conservancy and its partners have, since 1971, evolved a series of concepts to guide their management of Chichester Harbour AONB. These key concepts, originally published in the second Chichester Harbour Management Plan in 1992, are as follows:

- Sustainability and wise use

- Integrating the management of the land
- Balancing the various interests and uses
- Proactive, rather than reactive, management

### **Management Principles**

The above four key concepts have been translated into 14 Management Principles which provide a framework for managing Chichester Harbour AONB, and form the heart of the Harbour Management Plan. These are as follows:

- To conserve and enhance the natural beauty of Chichester Harbour.
- To conserve, maintain and improve Chichester Harbour, and its associated facilities and marine industries, for safe recreation, where they are consistent with its landscape and nature conservation designations.
- To support sustainable forms of rural industry and agricultural practices where they are consistent with Chichester Harbour's landscape and nature conservation designations.
- To support the economic and social needs of the local communities where they are consistent with Chichester Harbour's landscape and nature conservation designations.
- To ensure the wise use and management of Chichester Harbour is carried out for the benefit of present generations, without compromising the needs of future generations.
- To maintain a balance between the various interests and users and encourage restraint in the way Chichester Harbour is used.
- To retain the quiet, undeveloped nature of parts of Chichester Harbour, to guard these against pressure for greater access and to avoid the over-management of such areas.
- To increase public awareness, particularly among young people, of the value of Chichester Harbour and the threats to its well-being.
- To increase community involvement and public participation in the management of Chichester Harbour.
- To undertake or commission scientific research as the basis for sound environmental management of Chichester Harbour.
- To ensure that the delivery of the Chichester Harbour AONB Management Plan is supported by all the partner organizations.
- To develop a close working partnership between all bodies involved in Chichester Harbour and to co-ordinate policy with the other agencies involved in Coastal Zone Management.
- To raise the profile of Chichester Harbour amongst decision-makers at regional and national level.
- To serve all Chichester Harbour users effectively.

### **Harbour Authority Principles**

In executing its duties as a Harbour Authority, the Conservancy applies the following principles.

- To undertake and regulate marine operations in a way that safeguards the harbour, its users, the public and the environment by implementing and demonstrating compliance with the Port Marine Safety Code (PMSC).
- To maintain an organization for delivering the PMSC, identifying accountability and responsibility within the organization and directing how the PMSC is to be delivered.
- To maintain a Safety Management System, based on the comprehensive risk assessment of hazards associated with harbour operations, and the implementation of appropriate control measures.
- To conserve the harbour, so that it is fit for use as a port, and to ensure that users are provided with adequate information about conditions in the harbour.
- To control and direct vessels so as to ensure the safe and peaceful use of the harbour.
- To maintain a Chichester Harbour Emergency Plan and an Oil Spill Contingency Plan approved by the Maritime and Coastguard Agency.
- To regulate all moorings in the harbour and to maintain a fleet of suitable vessels to discharge conservancy, moorings and control of navigation roles.

## **Part 9: Agriculture and Agricultural Chemical Control**



**THE STUDY ON INTEGRATED MANAGEMENT FOR  
ECOSYSTEM CONSERVATION OF THE ANZALI WETLAND**

**FINAL REPORT  
Volume III      Supporting Report**

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## **CHAPTER 1 INTRODUCTION**

Anzali Wetland has warm temperatures, high moisture and abundant rain fall, and agriculture is active in the plain area. The Farmland is approximately 96,500 ha, and occupies 55 % of the plain area. The majority of the farmland is paddy field, and the area is about 81,000 ha. Especially, the land surrounding Anzali Wetland is suitable for rice cultivation since the groundwater lever is high. Rice cultivation is single cropping in Anzali Wetland watershed. Local varieties and high production varieties of rice are cultivated.

Chemical fertilizers and agricultural chemicals are applied in the farmland (paddy field), and the farmland becomes a source of pollution load in Anzali Wetland. Environmentally sound agriculture which focuses on the reduction of chemical fertilizer and agricultural chemicals is desired for the conservation of the wetland.

In this Part, present agricultural condition, issues and measures in the watershed of Anzali Wetland are described. The possibility of sustainable agriculture is also mentioned.

## CHAPTER 2 PRESENT CONDITIONS OF THE AGRICULTURE AND AGRICULTURAL CHEMICAL USE

### 2.1 Policy on the Agriculture Sector

The agricultural sector policy has been set by the Ministry of Agriculture. Main objectives of the agricultural policy can be summarized as follows:

- to increase the quality and quantity of agricultural production
- to decrease the cost of production
- to increase the farmers income
- to increase the fertility of the soil

Ministry of Jihad-e-Agriculture (MOJA) proceeds with the mechanizations, breed improvement, control of chemical fertilizer and use of compost in order to achieve the above objectives.

### 2.2 Organization Concerned

In the basin of Anzali Wetland, there are 96,442 ha of farmland, which consist of 81,200 ha of paddy fields and 15,242 ha of other farmland.

MOJA has an important role in guiding farmers on the control of pollution from agricultural activities. For the control of consumption of fertilizers, pesticides and herbicides, MOJA brings in extension workers and gives advice to farmers through agricultural Service Centers and Township Cooperative Offices as shown in Figure 2.2.1.

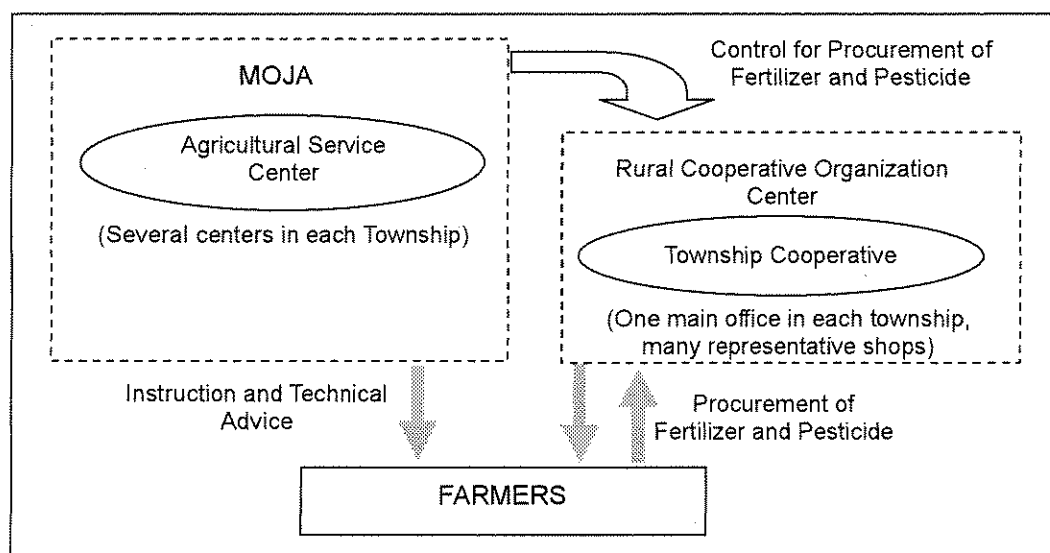


Figure 2.2.1 Organization for Control of Consumption of Fertilizer and Pesticide

## **2.3 Target of Agriculture Sector in Guilan Province**

### **2.3.1 Rice Production**

A five year plan for the rice production was prepared by MOJA Guilan in 2001. The target productions of local variety and high production variety were established as 4,500 kg/ha and 6,300 kg/ha respectively for 2006. The ratio of local variety and high production variety is 70 % to 30 %, and average target production is 5,100 kg/ha.

### **2.3.2 Fertilizer Use**

Guilan province was selected as one of the five pilot provinces for the optimum application of chemical fertilize. The amounts of applications are basically 100 kg of urea, 50 kg of  $P_2SO_4$  and 100 kg of  $K_2SO_4$  per hectare. Actual optimum fertilizer use is designated with soil analysis which is implemented every three years.

### **2.3.3 Agricultural Chemical Use**

There is no specific target for agricultural chemical use. MOJA and universities research the proper use and guide the farmers.

Regarding biological control, the five years plan was prepared by MOJA Guilan in 2004. The target area where the biological control is to be introduced is 65,000 ha in 2008.

## **2.4 Agriculture in the Study Area**

### **2.4.1 Main Crops and Cultivated Area**

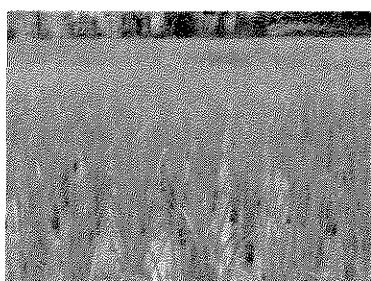
Main crops and cultivated areas in the study area are shown in the following table. As the study area (watershed) is 361,000 ha, cultivated area covers about 25 % of the study area.

The following table shows that the area of rice is remarkably high among crops. The paddy field of the study area accounts for 36 % of the whole of Guilan province and the production of the study area accounts for 35 % of the production of the whole country. The paddy field covers most of the plains in the study area. The paddy fields are also found in the valleys of the mountain slope up to the altitude 350 m. Except for the paddy field, fruits tree plantations, tea gardens and pulse farms occupy a relatively large area. However, many of those are fragmented and are distributed near residences and beside the roads.

