CHAPTER 9 INSTITUTIONAL PLAN FOR IMPLEMENTATION

9.1 Introduction

Successful environmental conservation of the Anzali Wetland and its watershed ultimately depends on how each organization and stakeholder fulfills its and his/her responsibility in implementing the proposed components of the master plan presented above. However, as reviewed in Chapters 2 and 3, there is poor communication and co-ordination, both within and between organizations, and this would prevent effective use of available information and human and financial resources. Therefore, the master plan's sixth component, the Institutional Plan for Implementation, was proposed to improve coordination among various organizations and stakeholders and achieve integrated management of the wetland and its watershed envisioned in the master plan.

9.2 Objective and Strategy

9.2.1 Objective

The objective of institutional development can be summarized as:

- Improve inter- and intra-organization coordination, and clarify environmental management responsibilities to improve the efficiency of environmental service provision.

9.2.2 Strategy

Given the size of the government machine, the establishment of yet another new body should always be avoided if possible. However, as indicated in section 2.9 above, existing institutional arrangements are not providing the degree of co-ordination and integration needed for the proper environmental management of Anzali Wetland and its watershed. In the circumstances, the study proposes establishment of a body referred to as a "Conservancy", which is a recognized forum of stakeholders and a body that can execute the decisions of the forum. The main strategy of the Institutional Plan is thus "establishment of a Conservancy".

9.3 Outline of the Institutional Plan

9.3.1 Establishment of the Anzali Conservancy

The idea of establishing a Conservancy has been proposed, and agreed at various meetings of Anzali stakeholders during the course of the present study. Moreover, the proposal was accepted at the first meeting of the provincial Thematic Working Group on Landuse 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.

Figure 9.3.1 First Meeting of the Provincial Thematic Working Group

9.3.2 What Is A Conservancy?

Experience over many years from several countries has contributed to the development of the 'conservancy', as an institutional model that can be very effective in managing multiple-use coastal wetland sites, particularly those which have previously experienced jurisdiction problems due being within more than one administrative authority.

The model 'conservancy' is run by a committee of stakeholder representatives (delegated, for example, by the provincial council, municipal councils, representatives from NGOs, representatives from conservation bodies, etc.). The model conservancy would have a permanent staff, which has two functions. It provides the secretariat of the committee, and is also the implementing executive of the committee, as indicated in Figure 9.3.2 below. A conservancy therefore acts as both a representative body and a management institution, having powers to make regulations, collect fees, undertake works, etc.

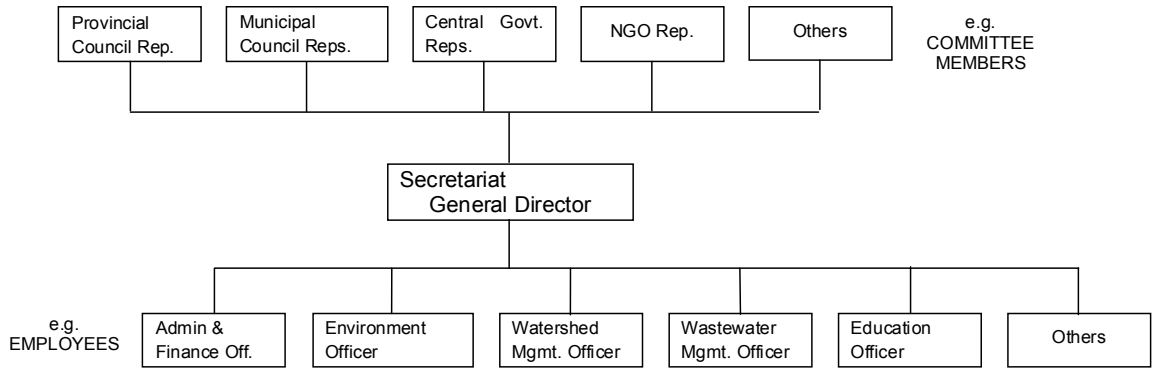


Figure 9.3.2 Generalized Structure of a Typical Conservancy

The benefit of the committee of stakeholders is that it provides a common forum within which environmental problems, development proposals, etc., can be openly discussed by the representatives of all people who may have an interest in, or may be affected by, the subject.

The executive staff is involved in a number of activities, e.g. conservation / enforcement, environmental protection / improvement, environmental research / monitoring, environmental education, control of navigation, 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, international donors, etc.) Once established, a conservancy is recognized as the official guardian and 'voice' of the wetland, and will be consulted as such by developers, government agencies, the public, etc.

9.3.3 Application of the Conservancy Model in Iran

The conservancy model described above is applicable to Iran, but the details of implementation need to be adjusted to the Iranian institutional arrangements. This has already been done elsewhere. Section 9.3.9 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 / watershed management initiatives. The establishment of a conservancy committee under the authority of the provincial environment committee, along with the formation of a secretariat, is therefore an institutional application that can be accommodated within the Iranian administrative system (see also section 9.3.4 below). In the case of Anzali, the initial conservancy staff could be established relatively easily by transferring existing employees from DOE, and possibly other

relevant organizations such as MOJA. (See section 9.3.11 below, which describes the preparatory steps that DOE and MOJA could take to initiate the functions of the Conservancy in advance of its formation).

9.3.4 Application of the Conservancy Model to Anzali

Clearly, any new body would need to fit within the Iranian legal and administrative system, so a small Steering Committee was formed in October 2003 to take the actions necessary to promote and initiate a new conservancy body for Anzali. This Steering Committee met for the first time on 11th October 2003, and determined the characteristics of the proposed 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 utilize 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 Guilan.

This proposal was subsequently considered and positively received by the Provincial Working Group on Landuse, Environment (and Population) on 23rd June 2004, and the General Director of DOE Guilan was requested to prepare a paper on implementation. 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 approval by the Higher Environment Council. 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.

Section 2.9 above has outlined nine institutional problems of Anzali wetland / watershed management. The establishment of a conservancy would address these problems as follows:

Table 9.3.1 Problems to be Addressed by a Conservancy

Problem		Conservancy Solution
a	Poor Inter-organization Co-ordination	The committee of the Conservancy will provide the forum for co-ordination between stakeholder organizations.
b	Poor Intra-organization Co-ordination	The single body responsible for management will be small enough for continuous and effective internal communication.
c	Unclear Responsibilities	The responsibilities of the conservancy will be clearly set out in the legislation used to establish it.
d	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 national and international grants, etc., for specific projects and programs of work.
e	Need for Ecosystem Approach	The Conservancy will be related to a specific ecosystem, the wetland and its catchment, rather than any one government department.
f	Inadequate Planning	The conservancy will be responsible for implementation of the Wetland Ecological Management Plan and its regular up-dating.
g	Lack of Pro-active Management	The conservancy will have specific pro-active responsibilities, which will be defined in its founding legislation.
h	Lack of Implementation	The past lack of implementation has been partly due to the fact that 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.
i	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.

9.3.5 Representation on the Stakeholder Committee of the Conservancy

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

If the Conservancy were established at provincial level, the stakeholder committee would probably be a sub-group of the existing provincial Thematic Working Group on Landuse and Environment (and Population), and the non-statutory members would be co-opted.

9.3.6 Functions of the Conservancy

The committee would meet frequently (perhaps monthly) and would direct the work of the executive. Apart from guiding the regular management of Anzali Wetland, such a forum would clearly facilitate dialogue on major planning issues, which in the past has been lacking. A very good example is the routing of the Anzali Ring Road.

There are many management 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 management body (conservancy) 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 centre, 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.

9.3.7 Funding of the Conservancy

If a new 'Conservancy' body is formed, it would need to have adequate and sustainable statutory sources of funding. 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. 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, and the cost of administration (see Table 9.5.1 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 9.3.11.

In addition, it would be expected that various existing sources of income would be transferred to the Conservancy, thus making it self-sufficient. 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 USD250,000). 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.

9.3.8 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 present 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 the Anzali Wetland. The broad membership of the stakeholder committee of the Conservancy will provide an appropriate conduit for integration.

9.3.9 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 and approved. The combination of the Stakeholders Management Committee (representative body) and the Lake Uromiyeh Secretariat (management institution) is very similar to the 'conservancy' model as previously described in section 9.3.4 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, along with an 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 some preparatory steps should be taken in advance of establishment of the conservancy, to effectively create an 'interim conservancy', as described in section 9.3.11 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 other Iranian wetlands and their catchments, of which there are many.

It will also be worthwhile keeping in contact with specific wetland and watershed management projects, such as the World Bank's forthcoming Alborz Integrated Land and Water Management Project, which is situated in the watershed adjacent to that of Anzali.

9.3.10 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 Landuse, 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 NRGO and watershed management organisation) will hopefully improve the co-ordination of management activities in the watershed. The preparatory steps described below could also be a 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.]

9.3.11 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 by existing institutions as outlined in (2) – (5) below (also see Figure 9.3.3). 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.

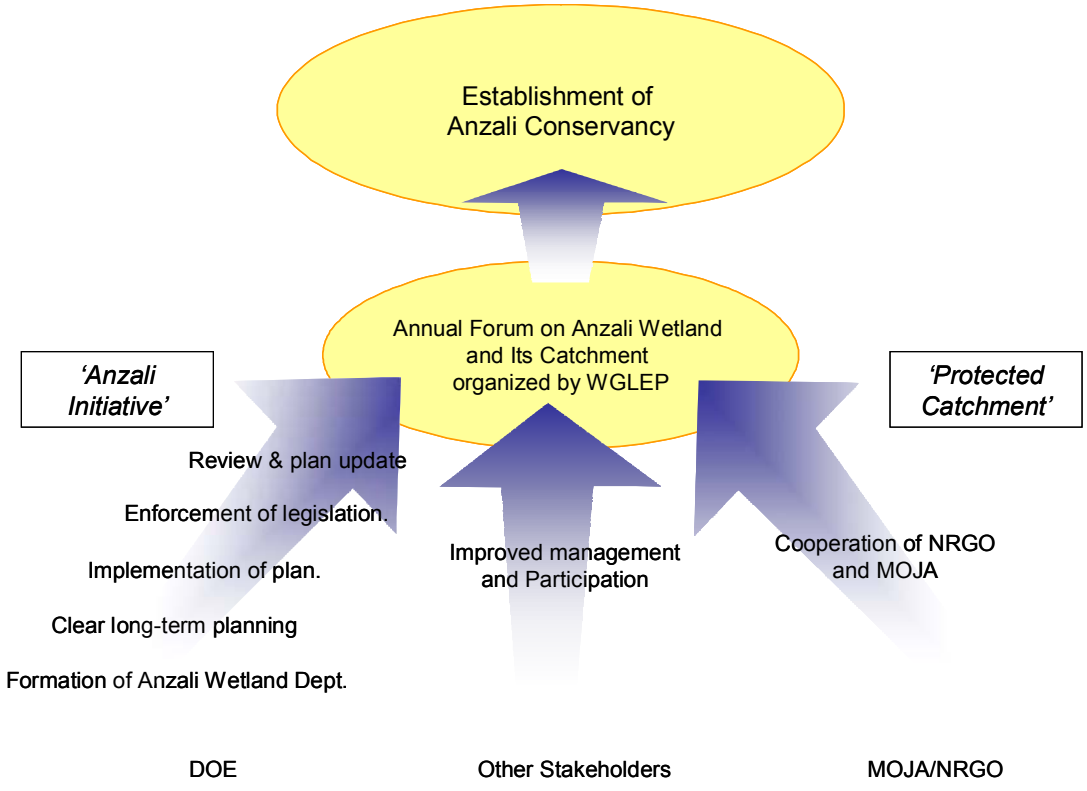


Figure 9.3.3 Preparatory Steps toward Establishment of the Anzali Conservancy

(2) Establishment of Anzali Wetland Department of DOE

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 Wetland 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 Wetland 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 emphasized 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, Part 9 of Supporting Report).

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-publicized 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 NRGO and Watershed Management Department. These organizations will deal with most of the management problems of the Anzali watershed, including soil erosion control, rangeland management, grazier 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-development 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 Landuse, Environment and Population (WGLEP).

As described in section 2.9 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.

(6) Annual Anzali Forum

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 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 publicized. However, it is emphasized 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 the 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.

9.3.12 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 links with sister organizations overseas, upon whose experience the participants should continue to draw in the future.

(2) Future Capacity Development

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 of the present study.

There will be a continuing need for internal training, particularly to build up the knowledge base of new recruits. DOE staff 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, 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-development 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-development.

9.4 Summary of Proposed Institutional Plan for Implementation

The proposed projects in the institutional plan are summarized and shown in Table 9.4.1.

Table 9.4.1 Summary of Proposed Institutional Plan

Sub-Components	Proposed Projects/Measures	Executing Organization
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	

9.5 Cost Estimate

9.5.1 Project Cost

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. If a new 'Conservancy' body is formed, it would need to have adequate and sustainable statutory sources of funding. As discussed in Section 9.3.7 above, most of this could be derived from existing sources of income.

Table 9.5.1 summarizes the project costs and operation and maintenance cost involved in establishing and operating the Anzali Conservancy. For the conditions of cost estimation, please refer to Chapter 3. The project cost is expected to be limited. The main part of the project cost is used to establish the Anzali Wetland Department within DOE. Initial costs for the proposed DOE apprenticeship trainings and oversea trainings are also included in the project cost.

Table 9.5.1 Cost Estimate of the Institutional Plan

Proposed Projects/Measures	Project Cost (million Rials)	O&M Cost	
		Overall (million Rials)	Annual Average (million Rials/year)
1. Establishment of Anzali Wetland Conservancy			
(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
2. Capacity Development			
(1) In-country cross-sectoral training	0	2,685	179
(2) DOE "apprenticeship" training	159	0	0
(3) Overseas exchange visits	270	0	0
Total	1,319	37,920	2,528

Source: JICA Study Team

9.5.2 Operation and Maintenance Cost

The operation and maintenance cost is used for daily activities of the Conservancy. It is emphasized that this table does not include the considerable existing expenditure of DOE, MOJA and other organizations on their current management activities in the wetland and its catchment.

9.6 Implementation Program

9.6.1 Executing Organizations

The organizations responsible for implementation of the proposed plan are summarized in Table 9.4.1. The main objective of the plan is inter-organizational coordination, and DOE, MOJA and all other relevant organizations should be involved in the implementation of the plan.

9.6.2 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 9.6.1 below.

Table 9.6.1 Scoring of Implementation Criteria

	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 contributes 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

9.6.3 Evaluation of Proposed Projects for Prioritization

Priority of the proposed projects is evaluated in Table 9.6.2 below. Each project is ranked A, B, C and scored.

Table 9.6.2 Evaluation of Proposed Projects for Prioritization

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

Source: JICA Study Team

9.6.4 Implementation Schedule

The implementation schedule for the proposed institutional development measures is indicated by the bar chart in Table 9.6.3. It is suggested that the proposed measures are implemented in the following manner.

(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-development 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 Landuse, 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 work plan, 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 work plan in their field of responsibility, i.e. education, conservation, environmental protection, eco-tourism, navigation, etc.

In the last year of the Fourth 5-year Development Plan period, a *post hoc* evaluation of the work of the Conservancy should be undertaken, and consequent work plans 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 year of the Fifth 5-year Development Plan, a *post hoc* evaluation of the work of the Conservancy should be undertaken and consequent work plans 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.

The timing of the above actions and activities is indicated in Table 9.6.3 below.

Table 9.6.3 Proposed Implementation Schedule of Institutional 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
INSTITUTIONAL DEVELOPMENT PLAN																
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															

9.7 Priority Projects

The tasks to be undertaken in the first stage of the Fourth 5-year Plan period are as follows:

1) Establishment of Anzali Conservancy
2) WGLEP Anzali Sub-Group Meetings, Annual Anzali Forum
3) DOE Technical Support for Municipalities.

CHAPTER 10 EVALUATION OF MASTER PLAN

10.1 Introduction

In this section, the proposed master plan is evaluated with respect to the (i) economic and financial aspects, (ii) environmental and social aspects, and (iii) technical aspects in order to confirm viability of the proposed plan.

(1) Economic and Financial Evaluation

The economic evaluation is carried out in order to assess whether the proposed projects are worth implementing from an economic point of view and the financial evaluation is to assess the financial viability of the proposed projects by estimating percentage of budget for relevant agencies on the necessary cost of the proposed projects and also revenue of some projects which are supposed to collect user charges.

(2) Environmental and Social Evaluation

The environmental measures proposed in the master plan are designed to improve the environmental conditions of the wetland and its watershed. Nevertheless, some projects could also bring adverse impacts on the environment. Thus, such potential impacts are evaluated, and mitigating measures are proposed. Similarly, the social aspects of the projects are evaluated in order to make sure that the projects do not have major undesirable social impacts.

(3) Technical Evaluation

The technical evaluation considers whether the proposed projects are technically appropriate or not. Those projects that require highly sophisticated technologies, specialized human resources, spare parts difficult to import, etc., may not be sustainable and the proposed projects are evaluated with respect to these aspects.

10.2 Overall Implementation Schedules and Costs of the Master Plan

10.2.1 Overall Implementation Schedules of the Master Plan

The proposed components of the M/P are summarized in Figure 10.2.1. The implementation schedules are presented in Table 10.2.1.

Environmental Education Plan

Environmental Education
- Environmental education in schools and universities

Public Awareness Raising and Participation
- Decision makers, religious leaders, business and industry, farmers and rural communities, general public and tourists, and NGOs and journalists

Institutional Plan

Establishment of Anzali Wetland Conservancy
- Establishment of Anzali Wetland Department
- Formation of Anzali Sub-Group of WGLEP
- Annual Anzali Forum

Capacity Development
- In-country cross sectoral training
- DOE "apprenticeship" training
- Overseas exchange visits

Watershed Management Plan

Soil Erosion Control and Prevention of Land Slides
- Soil erosion control
- Prevention of land slide

Forst and Rangeland Management
- Pilot activity of participatory resource management
- Reforestation of degraded forests (70 km^2)
- Reforestation of margin areas (112 km^2)
- Forest management under forestry plan
- Conservation of protected forests
- Rangeland management by graziers
- Development of regulations necessary for participatory resource management
- Improvement of livestock resettlement program

Plain Area Management
- Source-level control of sediment runoff in plain area
- Measures to control inflow of sediment into wetland
- River management for extreme conditions

Livelihood Development
- Capacity development of NRGO provincial and local offices
- Livelihood improvement of local people in forest and rangeland management

Environmental Monitoring plan
- Monitoring of soil erosion controls, land use/ vegetation cover, rangeland management, forest management, livestock resettlement program

Institutional Arrangement
- Coordination among relevant organizations
- Capacity development for sustainable watershed management

Wetland Ecological Mangement Plan

Environmental Zoning
- Establishment of environmental zones
- Enforcement of zoning

Conservation of Wildlife
- Conservation of threatened species
- Control of the alien species

Conservation of Habitat
- Strengthening of the regulations
- Rehabilitation and maintenence of habitat

Promotion of Wise Use
- Development of ecotourism
- Sustainable use of natural resources

Monitoring and Feedback
- Environmental monitoring for adaptive management
- Environmental Research