**Table 2.4.1 Main Crops and Cultivated Area, 2001**

Crop Name	Cultivated area (ha)	Production (t)	Production rate (kg/ha)
Rice	81,200	376,545	4,637
Wheat	1	1	1,200
Broad beans	823	1,248	1,516
Navy beans	23	29	1,248
Kidney beans	21	28	1,348
Soja beans	61	105	1,731
Green beans	56	98	1,769
Black-eye peas	56	65	1,166
Agricultural beans	1,579	2,242	1,420
Chick peas	9	13	1,467
Onions	91	290	3,202
Potatoes	63	487	7,761
Garlic	383	1,195	3,119
Eggplant	118	968	8,182
Tomatoes	190	1,422	7,501
Leaf vegetables	716	2,627	3,668
Gland vegetables	415	2,064	4,977
Cucumber	507	5,239	10,328
Melons	346	7,152	20,699
Watermelons	1,335	34,287	25,688
Pumpkin	265	4,054	15,327
Tobacco	416	395	951
Sugar cane	11	13	1,200
Clover	499	3,312	6,644
Grass sorghum	70	691	9,840
Grain sorghum	36	91	2,514
Sorghum	222	3,361	15,120
Peanuts	20	44	2,190
Sunflowers	14	20	1,414
Rapeseed	354	480	1,354
Tea	4,227	35,892	8,492
Trees with fruit	2,320	7,417	3,197
Total	96,442	491,871	-

Source: Horticulture and Agriculture Organization in Guilan, MOJA

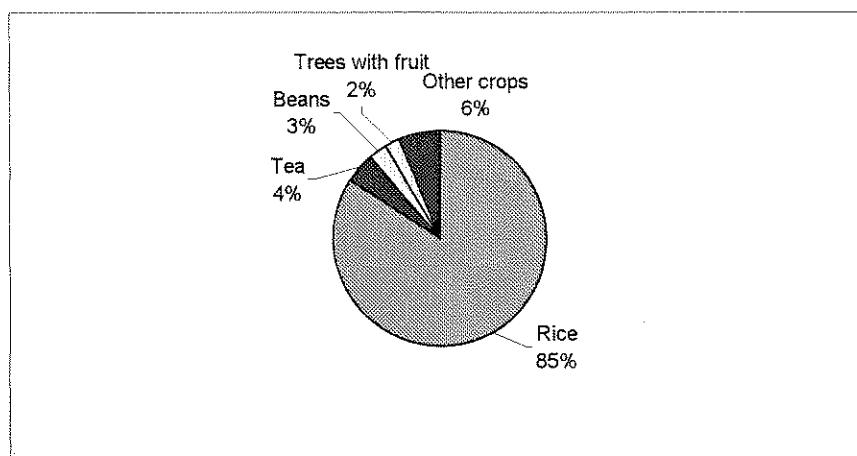


Paddy field



Tea garden

**Figure 2.4.1 Cultivated Areas**



Source: Horticulture and Agriculture Organization in Guilan, MOJA

**Figure 2.4.2 Percentage of Main Crops by Area**

#### 2.4.2 Irrigation Situation

When agricultural land is developed, water provision is necessary especially for rice because the cultivation period is in the dry season in Guilan province. Irrigation channels have been arranged in the study area. Irrigation water is taken from the rivers and the adjoining watershed of the Sefidroud river which is the largest watershed in Iran through the Foman cannel (32 m<sup>3</sup>/sec) and the Sangar Khonanroud cannel (8 m<sup>3</sup>/sec). The amount of water which finally flows into the wetland from rivers is 72 - 75 m<sup>3</sup>/sec during the irrigation period. On the other hand, irrigation water is supplied by MOE at about 1 liter/ha/sec into the paddy field, that is to say, 81 m<sup>3</sup>\*/sec is estimated to be used for rice cultivation.

\*:  $1 \times 0.001 \times 81,200$  (the paddy field area of the study area in 2002) = 81

The greater portion of the water passes through the paddy fields and flows into the wetland.

#### 2.4.3 Rice Cultivation

The rice cultivation is considered to have a large impact on the wetland as it constitutes a large percentage of total agriculture. The rice is cultivated in accordance with the direction of MOJA. The rice cultivation calendar is as follows.



**Table 2.4.2 Rice Cultivation Calendar in Guilan**

The type of operations	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Plowing and preparation of land	←→			←→						←→	←→	
Base fertilizer and troweling			←→	←→								
Seed plotting and seedling production			←→	←→								
Transplanting				←→	←→							
Herbicide				←→	←→							
Additional fertilizer					←→	←→	←→					
Pesticide						←→	←→					
Drainage						←→	←→					
Harvesting								←→	←→			

Source: Horticulture and Agriculture Organization in Guilan, MOJA

Cultivated area, production and yield in 2002 are shown in Table 10.4.1. Shahrestans which have large plains, such as Rasht and Somehsara have large cultivation areas. Cultivated area has been expanding during the last decade (MOJA pers. com.).

MOJA endeavors to raise the yields. The average yields of the local variety and high production variety were from 4,000 kg/ha to 5,000 kg/ha in 2002. MOJA Guilan recently started to recommend that farmers harvest the ratoons regenerated from stubble after harvest. The potential area is estimated about 7,000 ha. Ratoons mature within 60 days and the yield is equal to one forth of the first harvesting.

**Table 2.4.3 Cultivated Area and Production of Rice, 2002**

Township	Cultivated area (ha)	Production (t)	Yield (kg/ha)
Anzali	4,200	20,777	4,947
Rasht	15,500	70,867	4,572
Shaft	14,330	70,216	4,900
Fuman	13,870	70,670	5,095
Somehsara	27,150	116,772	4,301
Masal	6,515	27,244	4,182
Total	81,200	376,545	4,637

Source: Horticulture and Agriculture Organization in Guilan, MOJA

Note: The values shown in the cells "Rasht" are in the part of Rasht, which is in the basin of the wetland. It is assumed that 25 % of values in Rasht are suitable in the basin of the wetland.

According to the amount of consumption in the study area, the per capita of rice consumption is about 50 kg/yr. Since the amount of consumption per capita when people are using rice as the only staple food is more than 100 kg in general, it is assumed that rice is less than 50 % of the staple food source. The amount of rice consumption in the study area is 38,565 ton, and this is 10 % of the production (376,545 ton). Approximately 90 % is consumed in other areas and it is shown that the study area serves as the rice source in Iran.

**Table 2.4.4 Consumption of Rice, 2002**

Township	Consumption of Rice (t)	Population	Percapita (kg)
Anzali	4,760	125,255	38
Rasht	9,339	186,873	50
Shaft	4,996	73,477	68
Fuman	7,227	107,866	67
Somehsara	9,432	142,904	66
Masal	2,811	51,115	55
Total	38,565	687,490	53

Source: Horticulture and Agriculture Organization in Guilan, MOJA

Note: The values shown in the cells "Rasht" are in the part of Rasht, which is in the basin of the wetland. It is assumed that 25 % of values in Rasht are suitable in the basin of the wetland.

## 2.5 Chemical Fertilizer

On average, 75 kg of nitrogen, 4 kg of phosphate and 26 kg of potassium were applied per hectare of paddy fields in 2002, according to MOJA. The dosages for nitrogen and phosphorous are more or less equal with those recommended by MOJA, while that for potassium is quite lower than the MOJA's recommendation. The yield of rice has increased owing to stable application of fertilizer and improvement of rice varieties. At present, fertilizers are subsidized by the Government and provided to farmers through cooperatives. It is speculated that large quantities of fertilizers could be applied by farmers unless the agricultural extension work of MOJA would function well.

The soil laboratory of MOJA conducts soil analyses every year to determine the optimal dosage of fertilizers based on the soil analysis and give farmers recommendations on appropriate dosage to reduce the quantities. Through these activities, MOJA has been successfully reducing average phosphorous consumption, 36 kg/ha/year in 1992 to 4 kg/ha/year in 2002.

**Table 2.5.1 Chemical Fertilizer Use**

Year	(Unit: kg/ha)		
	Average of Nitrogen	Average of Phosphate	Average of Potassium
1992	68	36	0
1999	69	11	30
2000	68	11	13
2001	62	4	33
2002	75	4	26

Source: Horticulture and Agriculture Organization in Guilan, MOJA

It is estimated that 6,090 ton/year of Nitrogen, 324 ton/year of Phosphate and 2,111 ton/year of Potassium were consumed as chemical fertilizer in the basin in 2002. In addition to chemical fertilizers, livestock manure is applied to paddy fields. This is often done in winter when livestock are released to harvested paddy fields. Since the use of manure is carried out to improve the soil condition under instruction from MOJA, farmers sometimes purchase and apply livestock manure.

## 2.6 Agricultural Chemicals (Pesticides and Herbicides)

As much as 1,321,000 kg of agricultural chemicals were used in Guilan Province in 2001 (statistics data 2001). The kinds and the amount of the main agricultural chemicals used in the paddy fields are shown in the following table. On average, 4.5 kg/ha of pesticide, 0.1 lit./ha of fungicide and 2.5 kg/ha of herbicide are used per cropping.

**Table 2.6.1 Main Agricultural Chemicals in the Paddy Field, 2002**

Township	Cultivated area (ha)	Insecticide			Fungicide		Herbicide (kg)
		Diazinon (kg)	Rident (kg)	Padan (kg)	Hinozan (liter)	Beem (kg)	
Anzali	4,200	10,000	10,450	2,200	450	50	10,500
Rasht *	15,500	67,500	20,000	17,500	1,875	500	38,750
Shaft	14,330	10,409	29,650	-	1,000	1,000	35,800
Fuman	13,870	38,325	3,825	12,150	500	500	34,400
Somehsara	27,150	86,369	29,004	12,430	1,500	1,500	67,800
Masal	6,515	15,000	2,000	-	300	500	15,300
Total	81,200	227,603	94,929	44,280	5,625	4,050	202,550

Source: Horticulture and Agriculture Organization in Guilan, MOJA (Data of Chemical Consumption), JICA Study Team, based on the data from Statistic Data Book in Guilan Province, 1997 (Data of farmland area)

Note: The value shown in the cell "Rasht" is chemical consumption in the part of Rasht, that is in the basin of the wetland. It is assumed that 25 % of chemical amount in Rasht is used in the basin of the wetland.

The agricultural minister directed to reduce the quantity of agricultural chemical use in 1994. Accordingly, MOJA has instructed farmers through cooperatives to reduce the frequency of chemical application and implemented the IPM (Integrated Pest Management) program to enable farmers to minimize their chemical use. In fact, the consumption of chemicals has decreased to one third of the previous levels during the last decade in Iran. It is estimated that their impact on Anzali Wetland have also decreased.

Biological control is an insect control technology that uses the natural enemy of insect pests, such as the egg parasitism bee, which was introduced about 20 years ago in Iran. Since the agricultural minister directed curtailment of agricultural chemicals in 1994, biological control has been spreading quickly in recent years under the instruction of MOJA.

The rate of use of biological control is reaching the same rate as chemical control in the study area. The natural enemy which is used as the biological control agent is a species of egg parasitism bee (*Tricogramma* sp.) and native species in the study area. The egg parasitism bee grows up utilizing the egg of the moth (*Sitotroga* sp.) as a host. It is parasitic on the egg of several other insect pests, such as stem borer (*Chilocepro* sp.), and protects rice from such insect pests.

Thirty factories for the egg parasitism bee production are located in the study area. About 120 engineers and 30 agricultural college students are registered and cultivating biological control agents.

**Table 2.6.2 Area of Biological Control, 2002**

Township	Farmland (ha)	Biological Control (ha)
Anzali	4,200	390
Rasht *	15,500	4,650
Shaft	14,330	3,565
Fuman	13,870	3,371
Somehsara	27,150	5,434
Masal	6,515	2,500
Total	81,200	19,910

Note: The cell "Rasht" shows the values in the part of Rasht, which is in the basin of the wetland. The area of Rasht in the basin is assumed to be 25 % of overall Rasht.

Source: JICA Study Team, based on the data from Statistic Data Book in Guilan Province, 1997 (Data for Farmland Area), Horticulture and Agriculture Organization in Guilan, MOJA (Data of Biological Control Area)

## 2.7 Integrated Pest Management

Integrated Pest Management (IPM) is the development of a set of practices that maintain pest populations at a level below that which causes economically significant losses. It emphasizes minimal intervention and advocates the development of natural regulating mechanisms, both biological and cultural. Participatory IPM was introduced in Iran in 1999 through FFS to tackle the excessive pesticide use on pistachio trees. MOJA has also been practicing IPM by the release of parasitic wasps to combat insect pests of rice. Recently the Global Environmental Facility (GEF) has approved a small grant project to implement IPM/FFS in paddy fields in Mazandaran province, where the *Grus leucongeranus* (Siberian Crane) and other migratory birds winter over. This activity is managed by the national NGO 'Institute for Green Rural Advancement' (IGRA).

## 2.8 Animal Husbandry

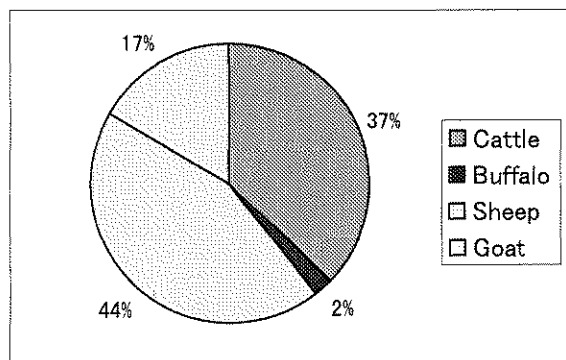
The numbers of livestock of the study area in 2001 were about 722,699 in total consisting of 270,000 cows, 320,000 sheep, 120,000 goats, and 20,000 water buffalo, as shown in the following table. Among these, most sheep and goats stay in the rangeland where altitude is high from spring to autumn, and only in winter they move to the plane.

Although the dung and urine in the rangeland are not treated, it is thought that there is little direct inflow to the river system. Moreover, in the cattle sheds of the plane, dung is supplied to the farmland as a compost.

**Table 2.8.1 Number of Livestock, 2001**

Township	Cattle	Buffalo	Sheep	Goat	Total
Anzali	8,520	1,568	960	0	11,048
Rasht	41,611	1,704	211	178	43,704
Shaft	47,310	649	67,845	32,819	148,623
Fuman	60,216	1,211	86,348	58,346	206,121
Somehsara	66,168	10,173	20,787	6,231	103,359
Masal	45,063	1,323	141,125	22,333	209,844
Total	268,888	16,628	317,276	119,907	722,699

Source: Animal Husbandry Dept., MOJA



Source: Animal Husbandry Dept., MOJA

**Figure 2.8.1 Percentage of Each Livestock**

## CHAPTER 3 IMPACTS OF AGRICULTURE FOR WETLAND CONSERVATION

### 3.1 Impacts of Chemical Fertilizer

According to the application of fertilizer, phosphate is low and nitrogen and potassium rates have been suitable recently. As a whole, large quantities of chemical fertilizers are applied in the entire farmlands of 96,500 ha in the study area, while the application rate per unit area is not quite large as described in chapter 2. However, a certain amount of chemical fertilizer is thought to be dissolved and flowing into the wetland. Chemical fertilizer is one of the water pollution loads and is a cause of hyper-eutrophication in the wetland.

### 3.2 Impacts of Agricultural Chemicals

Pesticides and herbicides, such as diazinon and paraquat, are widely used in the basin, though little is known about their environmental impacts. Apparently birds and fish are quite susceptible to diazinon<sup>1</sup>, while the concentrations of diazinon at 16 points in the wetland were recorded as between 14 and 143 µg/L in the water quality survey of September, 2003. Paraquat is moderately toxic to birds and fish<sup>2</sup>, and the concentration of paraquat was recorded as between 18 and 199 µg/L at the same points and time. The field survey results must therefore be suspect. It is not clear whether this is due to point sources of pollution or other reasons, such as analytical and reporting errors. A detailed monitoring of agricultural chemical use and environmental concentrations of such chemicals, both with chemical analysis of biological assay, should be established.

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<sup>1</sup> Reported LD50 (lethal dose) of diazinon for birds ranges of 2.8-41 mg/kg, and the reported LC50 (lethal concentration in water) for fish are 80-3,200 µg/L for rainbow trout, 52 µg/L for bluegill, 30 µg/L for loach (EXTOXNET, 1996; Kyoto Univ., 1997).

<sup>2</sup> Reported LD50 of paraquat for birds is 970-981 mg/kg (bobwhite, Japanese quail), and the LC50 for trout is 13-32 mg/L (EXTOXNET, 1996).

## CHAPTER 4 MANAGEMENT OF POLLUTION FROM FARMLAND

### 4.1 Introduction

Management of pollution from farmland is basically to control consumption of fertilizers and agricultural chemicals on farmland. However it would be difficult to reduce fertilizers consumption drastically since the present application level is more or less similar with the recommended and reducing application may affect crop productivity. Potentiality of the reduction and policy on management are mentioned in this Chapter.

### 4.2 Potentiality for the Reduction of Chemical Fertilizers and Agricultural Chemicals

The potential for the reduction of chemical fertilizers and agricultural chemicals is as follows.

#### 4.2.1 Chemical Fertilizers

Reduction of chemical fertilizers in Anzali Wetland is difficult for the following reasons.

- The present amount of chemical fertilizer use is close to the necessary minimum value.
- There is a target for the production increase per unit area in MOJA Guilan, and reduction of chemical fertilizer becomes a serious constraint for the achievement of the production increase target.
- Organic fertilizer use with livestock dung is already popular.

For the reduction of chemical fertilizer consumption, incentive for individual farmers is the key issue. However, fertilizers are provided at a low price with government subsidy, and farmers have little incentive to reduce the amounts of fertilizers they use. In order to increase the effectiveness of this program, it may be possible to give added value to crops produced organically (e.g., promotion of the product brand "Organic Rice from Guilan Province") while reducing the subsidy on agricultural chemicals.

#### 4.2.2 Agricultural Chemicals

MOJA Guilan province has a target in which biological controlled farmland will increase about 13,000 ha by 2008. If this is attained, 25% of the present pesticide use is estimated to decrease by 25%. However, in the present condition, more than the half of the farmers using biological control apply pesticide simultaneously, therefore, the actual pesticide decrease is predicted to be about 10%. In the meantime, it is presumed that the amount of agricultural chemicals for 4,500 ha of farmland can be decreased over the next 15 years. Over that time the area in which IPM/FFS will be implemented will increase by 300 ha/year (referring to the results of Mazandaran province). Since that area (4,500 ha) is 5% of all the farmland in the

watershed of Anzali Wetland, 5 % of agricultural chemical use is considered to be eliminated 15 years later.

#### **4.3 Policy on Management of Pollution from Farmland**

As for chemical fertilizer, the application of the proper quantity should be thorough, and to carry out the reduction of chemical fertilizer by substitution of organic fertilizer with the help of a subsidy in a limited area such as the buffer zone of the Wetland Ecological Management Plan is practical for chemical fertilizer management in Anzali Wetland.

As for agricultural chemicals, the Islamic Republic of Iran has set forth a plan which advances the reduction of agricultural chemical in farmland for some purposes such as the reduction of the import of agricultural chemicals, improvement of the safety of food and saving the environment. Furthermore high-concentrations of agricultural chemicals are detected by water quality survey in Anzali Wetland (though the result must be reviewed), and there is a possibility that agricultural chemicals may have direct impact on organisms in Anzali Wetland, therefore, the reduction should be carried out to cut down agricultural chemicals as much as possible.

The following measures are necessary for the management of pollution from farmland in the watershed of Anzali Wetland.

- Strengthening of the MOJA Extension System
- Introduction of Environmentally Sustainable Agriculture

The outlines of the measures are shown in Chapters 5 and 6.



## **CHAPTER 5 STRENGTHENING OF MOJA EXTENSION SYSTEM**

### **5.1 Introduction**

MOJA has an important role in guiding farmers on the control of pollution from agricultural activities. For the control of consumption of fertilizers, pesticides and herbicides, MOJA gives advice to farmers through agricultural Service Centers and Township Cooperative Offices as shown in Figure 1.2.1. It is proposed that the existing MOJA Extension System can be strengthened more.

### **5.2 Advice on Suitable Use of Chemical Fertilizers**

The soil laboratory of MOJA conducts soil analyses once in three years, and the optimal amount of fertilizer application is recommended based on the result.

Even in Japan, it is difficult to control the amount of consumption of chemical fertilizers. A continuous and long-term effort with individual farmers is important for reduction of chemical fertilizer consumption. Publication of annual consumption records of chemical fertilizers is also recommended for providing an incentive for the reduction.

### **5.3 Advice on Suitable Use of Livestock Waste**

Traditionally, farmers use livestock waste as one of farm inputs in the study area. Although it might possibly cause water pollution by COD, T-N and T-P if it is excessively dosed, livestock waste-based compost should be further promoted to minimize the use of chemical fertilizers, especially nitrogen-based ones (e.g., urea, ammonium sulfate, etc.). Application of organic materials can make soil healthy and help to minimize an outbreak of diseases and pest infestation if it is properly treated. The Agricultural Service Center needs to disseminate proper application of organic materials as well as appropriate application level of chemical fertilizers based on the dosage of organic materials.

The following actions should be considered to promote the use of compost.