Environmental Zoning

I. Core Protected Zone
- Wildlife Refugee
- Protected Area
- Non Hunting Area
- Lagoon
- Marsh

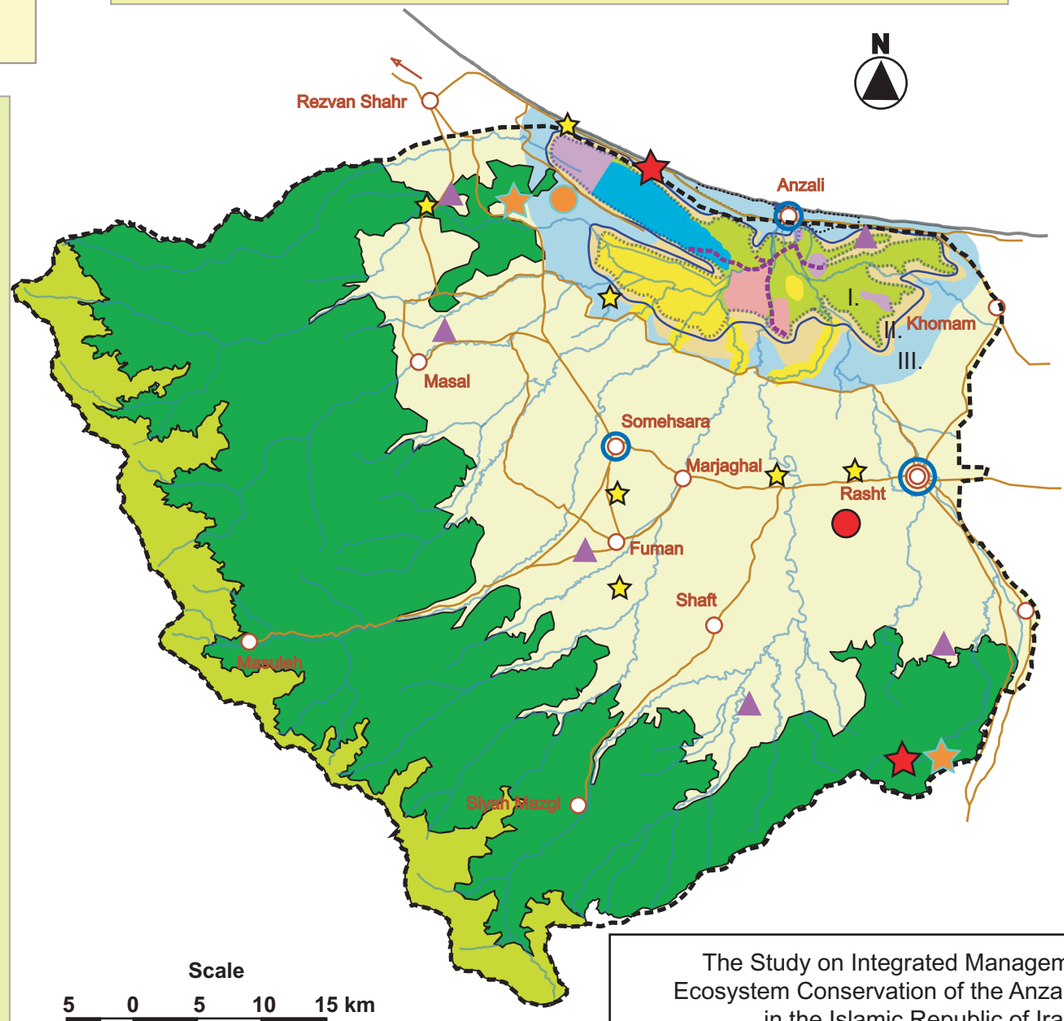
II. Buffer Zone

III. Transition Zone

River

Road

Eco-tourism Route



Solid Waste Management Plan

Municipal Solid Waste Management
- Environmental awareness raising
- Provision of efficient municipal waste collection service to the whole area
- Proper disposal of municipal solid waste

Composting of municipal solid waste (proposed)

Composting of municipal solid waste (existing)

Sanitary landfill construction (Rasht, Anzali)

Closure of present open dumping sites

Industrial and Medical Solid Waste Management
- Proper treatment of hazardous solid waste
- Non-hazardous industrial solid waste management

Environmental Monitoring
- Monitoring of management of recycling activities, leachate from landfills, industrial waste management, and medical waste management

Wastewater Management Plan

Management of Domestic Wastewater in Urban Area
- Sewerage system development projects (Rasht, Anzali, Somehsara)
- Promotion of individual wastewater treatment facilities outside of sewerage service area
- Promotion of low phosphorous detergent use

Management of Domestic Wastewater in Rural Area
- Community wastewater treatment system development

Management of Industrial Effluent
- Centralization of industrial factories
- Construction of centralized wastewater treatment system
- Strengthening of monitoring activities by DOE

Management of Livestock Waste
- Treatment of livestock waste from industrial animal husbandry
- Control of livestock waste in grazing lands in the plain area

Management of Pollution from Farmland
- Promotion of farming with less input

Environmental Monitoring
- Monitoring of domestic wastewater treatment, industrial factories, agricultural activities, pollution load to the wetland, and ambient water quality

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Figure 10.2.1
Propsed Projects in the Master Plan

Table 10.2.1 Implementation Schedule of the Master Plan (1/6) (Wetland Ecological Management 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
1. Environmental Zoning																
(1)	Establishment of Environmental Zones															
(2)	Enforcement of Zoning															
2. Conservation of Wildlife																
(1)	Conservation of the Threatened Species															
(2)	Control of Alien Species															
3. Conservation of Habitat																
(1)	Strengthening of Regulations															
1)	Construction of Guard Station															
2)	Capacity Development of Rangers															
3)	Regulation of Motorboats															
(2)	Rehabilitation and Maintenance of Habitat															
1)	Rehabilitation of Habitat															
2)	Prevention against Solid Waste Inflow															
4. Promotion of Wise Use																
(1)	Development of Ecotourism															
	1) Structuring of Ecotourism Network															
	2) Nature Interpreter Training															
	3) Preparation of Infrastructure															
	4) Implementation of Ecotour			Trial Activity						Full Activity						
(2)	Sustainable Use of Natural Resources															
5. Monitoring and Feedback																
(1)	Environmental Monitoring for Adaptive Management															
(2)	Environmental Research															

Table 10.2.1 Implementation Schedule of the Master Plan (2/6) (Watershed Management 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
WATERSHED MANAGEMENT PLAN																
1. Soil Erosion Control and Prevention of Land Slides																
(1)	Soil erosion control															
1)	Vegetative meausres		■	■	■	■	■	■	■	■						
2)	Structure measures	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(2)	Prevention of land slides	■	■	■	■	■	■	■	■	■						
2. Forest and Rangeland Management																
(1)	Pilot activity of participatory resource management	■	■	■	■	■										
(2)	Reforestation of degraded forests		■	■	■	■	■	■	■	■	■	■	■	■	■	
(3)	Reforestation of the margin areas					■	■	■	■	■	■	■	■	■	■	
(4)	Forest management under forestry plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(5)	Conservation of protected forests	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(6)	Rangeland management by graziers			■	■	■	■	■	■	■	■	■	■	■	■	
(7)	Development of regulations necessary for participatory resource management			■	■											
(8)	Improvement of livestock resettlement program		■	■	■											
3. Plain Area Management																
(1)	Source-level control of sediment runoff in plain area				■											
(2)	Measure to control inflow of sediment into the wetland					■	■	■	■	■	■	■	■	■	■	■
(3)	River management for extreme conditions	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4. Livelihood Development																
(1)	Capacity development of NRGO Provincial and Local Offices	■	■	■	■											
(2)	Livelihood improvement of local people in forest and rangeland management		■	■	■	■										
5. Environmental Monitoring Plan																
(1)	Monitoring of soil erosion controls	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(2)	Monitoring of land use / vegetation cover	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(3)	Monitoring of rangeland management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(4)	Monitoring of forest management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(5)	Monitoring of livestock resettlement program		■	■	■	■	■	■	■	■	■	■	■	■	■	■
5. Institutional Arrangement																
(1)	Coordination among relevant organizations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(2)	Capacity development for sustainable watershed management			■	■	■	■	■								
Livestock Resettlement Program (done by Iranian Government)		┈	┈	┈	┈	┈										

Table 10.2.1 Implementation Schedule of the Master Plan (3/6) (Wastewater Management 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
WASTEWATER MANAGEMENT PLAN																
1. Management of Domestic Wastewater in Urban Area																
(1)	Rasht Sewerage System Development Project															
1)	Rasht Sewerage (Phase 1)	■	■	■	■	■										
2)	Rasht Sewerage (Phase 2)						■	■	■	■	■	■	■	■	■	■
(2)	Anzali Sewerage System Development Project															
1)	Anzali Sewerage (Phase 1)	■	■	■	■	■										
2)	Anzali Sewerage (Phase 2)						■	■	■	■	■	■	■	■	■	■
(3)	Somehsara Sewerage System Development Project	■	■	■	■	■	■	■	■	■	■					
(4)	Promotion of Individual Wastewater Treatment Facilities											■	■	■	■	■
(5)	Promotion of Low Phosphorous Detergent Use						■	■	■	■	■	■	■	■	■	■
2. Management of Domestic Wastewater in Rural Area																
(1)	Community Wastewater Treatment System Development															
1)	First Stage (Seven Villages)		■	■	■	■										
2)	Second Stage & Third Stage						■	■	■	■	■	■	■	■	■	■
3. Management of Industrial Effluent																
(1)	Centralization of Industrial Factories		■	■	■											
(2)	Construction of Centralized Wastewater Treatment System															
1)	Anzali	▪			■	■										
2)	Rasht			■	■	■										
3)	Others						▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(3)	Strengthening of Monitoring Activities by DOE	■	■	■	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
4. Management of Livestock Waste																
(1)	Treatment of Livestock Waste from Industrial Animal Husbandry		■	■	■	■	■	■	■	■	■	■	■	■	■	■
(2)	Control of Livestock Waste in Grazing Lands in the Plain Area											■	■	■	■	■
5. Management of Pollution from Farmland																
(1)	Promotion of Low External Input Farming															
1)	Expansion of use of compost such as livestock manure and/or Azolla	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
2)	Expansion of integrated pest management through farmer field school	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
3)	Promotion of proper farming practice	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
6.Environmental Monitoring																
(1)	Monitoring of Domestic Wastewater Treatment	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(2)	Monitoring of Industrial Factories	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(3)	Monitoring of Agricultural Activities	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(4)	Monitoring of Pollution Load to the Wetland	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(5)	Monitoring of Ambient Water Quality	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪

Table 10.2.1 Implementation Schedule of the Master Plan (4/6) (Solid Waste Management 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
SOLID WASTE MANAGEMENT PLAN															
1. Municipal Solid Waste Management															
(1) Environmental Awareness Raising															
1) Participatory Recycling Activity															
a) Pilot Activities by Volantary Groups	■	■	■	■	■										
b) Extention of Target Groups						■	■	■	■	■					
c) Full Activity											■	■	■	■	■
(2) Provision of efficient municipal waste collection service to the whole area															
1) Provision of waste collection services to villages															
a) Phase 1 (Villages along the rivers)	■	■	■	■	■										
b) Phase 2 (Villages near the Anzali wetland)						■	■	■	■	■					
c) Phase 3 (Villages away from the Anzali wetland)											■	■	■	■	■
2) Change of collection frequency and collection point in urban areas															
1) Trial Operation in selected cities						■	■	■	■	■					
2) Extension of Target cities											■	■	■	■	■
3) Full Operation in selected cities											▪	▪	▪	▪	▪
(3) Proper disposal of municipal solid waste															
1) Composting of municipal solid waste	■	■	■	■	■										
2) Sanitary landfill construction															
1) Rasht						■	■	■							
2) Anzali						■	■	■							
3) Closure of present open dumping sites									■						
2. Industrial and Medical Solid Waste Management															
(1) Proper treatment of hazardous solid waste															
1) Construction of pretreatment facility for solid waste containing heavy metals	■														
2) Establishment of separation and collection system for infectious waste	■														
(2) Non-hazardous industrial solid waste management															
1) Promotion of reduction and recycling of industrial solid waste						■	■								
2) Establishment of regulations for industrial and medical solid waste								■	■	■	■	■	■		
3. Environmental monitoring															
(1) Monitoring of Municipal Waste Management in Urban Areas	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(2) Monitoring of Municipal Waste Management in Rural Areas	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(3) Monitoring of Recycling Activities	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(4) Monitoring of Leachate	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(5) Monitoring of Industrial Waste Management	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
(6) Monitoring of Medical Waste Management	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪

Table 10.2.1 Implementation Schedule of the Master Plan (5/6) (Environmental Education 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
ENVIRONMENTAL EDUCATION PLAN																
1. Environmental Education																
(1)	Environmental Education in Schools - Sub-measures 1) - 5)															
	Environmental Education in Schools - Sub-measures 6) - 7)															
(2)	Environmental Education in Higher Education. - Sub-measures 1) - 3)															
	Environmental Education in Higher Education - Sub-measures 4)															
	Environmental Education in Higher Education - Sub-measures 5)															
2. Public Awareness Raising and Participation																
(1)	Decision Makers - Sub-measures 1) - 4)															
(2)	Religious Leaders - Sub-measures 1)															
	Religious Leaders - Sub-measures 2) and 3)															
(3)	Business and Industry - Sub-measures 1)															
	Business and Industry - Sub-measures 2) - 4)															
(4)	Farmers and Rural Communities - Sub-measures 1) - 5)															
	Farmers and Rural Communities - Sub-measures 6)															
(5)	General Public and Tourists - Sub-measures 2) - 4)															
	General Public and Tourists - Sub-measures 1) and 5) - 7)															
(6)	NGOs and Journalists - Sub-measures 1) - 4)															

Table 10.2.1 Implementation Schedule of the Master Plan (6/6) (Institutional 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
INSTITUTIONAL DEVELOPMENT PLAN																
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															

10.2.2 Overall Cost Estimation of the Master Plan

(1) Conditions of Cost Estimate

Necessary costs for implementing the M/P were estimated under the following conditions.

- All costs in the master plan, i.e., the project (or investment) costs and O&M (operation and maintenance) costs during the entire master plan period between 2005 and 2019 are estimated based on June 2004 constant prices in Iranian Rials (IRR). All costs are presented without adjustment for price escalation.
- The exchange rate of USD 1 = IRR 8,652, JPY 100 = IRR 7,955 as of 30 June 2004 is applied.
- The value added tax (VAT) for all cost components and import tariffs for imported equipment are included in the cost estimation.

(2) Total Cost of the M/P

The total cost of implementing the M/P between 2005 and 2019 is about 4,479.3 billion Rials (USD 518 million) as shown in Table 10.2.2.

Table 10.2.2 Cost of the Master Plan

(Unit: billion Rials)

Sub-plans	Project Cost	Total O&M Cost*
1. Wetland Ecological Management Plan	30.8	15.3
2. Watershed Management Plan	726.8	43.3
3. Wastewater Management Plan	2,449.9	439.8
4. Solid Waste Management Plan	146.2	548.3
5. Environmental Education Plan	1.2	38.5
6. Institutional Plan	1.3	37.9
Total	3,356.2	1,123.1

Note: *- Total operation and maintenance (O&M) cost for 15 years of master plan period.
The above costs include the physical contingency.

The wastewater management plan, which involves construction of major sewerage systems in Rasht, Anzali and Somehsara, accounts for about 73.0% of the total cost, followed by the watershed management plan (21.7%) and solid waste management plan (4.4%). The cost for implementing wetland ecological management plan is 1.0% of the total cost, reflecting the fact that the main direction of the wetland ecological management plan is to keep the wetland as natural as possible. The wastewater management and solid waste management require significant O&M cost in order to provide regular services to the residents. The Environmental Education Plan and the Institutional Plan are the soft components and do not require much investment cost, though require sizable O&M costs.

(3) Annual Cost Disbursement Schedule

A disbursement schedule for the implementation of the M/P between 2005 and 2019 based on the implementation schedule of the proposed management plans is summarized in Tables 10.2.3 and 10.2.4. The average annual total disbursement of the project and O&M costs are about 224 billion Rials/year (USD 26 million/year) and 75 billion Rials/year

(USD 8.7 million/year), respectively. The maximum annual total disbursement of the project and O&M costs are about 408 billion Rials (USD 47 million/year) in 2008 and 94 billion Rials (USD 10.9 million/year) in 2019, respectively.

Table 10.2.3 Cost Disbursement Schedule for the Master Plan

	Year	Wetland Ecological Management		Watershed Management		Wastewater Management		Solid Waste Management		Environmental Education		Institutional Plan		Total		
		Project Cost	O&M	Project Cost	O&M	Project Cost	O&M	Project Cost	O&M	Project Cost	O&M	Project Cost	O&M	Project Cost	O&M	Total
1	2005	0	252	98,847	65	185,444	6,328	32,478	26,007	0	1,932	1,319	2,528	318,088	37,110	355,198
2	2006	0	508	48,669	275	259,670	9,412	6,764	31,287	0	2,201	0	2,528	315,103	46,211	361,314
3	2007	3,069	752	132,625	990	298,151	12,352	7,334	31,542	0	2,301	0	2,528	441,179	50,465	491,643
4	2008	532	773	109,458	2,500	362,941	16,215	7,524	32,698	0	2,201	0	2,528	480,455	56,916	537,371
5	2009	3,980	853	97,686	3,360	354,820	19,333	6,384	33,411	0	2,401	0	2,528	462,869	61,886	524,755
6	2010	6,473	851	44,711	4,679	120,423	25,272	16,454	36,969	587	2,954	0	2,528	188,647	73,252	261,900
7	2011	5,058	1,059	48,010	4,605	96,644	29,139	5,624	37,508	0	3,106	0	2,528	155,336	77,944	233,281
8	2012	4,336	1,386	45,251	3,954	163,404	32,736	7,904	38,565	0	2,493	0	2,528	220,895	81,660	302,555
9	2013	3,600	1,206	33,255	3,705	171,504	36,333	15,000	38,218	0	2,961	0	2,528	223,359	84,950	308,310
10	2014	3,600	1,206	28,652	3,317	174,729	41,618	6,194	38,840	0	2,484	0	2,528	213,175	89,992	303,167
11	2015	0	1,276	19,655	3,281	64,799	41,837	9,804	39,393	587	2,695	0	2,528	94,845	91,009	185,854
12	2016	0	1,206	8,484	3,190	64,799	42,001	5,624	39,850	0	3,224	0	2,528	78,907	91,998	170,906
13	2017	163	1,446	5,790	3,162	63,869	42,281	6,764	40,630	0	2,536	0	2,528	76,586	92,582	169,168
14	2018	0	1,276	3,204	3,119	34,208	42,281	6,764	41,417	0	2,488	0	2,528	44,176	93,108	137,284
15	2019	0	1,206	2,487	3,130	34,463	42,634	5,624	41,994	0	2,486	0	2,528	42,574	93,978	136,552
	Sub-total	30,811	15,256	726,785	43,331	2,449,866	439,766	146,239	548,329	1,175	38,460	1,319	37,920	3,356,195	1,123,061	4,479,255
	Total	**46,067** (1.0%)		**770,115** (17.2%)		**2,889,632** (64.5%)		**694,568** (15.5%)		**39,635** (0.9%)		**39,239** (0.9%)		**4,479,255** (100.0%)		

Note: The above costs were estimated at June 2004 constant price in theIranian Rials and include the physical contingency.
Price year of the above costs is June 2004. The above costs do not include price escalation.
Source: Estimated by JICA study team.