- to provide subsidy for using organic materials
- to give added value to products organically grown (e.g., promotion of the product brand "Organic Rice from Guilan Province")
- to develop a network with industrial livestock raisers to encourage recycling livestock waste

As discussed in Part 3, the use of compost / organic materials should first focus on the buffer zone to minimize the pollution load to the wetland.

### **5.4 Advice on Suitable Use of Pesticides and Herbicides**

MOJA is promoting biological control of insect pests in order to reduce pesticide consumption, which is to be encouraged. The promotion of herbicide reduction should also

be encouraged, with the added bonus of increasing soil health and fertility, providing animal forage, improving crop yields, and increasing food sources, as well as controlling weeds. The idea of promotion needs to be considered with local farmers.

In order not to use agricultural chemicals that have serious impacts on the eco-system, it is recommended to make a list of environmentally dangerous chemicals as a first step. In the case of Japan, diazinon and paraquat, which are widely used in the basin, are strictly controlled with respect to use as an agricultural chemical from the viewpoint of conservation of aquatic ecology.

### **5.5 Minimization of Water Pollution in River System**

Water management are crucial for the control of pollution loads from farmlands. Draining irrigation water soon after application of farm inputs (fertilizers / agricultural chemicals) means to discharge highly polluted water with nitrogen, phosphorous or toxic materials to rivers as well as the wetland.

As shown in Chapter 2, Diazinon is the main agricultural chemical presently used in the area. Since it has the property of being easily hydrolyzed and reduced in paddy fields, the water retention for a certain period after application is very important. Due attention should be paid to water management to minimize the discharge of pollution loads to river systems. Therefore, the Agricultural Service Center should also emphasize water management at the field level in addition to the extension works on the uses of agricultural chemicals and fertilizers

## CHAPTER 6 ENVIRONMENTALLY SUSTAINABLE AGRICULTURE

### 6.1 Introduction

In the watershed of Anzali Wetland, the plain area is about 160,000 ha. Approximately 96,500 ha is farmland in the plain area, and the paddy field occupies about 81,000 ha. Agricultural activities have impact on the wetland to some extent such as water pollution, regulation of water discharge and habitats supply for organisms. It is therefore necessary to promote environmentally sustainable agriculture which harmonizes agriculture and the environment.

Environmentally sustainable agriculture needs:

- to reduce use of chemical fertilizer,
- to reduce use of agricultural chemicals,
- to secure the irrigation water and river flow,
- to raise the public awareness, and
- to maintain the farmers' income.

### 6.2 Present Management and Issues

As for the present agriculture, the township cooperative office of each area distributes agricultural materials, agricultural chemicals, chemical fertilizers and technical assistance to the farmers. The soil laboratory of MOJA performs soil analysis once every three years and reports the proper amount of application of chemical fertilizer to the township cooperative office based on the result. However, farmers tend to use more fertilizer in order to increase the amount of harvest (MOJA pers.com.).

Prohibited agricultural chemicals are designated by MOJA and optimal agricultural chemicals use is instructed. The use of biological control has advanced recently for the reduction of agricultural chemicals use, but many farmers use agricultural chemicals together with biological control because the effect of biological control is limited. Moreover, most farmers use herbicide. According to the water quality survey which was conducted by the study team, the concentration of agricultural chemicals in the rivers and the wetland are high, and they are at the level which seriously affect the human body and inhabitants in the wetland.

### 6.3 Management Plan

#### 6.3.1 Reduction of Chemical Fertilizers

In order to maintain the productivity of the farmland, excess chemical fertilizer use should be restrained. If excess fertilizer use continues, the productivity of farmland declines. The measures to reduce chemical fertilizer are introduced as follows.

### (1) Application of Compost

Several composts are produced from livestock dung, solid waste and Azolla in the watershed of Anzali Wetland. The applications of composts are still limited. The JICA Study Team implemented a pilot activity which test composting of the Azolla and its use as fertilizer. The result of the test shows that the paddy field with compost produced almost same amount of rice as the paddy field with chemical fertilizer. The application of compost should be promoted.

In one measure taken around Lake Biwa in Japan, the government gives a certification to the products. Farmers can make agreements with government as they cut down agricultural fertilizer use to 50 % or less from previous levels. As compensation, the government pays a subsidy, and certifies the agricultural products with official marks attached to the products to take to the market. People tend to choose the products and issuance of certifications is increasing.

### (2) Introduction of Green Manure

Green manures such as Chinese milk vetch and kinds of barley are effective for the improvement of the soil condition. It is recommended to let the plants grow on the paddy field before the plowing in order to reduce chemical fertilizer use.

### (3) Extension of Soil Analysis

Soil analysis is conducted once every three years at 500 locations in Guilan province. Soil analysis is important to determine the rate of application of chemical fertilizer, it is recommended to conduct these test every year.

### (4) Minimum Application of chemical Fertilizer

In order to minimize the application of chemical fertilizer, the following measures are effective.

- Chemical fertilizer is intensively applied to the position which is efficient to be used for the root of crops.
- An ingredient to increase the speed of dissolving the chemical fertilizer, and chemical fertilizers with increased absorption efficiency are used.

## 6.3.2 Reduction of Agricultural Chemicals

### (1) Integrated Pest Management and Farmers' Field Schools (IPM/FFC)

Integrated pest management (IPM) has been promoted by MOJA as one of their extension programs. The main principle of IPM is to increase farm profit of individual farmers through reducing the expenses for external farm inputs but maintaining the productivity. Major practices taken under IPM are i) identification and prediction of pests, ii) determination whether pest population will reach a level that could cause economic damage, iii) application

of agricultural chemicals in case the situation is severe, and iv) maintenance of crop health. Farmer Field School (FFS), which is a training course composed of guidance and practical sessions in the field, has been a major tool for the promotion of IPM. Since all the practices from identification to chemical application should be done by farmers themselves, the capacity development of farmers is essential for the implementation of IPM. In general, FFS for rice farming organizes a field session per week and lasts for one cropping season.

Although MOJA has conducted the IPM program since 1999, the coverage of the activity is limited and the IPM practices seem unfamiliar to farmers in the study area. It is, therefore, proposed that two groups of two experts on IPM conducts 10 FFSs every year at different sites, and give guidance to about ten families of farmers on each school for several months. The experts on IPM need to keep close relation with farmers and give technical guidance to farmers to enable them to use the proposed practices. As a result of 10 FFSs, about one hundred families of farmers can get guidance for about 200 ha of farmland every year. The farmers who get the guidance are expected to be trainers and disseminate trained knowledge to his / her neighbors. FFS includes the following guidance:

- Guidance on identification and prediction of insects / pests to be controlled
- Guidance on method of pesticide use with suitable types and amount of pesticide to meet the site condition
- Guidance for biological control of insect pests in order to reduce pesticide consumption
- Guidance for method of herbicide reduction

The proposed IPM program should be concentrated on the buffer zone at the beginning of the master plan, and thence, it will expand its activity to the transition zone gradually.

## (2) Several Measures for the Reduction of Agricultural Chemicals

In the areas Surrounding Lake Biwa, the following measures are taken for the reduction of the use of agricultural chemicals.

- By exterminating weeds using agricultural machines, the number of applications of the herbicide is decreased.
- Ducks, carp, etc. are released in the paddy field, and they eat the weed.
- The natural enemies which prey on the insects, parasitic organisms, etc. are used, and diseases and insect pests are eliminated.
- A chemical which acts the same as pheromone of the insect pest is used as bait in a trap, and the insect pest is attracted and killed.
- The surface of farmland is covered with paper, a film, etc. and the spread of harmful animals and plants are prevented.

Parasitic bees as natural enemies have already introduced in Guilan province and are still multiplying.

Ducks and fish were tested in Mazandaran province as a pilot activity. It is possible for this to be applied in Guilan province, especially near the Anzali Wetland where ground water level is high.

## **Part 10: Capacity Development**

# THE STUDY ON INTEGRATED MANAGEMENT FOR ECOSYSTEM CONSERVATION OF THE ANZALI WETLAND

## FINAL REPORT Volume III      Supporting Report

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## CHAPTER 1 INTRODUCTION

### 1.1 Introduction

#### 1.1.1 Goals

Capacity development of stakeholders was one of the main objectives of this Study, and various capacity development activities were implemented throughout the course of the study. The goals of the capacity development activities were to:

- facilitate coordination among the stakeholders,
- develop capacities to develop management plans,
- implement activities that lead to local initiatives for environmental conservation,
- develop capacities for environmental management based on monitoring data, and
- develop mechanisms to disseminate environmental information

#### 1.1.2 Approaches

Figure 1.1.1 schematically shows the approaches taken in this study.

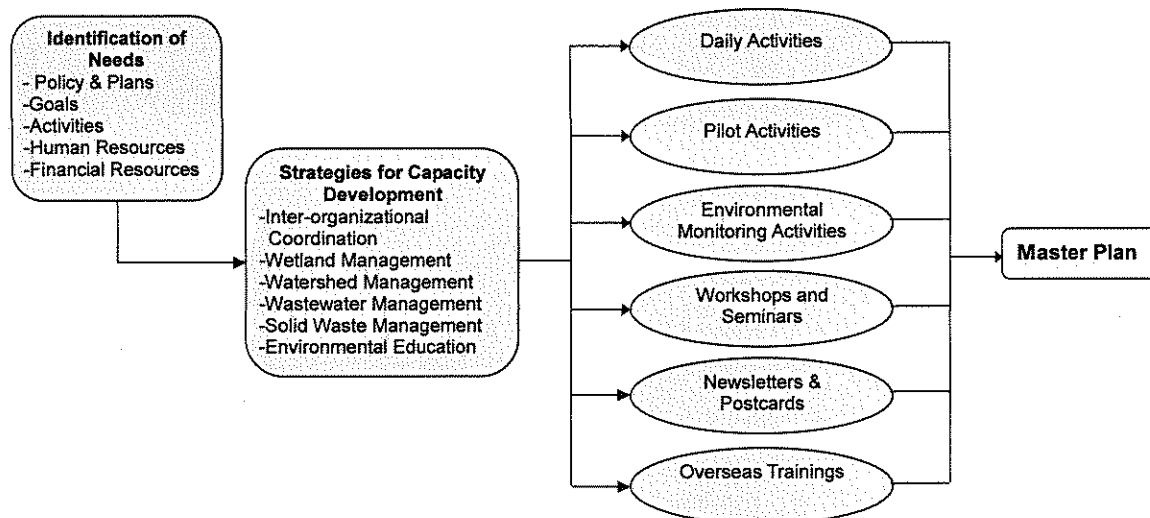


Figure 1.1.1 Approaches of Capacity Development Activities

#### (1) Identification of Needs and Formulation of Strategies

Before designing the capacity development activities, the following aspects of environmental

management were examined:

- Policy directives indicating the overall directions of the activities and services,
- Clear and well defined goals of activities (e.g., public services, projects and programs),
- Effective implementation of activities, such as providing environmental services or carrying out environmental projects and programs to achieve the goals, and
- Sufficient inputs of human and financial resources.

Then, the needs for capacity development were identified, and the capacity development activities were implemented according to the needs.

## (2) Focal Areas

The following 6 areas of the environmental management activities were selected for the analysis in relation to the proposed components of the master plan.

- Coordination among Relevant Organizations
- Management of the Wetland
- Management of Watershed
- Wastewater Management
- Solid Waste Management
- Environmental Education

## (3) Methods of Capacity Development

The capacity development activities were implemented through six types of activities as explained in Table 1.1.1.

**Table 1.1.1 Methods of Capacity Development Activities**

Method	Summary
Daily Activities (Chapter 2)	These are daily joint activities by the JICA Study Team and the Iranian partners, such as field surveys, collection and analysis of relevant data, discussions about planning issues, and so forth.
Pilot Activities (Chapter 3)	These are small demonstration activities jointly implemented by NGOs, contractors, government officials, and the JICA Study Team. Overall 11 activities were carried out during the course of the study.
Environmental Monitoring Activities (Chapter 4)	These are a set of simple monitoring activities carried out by the counterpart organizations to improve the monitoring systems and to support environmentally sound decisions.
Workshops and Seminars (Chapter 5)	In total, 7 workshops and 3 seminars were carried out in order to disseminate relevant information, such as the progress of the study, similar experiences in Japan, the UK and other countries, etc. The workshops were also used to exchange opinions with various stakeholders.
Newsletters and Post Cards (Chapter 6)	In total, 5 newsletters and 3 post cards were issued by the Study Team to keep stakeholders informed, and to raise environmental awareness.
Overseas Training (Chapter 7)	In total 9 experts (5 experts in spring 2004, and 4 experts in fall 2004) participated in 1-month JICA training courses in Japan. In addition, 3 experts visited wetlands in the U.K.

## CHAPTER 2 CAPACITY DEVELOPMENT THROUGH DAILY ACTIVITIES

### 2.1 Capacity Development for Inter-organizational Coordination

#### 2.1.1 Identification of Needs

Various organizations are involved in environmental management in the study area.

**Table 2.1.1 Organizations Involved in Environmental Management**

Category	Organization	Major Responsibilities
Wetland Management	DOE	Management of protected areas
	NRGO	Owner of a large part of the wetland
	PSO	Management of maritime activities
	CHTO	Tourism
	Shilat	Fishery
	Bony Fishes Research Center	Research on fishes
Watershed Management	MOJA	Management of agricultural area and watershed
	NRGO	Management of rangelands and forests
	RWO	Management of rivers
	Municipalities	Management of land use in each municipality
	HUDO	Urban planning
	DOE	Management of protected forests
Wastewater Management	GWWC	Water and wastewater management in urban areas
	RWWC	Water and wastewater management in rural areas
	IMO	Industrial development and management
	DOE	Pollution control
Solid Waste Management	Municipalities	Management of municipal solid wastes
	DOE	Pollution control
	IMO	Industrial development and management
	Ministry of Health	Public health and hygienic issues
Environmental Education	MOE	Formal education in schools
	DOE	Environmental education
	Others	Environmental education
Financial and General Planning	Governor's Office	General planning
	MPO	Socio-economic planning, approval of projects/budgets

However, when the study was initiated in May, 2003, there was no organization or mechanism to coordinate these organizations. This is partly because the administrative system in Iran is highly centralized, and many decisions are made at the central level, and there has been little inter-organizational decision making at the provincial level, this is even though the problem of weak inter-organizational coordination was considered one of the most serious flaws of environmental management in the area. This was a major concern for the study, which aimed to develop an integrated master plan.

## 2.1.2 Steering Committee Meetings

Considering this problem, the Iranian side organized three steering committees at the beginning of the study; (i) local steering committee, (ii) national steering committee, and (iii) technical committee. Figure 2.1.1 shows the organizational structure for the study.

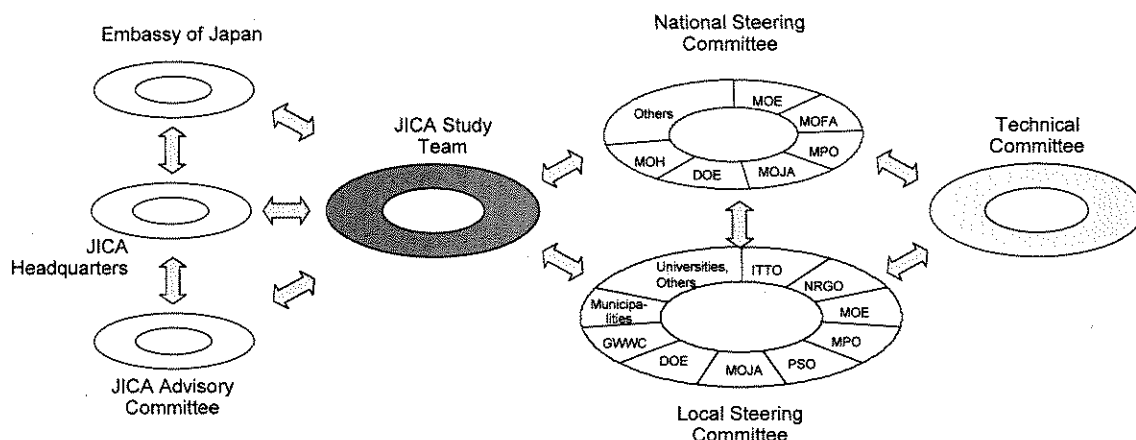


Figure 2.1.1 Organizational Structure for the Study

### (1) Local Steering Committee Meetings

One of the most important features of this study was that it was executed based in Guilan with active participation of local organizations and other stakeholders, rather than executed from the central ministries. A local steering committee represented by various provincial organizations was organized at the beginning of the study. There were 23 core members, and other stakeholders were also invited depending on the topics. The committee met monthly, in total 12 times, during the course of the study. The local steering committee meetings provided excellent opportunities to discuss inter-organizational issues, such as conservancy.

**Table 2.1.2 Local Steering Committee for the Study**

Roles	The Local Steering Committee is to assist the daily operation of the Study in Guilan.
Members	<p>Dr. Shaban Ali Nezami, General Director, Department of the Environment, Guilan</p> <p>Mr. Mahyar Sakari, Department of the Environment, Guilan</p> <p>Mr. Mohammad Reza Taherzadeh, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Reza Sohrabi, Ministry of Jihad-e-Agriculture, Headquarters</p> <p>Mr. Hossein Ali Mohammadi, Ministry of Jihad-e-Agriculture, Headquarters</p> <p>Mr. Rasoul Mohammadi, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Mohammad Hossein Mehdizadeh, Water and Wastewater Company, Guilan</p> <p>Mr. Morteza Haghighat, Regional Water Organization, Guilan</p> <p>Mr. Hossein Arami, Management and Planning Organization, Guilan</p> <p>Dr. Khanipour, Bony Fisheries Research Center</p> <p>Mr. Hadi Haghshenas, Port and Shipping Organization, Guilan</p> <p>Dr. Davoud Ahmadi Dastjerdi, Guilan University</p> <p>Dr. Ali Mohammadzadeh, Guilan University</p> <p>Mr. Mehrdad Lahooti, Government of Guilan</p> <p>Mr. Gholamhosein Ahadi, Industrial and Mining Organization, Guilan</p> <p>Dr. Hossein Ali Atefi, Iran Touring and Tourism Organization, Guilan</p> <p>Mr. Ali Meraji, Guilan Jihad-e-University</p> <p>Mr. Gholam Hossein Kordafshari, Director of NRGU, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Adili, Manager, Cultivation and Horticulture Department, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Hadi Rafiee, Deputy of Livestock Affair, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Dr. Mir Hosseini, Natural Resource and Livestock Research Center, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Kazerooni, Director, Fishery General Office, Ministry of Jihad-e-Agriculture, Guilan</p> <p>Mr. Hamid Nasri, Extension and Cooperative Director, Ministry of Jihad-e-Agriculture, Guilan</p>
Chairperson	Dr. Shaban Ali Nezami, Department of the Environment, Guilan
Co-chairperson	Co-chairperson Mr. Reza Sohrabi, Ministry of Jihad-e-Agriculture, Headquarters
Secretariat	Department of the Environment; Guilan
Operation	<p>Regular monthly meetings</p> <p>As requested by the JICA Study Team</p>

## (2) National Steering Committee Meetings

The national steering committee met 4 times in total, at the submissions of the Progress Report (1), Progress Report (2), Interim Report, and the Draft Final Report.

**Table 2.1.3 National Steering Committee for the Study**

Roles	To guide the general direction of the Study, and to share the information among relevant national level organizations. It is the highest decision making body concerning the operation of the Study on the Iranian side.
Representing Organizations	MOJA, DOE, Ministry of Interior, MPO, MOFA, Ministry of Health, MOE,
Chairperson Co-chairperson	Mr. Anoshrihan Najafi (2003-2004), Dr. Hadi Soleymanpoor (2004 to the end of Study), Department of the Environment Dr. Forood Sharifi, Ministry of Jihad-e-Agriculture
Secretariat	Ministry of Jihad-e-Agriculture
Operation	At the submissions of Inception Report, Progress Report (1), Progress Report (2), Interim Report and Draft Final Report. As requested by the JICA Study Team or the Local Steering Committee

The interests of national organizations are oriented toward policy issues, budgeting, inter-organizational coordination, etc., and clearly different from the interests of many local organizations which were oriented toward controlling immediate environmental problems, such as spreading of *Azolla* in the wetland or erosion and land slides in Masuleh. These differences in perspectives added important dimensions to the study.

### (3) Technical Committee Meeting

The Technical Committee was the third steering committee organized by the Iranian side. The committee met once.