Table 10.2.4 Disbursement of Project Cost and O&M Cost for the Compornent Plans of the Master Plan (1/2)

(Unit: million Rials)

Compornent Plan	Year 1 2005	Year 2 2006	Year 3 2007	Year 4 2008	Year 5 2009	Year 6 2010	Year 7 2011	Year 8 2012	Year 9 2013	Year 10 2014	Year 11 2015	Year 12 2016	Year 13 2017	Year 14 2018	Year 15 2019	Total
Wetland Ecological Management Plan																
Project Costs	0	0	3,069	532	3,980	6,473	5,058	4,336	3,600	3,600	0	0	163	0	0	30,811
1. Environmental Zoning	0	0	58	0	0	3,600	3,600	3,658	3,600	3,600	0	0	58	0	0	18,175
2. Conservation of Wildlife	0	0	2,134	0	0	0	0	58	0	0	0	0	58	0	0	2,251
3. Conservation of Habitat	0	0	818	246	0	122	0	0	0	0	0	0	0	0	0	1,186
4. Promotion of Wise Use	0	0	58	286	3,980	2,751	1,458	619	0	0	0	0	47	0	0	9,199
O&M Costs	252	508	752	773	853	851	1059	1386	1206	1206	1276	1206	1446	1276	1206	15,256
1. Zoning and Ecological Management	85	85	43	43	43	43	43	43	43	43	43	43	43	43	43	732
2. Conservation of Wildlife	0	0	20	55	55	55	55	55	55	55	55	55	55	55	55	682
3. Conservation of Habitat	0	0	20	246	316	287	287	357	287	287	357	287	287	357	287	3,664
4. Promotion of Wise Use	0	0	40.32	40.32	50.32	77.32	285.32	302.32	432.32	432.32	432.32	432.32	432.32	432.32	432.32	3,822
5. Monitoring and Feedback	167	423	628	388	388	388	388	628	388	388	388	388	628	388	388	6,356
Total Cost of Wetland Ecological Management Sub-plan	252	508	3,821	1,305	4,833	7,324	6,117	5,722	4,806	4,806	1,276	1,206	1,609	1,276	1,206	46,067
Price Contingency (3%/year)	4	23	293	142	688	1,294	1,297	1,421	1,373	1,559	465	488	720	626	646	11,039
Total Cost with Price Escalation	256	531	4,114	1,447	5,521	8,618	7,414	7,143	6,179	6,365	1,741	1,694	2,329	1,902	1,852	57,105
Watershed Management Plan																
Project Costs	98,847	48,669	132,625	109,458	97,686	44,711	48,010	45,251	33,255	28,652	19,655	8,484	5,790	3,204	2,487	726,785
1. Soil Erosion Control and Prevention of Land Slides	17,601	21,719	32,925	31,604	41,681	25,211	27,650	21,519	15,975	15,606	11,215	1,129	1,129	0	0	264,965
2. Forest and Rangeland Management	4,336	12,461	12,040	15,951	18,153	19,372	20,360	23,732	17,281	13,045	8,439	7,356	4,661	3,204	2,487	182,877
3. Plain Area Management	0	0	0	83	628	0	0	0	0	0	0	0	0	0	0	711
4. Livelihood Development	1,110	1,152	1,152	64	0	0	0	0	0	0	0	0	0	0	0	3,477
5. Institutional Arrangement	0	128	511	511	256	128	0	0	0	0	0	0	0	0	0	1,533
6. Project Cost for the Livestock Resettlement Program	75,801	13,209	85,997	61,246	36,968	0	0	0	0	0	0	0	0	0	0	273,221
O&M Costs	65	275	990	2,500	3,360	4,679	4,605	3,954	3,705	3,317	3,281	3,190	3,162	3,119	3,130	43,331
1. Soil Erosion Control and Prevention of Land Slides	0	175	175	438	438	1,044	1,044	1,088	1,381	1,381	1,381	1,405	1,405	1,405	1,405	14,164
2. Rangeland Management	0	0	653	1,699	2,447	2,790	2,790	2,170	1,797	1,518	1,579	1,506	1,497	1,461	1,472	23,377
3. Plain Area Management	0	0	0	0	0	216	216	216	216	216	216	216	216	216	216	2,163
4. Environmental Monitoring	65	100	162	364	476	629	555	479	311	202	105	64	44	37	37	3,627
Total Cost of Watershed Management Sub-plan	98,912	48,944	133,615	111,959	101,046	49,390	52,615	49,205	36,960	31,969	22,935	11,675	8,951	6,323	5,617	770,115
Price Contingency (3%/year)	1,484	2,224	10,263	12,217	14,388	8,725	11,153	12,219	10,562	10,369	8,350	4,728	4,003	3,102	3,007	116,793
Total Cost with Price Escalation	100,395	51,168	143,879	124,175	115,434	58,115	63,768	61,423	47,522	42,338	31,285	16,403	12,954	9,424	8,623	886,908
Wastewater Management Plan																
Project Costs	185,444	259,670	298,151	362,941	354,820	120,423	96,644	163,404	171,504	174,729	64,799	64,799	63,869	34,208	34,463	2,449,866
1. Management of Domestic Wastewater in Urban Areas	185,178	254,294	292,775	320,315	319,303	100,508	74,979	159,489	167,589	170,559	55,384	55,384	54,454	24,793	24,793	2,259,796
2. Management of Domestic Wastewater in Rural Areas	0	4,860	4,860	4,860	5,250	3,915	3,915	3,915	3,915	4,170	3,915	3,915	3,915	3,915	4,170	59,490
3. Management of Industrial Effluent	266	266	266	37,766	30,266	16,000	17,750	0	0	0	5,400	5,400	5,400	5,400	5,400	129,580
4. Management of Livestock Waste	0	250	250	0	0	0	0	0	0	0	100	100	100	100	100	1,000
O&M Costs	6,328	9,412	12,352	16,215	19,333	25,272	29,139	32,736	36,333	41,618	41,837	42,001	42,281	42,281	42,634	439,766
1. Management of Domestic Wastewater in Urban Areas	5,441	8,360	11,280	14,199	17,119	22,799	26,396	29,993	33,590	38,522	38,522	38,522	38,522	38,522	38,522	400,303
2. Management of Domestic Wastewater in Rural Areas	0	165	165	165	363	528	528	528	528	726	891	891	891	891	1,089	8,349
3. Management of Industrial Effluent	273	273	273	1,217	1,217	1,311	1,581	1,581	1,581	1,736	1,736	1,900	2,170	2,170	2,325	21,344
4. Management of Livestock Waste	0	0	20	20	20	20	20	20	20	20	74	74	84	84	84	560
5. Management of Pollution from Farmland	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	3,960
6. Environmental Monitoring	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	5,250
Total Cost of Wastewater Management Sub-plan	191,772	269,082	310,502	379,156	374,152	145,694	125,783	196,140	207,837	216,347	106,636	106,800	106,149	76,489	77,097	2,889,632
Price Contingency (3%/year)	2,877	12,230	23,851	41,373	53,276	25,739	26,661	48,706	59,394	70,171	38,823	43,254	47,464	37,522	41,268	572,608
Total Cost with Price Escalation	194,648	281,312	334,353	420,528	427,428	171,433	152,444	244,845	267,230	286,518	145,459	150,053	153,614	114,011	118,365	3,462,240
Solid Waste Management Plan																
Project Costs	32,478	6,764	7,334	7,524	6,384	16,454	5,624	7,904	15,000	6,194	9,804	5,624	6,764	6,764	5,624	146,239
1. Provision of Efficient Waste Collection Services to the Whole Area	14,795	6,764	7,334	7,524	6,384	16,454	5,624	7,904	8,094	6,194	9,804	5,624	6,764	6,764	5,624	121,651
2. Composting of Municipal Solid Waste	17,083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,083
3. Sanitary Landfill Construction	0	0	0	0	0	0	0	0	6,906	0	0	0	0	0	0	6,906

Table 10.2.4 Disbursement of Project Cost and O&M Cost for the Compornent Plans of the Master Plan (2/2)

(Unit: million Rials)

Compornent Plan	Year 1 2005	Year 2 2006	Year 3 2007	Year 4 2008	Year 5 2009	Year 6 2010	Year 7 2011	Year 8 2012	Year 9 2013	Year 10 2014	Year 11 2015	Year 12 2016	Year 13 2017	Year 14 2018	Year 15 2019	Total
4. Proper Treatment of Hazardous Industrial Solid Waste	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600
O&M Costs	26,007	31,287	31,542	32,698	33,411	36,969	37,508	38,565	38,218	38,840	39,393	39,850	40,630	41,417	41,994	548,329
1. Provision of Efficient Waste Collection Services to the Whole Area	18,240	18,843	18,743	19,591	20,011	23,396	23,680	24,505	24,402	24,821	25,068	25,351	25,906	26,460	26,745	345,761
2. Composting of Municipal Solid Waste	6,328	10,820	11,088	11,347	11,600	11,766	12,013	12,177	12,423	12,587	12,887	13,054	13,273	13,471	13,723	178,557
3. Sanitary Landfill Construction	922	960	964	1,009	1,046	1,049	1,053	1,056	562	597	599	601	603	605	640	12,265
4. Proper Treatment of Hazardous Industrial Solid Waste	402	516	519	522	526	529	533	566	570	574	578	583	588	620	625	8,252
5. Environmental Monitoring	114	149	229	229	229	229	229	261	261	261	261	261	261	261	261	3,494
Total Cost of Solid Waste Sub-plan	58,484	38,051	38,876	40,222	39,795	53,423	43,132	46,469	53,218	45,034	49,197	45,474	47,394	48,181	47,618	694,568
Price Contingency (3%/year)	877	1,729	2,986	4,389	5,666	9,438	9,142	11,539	15,208	14,607	17,911	18,417	21,192	23,636	25,489	182,227
Total Cost with Price Escalation	59,361	39,781	41,862	44,611	45,461	62,861	52,274	58,008	68,426	59,640	67,109	63,891	68,586	71,817	73,107	876,795
Environmental Education Plan																
Project Costs	0	0	0	0	0	587	0	0	0	0	587	0	0	0	0	1,175
1. Public Awareness Raising and Participation (General Public and Tou	0	0	0	0	0	587	0	0	0	0	587	0	0	0	0	1,175
O&M Costs	1,932	2,201	2,301	2,201	2,401	2,954	3,106	2,493	2,961	2,484	2,695	3,224	2,536	2,488	2,486	38,460
1. Environmental Education in Schools	141	179	229	129	229	174	314	178	284	194	323	264	294	148	244	3,324
2. Environmental Education in Higher Education	479	491	476	476	476	486	486	61	496	46	126	576	46	71	46	4,838
3. Professional Development for Decision Makers	0	109	99	99	99	199	199	209	199	199	199	199	199	209	199	2,416
4. Public Awareness Raising and Participation (Religious Leaders)	26	26	26	26	26	99	161	99	36	99	36	224	36	99	36	1,053
5. Public Awareness Raising and Participation (Business and Industry)	40	40	40	40	40	235	235	235	235	235	90	90	90	90	90	1,825
6. Public Awareness Raising and Participation (Farmers and Rural Comm	516	466	541	541	641	741	691	691	691	691	741	691	691	691	691	9,715
7. Public Awareness Raising and Participation (General Public and Touri	320	480	480	480	480	810	810	810	810	810	970	970	970	970	970	11,140
8. Public Awareness Raising and Participation (NGOs)	410	410	410	410	410	210	210	210	210	210	210	210	210	210	210	4,150
Total Cost of Environmental Education Sub-plan	1,932	2,201	2,301	2,201	2,401	3,541	3,106	2,493	2,961	2,484	3,282	3,224	2,536	2,488	2,486	39,635
Price Contingency (3%/year)	29	100	177	240	342	626	658	619	846	806	1,195	1,306	1,134	1,220	1,331	10,628
Total Cost with Price Escalation	1,960	2,301	2,478	2,441	2,743	4,166	3,764	3,111	3,807	3,289	4,477	4,529	3,670	3,708	3,817	50,262
Institutional Plan																
Project Costs	1,319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,319
1. Establishment of Anzali Wetland Department	890	0	0	0	0	0	0	0	0	0	0	0	0	0	0	890
2. DOE 'Apprenticeship' Training	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	159
3. Overseas Exchange Visits	270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	270
O&M Costs	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	37,920
1. Establishment of Anzali Wetland Department	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	2,224	33,360
2. Formation of Anzali Sub-Group of WGLEP	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	870
3. Annual Anzali Forum	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	1,005
4. In-country Cross-sectoral Training	179	179	179	179	179	179	179	179	179	179	179	179	179	179	179	2,685
Total Cost of Institutional Sub-plan	3,847	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	2,528	39,239
Price Contingency (3%/year)	58	115	194	276	360	447	536	628	722	820	920	1,024	1,130	1,240	1,353	9,823
Total Cost with Price Escalation	3,905	2,643	2,722	2,804	2,888	2,975	3,064	3,156	3,250	3,348	3,448	3,552	3,658	3,768	3,881	49,062
Grand Total at June 2004 Price	**355,198**	**361,314**	**491,643**	**537,371**	**524,755**	**261,900**	**233,281**	**302,555**	**308,310**	**303,167**	**185,854**	**170,906**	**169,168**	**137,284**	**136,552**	**4,479,255**
- Total Project Cost at June 2004 Price	**318,088**	**315,103**	**441,179**	**480,455**	**462,869**	**188,647**	**155,336**	**220,895**	**223,359**	**213,175**	**94,845**	**78,907**	**76,586**	**44,176**	**42,574**	**3,356,195**
- Total O&M Cost at June 2004 Price	**37,110**	**46,211**	**50,465**	**56,916**	**61,886**	**73,252**	**77,944**	**81,660**	**84,950**	**89,992**	**91,009**	**91,998**	**92,582**	**93,108**	**93,978**	**1,123,061**
Total Price Contingency (3%/year)	5,328	16,422	37,765	58,637	74,721	46,268	49,447	75,131	88,106	98,331	67,665	69,216	75,643	67,346	73,093	903,118
- Price Contingency of the Project Cost (3%/year)	4,771	14,321	33,888	52,426	65,909	33,327	32,926	54,853	63,830	69,142	34,531	31,957	34,245	21,671	22,789	570,587
- Price Contingency of the O&MCost (3%/year)	557	2,100	3,876	6,211	8,812	12,941	16,521	20,278	24,276	29,188	33,134	37,259	41,398	45,675	50,304	332,531
Grand Total with Price Contingency	**360,526**	**377,736**	**529,408**	**596,007**	**599,475**	**308,168**	**282,727**	**377,686**	**396,416**	**401,497**	**253,519**	**240,122**	**244,811**	**204,630**	**209,645**	**5,382,373**
- Total Project Cost with Price Contingency	**322,859**	**329,425**	**475,067**	**532,881**	**528,778**	**221,974**	**188,262**	**275,748**	**287,189**	**282,317**	**129,376**	**110,865**	**110,831**	**65,847**	**65,363**	**3,926,782**
- Total O&M Cost with Price Contingency	**37,667**	**48,311**	**54,341**	**63,126**	**70,697**	**86,193**	**94,466**	**101,938**	**109,226**	**119,180**	**124,143**	**129,257**	**133,979**	**138,783**	**144,282**	**1,455,592**

10.3 Economic Evaluation

10.3.1 Approach to the Economic Evaluation of the Proposed Master Plan

The proposed master plan is expected to bring substantial benefits and therefore contributes to the welfare of the area. However, the master plan also requires a large amount of funding for its implementation. Therefore, the benefits and the costs of the master plan are examined, and whether the master plan is worth implementing is evaluated from the economic perspective. In a conventional economic analysis of a development project, as in a typical transportation development project, the economic benefits of the project (e.g., the driving time reduced by the project and the reduced fuel consumption) are compared against the economic costs in monetary term. However, economic benefits of the proposed master plan are not easy to quantify for the following reasons:

a) The master plan involves various intangible benefits, e.g. the benefit of protecting threatened species or the benefit of improving water quality. These benefits are difficult to put prices on.
b) The effects of the proposed measures on the environment and the regional economy (e.g., the increase in fish production due to improved water quality) are not simple to predict because the environmental system is very complex, and is influenced by external factors, such as the fluctuation of the Caspian Sea or climate change. In addition, information required to predict the environmental conditions is often not available.
c) While the main goal of this study is conservation of the Anzali Wetland, the proposed measures have other benefits, such as improvement of public health and living environment, environmental protection of the Caspian Sea, disaster prevention, etc. In many cases, the main benefits accrue from these components rather than from wetland conservation.

The economic evaluation of the master plan was conducted taking these limitations into account. The benefits of the proposed plan are firstly identified qualitatively in the economic evaluation in the Study. Then, monetary evaluations for the selected benefits are attempted as much as possible. Based on these analyses, whether the proposed plan is worth implementing or not was judged, as presented below.

10.3.2 Basic Conditions for Economic Evaluation

The economic evaluation was conducted under the following basic conditions.

a) The economic life of the project was assumed to be 50 years since this type of environmental conservation project takes a longer time to deliver a return than that of ordinary infrastructure development projects.

b) The price contingencies, taxes and other kinds of transfer payments were excluded from the estimated financial costs for estimation of the economic costs by applying a conversion factor of 0.9 to the financial cost items.
c) Based on some references to other development studies in Iran, a social discount rate for the economic analysis was applied at 12%.
d) Regarding the "without-project" case as a base for the economic analysis, it is supposed that the environmental conditions in the Anzali wetland and its watershed area would be degraded further by uncontrolled human interventions without adequate environmental management. On the other hand, it is assumed that current environmental conditions would be improved or maintained at least in the "with-project case". By considering the difference in the environmental conditions between the without-project and with-project case as the economic benefits of the project implementation, the net present value (NPV), benefit-cost ratio (B/C), and economic internal rate of return (EIRR) are calculated for the assessment of the economic viability of the Project based on the projected economic cash flow.

10.3.3 Values of the Anzali Wetland and Economic Benefit of the Wetland Ecological Management Plan

The Wetland Ecological Management Plan (WEMP) consists of the following five components.

1) Environmental zoning
2) Conservation of wildlife
3) Conservation of habitat
4) Promotion of wise use
5) Monitoring and feedback

The Anzali Wetland is recognized internationally as among the most ecologically important wetlands in the world, and became a Ramsar site as early as 1975. This fact clearly signifies the ecological importance of the wetland. In addition, the wetland has various other values that are worth nothing. Thus, the values of the wetland were examined based on a framework on a valuation framework recommended by the Ramsar convention with respect to (i) economic activities, (ii) environmental services, (iii) option and quasi-option values, (iv) existence value, and (v) environmental and public awareness value. Table 10.3.1 summarizes some of the important values of the Anzali Wetland, and how they are affected by the Wetland Ecological Management Plan. Though the analysis is not exhaustive, it is clear that the wetland has substantial values, and the proposed Wetland Ecological Management Plan significantly enhances these values.

Table 10.3.1 Economic Benefits of the Wetland Ecological Management Plan

Economic Benefits of the Wetland and Benefits
1. Economic activities - Fishery in the Anzali Wetland is worth about 10 billion Rials/year, and hunting is about 3 billion Rials/year (see Section 2.3.2). The WEMP will maintain and possibly increase these values by, e.g., providing better spawning conditions for fishes, providing better management of these activities, and putting additional economic values, e.g., sports fishing as opposed to conventional commercial fishing. - The wetland receives about 40,000 tourists/year, who pay about 3 billion Rials/year. WEMP will increase this by constructing facilities for tourists, and by promoting eco-tourism.
2. Environmental service - The wetland provides important habitats for various species including as many as 200,000 migratory birds (see Section 2.3). This value is enhanced by WEMP by improving the management of protected areas, and other habitats. - The wetland has a substantial water purification function, which help reduce the pollution of the Caspian Sea including the beach area. The WEMP will help maintain this function, and prevent loss of this function due to encroachment and other development activities. - External ecosystem will be supported for wildlife that utilize the wetland as feeding/ breeding grounds, particularly migratory birds.
3. Option and quasi-option value - Options on potential future uses will be secured by conserving or improving present natural conditions of the wetland.
4. Existence value - There are a number of threatened species in the wetland (see Section 2.3). WEMP has programs to protect these species, and thus contribute to maintaining these species including their genetic resources. - The wetland has a significant aesthetic value, and this is the main reason that the wetland attracts tourists. The aesthetic value of the wetland will be increased by the WEMP through management of vegetation and control of garbage coming into the wetland. - Future generations can enjoy the natural environment of the wetland if it is conserved because of the conservation. This value is known as the bequest value. - By implementing the WEMP, Iran will be able to lift the Anzali Wetland from the Montraux Record, and fulfill the responsibility of the Ramsar Convention.
5. Environmental education and public awareness - The wetland has significant potentials to provide opportunities for environmental education, public awareness, and scientific research. In the past, these assets have been underutilized. However, the WEMP will make the wetland much more accessible to the general public, including children, and a Wetland Education Center has already been constructed as a part of this study.

Source: JICA Study Team

Efforts were made to quantitatively evaluate the values of the wetland and the benefits accrued by the WEMP in monetary terms. This was a difficult task due to the complexity of wetland ecosystem, lack of information, and inherent problems of putting monetary values to intangible values, such as the value of habitats and the bequest value of the wetland. Nonetheless, the present values of the Anzali wetland were roughly estimated by the benefit transfer method using average unit values of ecosystem services valued in similar wetlands elsewhere in the world. By applying the unit values of the wetland ecological services selected for the Anzali wetland with conversion of the reference price into current Iranian price, the total economic value of the Anzali wetland is estimated at around 223 billion Rials/year (USD 26 million/year). It seems the wetland has a significant value from wastewater treatment, and the recreational and cultural values are also potentially significant.

Table 10.3.2 Estimate of Ecosystem Value of the Anzali Wetland

Item	Annual Value per ha (thousand Rials/ha/year)	Total Value for the Anzali Wetland: 193 km^2 (billion Rials/year)
1. Wastewater treatment	4,400	84.9
2. Habitat	1,200	23.2
3. Food production	125	13.0*1
4. Recreation	1,300	25.1*2
5. Cultural	4,500	86.9
Total	11,525	233.1

Note: The ecosystem service items in the table are selected from other kinds of services, considering the present conditions of the Anzali wetland. Explanations on each ecological service are shown below as mentioned in the referenced research paper.
1) Waste treatment- waste treatment, pollution control, detoxification,
2) Habitat- nurseries, habitat for migratory species, regional habitats for locally harvested species, or wintering grounds,
3) Food production- production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing,
4) Recreation- eco-tourism, sport fishing, and other outdoor recreational activities,
5) Cultural- aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.
*1- As mentioned in the previous table, present productions of fishery and hunting in the Anzali Wetland are used.
*2- As mentioned in the previous table, present income from tourism at around 3 billion Rials/year is smaller than that in this table. However, it is supposed that this value be increased by promoting tourism in and around the Anzali wetland.
Source: Modified by JICA Study Team referring to "The value of the world's ecosystem services and natural capital, Robert Costanza et al., NATURE, 1997"

10.3.4 Economic Benefit of the Watershed Management Plan

The watershed management plan consists of the following six components.