**Table 2.1.4 Technical Committee for the Study**

Roles	The Technical Committee is under the National Steering Committee, and gives advice to the National Steering Committee on technical matters.
Representing Organizations	Dr. Shaban Ali Nezami, Department of the Environment, Guilan Mr. Mahyar Sakari, Department of the Environment, Guilan Mr. Reza Sohrabi, Ministry of Jihad-e-Agriculture, Headquarters Mr. Hossein Ali Mohammadi, Ministry of Jihad-e-Agriculture, Headquarters Mr. Seyyed Hojat Khodaparast, Bony Fisheries Research Center Mr. Khorasani, Regional Water Organization, Guilan Mr. Farhad Momenpour, Water and Wastewater Company, Guilan Dr. Maryam Fallahi, Bony Fisheries Research Center Dr. Kamran Taghavi, Guilan University Mr. Babak Tavakoli, Guilan University Mr. Javadi, Mining and Industrial Organization, Guilan Dr. Mohammad Mahdavi, Tehran University Dr. Farhang Ghasriani, Department of the Environment, Headquarters Dr. Serajzadeh, Department of the Environment, Headquarters Mr. Masoud Bagherzadeh Karimi, Department of the Environment, Headquarters Mr. Mohammad Cheraghcheshm, Natural and Livestock Resources Research Center, Ministry of Jihad-e-Agriculture, Guilan Mr. Ataollah Maslahatjo, Watershed Management Expert, Ministry of Jihad-e-Agriculture, Guilan Dr. Bahman Ramzany, Rasht Azad University Dr. Jalillodin Sorour, Rasht Azad University
Chairperson	Dr. Shaban Ali Nezami, Department of the Environment, Guilan
Co-chairperson	Mr. Reza Sohrabi, Ministry of Jihad-e-Agriculture, Headquarters
Operation	At the submissions of Inception Report, Progress Report (1), Progress Report (2), Interim Report and Draft Final Report. As requested

### 2.1.3 Provincial Workgroup on Environment, Land Use and Population

In Guilan, there are 16 provincial thematic working groups on various subjects, such as the working group on land use, environment and population, working group on water, agriculture and natural resources, etc. These working groups are organized to coordinate various inter-organizational issues under the provincial development committee. They are chaired by the provincial governor, and represented by general directors of relevant organizations. However, in reality, many of these committees, including the working group on environment, land use and population, were not active when the study started in May, 2003.

The first meeting of the Provincial Working Group on Environment, Land Use and Population was organized in June, 2004. The agendum of the first meeting was the Anzali Wetland Conservancy proposed in this study, which was put forward for review by the Provincial Government, and this working group was organized. This was considered as a milestone in the progress toward the integrated environmental management in the region.



#### 2.1.4 Committee for Implementation of the Master Plan

At the end of the Phase 2, the study necessitated inter-organizational coordination at the central level, mainly to secure funding for implementation of the proposed master plan. The relevant organizations discussed the possible inclusion of the proposed plans in the Fourth Five-year Development Plan, promotion of the master plan at a high-level coordination body at the national level (e.g., Supreme Council for the Environment, Supreme Council for Water, or National Sustainable Development Committee), organization of committees for implementation of the master plan, joint implementation of the master plan as a special code project, etc.

It has to be mentioned that the development of these inter-organizational coordination mechanisms at the provincial and national levels was quite challenging as there was no preceding example that one could follow, and many counterpart personnel, especially at the provincial level, were inexperienced in such matters.

Nevertheless, inter-organizational coordination is one the weakest aspects of the current environmental administration in Iran, and the efforts made to overcome this problem, as exemplified by the discussions among the stakeholders, which evolved from simple technical coordination to organizational and financial issues, clearly indicated that inter-organizational coordination improved markedly during the 1.5 years of the study in Iran.

## 2.2 Capacity Development for Wetland Ecological Management

### 2.2.1 Identification of Issues

#### (1) Lack of Wetland Management Plan

There have been a number of environmental studies in the Anzali Wetland, including comprehensive studies by MOJA (Yekom, 1988) and Guilan University (1999). However, none of these studies were followed up, and when the current study was started in 2003, there was no plan for management of the Anzali Wetland. As a result, many stakeholders, including some of the DOE staff, did not have a clear vision about the direction of environmental management for the wetland. In addition, the wetland management was strongly oriented toward regulatory control of illegal activities, and many important aspects of the wetland management, such as public participation, wise use, and coordination among relevant organizations, were weak. There was an obvious need to develop a comprehensive wetland management plan.

## (2) Weak Coordination among Relevant Organizations

As summarized in Table 2.1.1, DOE, NRGGO, PSO, ITTO, Shilat, Bony Fishes Research Center, and a number of other organizations are involved in wetland management. However, they have different views about the development and environmental protection of the Anzali Wetland, and they carried out their activities with little coordination. There has to be a mechanism to coordinate these stakeholders.

## (3) Limited Participation of Local Stakeholders in Wetland Management

The current management of the wetland is oriented toward protection of the legally-protected areas from human activities, and participation of local people in wetland management has been limited. However, experiences in other parts of the world suggest that participation of local stakeholders is a key to sustainable wetland management. In the case of the Anzali Wetland, there are conflicts related to fishing or hunting, as well as encroachment of the wetland boundaries. These problems can be resolved if constructive solutions in the direction of “wise-use” of the wetland resources are discussed among the local people, DOE, and other stakeholders.

## (4) Limited Environmental Information

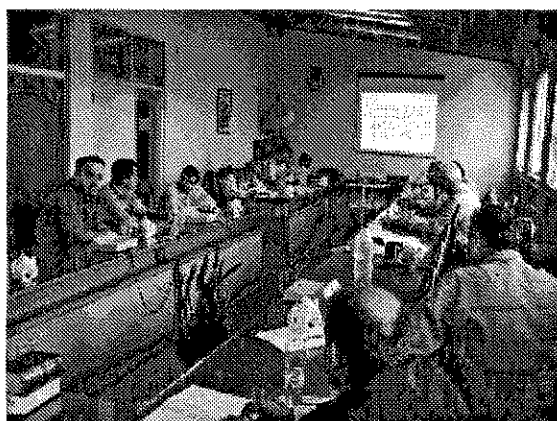
DOE carries out regular water quality testing and an annual counting of migratory birds in winter. However, there was serious lack of biological and ecological information, such as distributions of macrophytes, distributions of important habitats for migratory and resident birds, spawning grounds for fishes, etc. This hampered the development of the master plan.

### 2.2.2 Joint Development of the Wetland Ecological Management Plan

In order to develop the Wetland Ecological Management Plan jointly with many organizations, numerous discussion sessions and field visits were held. Table 2.2.1 summarizes some of the major issues discussed in such meetings and field visits. These joint efforts provided essential steps to develop the Wetland Ecological Management Plan.

**Table 2.2.1 Major Issues Discussed during Development of the Wetland Ecological Management Plan**

Category	Participants	Major Issues Discussed
Protection of Ecologically Sensitive Areas	DOE-Guilan, DOE Headquarters, Bony Fishes Research Center, local ecologist	<ul style="list-style-type: none"> <li>- Delineation of new protected areas, no hunting areas, etc.</li> <li>- Legal status of protected areas</li> <li>- Effectiveness of licensing system to control fishing and hunting activities</li> </ul>
Creation of Diverse Environment	DOE, Bony Fishes Research Center, local ecologist	<ul style="list-style-type: none"> <li>- Creation of open-water by dredging</li> <li>- Creation of water channels</li> <li>- Reed cutting</li> <li>- Removal of <i>Azolla</i></li> </ul>
Delineation of boundaries of the wetland, the buffer areas and the transition area	DOE-Guilan, NRG, MOJA, Natural Resources Research Center, local legal expert, local ecologist	<ul style="list-style-type: none"> <li>- Boundaries of the wetland</li> <li>- Encroachment in Siakeshim and other areas</li> <li>- Concepts of a buffer zone and transition zone to protect the wetland</li> <li>- The impact of the water fluctuation of the Caspian Sea on the wetland management.</li> <li>- The impact of the proposed Anzali Ring Road</li> </ul>
Wise use of the wetland resources	CHTO, DOE, MOJA,	<ul style="list-style-type: none"> <li>- Potential of eco-tourism development</li> <li>- Potential of development of sports fishing instead of commercial fishing</li> <li>- Potential of aquaculture/cage culture in the wetland</li> <li>- Revision of fishing and hunting licenses</li> </ul>
Involvement of local stakeholders in wetland management	DOE-Guilan, Bony Fishes Research Center, Somehsara Municipality, NGOs, Rice Research Institute	<ul style="list-style-type: none"> <li>- Employment of local fishermen/hunters as eco-tourism guides</li> <li>- Guardians of the wetland</li> <li>- Paper making using reeds</li> <li>- Development of handy craft industry</li> <li>- <i>Azolla</i> fertilizer</li> </ul>
Control of Activities	DOE, Bony Fishes Research Center, Anzali Port Authority	<ul style="list-style-type: none"> <li>- Control of speed boats</li> <li>- Control of illegal fishing and hunting</li> <li>- Revision of license system</li> </ul>



A joint meeting on wetland management. In this particular meeting, DOE, Bony Fishes Research Center, GWWC, MOE, CHTO and others discussed wetland ecology and water quality control.



A boarder of the wetland, the issues of delineation of the wetland, encroachment and agriculture around the wetland were discussed by DOE, MOJA, NRG, NRRC, and other stakeholders.

**Figure 2.2.1 Joint Development of Wetland Ecological Management Plan**

### 2.2.3 Meeting with Local Stakeholders

The study took a number of different approaches to involve stakeholders, such as stakeholder meetings, questionnaire surveys, workshops, direct interviews, etc.

The first meeting with local stakeholders was held on August 4, 2003 at Guilan University in Somehsara inviting over 50 participants. In this meeting, the study team presented the general framework of the study, and the participants discussed the local environmental management issues. Another local stakeholder meeting was organized on September 25, 2004 with participation of 23 local farmers, fishermen and hunters. The participants discussed the values of the wetland, especially fishing, hunting and tourism resources, and how to live with the wetland in harmony with the wetland ecosystem. These stakeholders are highly dependent on the natural resources in the wetland, and stressed the need to manage the wetland properly and control environmental problems, such as pollution and garbage.