1) Soil erosion control and prevention of land slides
2) Forest and rangeland management
3) Plain area management
4) Livelihood development
5) Environmental monitoring
6) Institutional arrangement

The proposed watershed management plan (WMP) is anticipated to have primarily positive social and environmental impacts, especially on local people (graziers and forest dwellers). As designed, the project is intended to promote more sustainable management of the watershed, which will enhance the values of the wetland as well as the watershed and improve the livelihoods of the local people. The main envisaged effects are summarized below.

Table 10.3.3 Economic Benefits of the Watershed Management Plan

Economic Benefits of the Watershed Management Plan
1. Reduction of sediment load from the watershed - A total of 326,000 ton/year of sediment are presently discharged into rivers from the upper watershed. The WMP will reduce the sediment load by about 58,700 ton/year through recovering the degraded rangelands of 77 km2 and reforesting the degraded forests of 182 km2. - The WMP will reduce the progress of soil erosion by applying structural erosion control measures to potentially hazardous areas, and thus reduce the sediment load as well as an outbreak of flood/debris flow.
2. Mitigation of floods and debris flow - For the last decade, a total of 12 floods have occurred in the watershed, of which eight were in the last five years. These floods caused extensive damage to the downstream areas. The WMP will take countermeasures against landslides/slope failure and reforest the degraded areas to mitigate the occurrence of floods.
3. Restoration and protection of the fabric of the watershed - Owing to its rich natural resources, the watershed provides habitat for many animals, especially birds and fish. There is a need to restore and protect the natural environment of the watershed. The WMP will contribute to restoration and protection of the fabric of the watershed by conservation of the forests and rangelands.
4. Improvement of livelihood of graziers - Livelihood support to graziers is very limited in the present management system, and therefore, there is a high possibility that living condition of graziers will become worse, even if the graziers can have monetary compensation by the resettlement program. Depression of household economy will make them more resource-dependant and eventually cause the degradation of forests and rangelands. The WMP aims to improve their livelihood by involving them in forest and rangeland management works as contractors and developing the capacity of NRGO local offices to assist graziers in establishing alternative livelihoods. As a result of the WMP, graziers who would participate in forest and rangeland management works will receive 4.4 ~ 7.7 million Rials/year of supplemental annual income until year 2019.
5. Sustainable use of rangeland - Assuming the rangeland is located between EL. 1500 m and EL. 2000 m, the total area of the rangeland would be about 280 km^2. By applying such estimated carrying capacity (3 units/ha) to be applied for the sustainable use of the rangeland, the stocking capacity of the rangeland will be secured as estimated at about 840,000 units, which is equivalent to about 8.4 billion Rials[1].
6. Recharge of water sources in the watershed - An important role of the watershed is to secure the water sources for the wetland as well as irrigated paddy fields in the plain area. It is said that the volume of river flow has decreased recently, though there is no clear data to proof its phenomenon. Reforestation of the degraded forests (182 km2) will enhance the recharge of water sources in the watershed.
7. Carbon sequestration - A major function of forest to the global environment is the carbon sequestration. Reforestation proposed in the WMP will increase carbon storage in the watershed. Based on the IPPC Guidelines for National Greenhouse Gas Inventories (1997), the total sequestered carbon is estimated at 1 ton C/ha/year. Though it is an indicative figure, there is no doubt that the WMP will contribute to improving a global environmental issue. .
8. Increase of timber production - Four (4) sub-watersheds are presently used for timber production, and therefore reforested trees in those sub-watersheds could be harvested in future. The area of about 4,740 ha will be reforested in the four sub-watersheds. In future, approximately 4,830 m^3 of timber can be extracted from the reforested area by applying the present exploitation rate of 1.0 m^3/ha/yr.

Source: JICA Study Team

The WMP will make several types of effects as enumerated above. Like other management plans, many of the effects derived from the WMP are difficult to evaluate quantitatively due to

[1] Total value of livestock is computed by applying the estimated price of livestock (100,000 Rials / Unit) presently used by NRGO.

a lack of information or inherent properties of the effect, while some can be converted into monetary value. In particular, the benefits of "Improvement of biodiversity" and "Improvement of livelihoods" are not evaluated in the section. The others, except for those of carbon sequestration and timber production, are evaluated by using either the benefit transfer method or least cost method as summarized below.

a) Reduction of sediment load: Least cost method
b) Mitigation of flood: Benefit transfer method
c) Restoration of fabric of watershed: Not economically evaluated
d) Improvement of livelihood: Not economically evaluated
e) Water recharge: Benefit transfer method
f) Carbon sequestration: Using estimated international value
g) Timber production: Using present market prices

The analyses made are summarized in the following table.

Table 10.3.4 Quantitative Evaluation of Economic Benefits of the Watershed Management Plan

Benefits	Outline of Analysis	Economic Benefits
1. Reduction of Sediment load	The total cost is based on the construction and operation of sediment traps to remove a sediment load of 67,900 ton/year. In the estimation, the same trap rate with the plain area management (1.25 ton/ha = 25,000 ton/20,000 m^2) is employed and the total area for the sediment traps is estimated at 54,320 m^2.	Construction cost: 1.2 billion Rials Annual operation cost: 0.6 billion Rials/year
2. Carbon Sequestration	Various sources place the economic value of sequestered carbon at US$ 5 to 10 per ton, and thus the total value is estimated by multiplying US$ 5 by 18,200 ton C per annum.	Annual benefit: 0.8 billion Rials/year
3. Timber Production	As described above, about 4,830 m^3 of timber can be extracted from the reforested area in the future. According to the forestry plan prepared by the NRGO, reforested trees are cut at intervals of about 100 years. Though the benefit will emerge 100 years later, the total benefit is computed by applying the estimated market log price of 900,000 Rials/m^3.	Total Benefit: 4.3 billion Rials
4. Mitigation of Flood	The unit value of flood prevention effect of the forest in Japan was used for evaluation since the conditions of forests (e.g., tree species, climate and soils) in the study area are similar to that of Japan. With conversion of the reference price into current Iranian price, the total economic value of the benefit is estimated at about 4,288,000 Rials/ha/year.	Benefit of the reforestation of 182 km^2: 78 billion Rials/year.
5. Water Recharge	Likewise, the unit value of water recharge (water reserve) of the forest in Japan was use for evaluation. The total economic value is estimated at about 6,729,000 Rials/year by employing the same method as mentioned above.	Benefit of the reforestation of 182 km^2: 122 billion Rials/year.

Source: Modified by JICA Study Team referring to "Valuation of Public Benefit Function of Forest in Japan, Forest Agency of Japan, 2000"

10.3.5 Economic Benefit of the Wastewater Management Plan

The proposed Wastewater Management Plan (WMP) consists of the following six components.

1) Management of domestic wastewater in urban areas
2) Management of domestic wastewater in rural areas
3) Management of industrial effluent
4) Management of livestock waste
5) Management of pollution from farmland
6) Environmental monitoring

Table 10.3.5 summarizes the anticipated benefits of the WMP with respect to (i) improvement of the environmental conditions, (ii) improvement of public health, (iii) improvement of living environment, (iv) improvement of service efficiency, and (v) other.

Table 10.3.5 Economic Benefits of the Wastewater Management Plan

Economic Benefits of the Wastewater Management Plan
1. Improvement of environmental conditions - If the WMP were not implemented, it is estimated that 87,151 ton/year of COD pollution load and 1,120 ton/year of T-P pollution load would be discharged into Anzali Wetland in 2019. The WMP is expected to reduce about 30 % of pollution load into Anzali Wetland. - These reductions of pollution loads to the wetland will result in significant improvement of the wetland ecosystem, such as reduction of eutrophication and improvement of fish habitats in the wetland. - The WMP will also contribute to the control of water pollution in the rivers and the Caspian Sea. - The WMP will reduce the environmental risks by toxic agrochemicals and heavy metals on the wetland, rivers and the sea.
2. Improvement of public health - Untreated wastewater discharge causes waterborne diseases. Common waterborne diseases in the Study Area are diarrhea and conjunctivitis. In 2001, the number of cases of these diseases was as below. Diarrhea Conjunctivitis Total Rasht 1,471 260 1,858 Anzali 260 733 1,133 The WMP will significantly reduce these waterborne diseases, and reduce related medical expenses and lost earnings due to illness. - The WMP will also contribute to improving the public health conditions in the wetland as well as the coastal beaches.
3. Improvement of living environment - The rivers in the downstream of urban areas have odor and aesthetic problems. The WMP will reduce these problems. - The reduction of pollution also improves the living environment in the wetland and also the coastal areas. This will enhance the values of the wetland and the beaches as tourism resources. - The WMP will promote centralization of the factories, and thus reduce problems on living environment caused by existence of factories in residential or agricultural areas.
4. Improvement of service efficiency - Currently, the entire urban population (763,000 residents) is without proper wastewater treatment. However, if the WMP was implemented, about 70% of the urban population, or 818,000 out of 1,200,000 residents in the urban area, will receive adequate wastewater treatment service in 2019. - Installation of the sewerage system is more efficient than installation of the individual waste water treatment system in terms of cost and other resources such as materials.
5. Others - The value of land is expected to increase, in general, if the sewerage system is improved. Current value of land in the urban area is about 1.5 million Rials/m2, and the proposed sewerage service area is about 10,000 ha. For a 5 % increase in land value, 75,000 million Rials of the value will be generated by the sewerage system development in Rasht.

Source: JICA Study Team

As is evident from this table, the WMP is expected to bring significant improvement in environmental conditions of the rivers, the wetland, and the coastal area of the Caspian Sea, as well as the improvement to the public health and the living environment in the area.

The main components of the WMP are the development of sewerage systems in Rasht and Anzali, and the Iranian Government has already committed to construction of these facilities. Economic viabilities are shown for the sewerage system development projects for Rasht and Anzali Townships in the feasibility studies for both Townships. Moreover, reduction of pollution in the coastal area is the responsibility of member countries of the Caspian Environment Program. In addition, the proposed Wastewater Management Plan itself was examined using the minimum cost approach by comparing the proposed approach with the case of installation of individual sewage treatment system as a conceivable alternative.

10.3.6 Economic Benefit of the Solid Waste Management Plan

The Solid Waste Management Plan (SWMP) consists of the following three components.

1) Municipal solid waste management,
2) Industrial and medical solid waste management
3) Environmental monitoring

The economic benefits of the SWMP were evaluated with respect to (i) improvement of environmental conditions, (ii) improvement of the living environment, (iii) improvement of public health, (iv) improvement of efficiency of material uses, and (v) other benefits (see JICA, 2003)[2]. Table 10.3.6 summarizes the benefits of the SWMP.

Table 10.3.6 Economic Benefits of the Solid Waste Management Plan

Economic Benefits of Solid Waste Management Plan
1. Improvement of environmental conditions - Due to insufficient waste collection and lack of environmental awareness, roughly 66 tons/day of solid waste is dumped into rivers polluting the water bodies. By expanding the collection to rural areas and by providing programs for environmental awareness raising, the SWMP will significantly reduce illegal dumping into rivers and halt the pollution of rivers. - The reduction of illegal dumping of wastes into river will also reduce the risks of accidental ingestion of waste by birds and fishes in the wetland. - None of the solid waste dumping sites in the area has a leachate control facility. By constructing two sanitary landfills with adequate leachate control, the SWMP will eliminate the problem of groundwater pollution by leachate. - The SWMP includes construction of a hazardous waste solidification facility, and thus reducing the risk of environmental pollution by toxic substances, especially heavy metals from plating industries in the area.
2. Improvement of living environment - There are numerous illegal dumping sites in the study area, which are the major sources of bad odors and aesthetic problems. The SWMP will provide efficient solid waste collection services even in rural areas, and thus significantly reduce these problems.
3. Public health improvement - The illegal dumping sites harbor pests, such as rats. The SWMP will eliminate these illegal dumping sites, and thus contribute to improvement of public health conditions. - The infectious wastes generated from the hospitals will be properly incinerated eliminating the risk of people contracting infectious diseases from medical waste.
4. Improvement of efficiencies of material uses - The SWMP promotes recycling of organic wastes and other recyclables (e.g., papers, bottles, etc.). This will help improve the efficiencies of materials use, and reduces landfill costs by reducing the amount of waste to be landfilled. - The SWMP promotes recycling of materials in factories. By streamlining material flows in production processes, the factories will be able to reduce material losses, recycle raw materials, and reduce energy consumption.
5. Other - The reduction of waste thrown into rivers (66 tons/day) will reduce the amount of waste in the wetland, improve the aesthetic aspect of the wetland, and increase the sightseeing value of the wetland.

Source: JICA Study Team

As identified above, the SWMP is expected to bring various economic benefits, though many of them are intangible and difficult to evaluate quantitatively. Moreover, solid waste management is an essential public service, and under the new solid waste management law, provision of the service became mandatory in the entire study area. Thus, the economic

[2] JICA, Study on Methods of Economic Evaluations of Development Study, Solid Waste Management, 2004

viability of the domestic waste management was evaluated using the least cost approach, i.e., whether the proposed measure provides the service at the minimum cost. The analysis was done by using a simulation model in which, the cost implications of various alternatives such as collection frequencies, collection points, recycling/composting, number and locations of final disposal sites, were compared. The existing policies and plans, such as the use, locations and capacities of composting plants in Rasht and Anzali, were also taken into consideration. Based on the results, the least cost option was selected (see the Supporting Report, Solid Waste Management). Similarly, the plans for industrial and medical waste management can be implemented with minimal investment. Thus, it was concluded that the proposed SWMP itself is economically justifiable.

10.3.7 Economic Benefits of the Environmental Education Plan and the Institutional Plan

Environmental education, public awareness activities, and institutional arrangements are indispensable to implement all the proposed management plans mentioned above. Therefore, economic benefits accrued by the Environmental Education and Institutional Plans are considered to be included in the economic benefits of the other management plans.

10.3.8 Economic Evaluation of the Master Plan

In this section, the economic viability of the entire master plan is evaluated. By combining the economic values of the various wetland functions and forest functions and the estimated monetary benefits from the sewerage system development projects, the net present value (NPV), benefit-cost ratio (B/C) and economic internal rate of return (EIRR) were calculated for the assessment of the economic viability of the M/P based on the projected economic cash flow for all economic costs of implementing the Master Plan.

(1) Methodology of Benefit Valuation

The following benefits were used in the economic evaluation below.

1) Wetland values on its various functions

Assuming that the wetland values mentioned above will decrease at a certain level in the without-project case and will be improved or at least maintained in the with-project case, the difference in wetland values between the with-project case and without-project case is regarded as the economic benefits of the with-project case.

2) Forest and rangeland values on its various functions

Assuming that the forest values mentioned above will gradually appear through reforestation in the with-project case, while there is no benefit in the without-project case, the difference in forest values between the with-project case and without-project case is considered to be the economic benefits of the with-project case. Likewise, the value of rangeland through the proposed rangeland management is considered by applying unit benefit of the forest for prevention of sediment loss.

3) Benefits accrued from the sewage system development

Based on the results of economic evaluations in the F/S for Rasht and Anzali Sewage Development Projects, the economic benefits of alternative options, decrease of health expenses, and agricultural revenue are applied. Regarding the sewerage system development project in Somehsara and community wastewater treatment system in rural areas, the average unit benefit from the above projects was applied by multiplying the service population.

(2) Economic Cost of the Projects

As mentioned above, a conversion factor of 0.9 was applied to convert the Master Plan financial prices to economic prices.

(3) Cost-Benefit Analysis

The net present value (NPV), benefit-cost ratio (B/C) and economic internal rate of return (EIRR) were calculated for assessment of the economic viability of the master plan based on the projected economic cash flow as shown in Table 10.3.7. The results of the calculation are summarized in Table 10.3.8. The NPV is estimated at about 216 billion Rials worth. The B/C exceeds 1.0. The EIRR exceeds the social discount rate of 12%. All economic values show economic viability of the master plan.

Table 10.3.8 Assessment of the Environmental Viability of the Master Plan

Economic Criteria	Results
NPV	216.4 billion Rials
B/C	1.10
EIRR	13.1 %

Table 10.3.7 Economic Cash Flow and Cost-Benefit Analysis

(Unit: million Rials)

Year		Economic Cost	Economic Benefit				Net Benefit
		Total Cost of M/P	Various functions of Wetland	Various functions of Forest and Rangeland	Benefits from Sewerage	Total	
		(a)	(b)	(c)	(d)	(e)=(b)+(c)+(d)	(f)=(e)-(a)
1	2005	251,625	10,585	119	0	0	-240,920
2	2006	313,387	21,688	2,489	0	0	-289,211
3	2007	365,174	33,335	5,552	189,192	189,192	-137,095
4	2008	428,530	45,556	12,116	127,718	127,718	-243,141
5	2009	438,295	58,381	20,281	72,411	72,411	-287,223
6	2010	235,607	71,842	27,183	67,032	67,032	-69,550
7	2011	209,850	85,972	34,547	70,521	70,521	-18,808
8	2012	272,197	100,809	39,495	85,281	85,281	-46,611
9	2013	277,376	116,390	43,788	89,128	89,128	-28,070
10	2014	272,747	132,754	48,130	98,413	98,413	6,549
11	2015	167,166	149,943	52,473	91,034	91,034	126,285
12	2016	153,712	168,003	56,816	110,974	110,974	182,081
13	2017	152,148	186,981	61,159	112,406	112,406	208,397
14	2018	123,452	206,926	65,502	135,460	135,460	284,435
15	2019	122,794	227,891	69,845	136,802	136,802	311,744
16	2020	88,977	249,932	74,187	71,463	71,463	306,605
17	2021	88,977	273,108	78,530	71,463	71,463	334,124
18	2022	88,977	297,482	82,873	71,463	71,463	362,841
19	2023	88,977	323,120	87,216	71,463	71,463	392,822
20	2024	88,977	350,092	91,559	71,463	71,463	424,136
21	2025	88,977	378,472	95,902	71,463	71,463	456,860
22	2026	88,977	408,340	100,245	71,463	71,463	491,070
23	2027	88,977	439,779	104,587	71,463	71,463	526,852
24	2028	88,977	472,878	108,930	71,463	71,463	564,294
25	2029	88,977	507,731	113,273	71,463	71,463	603,490
26	2030	88,977	544,438	117,497	71,463	71,463	644,420
27	2031	88,977	583,105	121,379	71,463	71,463	686,970
28	2032	88,977	623,846	124,845	71,463	71,463	731,177
29	2033	88,977	666,780	127,871	71,463	71,463	777,138
30	2034	88,977	712,036	130,431	71,463	71,463	824,953
31	2035	88,977	759,749	132,511	71,463	71,463	874,745
32	2036	88,977	810,063	133,852	71,463	71,463	926,400
33	2037	88,977	863,133	134,549	71,463	71,463	980,167
34	2038	88,977	919,122	134,686	71,463	71,463	1,036,294
35	2039	88,977	978,207	134,686	71,463	71,463	1,095,378
36	2040	88,977	1,040,573	134,686	71,463	71,463	1,157,744
37	2041	88,977	1,106,419	134,686	71,463	71,463	1,223,591
38	2042	88,977	1,175,959	134,686	71,463	71,463	1,293,130
39	2043	88,977	1,249,418	134,686	71,463	71,463	1,366,590
40	2044	88,977	1,327,040	134,686	71,463	71,463	1,444,212
41	2045	88,977	1,409,084	134,686	71,463	71,463	1,526,255
42	2046	88,977	1,495,827	134,686	71,463	71,463	1,612,999
43	2047	88,977	1,587,567	134,686	71,463	71,463	1,704,738
44	2048	88,977	1,684,620	134,686	71,463	71,463	1,801,792
45	2049	88,977	1,787,329	134,686	71,463	71,463	1,904,500
46	2050	88,977	1,896,057	134,686	71,463	71,463	2,013,229
47	2051	88,977	2,011,197	134,686	71,463	71,463	2,128,369
48	2052	88,977	2,133,169	134,686	71,463	71,463	2,250,340
49	2053	88,977	2,262,423	134,686	71,463	71,463	2,379,595
50	2054	88,977	2,399,445	134,686	71,463	71,463	2,516,617

Note: CF=0.9, Social discount rate=12%

NPV=	216,365
B/C=	1.10
IRR=	13.1%

10.3.9 Economic Evaluation by Contingent Valuation Method

As another approach to economic evaluation of the master plan, a questionnaire survey targeting 1,750 residents was conducted in September 2004 to assess their willingness-to-pay (WTP) for the conservation of the Anzali Wetland and its watershed. In this survey, the respondents were asked whether they were willing to pay the indicated amount of money for environmental causes. About 1,000 questionnaires were returned (60% collection rate). The results are summarized as below.

Table 10.3.9 Willingness-to-Pay of Residents for Environmental Improvement

Indicated Amount (Rials/month/household)	Respondents prepared to pay the indicated amount for environmental improvement
20,000	42.3%
40,000	36.1%
80,000	33.4%
120,000	27.0%
200,000	22.5%

Source: JICA Study Team

The level of WTP amount to make the proposed master plan economically feasible was estimated at 85,000 Rials/month/household. The average WTP is 58,000 Rials/month/household, and is not sufficient to cover the total cost of the master plan. However, according to the result, about 30% of the residents agreed to pay more than 85,000 Rials/month/household and also 22.5% of them agreed to pay more than 200,000 Rials/month/household. In addition, more than 90% of the residents answered positively toward conservation of the Anzali wetland and its watershed. Thus, it was concluded that the proposed master plan is likely to become viable with environmental awareness raising.

10.4 Financial Evaluation

10.4.1 General Principles

In this section, the financial viability of the proposed master plan is evaluated. As reviewed in the economic evaluation, the main benefits of the proposed measures are conservation of the environmental conditions of the wetland and its watershed, and improvement of related environmental and public services, such as erosion control, water quality control, wastewater treatment, and solid waste management, etc. Provision of these benefits and services generally falls under the responsibilities of the government, and because many of the proposed measures do not have any revenues, these measures have to be financed by government budgets. There are two important issues in financing public projects, and the financial evaluation in this study focuses on these issues:

1) Scale of the Proposed Measures

The first issue is whether the scales of the proposed measures are reasonable compared to the relevant government budgets and the affordability of local residents.

2) Financial Responsibility and Equity

The second issue is the allocation of financial responsibilities. Provision of basic and uniform public services is an important policy goal. However, if the benefits and the services of the proposed measures are not received uniformly among those who share the costs, there is a problem of equity. Thus, the potentials of introducing other financial mechanisms, in particular charges collected from polluters and users of environmental services were examined under the Polluter-Pays-Principle and User-Pays-Principle.

Because most measures depend strongly on public financing, and because fiscal policies in Iran are quite precarious, detailed cash flow analyses of revenues and costs were beyond the scope of this study.

10.4.2 Financial Sources

There are six types of financial sources for implementation of the master plan as shown in the Table 10.4.1.

Table 10.4.1 Financial Sources for Implementation of the Master Plan

Financial Source	Typical Use
1. Provincial General Budget	Salary, daily operation costs, other recurrent costs, and investment cost that the provincial government deemed necessary
2. Provincial Development Budget	Medium/small-scale projects to be implemented by executing agencies
3. National Project	Large development projects
4. Purpose Tax	Part of project and O&M cost for specific projects/activities
5. User Charges	Operation costs
6. Others	International grants and loans, domestic loans

The main sources for funding are a general provincial budget and a national project budget. In principle, the provincial general budget is used for salaries, daily activities and investment projects that the provincial government deems necessary. The national project budget is used for large investment projects. Apparently, the provincial budgets in the recent years are barely enough to cover salaries, and insufficient for daily activities and large development projects. As a result, many government organizations orient their programs toward receiving budgets for short-lived national projects rather than daily activities.

From the fourth 5-year plan starting in 2005, however, it seems the central government is going to increase the proportion of the national grant component of the provincial general budget. This could increase the financial autonomy of the local government, and make it possible to finance more activities from the provincial government, enabling more stable funding for daily activities. At any rate, it is still premature to judge exactly how these financial sources are to be utilized from 2005. Thus, the relevant organizations are urged to reanalyze the financial plan as soon as the fourth 5-year plan and related fiscal policies become available.

10.4.3 Basic Conditions for Financial Evaluation

The financial evaluation was conducted under the following basic conditions.

a) All costs in the master plan, i.e., the project (investment) costs and O&M costs during the entire master plan period between 2005 and 2019 are estimated based on June 2004 constant prices in Iranian Rials (IRR). The exchange rates of USD 1 = IRR 8,652 and JPY 100 = IRR 7,955 as of 30 June 2004 are applied. The value added tax (VAT) for all cost components and import tariffs for imported equipment are included in the cost estimation.
b) Based on the average household incomes in the study area, average disposable incomes of households in urban areas are 20,275 thousand Rials/year and in rural areas, 15,797 thousand Rials/year.

10.4.4 Financial Evaluation of the Proposed Management Plans

(1) Overall Evaluation

The estimated GRDP in Guilan province and total costs of the M/P during the M/P period are compared as shown below. It is said that the costs of public utilities in developing countries occupy GRDP at a rate of between 3% and 5% in general. Thus, the total costs of the M/P will be affordable from the viewpoint of regional economic scale since the annual cost of implementing the M/P ranges between 0.2% and 1.3% of GRDP.

Table 10.4.2 Comparison between GRDP and Total Cost of the Master Plan

(Unit: billion Rials)

Year	Estimated GRDP	Total Cost of M/P*	% of GRDP
2005	35,793	355	1.0%
2006	37,582	361	1.0%
2007	39,462	492	1.2%
2008	41,435	537	1.3%
2009	43,506	524	1.2%
2010	45,682	262	0.6%
2011	47,966	233	0.5%
2012	50,364	302	0.6%
2013	52,882	308	0.6%
2014	55,526	303	0.5%
2015	58,303	186	0.3%
2016	61,218	171	0.3%
2017	64,279	169	0.3%
2018	67,493	137	0.2%
2019	70,867	136	0.2%

Note: Total cost of the M/P consists of the total project costs and O&M costs.

With respect to governmental affordability, the national project budget will be the main financial source for the initial investment cost, at least for now. Unfortunately, practically no information is available on the national project budgets of the relevant organizations, and detailed financial assessment of the national project budget was not possible. However, it was noted that the average investment cost of the proposed master plan (224 billion Rials/year) is about 0.05% of the national budget to be used by executive bodies for the annual programs and development projects, 436,022 billion Rials in 2003. In short, there is a large pool of national project budget, and the budget is theoretically available for implementation of the master plan. The main issue is how the national government values the conservation of this internationally important wetland and its watershed, which over 90% of the residents believe important (see Supporting Report, Socio-Economy). See Section 10.4.4. about how the master plan could be promoted both at the national and local level.

While the master plan can be initiated by injecting national investment, the sustainability of the measures is dependent on the flow of O&M budgets. Since most of the O&M cost

consists of personnel cost, the required O&M costs were compared with the total provincial budget consisting of current and development budgets as shown below.

Table 10.4.3 Annual O&M Costs of the Master Plan and Provincial Budgets for Relevant Organizations

(Unit: million Rials/year)

Organizations	Annual Provincial Budget Allocated*	Annual O&M Costs for M/P	% of the Budget
1. MOJA	92,979	330 ~ 2,100	0.4% ~ 2.3%
2. DOE	9,923	2,600 ~ 4,100	26.2% ~41.3%
3. NRGO	33,622	0 ~ 2,790	0.0% ~ 8.3%
4. GWWC	20,071	5,600 ~ 39,000	27.9% ~ 194.3%
5. RWWC	96,843	180 ~ 1,300	0.2% ~ 1.3%
6. Ministry of Education	1,041,599	219 ~ 840	0.0% ~ 0.0%
7. Local governments	32,873	25,500 ~ 41,000	77.6% ~ 124.7%

Source: *- The budget is total of the current and development expenditure in 2002, Statistical Yearbook of Guilan 2003

The O&M costs to be met by the MOJA, NRGO, RWWC, and Ministry of Education are relatively small and may be covered by rearranging the present provincial budget or by a slight increase in the present budget. On the other hand, the amount required for O&M by the DOE is relative large compared with the present budget. This is because various new tasks, such as development of eco-tourism, are included in the Wetland Ecological Management plan. Thus, the provincial budget allocation to the DOE may have to be increased. In addition, the O&M costs for GWWC and local government exceed the present levels of the provincial budgets for these organizations. This is because the sewerage and solid waste management services have to be strengthened over the next 15 years. A large proportion of the O&M costs for these services can be collected from the users. In order to evaluate the capacities of the local residents to absorb increased service charges, an affordability analysis based on disposal income of local residents was carried out. The results showed that the required service costs are well within the affordability of the local residents. Based on these analyses of overall investment costs and O&M costs, it was concluded that the proposed master plan is financially viable, though rearrangement of provincial budgets and the financial support of the central government for large investment projects will be essential. With this general assessment, the financial evaluation of each component plan is presented below.

(2) Financial Evaluation of the Wetland Ecological Management Plan

The necessary costs for implementing the Wastewater Management Plan are shown below. The land acquisition under the Environmental Zoning and establishment of relevant facilities for eco-tourism under the Promotion of Wise Use are a large percentage of the total project cost at about 58% and 30%, respectively.

Table 10.4.4 Cost of Implementing the Wetland Ecological Management Plan

(Unit: billion Rials)

Components	Project Cost	Total O&M Cost
1. Environmental Zoning	18,175	732
2. Conservation of Wildlife	2,251	682
3. Conservation of Habitat	1,186	3,664
4. Promotion of Wise Use	9,199	3,822
5. Monitoring and Feedback	-	6,356
Total	30,811	15,256
Average Annual	2,054	1,017

As mentioned in Chapter 9, it would be expected that various existing sources of income would be transferred to the Conservancy to implement the Wetland Ecological Management Plan, thus making it self-sufficient. Some or all of the existing boat licensing fees (PSO), the DOE hunting and fishing license fees (325 million Rials/year and 125 million Rials/year respectively), and DOE 'abandan' rental fees (225 million Rials/year) could be directed to the conservancy. A local tourism tax could also be introduced. In addition, the Executive Bylaw 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 (roughly estimated at USD250,000). A part of this budget may be used to cover the cost for the relevant projects. The cost for the daily environmental monitoring would be covered by the provincial budget as regular work.

The costs of proposed activities that start in the initial stage of the M/P, such as land acquisition for environmental zoning and installation of facilities for the promotion of eco-tourism, should be covered by the national budget since they would be new costs and large additions to the regular budgets of the relevant agencies concerned.

(3) Financial Evaluation of the Watershed Management Plan

The necessary costs of the Watershed Management Plan are shown below.

Table 10.4.5 Cost of Implementing the Watershed Management Plan

(Unit: billion Rials)

Components	Project Cost	Total O&M Cost
1. Soil Erosion Control	264,965	14,164
2. Forest and Rangeland Management	182,877	23,377
3. Plain Area Management	711	2,163
4. Livelihood Development	3,477	-
5. Environmental Monitoring	-	3,627
6. Institutional Arrangement	1,533	-
7. Livestock Resettlement Program	273,221	-
Total	726,785	43,331
Average Annual	48,452	2,889

The required budget for soil erosion control, forest management, plain area management and capacity development are much larger than current budget allocated to the relevant agencies such as MOJA and NRGO. Therefore, the project costs should be funded by national budget under the decree on northern forest conservation. The O&M costs of the soil erosion control and forest management should be budgeted under the provincial budget as regular work. However, these costs are also additional to the present budget. Thus, support from the central government may be necessary in the beginning. The cost for the environmental monitoring should be covered by the provincial budget as regular work.

(4) Financial Evaluation of the Wastewater Management Plan

The necessary costs of implementing the Wastewater Management Plan are shown below.

Table 10.4.6 Cost of Implementing the Wastewater Management Plan

(Unit: billion Rials)

Components	Project Cost	Total O&M Cost
1. Management of Domestic Wastewater in Urban Areas	2,259,796	400,586
2. Management of Domestic Wastewater in Rural Areas	59,490	8,349
3. Management of Industrial Effluent	128,250	21344
4. Management of Livestock Waste	1,000	560
5. Management of Pollution from Farmland	-	3,960
6. Environmental Monitoring	-	5,250
Total	2,448,865	440,049
Average Annual	163,324	29,337

The project cost for the domestic wastewater management, especially for urban areas, is quite large, so the project cost should be covered by the governmental budget, especially from the national budget through NWWEC. A part of the project costs for Phase 1 for the sewerage system constructions in Rasht and Anzali will be secured by using a loan scheme under the World Bank. This is now under the appraisal process, at 531 billion Rials and 365 billion Rials, respectively (71.7% and 71.5% of the total project costs, respectively). The O&M cost is expected to be covered by user charges as it has already been applied in some local governments such as Rasht and Anzali cities at present.

Under the proposed domestic wastewater management, the average user charge for households to cover all of the O&M cost in the study area is estimated at between 48 and 233 thousand Rials/year/household for urban areas and between 31 and 174 thousand Rials/year/household for rural areas.

Table 10.4.7 Estimated Average User Charges for Wastewater Management

(Unit: Rials/year/household)

Item	Urban Area (Shahr)	Rural Area (Dehestan)
Estimated User Charge for Recovery of O&M Cost*1	48,000 ~ 233,000	31,000 ~ 174,000
1% of Disposal Household income*2	203,000	158,000
Annual total Income (= Annual Total O&M Cost)	5,441~38,522 million Rials	165 ~ 1,089 million Rials

Note: *1- The figures above are average values during M/P over 15 years.
*2- The data year on household income is in 2001.

At about 1% of the disposable income level, the required household wastewater management charge shown in Table 10.4.7 will be acceptable, especially considering future increases in household income and the current national average user charge of 120 thousand Rials/year/household in urban areas. In practice, the user charge for the waste management is set by the Committee for Water and Wastewater Pricing represented by the city councils in the province and representatives from Water and Wastewater Companies. Though the amount is within the affordable level under the disposable household income, it would be difficult to raise the user charge at once, especially in rural areas. Thus, support from the local and central governments may be necessary in the beginning.

Regarding the management of industrial effluent, relevant industries are supposed to cover the necessary cost for both the project and O&M cost based on the polluter-pays-principle under the direction of DOE. In the same way, the cost for management of livestock waste should be covered by the industrial livestock keepers.

The management of pollution from farmland is the responsibility of farmers, though financial support from the provincial budget will be desirable.

The cost of environmental monitoring should be covered by the provincial budgets of relevant organizations as regular work.

(5) Financial Evaluation of the Solid Waste Management Plan

The necessary costs of implementing the Solid Waste Management Plan are shown below.

Table 10.4.8 Cost of Implementing the Solid Waste Management Plan

(Unit: billion Rials)

Components	Project Cost	Total O&M Cost
1. Provision of Efficient Waste Collection Services	121,651	345,761
2. Composting	17,083	178,557
3. Sanitary Landfill	6,906	12,265
4. Proper Treatment of Hazardous Industrial Waste	600	8,252
5. Environmental Monitoring	-	3,494
Total	146,239	548,329
Average Annual	9,749	36,555

The cost of domestic solid waste management is expected to increase, especially in rural areas (Dehestan) where solid waste management will be introduced under the new regulations on solid waste management that state that the Governors of counties (Bakhsh) should be newly responsible for waste generated in rural area (Dehestan). According to MPO, any additional budgeting plan, such as budget allocation from the provincial budget, has not yet been decided for rural areas under the new regulations.

In order to ease budget pressure on the local governments, it is recommended to charge a SWM fee to residents, because even now, the municipalities do not have enough budget. This can be achieved by adding the solid cost of waste management to the local governmental tax, which is currently charged based on the area of the house in some urban areas (Shahr). For

example, the rate in Rasht city is 100,000 rials per household per year to a resident living in a house with 80 m2.

It is desirable to fully-recover the solid waste management cost by local governmental tax or user charge. The full cost recovery requires a household with 4 members to pay 163,000 Rial/year in urban areas and 311,000 Rial/year in rural areas. Though the amount is within the affordable level at below 2% of the disposable household income (Information and Modeling Issues in Designing Water and Sanitation Subsidy Scheme, May 2000, the World Bank), it would be difficult to raise the tax at once, especially in rural areas. Thus, support from the local and central governments may be necessary in the beginning.

Table 10.4.9 Estimated Average User Charge for Domestic Waste Management

(Unit: Rials/year/household)

Item	Urban Area (Shahr)	Rural Area (Dehestan)
Estimated User Charge for Full Cost Recovery*1	163,000	311,000
2% of Disposal Household Income*2	406,000	316,000
Annual Total Income (= Annual Total Cost)	35,000 ~ 49,000 million Rials	1,850 ~ 13,700 million Rials

Note: *1- The figures above are average values during M/P over 15 years.
*2- The data year on household income is in 2001.
The number of household members is supposed as 4 persons.

Regarding the pre-treatment of industrial hazardous waste, relevant industries are supposed to cover the necessary costs for both the project and O&M based on the polluters-pays-principle under the direction of the DOE. In the same way, the cost of treatment of the infectious waste should be covered by the hospitals/medical facilities.

The cost of environmental monitoring should be covered by the provincial budget as regular work.

(6) Financial Evaluation for the Environmental Education Plan

The cost of implementing the Environmental Education Plan is shown below.

Table 10.4.10 Cost of Implementing the Environmental Education Plan

(Unit: million Rials)

Components	Project Cost	Total O&M Cost
1. Environmental Education in Schools	-	3,324
2. Environmental Education in Higher Education	-	4,838
3. Professional Development for Decision Makers	-	2,416
4. Activities for Religious Leaders	-	1,053
5. Activities for Business and Industry	-	1,825
6. Activities for Farmers and Rural Communities	-	9,715
7. Activities for the General Public	1,175	11,140
8. Activities for NGOs	-	4,150
Total	1,175	38,461
Average Annual	78	2,564

Various stakeholders will be involved in the Environmental Education Plan. Most of the proposed activities are to be ongoing indefinitely and the cost of each component is relatively small. Although the relevant costs may be borne by the relevant stakeholders by rearrangement and coordination of their budgets, further financial support from the provincial budget should be provided to ease the budget pressure on the stakeholders, especially in the initial stage.

(7) Financial Evaluation for the Institutional Plan

The cost of implementing the Institutional Plan is shown below.

Table 10.4.11 Cost of Implementing the Institutional Plan

(Unit: million Rials)

Components	Project Cost	Total O&M Cost
1. Establishment of a Conservancy (or similar body)	890	-
2. DOE 'Apprenticeship' Training	159	-
3. Initial Overseas Exchange Visits	270	-
4. Regular Administration of the Conservancy	-	27,150
5. WGLEP Anzali Sub-Group Meetings	-	870
6. Annual Anzali Forum	-	1,005
7. Annual Anzali State of the Environment Report	-	2,250
8. In-country Cross-sectoral Training	-	2,685
9. DOE Technical Support for Municipalities	-	3,450
10. Monitoring and Auditing the Conservancy Performance	-	510
Total	1,319	37,920
Average Annual	88	2,528

The proposed activities for the institutional plan will be regular works for implementation of the M/P under the operational cost except for the establishment of the Conservancy, DOE 'apprenticeship' training, and initial overseas exchange visits. It is suggested that the relevant costs of implementing the Institutional Plan be borne by provincial budget due to the relatively low project and O&M costs.

10.4.5 Price Contingency

While the economic and financial evaluation were conducted using the constant price in June 2004 in the above sections, examples of the total cost of the M/P at current prices are shown assuming future price escalations at several levels. Based on the statistics in Iran, the average annual price escalation based on the consumer price index (CPI) for the past 5 years is very high at around 18.7%/year. This high level of inflation is not a realistic figure to assume for future price escalations. As shown in the following table, only 3% of the annual price escalation causes about a 20% increase in the total cost of the M/P.

Table 10.4.12 Estimate of Price Contingency

(Unit: billion Rials)

Annual Price Escalation	Total Cost of M/P at 2004 Constant Price	Total Price Contingency in 2019	% of Total Cost of M/P
3%/year Case	4,478	903	20.2%
5%/year Case		1,633	36.5%
10%/year Case		4,050	90.4%

Source: JICA Study Team

10.4.6 Suggested Preparations

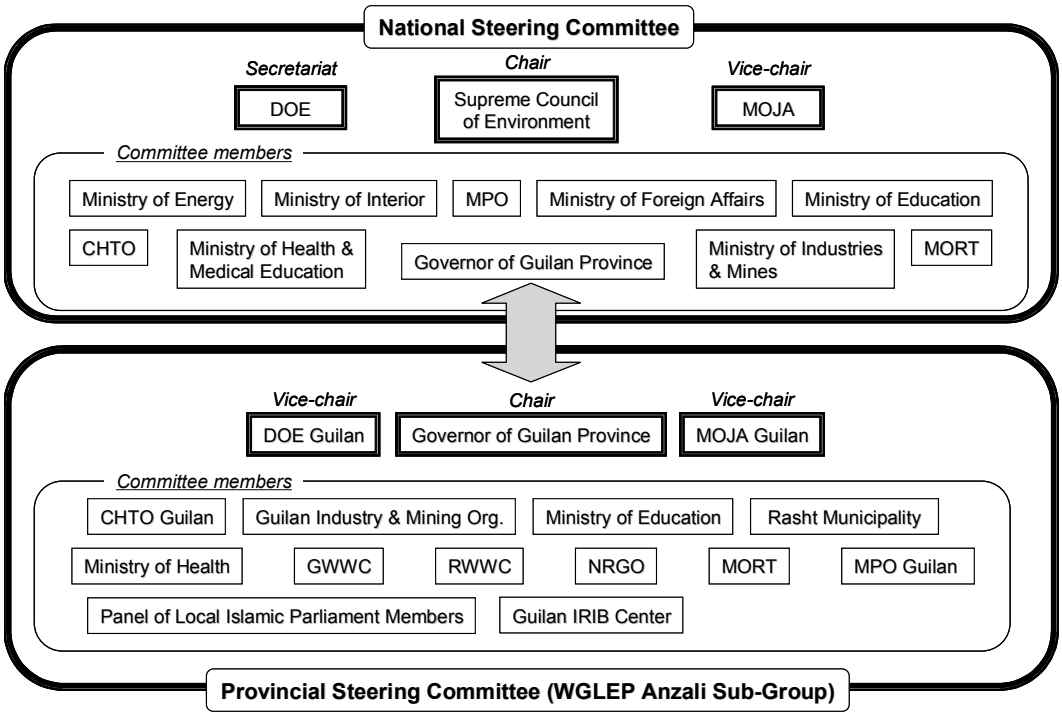
Because a significant budget is required for the implementation of the master plan, and as it is essential that the proposed measures be implemented in a coordinated manner, the relevant organizations are urged to take coordinated actions to secure the necessary budget.