A stakeholder meeting on August 4, 2003. Stakeholders in Somehsara discussed local environmental issues.



A stakeholder meeting on September 25, 2004. Local fishermen, hunters and farmers discussed the values of the wetland and how to protect it.

**Figure 2.2.2 Stakeholder Meetings on Wetland Management**

### 2.2.4 Environmental Survey

Environmental information is essential for development of the master plan, and the following 6 surveys were carried out during the course of the study. The details of these surveys can be found in the Data Book.

**Table 2.2.2 Environmental Surveys**

Name of Survey	Summary
Water & Bottom Sediment Survey	A survey of water and sediment in 16 locations in the wetland and 20 locations in tributaries to the wetland.
Plankton and Benthos Survey	A survey of plankton and benthos in the wetland, which was carried out in conjunction with the water and bottom sediment survey.
Biological Survey	An ecological survey of birds, fishes and macrophytes in the wetland.
Bathymetrical Survey	A bathymetrical survey of the Anzali Wetland, and installation of 4 gauges for water level monitoring in the wetland.
Social Survey	A questionnaire survey of socio-economic conditions of stakeholders.
Institutional Survey	An interview survey of 22 organizations involved in environmental management of the Anzali Wetland and its watershed.

## **2.3 Capacity Development for Watershed Management**

### **2.3.1 Identification of Issues**

#### **(1) Lack of Social Dimensions in Watershed Management Plan**

For rangeland and forest management, various plans, such as the forestry plan, forest protection plan, plan for balancing the number of livestock in the rangeland, eco-tourism plan, and erosion control plan, existed. However, these plans generally lacked social dimensions, and this makes the sustainability of the plans questionable.

#### **(2) Limited Expertise in Advanced Measures against Erosion and Landslide**

There was shortage of experts specialized in measures against advanced erosion and large-scale land slides that exist in the area. Because these works are costly, and involve the risks of making the situation worse, local expertise has to be developed.

### **2.3.2 Joint Development of the Watershed Management Plan**

NRGO, MOJA, HUDO and a number of other stakeholders participated in the development of the Watershed Management Plan. Table 2.3.1 summarizes the major issues discussed in the development of the plan.

**Table 2.3.1 Major Issues Discussed during Development of the Watershed Management Plan**

Category	Participants	Major Issues Discussed
Control of Number of Livestock in the Rangeland	NRGO, MOJA, graziers, NGO	<ul style="list-style-type: none"> <li>- Carrying capacity of the rangeland</li> <li>- Social considerations in watershed management</li> <li>- Livelihood improvement</li> <li>- Resettlement plans by NRGO</li> <li>- Coordination among relevant organizations for resettlement</li> </ul>
Control of Erosion	MOJA, NRGO	<ul style="list-style-type: none"> <li>- Methods of erosion estimation</li> <li>- Satellite image analysis</li> <li>- Process of erosion and counter measures</li> <li>- Financial issues related to erosion control</li> </ul>
Forest Management	NRGO	<ul style="list-style-type: none"> <li>- Forestry plans by NRGO</li> <li>- Forest Protection Plan by NRGO</li> <li>- Coordination between NRGO and DOE about protected forest</li> <li>- Resettlement of graziers living in the forest proposed by NRGO</li> </ul>
Control of Land Slide and Slope Collapse	MOJA	<ul style="list-style-type: none"> <li>- Mechanisms of land slides and slope collapses</li> <li>- Site specific counter measures</li> </ul>
Sedimentation Control in the Plain Area	MOJA, MOE	<ul style="list-style-type: none"> <li>- Simulation of sediment transport</li> <li>- Monitoring of sediment transport</li> <li>- Design of sediment traps</li> </ul>
Urbanization Control	HUDO, NRGO	<ul style="list-style-type: none"> <li>- Jurisdiction and responsibility of each organization concerned</li> <li>- Master plans for urban areas</li> <li>- Controlling the spread of urbanization</li> </ul>

### 2.3.3 Participatory Study on Livelihood Improvement of Graziers

The problem of overgrazing in rangelands is deeply rooted in the regional social issues, in particular in the lives of graziers, who strongly depend on livestock keeping. In order to find solutions to the overgrazing problem, a participatory study on livelihood improvement of graziers was carried out in the summer of 2004. The objective of the study was to propose livelihood improvement alternatives for the graziers so that they rely less on grazing activities. The study was designed based on discussions among an NGO (CENESTA), NRGO, MOJA and the JICA Study Team, and implemented by the NGO with participation of graziers in the area.



A joint meeting among an NGO, NRGD and MOJA to plan the survey



A workshop in which graziers addressed their issues and possible solutions to overgrazing problems

**Figure 2.3.1 Participatory Livelihood Improvement Planning**

This participatory planning was a new approach to the management of the natural resources in the area. In the past, the management of rangeland was based widely on regulatory approaches, and it has been difficult to get graziers' support. However, the participatory approach could bring graziers' ideas and graziers' support for rangeland management. There is a high hope that this new approach may be able to give solutions to the overgrazing problems.

#### 2.3.4 Workshops on Control of Erosion and Landslide

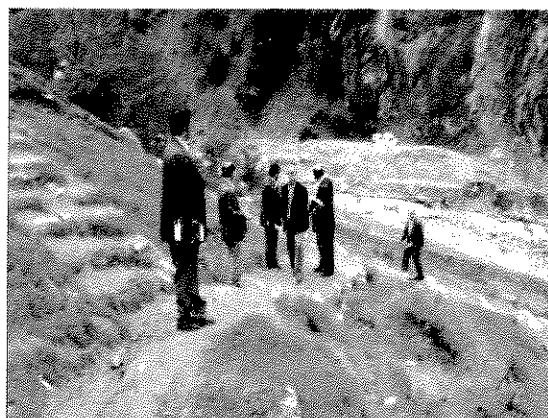
The following workshops were carried out in order to transfer technologies about erosion and landslide control.

**Table 2.3.2 Activities of the Erosion Control Working Group**

Meeting	Content	Participating Organizations	Outputs	Date
Erosion Control in Masuleh (Landslide)	A 1-day technical discussion consisting of a site visit with lectures in Masuleh. Discussion about the environmentally sound design and construction methods for roads in landslide areas (location: Masuleh)	Watershed Organization, Natural Resources General Office, Ministry of Road and Transport, JICA Study Team	Expanded knowledge on landslide recognition and remedies.	September, 2003
Analysis of Erosion Mechanisms (Sediment Transport)	A 1-day technical seminar/hands-on mini workshop. Explanation of the erosion mechanisms in the Study Area during the morning. Hands on modeling of sediment transport in the river using computers during the afternoon. (location: Rasht)	Watershed Organization, Natural Resources General Office, Ministry of Energy, DOE, JICA Study Team	Understand sediment transport in rivers. Solving example problem for a river in the basin.	November, 2003
Regional Erosion Control Plan 1 (Gully Erosion and Surface Erosion)	A 1-day technical lecture. Discussion of overall erosion control strategies in Guilan; control of overgrazing, illegal deforestation, landslide control, river engineering, sand traps, study of erosion and sediment transport. (location: Rasht)	Watershed Organization, Natural Resources General Organization, Ministry of Energy, JICA Study Team	Model case study for participants. Staff will be asked to examine photos and make evaluations of landslides.	January 2004



A workshop on erosion control.



A field excursion. On 25 and 28 September, 2003, the team organized special capacity development excursions. Experts from MOJA and MORT studied how to control landslides.

**Figure 2.3.2 Photographs of Erosion Control Workshops**



## 2.4 Capacity Development for Wastewater Management

### 2.4.1 Identification of Needs

#### (1) Lack of Plan for Water Pollution Control for Each Pollution Source

It is believed that the water quality of the Anzali Wetland is polluted and should be improved. However, the target level of water quality in the Anzali Wetland had not been set, and the target of pollution load reduction also had not been set.

Various organizations, such as DOE, GWWC, RWWC, etc., are making significant efforts to manage wastewater. There are several plans for development of wastewater treatment. However, there is no general plan or target for the purpose of improvement of the water qualities of public water bodies, including the Anzali Wetland. Therefore the plans for wastewater management of each pollution source are required for the purpose of reduction of the entire pollution load in the Anzali Wetland. The contributions of all pollution sources have to be analyzed and a comprehensive plan to reduce pollution loads must be developed.

#### (2) Limited Capacity to Evaluate Water Quality Problems and Develop Countermeasures

DOE regularly monitors the water quality of the wetland and rivers. However, such data are not used to analyze the mechanisms of water pollution or to develop countermeasures. A target for water quality in the Anzali Wetland should be set, and be reviewed from time to time based on continuous evaluation of pollution load reduction and water quality in the wetland.

### 2.4.2 Joint Development of the Wastewater Management Plan

The Wastewater Management Plan was jointly developed by GWWC, RWWC, DOE and other organizations. Table 2.4.1 shows the major issues discussed during the development of the Wastewater Management Plan.