(1) Application for the National Five-Year Development Plan

The first step to secure the necessary budget for the M/P for both national and provincial budgets is that implementation of the M/P is clearly prescribed in the 4th national five-year development plan after approval in the Majlis. The period of the 4th national five-year development plan is between 2005 and 2009. To continuously secure the budget of the M/P over the M/P period, the M/P needs to be approved for the next period of the five-year development plan and then prescribed in the subsequent five-year development plans. Therefore, application for the five-year development plan has to be made every 5 years by phasing the M/P. Based on the five-year development plan, fiscal budgeting will be decided year by year after the performance of the previous year is reviewed by MPO.

(2) Organizing Coordination Mechanisms at National, Provincial and Local Levels

The organizational arrangements for implementation of the master plan were discussed at the 5th National Steering Committee Meeting and the 11th Local Steering Committee Meeting. It was decided that coordinating mechanisms be organized at the national, provincial and local levels. It is envisaged that the national-level coordination structure will be organized under the Supreme Council for the Environment, and the provincial-level coordination mechanism will be organized under the Provincial Governor by involving concerned organizations and stakeholders. At the local level, working groups on land use, environment, watershed management, etc., would be organized to enable active participation of local communities, NGOs and other local stakeholders, and to reflect the voices of such stakeholders in the decision making. The proposed organizational structure and the main tasks of the proposed committees are shown below.



Note: MPO- Management & Planning Organization, GWWC- Guilan Water and Wastewater Company, RWWC- Rural Water and Wastewater Company, NRGO- Natural Resources General Office, MORT- Ministry of Road and Transport, IRIB- The Islamic Republic of Iran Broadcasting
Source: JICA Study Team

Figure 10.4.1 Organizational Chart for the Proposed Special Committees for Financial Arrangement of the Master Plan

Table 10.4.13 Main Tasks of the Special Committees

Level	Main Tasks
National	1) Coordination among relevant ministries and organizations at national level 2) Evaluation of accomplishment of the M/P 3) Re-schedule the Implementation Program (I/P) based on the accomplishments 4) Application to the 5-year Development Plan and national budget for the M/P
Provincial	1) Coordination among relevant governmental agencies and organizations at the provincial level 2) Detailed planning and periodical revising of the plans 3) Monitoring the accomplishment of the M/P 4) Report to the National Committee on the accomplishment
Local	1) Coordination among local stakeholders 2) Voicing local needs and concerns to the provincial level committee 3) Participation in planning / reviewing sessions

Source: JICA Study Team

10.5 Environmental and Social Evaluation

10.5.1 Introduction

The master plan was designed to improve the environmental conditions of the wetland and its basin. Thus, the overall adverse environmental impacts of the proposed projects are expected

to be small, as shown in the subsequent sections. Nevertheless, it is important to carry out an environmental evaluation of the proposed projects for the following reasons:

- Many projects are implemented in ecologically sensitive areas, such as the wetland and the rangelands, and it is important to minimize any negative impact.
- Some measures, in particular sewerage and solid waste management projects, are potential causes of environmental pollution.
- In addition to the adverse impacts, it is also of interest to identify positive environmental impacts.

Similarly, the social impacts of the proposed projects should be carefully analyzed and minimized. Resettlement of graziers discussed in the Watershed Management Plan and impact on the people depending on the wetland of environmental zoning for conservation of the wetland in the Wetland Ecological Management Plan are some of the most serious social impacts of the proposed master plan. In addition, the social impacts on the people around major environmental facilities (e.g., the wastewater treatment facilities and solid waste disposal sites) and impacts caused by change of the solid waste collection system are possibly important social issues. For these reasons, the environmental and social impacts of the following components of the master plan were subject to the analysis:

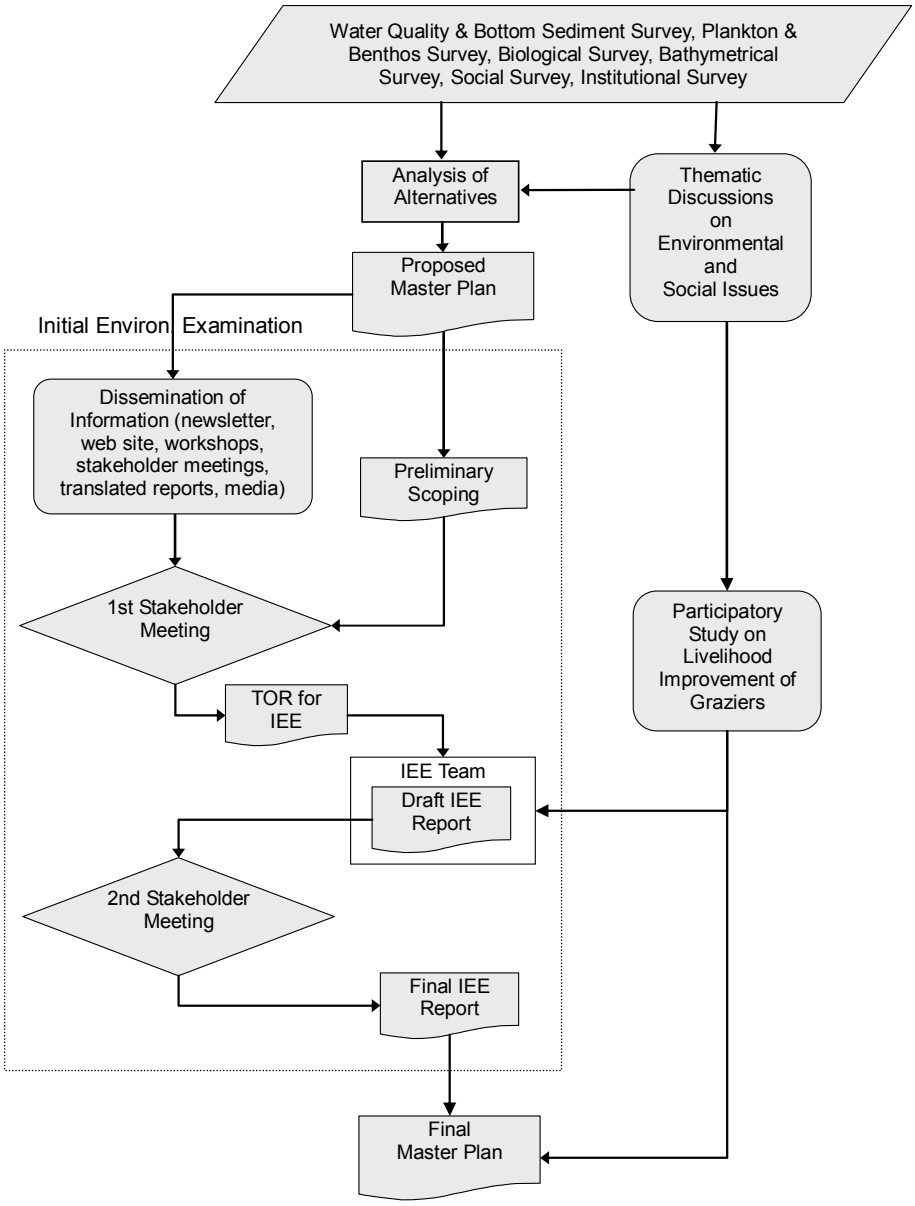
- Wetland Ecological Management Plan
- Watershed Management Plan
- Wastewater Management Plan
- Solid Waste Management Plan

The Environmental Education Plan and the Institutional Plan for Implementation were not analyzed as these plans do not involve any physical projects, and their environmental and institutional impacts were deemed small.

10.5.2 Methodologies

This environmental and social impact evaluation was implemented by referring to the JICA Guidelines for Environmental and Social Considerations (2004) as well as considering the relevant laws, regulations and guidelines in Iran. Because this is a master plan study and many details of the projects are yet to be decided, the evaluations were focused on broadly identifying associated positive/negative impacts of the proposed projects in the early phase of the project cycle and giving recommendations on how to avoid and mitigate negative environmental and social impacts in the subsequent phases of the study. This type of environmental and social examination in the early stage of a project cycle is known as an "Initial Environmental Examination (IEE)".

The IEE in this study was carried out as a part of environmental and social considerations in this study by referring to the JICA Guidelines for Environmental and Social Considerations (2004), as shown in Supporting Report, Part 11, Initial Environmental Examination. The steps of the IEE are shown in Figure 10.5.1.



Source: JICA Study Team

Figure 10.5.1 Steps of Initial Environmental Examination

(1) Dissemination of Basic Information

Before the first stakeholder meeting, the information related to the study and the proposed master plan was distributed[4] to stakeholders in the following ways:

- Project Newsletters: three issues, total 3,000 copies

[4] The IEE was carried out based on the Interim Report. The master plan was later revised based on the results of IEE and other evaluations, and some components of the final master plan are slightly different from the ones reviewed in the IEE.

- Web sites: available from February 2004, English and Farsi
- Workshops, Seminars and Stakeholder Meetings: Four workshops (total 326 attendants), two seminars (total 89 attendants), stakeholder meetings
- Translated Reports: summaries of Progress Report (1), Progress Report (2) and Interim Report, total 180 copies; translated Interim Report 40 copies.
- Media Coverage: TV and Newspaper, 5 or 6 times
- Pilot activities: 10 activities

(2) Analysis of Alternatives (including without project case)

As this was a master plan study, the main focus was to develop policy-, plan- or program-level alternatives. Each sub-plan of the master plan set policy-level objective(s), and a set of strategies. Then, specific measures to achieve the objective were developed considering a wide range of alternatives at different levels.

1) Wetland Ecological Management

The main management tool adopted for wetland conservation was environmental zoning. Three alternative zoning plans were developed and compared with the existing zoning program[5] considering the (i) ecological diversity/sensitivity of habitats, (ii) requirements for designating a zone under the legally protected areas in compliance with the Executive By-law of the Environmental Protection Act, (iii) social and economical impacts of the zoning regulations on farmers, fishermen, hunters and other local residents, and (iv) capacity of the DOE to enforce zoning regulations, and other criteria.

2) Watershed Management Plan

There were two main issues in the Watershed Management Plan. The first issue was the priority of erosion control in the 9 sub-basins of the wetland that had progressed beyond natural recovery (about 77 km2). In order to set priorities, the sediment load from each sub-basin was estimated from satellite data analysis, and the anticipated reduction of sediment load by erosion control measures was estimated. Then, the priority was set based on the amount of sediment load to the wetland. Overall, there were no major differences between the team and the Iranian experts in the technical approaches to the problems of erosion and landslide control. However, MOJA emphasized the importance of disaster prevention (e.g., floods, debris flows, and other extreme conditions), while the team tried to focus on erosion control to conserve the wetland.

The second, more complex issue was the control of overgrazing in the mountains and its impact on graziers. The government has already approved through a presidential decree a program to control grazing activities by

[5] The without project option was the existing zoning regulation, which was developed by Guilan University (1999), and has been used as an internal guideline of the DOE Guilan for development control around the wetland.

removing livestock from mountains (livestock resettlement program). This program would resettle about 1,450 families and also force about 2,150 families to quit grazing activities. Many graziers were opposing this program. NRGO was aware of the social impact of the program, though there was no concrete program for providing a social safety net. Thus, the team advocated introduction of participatory resource management by graziers/forest dwellers, and proposed programs for development of alternative livelihood.

3) Wastewater Management

Among the pollution sources, urban domestic wastewater, in particular from the urban population in Rasht, is the main pollution source in the study area. To control this, GWWC already has plans to construct sewerage systems for most urban areas (Rasht, Anzali, Somehsara, Masal, Fuman, Shaft, Khomam and Masuleh), and construction in Rasht (Phase 1), Anzali (Phase 1) and Somehsara has already commenced with the national budget; GWWC has been negotiating with the World Bank for loan arrangements for the Rasht and Anzali systems. Therefore, these plans were reviewed, and adopted in the master plan.

While the technical issues of these plans were relatively small, the real issue was financial feasibility. Development of a sewerage system is very expensive, and the availability of funds for the initial investment is highly dependent on the allocation of the national budget. Obviously, there is a trade off between the achievable water quality and the budget required. From the environmental point of view, it was desired to reduce the pollution loads as much as possible, but it was not realistic to expect construction of sewerage systems in all cities.

Trial calculations of pollution loads to the Anzali Wetland were made under different scenarios of sewerage development including the no-project alternative. Based on these calculations, as well as reviews of international environmental standards and discussions with local water quality specialists, the target water quality in the wetland was tentatively set at CODCr 30 mg/L, T-N 2.0 mg/L and T-P 0.20 mg/L, and the targets for pollution load reduction were tentatively set. These targets aim to improve the water quality of the eastern side of the wetland, which receives untreated wastewater from Rasht.

4) Solid Waste Management

Solid waste management in the study area was facing financial difficulties, and improving efficiency of waste management service was deemed a priority. The overall efficiency of solid waste management services is influenced by factors such as recycling at source, level of waste collection service, use of composting plants, and the number and locations of disposal sites. A computer simulation model was used to evaluate construction and operation costs of various combinations of these factors (alternatives).

The analysis of alternatives was compounded by the conflicting demands of residents/NGOs for better services, concern over environmental issues (e.g., construction of landfills in the plain area), reluctance to pay service fee, and the existence of composting plants in Rasht (already in operation) and Anzali (to open in 2006) which were implemented without a clear strategy for solid waste management. The fact that there was no well-structured counterpart organization for solid waste management also made it difficult to develop the solid waste management plan.

Based on these analyses, the domestic waste management scheme based on (i) environmental awareness including community-level recycling activities, (ii) collection service of about three times/week from every 20 households, (iii) expansion of collection service to rural areas, (iv) recycling/composting, and (v) disposal at 2 sanitary landfills, were selected.

For industrial and medical wastes, urgent measures to control hazardous/infectious wastes, and longer-term measures were proposed.

(2) Preliminary Scoping

Based on the projects proposed in the Interim Report, the potential environmental and social impacts of the proposed projects were discussed with the DOE, the resettlement/grievance section of NRGO, as well as other local specialists and NGOs. The results of the social survey conducted in 2003 were also taken into consideration. The selected types of impacts are in total 12 items in 4 categories:

- Physical Environment (Soil, Water, Air and Secondary)
- Natural Environment (Plants, Animals, Ecosystems)
- Social and Cultural (Health and Hygiene, Social, Cultural)
- Development Plans (Sectoral Development Plans, Land use)

These were selected based on the classification of environmental impacts in the Iranian EIA regulations. In a typical project-level EIA in Iran, impacts on water quality, noise, etc., are presented as sub-categories of the items selected in this study. However, further breakdown of the evaluation items were avoided for the following reasons:

- This is a master plan study, and many of the proposed measures are at policy-, plan- and program-levels (e.g., environmental zoning). For such measures, impact evaluation criteria typically used in a project level EIA, such as conformity with environmental standards, and other site-specific criteria, are not applicable.
- Many stakeholders who reviewed the IEE documents were not familiar with technical aspects of environmental and social impact evaluation. On the other hand, some stakeholders, especially academics and environmental specialists, tend to get caught up in the details of environmental evaluations. Because it was more important to discuss the overall directions of the master plan, and the team wanted the stakeholders to express their opinions without getting side-tracked

into technical issues, the evaluation criteria were kept as simple as possible.

- There were already 12 tables (4 sub-plans x 3 phases (construction, operation, and without-project)) with many project components, and it was not realistic to request stakeholders to examine an even larger number of items one by one.

(3) First Stakeholder Meeting on IEE

The first stakeholder meeting on IEE was held on August 10, 2004,. Twenty-five stakeholders representing DOE, MOJA, NRGO, MOE, IMO, local research institutions/universities and NGOs (Nejatesabz Committee, Guilan Jamieate Sabz, Sabzaeen, Women Association Against the Environmental Pollution, Guilan Sabzkaran) participated in the meeting.

Table 10.5.1 Participants in the First Stakeholder Meeting on August 10, 2004

No.	Name	Organization/Department
1	Mr. Rasoul Mohammadi	MOJA
2	Mr. Mohammad Nejati	MOJA
3	Mr. Alireza Saeedi	Environmental Health Expert of Physician Science University
4	Mr. Sadegh Islami	Environmental Health Expert of Guilan Physician Science University
5	Mr. Adel Kazemi	NRGO
6	Mr. Ismail Javadi	Mine & Industry Organization in Guilan
7	Mr. Naser Toutchi	Ports and Shipping Organization – Port of Anzali
8	Mr. Alireza N. Sanati	Guilan Fishery Bureau
9	Mr. Mohsen Urumieh	Watershed Management Deputy
10	Mr. Farhad Momenpour	GWWC
11	Mr. Rahim Khorasani	MOE
12	Mr. Alireza Mirzajani	Caspian Bony Fishes Research Center, Anzali
13	Mr. Nooroddin Azimi	Guilan University
14	Mr. Shahrouz Mallah	NGO, Nejatesabz Committee
15	Mr. Mohamoud Nikouyeh	NGO, Guilan Jamieate Sabz
16	Mr. Roohollah Vahidi	NGO, Sabzaeen
17	Ms. Mayam Panahandeh	NGO, Sabzaeen
18	Ms. Shirin Parsi	NGO, Women's Association Against the Environmental Pollution
19	Ms. Nasim Tavafzadeh	NGO, Guilan Sabzkaran
20	Mr. Abbas Safakar	Guilan DOE
21	Mr. Asan Bagharzadeh	Guilan DOE
22	Mr. Hossein Ali Mohammadi	Watershed Management Deputy
23	Dr. Moslem Akbarinia	JICA Study Team
24	Dr. Itaru Okuda	JICA Study Team
25	Mr. Masayuki Fujii	JICA Study Team

Source: JICA Study Team

Though the participants were aware of the study, it was evident that some stakeholders had not been fully informed about the details of the master plan. Thus, this meeting was used to explain the contents of the proposed master plan and to discuss major environmental and social issues related to the master plan. The specific issues presented to the stakeholders and comments/questions received from the stakeholders are as follows:

Table 10.5.2 Major Environmental and Social Issues Addressed in the First Stakeholder Meeting

Management Plan	Major Issues
Wetland Ecological Management Plan	- Is the designation as protected area sufficient to protect the ecosystems? - What are the appropriate regulations to control activities in and around the wetland? - How should we promote eco-tourism and other wise use? - What are the impacts of such regulations on farmers and other people living in the buffer zone and the transition zone? - Is it a good idea to collect tourism tax from tourists?
Watershed Management Plan	- What is the impact of sedimentation in the wetland? - Is the use of natural resources in the mountains (rangelands and forests) and their protection balanced? - How should we control the urbanization of Bandar Anzali affecting the wetland? - How should we minimize the social impact of rangeland management (e.g., resettlement) on graziers? - Who should bear the cost for management of forests and rangelands?
Wastewater Management Plan	- Is the water quality target of COD 30 mg/L and T-P 0.15 mg/L appropriate? - What would be the environmental impact of effluent from the Anzali sewage treatment plants discharged to the wetland? - What incentives (e.g., loans) do industries have to comply with the effluent standards? - How much can a household pay for the sewerage service a year? How much can the Guilan Province pay?
Solid Waste Management Plan	- In Japan, solid waste is collected 2 or 3 times/week, but it covers wide areas. We proposed a similar system for Guilan. Do you agree with this change? - Do you have any suggestion about sites for new landfills for Anzali, Rasht and other cities? - The budget for solid waste management seems very small. Are you willing to pay for solid waste management service?

Source: JICA Study Team

Table 10.5.3 Comments Raised during the First Stakeholder Meeting

Management Plan	Comments from Stakeholders	Answers from the Team
Wetland Ecological Management Plan	Some houses are located in the buffer zone. How does the proposed zoning affect these people? (NGO, Women Against Pollution)	The social impact of the zoning is an important issue. The team is concerned about the impact of zoning on agricultural activities and has been discussing this issue with the experts of MOJA agricultural section, especially about the potential impacts of reduced inputs of agricultural chemicals on production.
	There are encroachment problems around the wetland (NGO, Nejat Sabz). How is this issue addressed in the plan?	The team is considering an option to purchase a part of the private land in the buffer zone, but this would be costly. Introduction of regulations would be necessary.
Watershed Management Plan	NRGO is responsible for management of forests and rangelands. Entry of people and livestock to some areas should be prohibited. We also have to introduce new ideas, such as industrial animal husbandry, rather than traditional grazing. Training and education are also important. Medicinal plants and horticulture also offer potential as alternative sources of income. (MOJA officer)	The team is currently implementing a participatory study and trying to work with the graziers to tackle the problem of overgrazing, since they are the ones affected by these changes. We hope the results of this study will help us come up with new ideas.
Wastewater Management Plan	It is not possible to transfer all industries to industrial cities. Many industries have outdated treatment facilities. How about connecting industrial factories to the sewerage system? (DOE officer)	As it is not possible to relocate all factories, we could focus on the major polluting industries. Discharge to the sewerage is possible as long as industries pre-treat effluent to the level acceptable for discharge to the sewerage system.
Solid Waste Management	Our NGO has an education program concerning solid waste separation using waste bins of three different colors. However, there is no system to recycle separated waste. We think systems to reuse recycled materials have to be established. (NGO, women against pollution)	This is a good point. Please discuss it at the next solid waste improvement meeting (SWIM).

Source: JICA Study Team

(4) Formation of IEE Team

Based on the results of the first stakeholder meeting, a TOR for the IEE was developed. Then, a team of six environmental experts from DOE (natural environment, human environment), NRGO (resettlement, social issues, natural resources management), and the JICA Study Team, was formed.

(5) Preliminary Evaluation of Environmental and Social Impacts

Based on the TOR, the IEE team analyzed the environmental and social impacts of the proposed projects and developed a draft IEE document.

(6) Review of TOR and Draft Scoping Document by Stakeholders

The TOR and the draft IEE document were then sent to the stakeholders who participated in the first stakeholder meeting for review and comments.

(7) Second Stakeholder Meeting on IEE

The results of the analysis were distributed to the stakeholders, and the second stakeholder meeting was held on October 4, 2004. In total, 24 participants reviewed the draft IEE document. The participants in the second stakeholder meeting and the comments submitted on the IEE document are as follows.

Table 10.5.4 Participants in the Second Stakeholder Meeting on October 4, 2004

No.	Name	Title, Organization
1	Mr. Seyednourodin Hosseinpour	Advisor, Anzali Bony Fishes Research Center
2	Mr. Seyedhojjat Khodaparast	Head Wetland Research Center , Anzali Fishery General Department
3	Mr. Naser Toutchi	Expert, Anzali Ports and Navigation Organization
4	Mr. Alireza Nejatsanati	Expert, Guilan NRGO
5	Mr. Mohammad Cheraghcheshm	Expert, MOJA
6	Mr. Mohammadbagher Rafati	Head of Evaluation Department, WMD
7	Mr. Reza Mahdavi	Expert, MPO
8	Mr. Hossein Amini	Expert, ITTO
9	Mr. Mohsen Oroumieh	Head of Erosion and Sediment Group, Watershed Evaluation study Office
10	Mr. Mohammad Heidarzadeh	Expert, HUDO
11	Mr. Esmaill Tahsini	Expert, HUDO
12	Mr. Azadeh Amed	Women's NGO
13	Mr. Adel Kazemi	Expert, NRGO
14	Mr. Mahyar Sakari	Deputy for natural Environment DOE Guilan, DOE
15	Mr. Asan Bagharzadeh	Responsible Expert of Natural Environment, DOE
16	Mr. Rahim Khorasani	Head of water Quality central Section, RWO
17	Mr. Hossein Ali Mohammadi	Expert, MOJA
18	Mr. Eghdami	Expert of Budget, MPO
19	Mr. Hirofumi Sadamura	JICA Study Team
20	Dr. Itaru Okuda	JICA Study Team
21	Mr. Shin-ichiro Tanimoto	JICA Study Team
22	Mr. Yoji Mizuguchi	JICA Study Team
23	Mr. Tomoo Aoki	JICA Study Team
24	Dr. Paul Driver	JICA Study Team

Source: JICA Study Team

Table 10.5.5 Comments on the IEE Documents Submitted by Stakeholders

Management Plan	Comments from Stakeholders
Wetland Ecological Management Plan	- It is important to clarify suitable economic activities which can be executed in the core protected zone, buffer zone, and transition zone.
Wastewater Management Plan	- Use of phosphate fertilizers will cause increase in the T-P level in the wetland. - Construction and operation of domestic wastewater treatment systems is essential for significant reduction of BOD and COD loads. - It is not possible to relocate large factories to industrial cities because facilities are old and the relocation cost would be high. It is recommended that (i) industries located in the buffer zone be transferred to the industrial cities first, and (ii) wastewater treatment systems in industrial cities should be renewed or optimized. - There are at least two metal plating industries in the Anzali watershed. Heavy metals from these factories should be removed under the supervision of DOE. - Sludge from the sewage treatment plants may be composted at the composting plants.
Solid Waste Management Plan	- Due to the high groundwater table, water pollution around landfills is a concern. - DOE and provincial authorities agreed to promote composting and recycling of waste and a plant is being constructed near Abkenar. - Residential units are scattered in the rural areas. It is suggested to keep garbage in covered temporary stations from where it would be transferred to the composting plants three times a week. - A study to select a hazardous waste disposal is being carried out in Loshan, Guilan.

Source: JICA Study Team

(8) Preparation of IEE document

Based on the results of the second stakeholder meeting, the IEE document was finalized. The document was made available through the DOE Guilan and NRGO.

10.5.3 IEE on the Wetland Ecological Management Plan

In this section, mitigating measures for projects in the Wetland Ecological Management Plan that have adverse environmental and social impacts with ratings of medium negative impact or worse in the IEE are discussed. For the details of the evaluation, please see Supporting Report, Part 11, Initial Environmental Examination.

Table 10.5.6 Suggested Mitigating Measures for Rehabilitation and Maintenance of Habitat

Project	Rehabilitation and Maintenance of Habitat
Impact Category	Natural Environment: Plants, Animals, Ecosystem
Phase	Construction
Activities and/or Impacts	The master plan proposed restoration of habitats for birds and fish by dredging sediment and creating open waters. While these measures could improve the natural environment, the dredging works and disposal of dredged materials, possibly within the wetland as "islands", should be carried out carefully to minimize water pollution and other secondary environmental problems.
Suggested Mitigating Measures	The potential risks of these measures and the need for an EIA study were pointed out in the Final Report. Before a large scale change (in particular, dredging) is made, it is necessary to carry out a small-scale pilot project by a team of specialists. The project should be designed in such ways to enable an evaluation of effectiveness and environmental impact of the measure before and after the pilot project. Good environmental monitoring (e.g., fish numbers in the dredged area, water quality, use of created open-water by waterfowls) is important. The full-scale implementation should be designed based on the result of the pilot project.
Responsible Organization	DOE, proposed Conservancy

Source: JICA Study Team

Table 10.5.7 Suggested Mitigating Measures for Establishment of Environmental Zoning

Project	Establishment of Environmental Zoning
Impact Category	Social and Cultural: Social Development Plans: Sectoral Development Plan, Land Use
Phase	Operation
Activities and/or Impacts	Approximately 150 km^2 of the agricultural areas around the wetland will be designated as the buffer zone or transition zone. In these areas, agriculture practices will be changed from the ones that use high amount of fertilizers to sustainable but potentially less productive ones. Also, in these areas, development of factories and other industries that are not environmentally-sustainable will not be permitted.
Suggested Mitigating Measures	Given the complexity of this issue, more stakeholder meetings are needed to develop appropriate zoning regulations despite the fact that many meetings have already been held to discuss key issues, such as restrictions to use agricultural chemicals in the buffer zone and control of fishing, hunting and other activities in the wetland. In addition, a detailed socio-economic study of the buffer zone should be implemented to identify the needs of the stakeholders living and working there. There are numerous ideas on how to provide compensation for the reduced productivity and lost opportunities for development. For example, some areas immediately around the wetland may be converted to commercial forests of poplar and alder. Organically produced agricultural products may be bought by the government and served at a restaurant in the visitor center and the guest house. These ideas should be explored more and implemented as appropriate.
Responsible Organization	DOE, proposed Conservancy, municipalities

Source: JICA Study Team

Table 10.5.8 Suggested Mitigating Measures for Sustainable Use of Natural Resources

Project	Sustainable Use of Natural Resources
Impact Category	Social and Cultural: Social Natural Environment: Animals, Ecosystem
Phase	Operation
Activities and/or Impacts	Ecosystem in the wetland is very dynamic, and the balance between environmental conservation and wise use activities, in particular hunting and fishing, is not easy to establish. Over-hunting and over-fishing should be avoided. On the other hand, fishing and hunting are important local industries, and strict control of these activities could affect the lives of professional fishermen and hunters.
Suggested Mitigating Measures	Stakeholder Meetings: These issues should also be addressed in the stakeholder meetings[6]. Development of Alternative Livelihood: Professional fishermen and hunters could make living as, for example, guides for eco-tourism or for sport fishing and sport hunting. These alternative job opportunities have to be developed in parallel with the enforcement of stricter restrictions. The proposed "Development of Ecotourism" in the Final Report, Main Report, Chapter 4, includes programs to involve local stakeholders as nature interpreters. Monitoring: The study advocated adaptive management of these resources, and monitoring programs were proposed as a part of the Wetland Ecological Management Plan.
Responsible Organization	DOE, proposed Conservancy

Source: JICA Study Team

10.5.4 IEE on the Watershed Management Plan

In this section, mitigating measures for projects in the Watershed Management Plan that have adverse environmental and social impacts with ratings of medium negative impact or worse in the IEE are discussed. For the details of the evaluation, please see Supporting Report, Part 11, Initial Environmental Examination.

[6] A stakeholder meeting with fishermen, hunters and farmers were held on September 25, 2004 to discuss these issues. Overall, these stakeholders are in favor of stricter control of activities in the wetland, and the master plan suggested new license fees and bag limits. There were suggestions to create different types of licenses, e.g., weekly license for pleasure hunters/fishermen and season license for professional hunters/fishermen. Thus, more discussions are recommended.

Table 10.5.9 Suggested Mitigating Measures for Soil Erosion Control

Project	Soil Erosion Control
Impact Category	Physical Environment: Soil
Phase	Construction
Activities and/or Impacts	Destruction of areas around the sites (e.g., construction of service road, cut and fill work, quarries for construction materials) and release of wastewater from the construction sites are potential impacting activities.
Suggested Mitigating Measures	A guideline for environmental considerations for erosion control works should be developed in the design phase of the project, and all contractors should be properly trained in the early phase of the projects. The guideline should explain how to construct a service road, minimize cut and fill work, divert water during construction, contain/neutralize wastewater containing high sediment loads, oil, high pH, or other adverse conditions. The need for technical support by MOJA head office is recommended in the Final Report, Executive Summary, Section 10.6, Technical Evaluation.
Responsible Organization	MOJA

Source: JICA Study Team

Table 10.5.10 Suggested Mitigating Measures for Prevention of Landslides

Project	Prevention of Landslides
Impact Category	Physical Environment: Soil
Phase	Construction
Activities and/or Impacts	Civil works in a landslide area or on a steep slope could induce further landslides and slope collapses.
Suggested Mitigating Measures	The mitigating measures have to be designed and implemented carefully by competent experts. The need for technical support by the MOJA head office is recommended in the Final Report, Executive Summary, Section 10.6, Technical Evaluation.
Responsible Organization	MORT, MOJA

Source: JICA Study Team

Table 10.5.11 Suggested Mitigating Measures for Improvement of Livestock Resettlement Program

Project	Improvement of Livestock Resettlement Program
Impact Category	Social and Cultural: Social, Cultural
Phase	Operation
Activities and/or Impacts	The Government has recently issued the "Presidential Decree of the Council of Ministries of MOJA-DOE-MPO on the Management of the Northern Forests" endorsing the resettlement of roughly 1,450 families in the watershed based on the NRGO's regulation on resettlement and compensation to protect watersheds. If implemented, this plan would markedly reduce the overexploitation of the natural resources in the area. However, the plan does not contain a social safety net for those to be resettled or for those remaining in the mountains; the plan needs to be reviewed.
Suggested Mitigating Measures	Participation of Stakeholders in Decision Making [7]: Detailed participatory studies on the livelihood of graziers should be carried out in order to identify the needs of the graziers and potential alternatives to grazing livestock. The JICA Study Team together with an NGO have started a participatory study, but as the time is limited, it is suggested that the study be continued by the Iranian government. The Watershed Management Plan (Final Report, Main Report, Section 5.4) proposed activities for participatory resource management. Development and Implementation of Livelihood Improvement Plan[8]: Based on such studies, a livelihood improvement plan should be developed considering the local needs, capacity of graziers to take up alternative livelihoods, markets for products produced by graziers, and other factors. Training of graziers as well as various support mechanisms should be built into the livelihood development plan. These are suggested in the proposed Watershed Management Plan in the Final Report.
Responsible Organization	NRGO

Source: JICA Study Team

10.5.5 IEE on the Wastewater Management Plan

In this section, mitigating measures for projects in the Wastewater Management Plan that have adverse environmental and social impacts with ratings of medium negative impact or worse in the IEE are discussed. For the details of the evaluation, please see Supporting Report, Part 11, Initial Environmental Examination.

[7] A participatory study for improvement of livelihood of graziers was implemented during the course of this study. For details, see the Main Report, Section 5.6.1.
[8] A program for livelihood development, which consisted of (i) capacity development of NRGO provincial and local offices and (ii) livelihood improvement of local people in forest and rangeland management, was proposed in the Watershed Management Plan.

Table 10.5.12 Suggested Mitigating Measures for Sewerage Development (Disposal of Sludge)

Project	Sewerage Development
Impact Category	Physical Environment: Secondary
Phase	Operation
Activities and/or Impacts	There will be problems for disposal of sludge generated from the sewage treatment plants (about 16 tons/day).
Suggested Mitigating Measures	The sludge may be dewatered and composted at a composting plant, or disposed of at a solid waste disposal site (see Solid Waste Management Plan). GWWC has a plan to construct an incinerator for sludge disposal. In this case, attention should be paid to air pollution. The temperature of incineration would need to be high enough to prevent pollution by dioxin.
Responsible Organization	GWWC

Source: JICA Study Team

Table 10.5.13 Suggested Mitigating Measures for Sewerage Development (Water Pollution)

Project	Sewerage Development
Impact Category	Physical Environment: Water[9]
Phase	Operation
Activities and/or Impacts	The main cause of water pollution in the wetland is the discharge of untreated domestic wastewater. Thus, the construction of wastewater treatment systems would greatly reduce the pollution problem. However, the treated wastewater still contains some pollutants (according to the design). In the case of Rasht and Somehsara, the treated wastewater will be discharged to rivers, and as these rivers are already polluted by the inflow of untreated wastewater, any additional impact from the discharge of treated wastewater would be comparatively small. On the other hand, treated wastewater from two sewage treatment plants in Bandar Anzali will be directly discharged to the Anzali Wetland. In particular, the treated wastewater from the western sewage treatment plant will be discharged to a point near the natural lagoon, and there is a risk that the lagoon could be impacted.
Suggested Mitigating Measures	The wastewater could be discharged directly to the Caspian Sea. However, this could cause the pollution of the beach and coastal area. Thus, the option of releasing the treated wastewater to the wetland seems better than the option of releasing the wastewater directly to the Caspian Sea[10]. Assuming that the treated wastewater is discharged to the wetland, the impact to the wetland should be minimized, and the installation of a tertiary treatment system to remove nutrients was proposed in the Draft Final Report. The discharged treated wastewater may be then treated further in designated sections of the wetland around the discharge points and discharged to the downstream of the wetland. More discussions between GWWC and DOE are recommended.
Responsible Organization	GWWC, DOE

Source: JICA Study Team

[9] The proposed sewerage systems are expected to markedly improve water quality in the wetland and rivers. However, localized pollution around the discharge points should be minimized carefully. Thus, this item was addressed here, though the overall rating was "+H".

[10] According to the general director of the DOE Guilan, discharging of wastewater to the Caspian Sea is not permitted. It was noted that Iran is a member country of the Caspian Environment Programme, and it is important to minimize the pollution load discharged to the Caspian Sea.

10.5.6 IEE on the Solid Waste Management Plan

In this section, mitigating measures for projects in the Solid Waste Management Plan that have adverse environmental and social impacts with ratings of medium negative impact or worse in the IEE are discussed. For the details of the evaluation, please see Supporting Report, Part 11, Initial Environmental Examination.

Table 10.5.14 Suggested Mitigating Measures for Proper Disposal of Municipal Solid Waste

Project	Proper Disposal of Municipal Solid Waste
Impact Category	Natural Environment: Water Social and Cultural: Social
Phase	Construction and Operation
Activities and/or Impacts	None of the existing landfills in the area are environmentally acceptable, and construction of two sanitary landfills is envisaged in the master plan. While these new landfills are essential, the sites have to be carefully selected to minimize impacts on residents around the landfills due to odor, increased traffic and other nuisance. The landfills also have to be constructed properly to prevent pollution of the surrounding areas by leachate.
Suggested Mitigating Measures	Feasibility Study: Tentatively the study suggested three alternative locations (near the Sarawan dumping site, Ab Kenar in Bandar Anzali, and an alternative site in the low mountains near Masal or Fuman) for construction of two landfills (Final Report, Main Report, Section 7.3.3). However, a detailed feasibility study has to be conducted for each new landfill. This should include site investigations (topography, geology/soil, groundwater, etc.), design study, a full EIA study, socio-economic survey, analysis of alternatives, and selection of the site. Public participation in this phase is necessary. This was recommended in the Solid Waste Management Plan. In addition, another feasibility study should be carried out for closure of the existing landfills. Good management of the landfill, such as regular application of top soil cover, management of surface runoff, treatment of leachate, control of pests, etc., is essential to minimize environmental and social impacts in the operation phase of the landfills.
Responsible Organization	Municipalities

Source: JICA Study Team

Table 10.5.15 Suggested Mitigating Measures for Provision of Efficient Municipal Waste Collection Service to the Whole Area

Project	Provision of Efficient Municipal Waste Collection Service to the Whole Area
Impact Category	Social and Cultural: Social
Phase	Operation
Activities and/or Impacts	The Solid Waste Management Plan proposed a new system of solid waste collection similar to the one used in Japan. The new system is designed to improve the cost-effectiveness of the collection service and to expand the service area to rural areas. However, some residents might raise concern about the reduced collection frequency (about 3 times/week) and reduced collection points (about one every 20 households) considered in the new system, as they have to store waste at home or bring the waste to the collection point in the neighborhood.
Suggested Mitigating Measures	Environmental Awareness Raising: The most important thing is to raise the environmental awareness of people. The Solid Waste Management Plan proposed to introduce community-level recycling activities prior to introducing the new collection system. By participating in recycling activities, people would learn to be environmentally conscious. Participatory recycling activity has been proposed in the master plan. Disclosure of information is another important strategy to convince people and improve services.
Responsible Organization	Municipalities, DOE

Source: JICA Study Team

10.6 Technical Evaluation

The master plan comprises six plans that include construction and operation of infrastructure, such as wastewater treatment plants proposed in the wastewater management plan (see Chapter 6) or the sanitary landfills proposed in the solid waste management plan (Chapter 7). These projects have been evaluated in the design of the specifications with respect to their technical sustainability, such as:

- Whether all technical alternatives were examined and the most appropriate technologies were selected,
- Whether the technical level of the proposed works is acceptable for local engineers or experts
- Whether the spare parts and other consumables can be easily procured
- Whether the proposed technology is consistent with Iranian construction code or technical requirements
- Others

Recommendations on the technical capacity building are provided in the relevant chapters.