**Table 2.4.1 Major Issues Discussed during Development of Watershed Management Plan**

Category	Participants	Major Issues Discussed
Water Quality in the Wetland	DOE, Bony Fishes Research Center, GWWC, RWWC	<ul style="list-style-type: none"> <li>- Current problems of water pollution</li> <li>- Mechanisms of water pollution</li> <li>- Impacts of water pollution on ecosystems</li> </ul>
Domestic Wastewater Management in Urban Areas	GWWC, NWVEC, DOE	<ul style="list-style-type: none"> <li>- Existing sewerage system development plans by NWVEC</li> <li>- Progress of construction for sewerage system development</li> <li>- Alternative sewerage development plans</li> <li>- Cost-sharing mechanisms</li> <li>- Discharge of treated wastewater</li> <li>- Legal basis for sewerage development</li> <li>- Use of low-phosphorous detergents</li> </ul>
Domestic Wastewater Management in Rural Areas	RWWC, NWVEC, DOE	<ul style="list-style-type: none"> <li>- Existing strategies by NWVEC</li> <li>- Existing wastewater management plans by RWWC</li> </ul>
Industrial Wastewater Management	IMO, MOIM, DOE, GWWC, Rasht Industrial City Company	<ul style="list-style-type: none"> <li>- Current conditions of industrial activities</li> <li>- Wastewater management in industrial cities</li> <li>- Management of toxic substances</li> <li>- Possibility of centralizing factories to industrial cities</li> </ul>
Management of Livestock Waste	DOE, MOJA	<ul style="list-style-type: none"> <li>- Possible measures for livestock waste management</li> </ul>
Management of Pollution from Farmland	MOJA, DOE	<ul style="list-style-type: none"> <li>- Current activities of MOJA Extension System on Control of Use of pesticides and fertilizers</li> <li>- Possible measures for management of pollution from farmland</li> </ul>
Environmental Monitoring	DOE, GWWC, MOE	<ul style="list-style-type: none"> <li>- Monitoring of pollution sources</li> </ul>

### 2.4.3 Workshop on Water Pollution Mechanisms

#### (1) Workshop No. 4

Many stakeholders believed that water pollution is the main environmental problem in the wetland, but few had clear ideas about the distributions and magnitudes of pollution sources, current levels of water pollution, pollution mechanisms in the wetland, or how to control pollution. In order to clarify these, the JICA Study Team organized a workshop, the “Study on Wetland Degradation” on November 30, 2003 (Workshop No.4). In relation to the wastewater issues, the following presentations were made:

**Table 2.4.2 Major Issues Discussed in Workshop No.4**

Presentation	Contents	Participants
Evaluation of the Present Water Quality Conditions in the Wetland	1. Outline a of Water and Bottom Sediment Quality Analysis in the Study 2. Results of the Analysis 3. Evaluation of Water Pollution in the Anzali Wetland	DOE, MOJA, GWWC, RWWC, MOE, MOIE, Bony Fishes Research Center, Environmental Research Center, NGOs
Evaluation of Pollution Load into the Wetland	1. Estimate of Pollution Load into the Anzali Wetland 2. Way of Pollution Load Discharged 3. Condition of Pollution Sources in the Basin 1) Urban Domestic Wastewater, 2) Rural Domestic Wastewater, 3) Industrial Effluent, 4) Livestock Waste, 5) Pollution from Farmland, 6) Solid Waste dumped into River	

## (2) Workshop No. 7

In order to clarify present condition of water pollution in the Anzali Wetland and discuss proposed measures for the wastewater management, the following subjects were discussed in Workshop No. 7.

**Table 2.4.3 Major Issues Discussed in Workshop No.7**

Date	Major Subjects	Participants
4 August 2004	1. Evaluation of Water Quality in/around the Anzali Wetland based on the Results of Water Quality Analysis in 2003 2. Estimation of Pollution Load Discharge into the Anzali Wetland and Target of Pollution Load Reduction 3. Water Quality Standards and Regulations 4. Proposed Measures for Wastewater Management	DOE, MOJA, GWWC, RWWC, MOE, MOIE, Bony Fishes Research Center, Environmental Research Center, Jihad University
26 August 2004	1. Selection of Priority Projects 2. Urgent Issues to be considered 1) Environmental Impact of the Sewerage Project 3. Strategy of Water Pollution Load Reduction 1) Measures for completion of Sewerage Collection System 2) Industrial Wastewater Management 4. Next 5 Year Development Plan on Wastewater Management	

## 2.5 Capacity Development for Solid Waste Management

### 2.5.1 Identification of Issues

#### (1) Weak Coordination among Stakeholders

Domestic solid waste management is carried out by each municipality. However, there is almost no coordination among the municipalities, even though they have common problems related to solid waste management. Thus, it would be a good idea to organize a group of solid waste managers, and discuss common issues.

## (2) Limited Knowledge about Solid Waste Management

The technical knowledge of people engaged in the solid waste management is limited, in part because many of them have no opportunities to learn appropriate technologies (e.g., sanitary landfill) or management methods. They have to be trained about issues such as (i) various strategies to increase collection efficiency, (ii) environmentally sound disposal of solid waste, (iii) management of solid waste disposal sites, (iv) operation of the recycling facility, (v) fee collection, and (vi) others.

### 2.5.2 Solid Waste Improvement Meetings

Solid Waste Improvement Meetings (SWIMs) is a set of meetings and other activities to improve the municipal solid waste management situation. SWIM is targeted for solid waste managers from all municipalities in the Study Area and those using the Sarawan Disposal Site. Its main objectives are; (i) to discuss key issues of policy, strategy, and planning, (ii) to disseminate information about the appropriate technologies for solid waste management, (iii) to exchange opinions about the pilot activities, (iv) to discuss possible alternatives for solid waste management in the master plan, and (v) to facilitate lateral coordination among the municipalities.

In the Study duration, 4 meetings were held, as shown in Table 2.5.1. The participants very actively discussed the Master Plan and the Pilot Activity.

**Table 2.5.1 Solid Waste Management Meeting (SWIM)**

Date	No. of Attendants	Major Subjects
1 <sup>st</sup> Meeting 20 July 2003	25	- Current situation and Issues Segmentation - Introduction of Japan's Experiences - Call for Proposals for pilot activity from Municipalities
2 <sup>nd</sup> Meeting 28 July 2003	11	- Discussions on pilot activity based on the presentation from attendants
3 <sup>rd</sup> Meeting 27 February 2004	22	- Solutions to improve the current situation - Site visit to Pilot Activity Site of "Drop-off Center"
4 <sup>th</sup> Meeting 15 August 2004	14	- Discussions based on the revised solutions to improve the current situation toward establishing the Master Plan



A SWIM organized in July, 2003. The participants from various municipalities learned the current situation of solid waste management and solid waste management in Japan.



Many NGOs actively participated in SWIM. Some of the ideas proposed by NGOs to control solid waste were incorporated into the pilot activities.

**Figure 2.5.1 Solid Waste Improvement Meetings**

### 2.5.3 Joint Development of the Solid Waste Management Plan

Table 2.5.2 summarizes the issues that the stakeholders discussed during the SWIMs and other meetings for the development of the Solid Waste Management Plan.

**Table 2.5.2 Major Issues Discussed during Development of the Solid Waste Management Plan**

Category	Participants	Major Issues Discussed
Collection of Domestic Solid Waste	Municipalities, DOE, NGOs	<ul style="list-style-type: none"> <li>- Existing waste collection systems</li> <li>- Awareness about waste issues</li> <li>- Solid waste management systems in Japan</li> <li>- Frequency of collection and location</li> <li>- Recycling</li> <li>- Cost recovery</li> </ul>
Disposal of Domestic Solid Waste	Municipalities, DOE, HUDO, NGOs	<ul style="list-style-type: none"> <li>- Conditions of the existing dumping sites</li> <li>- Operation of composting plants</li> <li>- Sanitary landfills</li> <li>- Selection of potential sites for landfills</li> <li>- Closure of existing dumping sites</li> </ul>
Management of Industrial Solid Waste	DOE, IMO, factories	<ul style="list-style-type: none"> <li>- Current methods of industrial waste management</li> <li>- Environmental risks of hazardous waste</li> <li>- Solidification of hazardous waste</li> <li>- Disposal of hazardous waste</li> <li>- Disposal site for industrial waste</li> </ul>
Management of Medical Solid Waste	DOE, Medical University, hospitals	<ul style="list-style-type: none"> <li>- Current methods of medical waste management</li> <li>- Handling of infectious wastes</li> <li>- Construction of incinerators</li> <li>- Cooperation among hospitals</li> </ul>

#### 2.5.4 Participation in Provincial Committee on Recycling

The Provincial Committee on Recycling was recently organized by the province to discuss solid waste management issues in Guilan. The chairperson is the provincial governor. The formation of this committee was highly significant to the regional solid waste management, because there had been essentially no such authority that could coordinate solid waste management in the region. The JICA Study Team gave a presentation about the problems and solutions regarding solid waste management in the area, as well as the technical issues of incineration of hospital wastes.

### 2.6 Capacity Development for Environmental Education

#### 2.6.1 Identification of Issues

##### (1) Environmental Education in Schools

There is no environmental education subject in the curriculum, it is not effectively integrated into other school subjects, there are few resources, and teachers are not well trained to teach it. The study area needs well-designed environmental education programs and facilities, so that students can learn environmental issues in a structured way.

##### (2) Human Resources

In MOJA and DOE, there are people and departments with specific responsibilities for extension, participation and awareness raising. These people, although usually not formally trained in these areas, have a wealth of practical experience. The Ministry of Education on the other hand does not have a specific department or full time person responsible for environmental education, either nationally, or at a provincial level. The same is true of many other local governments and other organizations. Overall, capacity development of those who deliver environmental education is a priority.

#### 2.6.2 Development of Wetland Education Program

Table 2.6.1 summarizes the activities related to environmental education. Various workshops were organized in order to evaluate the needs and then to develop a wetland education program, which was implemented as a part of the pilot activities. As the activities of this pilot activity is explained in Section 3.3.2, they are not repeated here. In order to develop capacities for environmental education, various “hands-on” type demonstrations were carried out. Student-centered learning and environmental conscious behavior, were

emphasized. Many activities were organized and implemented jointly by DOE, local teachers, and NGOs, and this fostered cooperation among these stakeholders.

**Table 2.6.1 Activities of Environmental Education**

Date	Activities
19.01.04	Teachers Workshop - needs analysis
23.01.04	Teachers Workshop - needs analysis
28.01.04	Teachers Workshop - needs analysis and piloting student centered approaches
06.02.04	Students Workshop at Selkeh - piloting Wetland Education Program
13.02.04	Teachers Workshop at Selkeh - piloting Wetland Education Program
15.02.04	Students Workshop at Selkeh - piloting Wetland Education Program
16.02.04	Teachers Workshop - piloting Wetland Education Program
12.06.04	Meeting with Wetland Teaching Experts
14.06.04	Meeting with Wetland Education Program Advisory Team
23.09.04	Students Workshop in Schools - piloting Wetland Education Program



A teacher workshop



Various educational materials produced for the wetland education program.



A web game, in which children learned how components of ecosystem are inter-related.



A demonstration of water quality testing. Participants checked the water quality using a portable equipment.

**Figure 2.6.1 Development of Wetland Education Program**

### 2.6.3 Special Lectures

The team also gave a number of lectures to specialists and university students.



On the World Wetland Day (February, 2004), Dr. Hindson gave a special lecture to DOE staffs on environmental education at the Ramsar Hotel.



Dr. Okuda explained the importance of integrated environmental management to students from the University of Tehran.

**Figure 2.6.2 Special Lectures**