CHAPTER 11 IMPLEMENTATION PROGRAMS LISTED BY IMPLEMENTING ORGANIZATION

11.1 Introduction

The proposed master plan consists of six sub-plans; Wetland Ecological Management Plan, Watershed Management Plan, Wastewater Management Plan, Solid Waste Management Plan, Environmental Education Plan and Institutional Plan for Implementation, and it includes many projects/measures to be implemented. They are to be carried out by various organizations, such as DOE, MOJA, Local Governments, GWWC, RWWC, etc. In this section, the implementation programs proposed in the previous chapters are rearranged by executing organization. This section describes the followings.

1) Implementation schedule of the proposed projects to be carried out by each organization
2) Investment cost and operation and maintenance (O&M) cost for implementation of the proposed projects to be provided by each organization
3) Outline of priority projects to be carried out by each organization

Table 11.1.1 shows demarcation of responsibilities by organization for implementation of the proposed master plan.

Table 11.1.1 Responsible Organizations for Implementation of Proposed Sub-plans

Sub-Plan	DOE	MOJA	Local Gov.	GWWC/ RWWC	Others
1) Wetland Ecological Management	○	-	-	-	-
2) Watershed Management	△	○	-	-	-
3) Wastewater Management	○	○	-	○	○
4) Solid Waste Management	○	-	○	-	○
5) Environmental Education	○	○	△	-	○
6) Institutional Plan	○	○	○	△	○

Note: ○ Direct responsibility, △ Assistance
Source: JICA Study Team

11.2 Implementation Program for Each Organization

11.2.1 DOE

(1) Implementation Schedule of Proposed Projects

DOE shall take responsibility for implementation of all projects of the Wetland Ecological Management Plan, and some projects of the Wastewater Management Plan, the Solid Waste Management Plan, the Environmental Education Plan and the Institutional Plan. The implementation schedule for DOE is shown in Table 11.2.1.

Table 11.2.1 Proposed Implementation Schedule for DOE (1/2)

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
WETLAND ECOLOGICAL MANAGEMENT PLAN															
1. Environmental Zoning															
(1) Establishment of Environmental Zones															
(2) Enforcement of Zoning															
2. Conservation of Wildlife															
(1) Conservation of the Threatened Species															
(2) Control of Alien Species															
3. Conservation of Habitat															
(1) Strengthening of the Regulations															
1) Construction of Guard Station															
2) Capacity Development of Rangers															
3) Regulation of Motorboats															
(2) Rehabilitation and Maintenance of Habitat															
1) Rehabilitation of Habitat															
2) Prevention against Solid Waste Inflow															
4. Promotion of Wise Use															
(1) Development of Ecotourism															
1) Structuring of Ecotourism Network															
2) Nature Interpreter Training															
3) Preparation of Infrastructure															
4) Implementation of Ecotour			Trial Activity						Full Activity						
(2) Sustainable Use of Natural Resources															
5. Monitoring and Feedback															
(1) Environmental Monitoring for Adaptive Management															
(2) Environmental Research															
WASTEWATER MANAGEMENT PLAN															
1. Management of Domestic Wastewater in Urban Area															
(4) Promotion of Individual Wastewater Treatment Facilities															
(5) Promotion of Low Phosphorous Detergent Use															
3. Management of Industrial Effluent															
(1) Centralization of Industrial Factories															
(3) Strengthening of Monitoring Activities by DOE															
4. Management of Livestock Waste															
(1) Treatment of Livestock Waste from Industrial Animal Husbandry															
(2) Control of Livestock Waste in Grazing Lands in the Plain Area															
SOLID WASTE MANAGEMENT PLAN															
2. Industrial and Medical Solid Waste Management															
(2) Non-hazardous industrial solid waste management															
2) Establishment of Reductions for industrial and medical Solid Waste															

Source: JICA Study Team

Table 11.2.1 Proposed Implementation Schedule for DOE (2/2)

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
ENVIRONMENTAL EDUCATION PLAN																
2. Public Awareness Raising and Participation																
(1)	Decision Makers - Sub-measures 1) - 4)															
(3)	Business and Industry - Sub-measures 1)															
	Business and Industry - Sub-measures 2) - 4)															
(5)	General Public and Tourists - Sub-measures 2) - 4)															
	General Public and Tourists - Sub-measures 1) and 5) - 7)															
INSTITUTIONAL DEVELOPMENT PLAN																
1. Establishment of Anzali Wetland Conservancy																
(1)	Establishment of Anzali Wetland Department															
(3)	Annual Anzali Forum															
2. Capacity Development																
(1)	In-country cross-sectoral training															
(2)	DOE "apprenticeship" training															
(3)	Overseas exchange visits															
DISBURSEMENT SCHEDULE		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
	1) Project Cost	1,639	730	3,799	1,012	4,460	7,283	5,868	5,146	4,410	4,410	1,070	1,070	1,233	1,070	1,070	44,270
	2) O&M Cost	3,112	3,477	3,731	3,752	3,832	4,125	4,333	4,670	4,480	4,480	4,459	4,389	4,639	4,479	4,399	62,357

Source: JICA Study Team

(2) Required Cost for Implementation

DOE should get budget for the project cost and O&M cost given in Table 11.2.1. Total project cost is 44,270 million Rials and the annual O&M cost ranges between 3,100 million Rials/year and 4,700 million Rials/year.

(3) Priority Projects

DOE is required to carry out the following six priority projects.

1) Environmental Zoning (Wetland Ecological Management Plan)

For effective management of Anzali Wetland, DOE is required to complete environmental zoning in/around Anzali Wetland. Major activities are to fix the boundary of each environmental zone, namely the core zone (conservation sub-zone and wise use sub-zone), buffer zone and transition zone, and to establish the environmental regulations for each zone.

2) Development of Ecotourism (Wetland Ecological Management Plan)

As an initial stage of development of the ecotourism, DOE should act as the center of the ecotourism network involving a variety of stakeholders. Major activities are the

structuring of an ecotourism network, nature interpreter training, preparation of infrastructure for ecotourism, such as a visitor center, access routes, a watching tower, etc.

3) Establishment of Adaptive Management System (Wetland Ecological Management Plan)

It is proposed that an adaptive management, a system where a decision is made based on monitoring data with feedback, be implemented. DOE is therefore required to monitor the ecological dynamics of the wetland, which include a wetland ecological census, annual ecological monitoring program, ecotourism monitoring program, and environmental monitoring by universities.

4) Strengthening of Monitoring Activity for Industrial Effluent by DOE (Wastewater Management Plan)

For the purpose of strengthening of the monitoring system for industrial effluent, DOE is required to construct a new water quality laboratory (under construction), which can analyze heavy metals and increase staff for water quality analysis and inspection of industrial factories.

5) Public Awareness Raising and Participation for Decision Makers (Environmental Education Plan)

To increase the level of environmental awareness and understanding, DOE is required to carry out the activities of public awareness raising and participation for decision makers in Guilan such as training programs and preparation of publications.

6) Establishment of Anzali Wetland Department in DOE Guilan (Institutional Development Plan)

For smooth establishment of Anzali Wetland Conservancy, the executive part of the conservancy could effectively be established as a new "Anzali Wetland Department" of DOE Guilan The task of the new department is to introduce and take forward a new "Anzali Initiative", which would have a strong public awareness focus.

11.2.2 MOJA

(1) Implementation Schedule of Proposed Projects

MOJA shall take responsibility for all projects in the Watershed Management Plan, and some projects in the Wastewater Management Plan, the Environmental Education Plan and the Institutional Plan. The implementation schedule for MOJA/NRGO is shown in Table 11.2.2.

Table 11.2.2 Proposed Implementation Schedule for MOJA

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
WATERSHED MANAGEMENT PLAN																
1. Soil Erosion Control and Prevention of Land Slides																
(1)	Soil erosion control															
1)	Vegetative meausres															
2)	Structure measures															
(2)	Prevention of land slides															
2. Forest and Rangeland Management																
(1)	Pilot activity of participatory resource management															
(2)	Reforestation of degraded forests															
(3)	Reforestation of the margin areas															
(4)	Forest management under forestry plan															
(5)	Conservation of protected forests															
(6)	Rangeland management by graziers															
(7)	Development of regulations necessary for participatory resource management															
(8)	Improvement of livestock resettlement program															
3. Plain Area Management																
(1)	Source-level control of sediment runoff in plain area															
(2)	Measure to control inflow of sediment into the wetland															
(3)	River management for extreme conditions															
4. Livelihood Development																
(1)	Capacity development of NRGO Provincial and Local Offices															
(2)	Livelihood improvement of local people in forest and rangeland management															
5. Environmental Monitoring Plan																
(1)	Monitoring of soil erosion controls															
(2)	Monitoring of land use / vegetation cover															
(3)	Monitoring of rangeland management															
(4)	Monitoring of forest management															
(5)	Monitoring of livestock resettlement program															
5. Institutional Arrangement																
(1)	Coordination among relevant organizations															
(2)	Capacity development for sustainable watershed management															
Livestock Resettlement Program (done by Iranian Government)																
WASTEWATER MANAGEMENT PLAN																
5. Management of Pollution from Farmland																
(1)	Promotion of Low External Input Farming															
1)	Expansion of use of compost such as livestock manure and/or Azolla															
2)	Expansion of integrated pest management through farmer field school															
3)	Promotion of proper farming practice															
ENVIRONMENTAL EDUCATION PLAN																
(4)	Farmers and Rural Communities - Sub-measures 1) - 5)															
	Farmers and Rural Communities - Sub-measures 6)															

DISBURSEMENT SCHEDULE		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
	1) Project Cost	98,847	48,669	132,625	109,458	97,686	44,711	48,010	45,251	33,255	28,652	19,655	8,484	5,790	3,204	2,487	726,785
	2) O&M Cost	845	1,005	1,795	3,305	4,265	5,684	5,560	4,909	4,660	4,272	4,286	4,145	4,117	4,074	4,085	57,006

Source: JICA Study Team

(2) Required Cost for Implementation

MOJA should get budget for the project cost and O&M cost given in Table 12.2.2. Total project cost is 726,900 million Rials and the annual O&M cost ranges between 845 million Rials/year and 5,700 million Rials/year.

(3) Priority Projects

MOJA is required to carry out the following six priority projects.

1) Vegetative Erosion Control Measures (Watershed Management Plan)

For the purpose of the soil erosion control, MOJA (WMD) is required to carry out the vegetative erosion control measures. The main activities to be undertaken are seeding, fertilization, and straw matting in order to rehabilitate the degraded rangelands of about 77 km^2 in six (6) sub-watersheds of the study area.

2) Structural Erosion Control Measures (Watershed Management Plan)

MOJA (WMD) is also required to carry out the structural erosion control measures. The activities are to construct 130 concrete check dams, 2,838 gabion check dams, 920 wooden check dams, and 192 km of contour bunds in the six sub-watersheds in which the degraded rangelands are located.

3) Pilot Activity of Participatory Resource management (Watershed Management Plan)

To implement and demonstrate the participatory forest management, it is proposed to carry out the pilot activity of participatory resource management in the major four (4) townships with the assistance of external experts (NGOs/consultants). The target beneficiaries of the pilot activity are graziers and forest dwellers who ordinarily use the respective pilot sites. The major works of the pilot activity are i) socio-economic survey, ii) organization of beneficiaries, iii) training of graziers, and iv) assistance to graziers in forest management works.

4) Reforestation of the Degraded Forests (Watershed Management Plan)

This aims to restore the degraded forests of about 70 km^2 to enhance the functions of the forest for the wetland. Reforestation works are composed of i) ground surveys, ii) land preparation, iii) planting, iv) maintenance and tending, v) thinning, and vi) protection. Major tree species to be introduced are Oak, Ash, Alder, Acer, Pine, Beach, etc.

5) Livelihood Development (Watershed Management Plan)

Livelihood development aims to enhance NRGO's capability to assist local people in livelihood development. Major activities are to conduct a pilot activity of participatory livelihood development and to train NRGO provincial and local staff.

In the pilot activity, the whole processes of livelihood development from identification to actual implementation will be undertaken together with the graziers. On the other hand, the training will focus on the capacity development of NRGO staff on the participatory livelihood development.

6) Public Awareness Raising and Participation for Farmers and Rural Communities (Environmental Education Plan)

To increase the level of environmental awareness and understanding, MOJA is required to carry out the activities for farmers and rural communities, such as environmental courses for farmers, demonstration farms and pilot organic farming as shown in Table 8.6.1.

11.2.3 GWWC and RWWC

(1) Implementation Schedule of Proposed Projects

GWWC and RWWC shall take responsibility for projects for domestic wastewater treatment in the wastewater management plan. The implementation schedule for GWWC and RWWC is shown in Table 11.2.3.

Table 11.2.3 Proposed Implementation Schedule for GWWC and RWWC

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
WASTEWATER MANAGEMENT PLAN															
1. Management of Domestic Wastewater in Urban Area															
(1) Rasht Sewerage System Development Project															
1) Rasht Sewerage (Phase 1)	■	■	■	■	■										
2) Rasht Sewerage (Phase 2)						■	■	■	■	■	■	■	■	■	■
(2) Anzali Sewerage System Development Project															
1) Anzali Sewerage (Phase 1)	■	■	■	■	■										
2) Anzali Sewerage (Phase 2)						■	■	■	■	■	■	■	■	■	■
(3) Somehsara Sewerage System Development Project	■	■	■	■	■	■	■	■	■	■					
2. Management of Domestic Wastewater in Rural Area															
(1) Community Wastewater Treatment System Development															
1) First Stage (Seven Villages)		■	■	■	■										
2) Second Stage & Third Stage						■	■	■	■	■	■	■	■	■	■

DISBURSEMENT SCHEDULE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1. GWWC																
1) Project Cost	185,178	254,294	292,775	320,315	319,303	100,508	74,979	159,489	167,589	170,559	55,384	55,384	54,454	24,793	24,793	2,259,796
2) O&M Cost	5,441	8,360	11,280	14,199	17,119	22,799	26,396	29,993	33,590	38,522	38,522	38,522	38,522	38,522	38,522	400,303
2. RWWC																
1) Project Cost	0	4,860	4,860	4,860	5,250	3,915	3,915	3,915	3,915	4,170	3,915	3,915	3,915	3,915	4,170	59,490
2) O&M Cost	0	165	165	165	363	528	528	528	528	726	891	891	891	891	1,089	8,349

Source: JICA Study Team

(2) Required Cost for Implementation

GWWC and RWWC should get budget for the project cost and O&M cost given in Table 11.2.3. Regarding to GWWC, total project cost is about 2,260,000 million Rials and the annual O&M cost ranges between 5,400 million Rials/year and 38,500 million Rials/year. Regarding to RWWC, total project cost is 59,500 million Rials and the annual O&M cost ranges between 165 million Rials/year and 1,100 million Rials/year.

(3) Priority Projects

GWWC is required to implement two sewerage development projects as priority projects.

1) Rasht Sewerage Development Project: Phase 1 (Wastewater Management Plan)

For the purpose of pollution load reduction in the biggest city in the study area, it is proposed to develop a sewerage system to treat wastewater from 254,000 residents in Rasht. Some parts of the project are under construction, including construction of WWTP and pump stations with pipe installation. The remaining works include installation of advanced treatment process to WWTP, about 854 km of pipe installation and construction of 15 pump stations. A large part of the remaining works are planned to be carried out by the World Bank Fund.

2) Anzali Sewerage System Development Projects: Phase 1 (Wastewater Management Plan)

For the purpose of pollution load reduction in the second biggest city, it is proposed to develop sewerage system to treat wastewater from 78,000 residents in Anzali. Some parts of the project are under construction, including construction of WWTP and pump stations with pipe installation. The remaining works include installation of advanced treatment process to WWTP, construction of new WWTP with treatment capacity of 14,000 m^3/day, about 400 km of pipe installation and construction of 18 pump stations. A large part of the remaining works in Anzali are also planned to be carried out by the World Bank Fund.

11.2.4 Provincial Government and Municipalities

(1) Implementation Schedule of Proposed Projects

Guilan Provincial government shall take responsibility for one project in the institutional development plan, and the municipalities shall take responsibility for some projects in the solid waste management plan. The implementation schedule for the provincial government and the municipalities is shown in Table 11.2.4.

Table 11.2.4 Proposed Implementation Schedule for Local Governments

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
SOLID WASTE MANAGEMENT PLAN															
1. Municipal Solid Waste Management															
(1) Environmental Awareness Rising															
1) Participatory Recycling Activity															
a) Pilot Activities by Volantary Groups	■	■	■	■	■										
b) Extention of Target Groups						■	■	■	■	■					
c) Full Activity											■	■	■	■	■
(2) Provision of efficient municipal waste collection service to the whole area															
1) Provision of waste collection to villages															
a) Phase 1 (Villages along the rivers)	■	■	■	■	■										
b) Phase 2 (Villages near the Anzali wetland)						■	■	■	■	■					
c) Phase 3 (Villages away from the Anzali wetland)											■	■	■	■	■
2) Change of collection frequency and collection point in urban areas															
1) Trial Operation in selected cities						■	■	■	■	■					
2) Extension of Target cities											■	■	■	■	■
3) Full Operation in selected cities											■	■	■	■	■
(3) Proper disposal of municipal solid waste															
1) Composting of municipal solid waste	■	■	■	■	■										
2) Sanitary landfill construction															
1) Rasht						■	■	■							
2) Anzali						■	■	■							
3) Closure of present open dumping sites									■						
INSTITUTIONAL DEVELOPMENT PLAN															
1. Establishment of Anzali Wetland Conservancy															
(2) Formation of Anzali Sub-Group of WGLEP	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

DISBURSEMENT SCHEDULE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1. Provincial Government																
1) Project Cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2) O&M Cost	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	870
2. Municipalities																
1) Project Cost	32,478	6,764	7,334	7,524	6,384	16,454	5,624	7,904	15,000	6,194	9,804	5,624	6,764	6,764	5,624	146,239
2) O&M Cost	26,007	31,287	31,542	32,698	33,411	36,969	37,508	38,565	38,218	38,840	39,393	39,850	40,630	41,417	41,994	548,329

Source: JICA Study Team

(2) Required Cost for Implementation

The provincial government and the municipalities should prepare the project cost and O&M cost given in Table 11.2.4. Regarding to the provincial government, no project cost is required and the annual O&M cost is 58 million Rials/year. Regarding the municipalities, total project cost is 146,200 million Rials and the annual O&M cost ranges between 26,000 million Rials/year and 42,000 Rials/year.

(3) Priority Projects

The provincial government and the municipalities are required to carry out the following priority projects.

1) Participatory Recycling Activity for Municipal Waste (Solid Waste Management Plan)

To raise public environmental consciousness, it is proposed to encourage people to participate in recycling activities for glass bottles, PET bottles, steel and paper. The activities shall be carried out by joint works between recyclers and local groups, such as communities, schools, private offices and municipal offices. The municipalities are required to promote these activities with NGOs collaboration.

2) Provision of Waste Collection Services to Villages (Solid Waste Management Plan)

In order to start the collection services in the villages it is necessary to procure collection vehicles and establish disposal systems. Approximately 30-40 collection vehicles will be required. It is proposed to jointly use existing disposal facilities with other municipalities from an economical view point.

3) Construction of a Composting Plant in Anzali (Solid Waste Management Plan)

For the purpose of reduction of volume of solid waste in Anzali, Somehsara and Fuman, Anzali municipality is proposed to construct a composting plant. The plant is expected to reduce the amount dumped to the existing dumping sites.

4) Formation of Anzali Sub-Group in the Provincial Thematic Working Group on Land Use, Environment and Population (WGLEP) (Institutional Development Plan)

To facilitate the participation of all relevant stakeholders, the provincial government is required to form an Anzali Sub-Group in WGLEP, which can meet frequently to co-ordinate and integrate the work of the various stakeholders in the Wetland and the watershed.

11.2.5 Other Organizations

(1) Implementation Schedule of Proposed projects

MOIM/IMO and some other organizations such as private companies and hospitals shall take responsibility for some projects in the wastewater management plan and the solid waste management plan. Ministry of Education and some other government and non-government organizations shall take responsibility for projects in the environmental education plan. The implementation schedule for these organizations is shown in Table 11.2.5.

Table 11.2.5 Proposed Implementation Schedule for Others

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
WASTEWATER MANAGEMENT PLAN															
3. Management of Industrial Effluent															
(1) Centralization of Industrial Factories															
(2) Construction of Centralized Wastewater Treatment System															
1) Anzali															
2) Rasht															
3) Others															
SOLID WASTE MANAGEMENT PLAN															
2. Industrial and Medical Solid Waste Management															
(1) Proper treatment of hazardous solid waste															
1) Consyruction of pretreatment facility for solid waste containing heavy metals															
2) Establishment of separation and collection system for infectious waste															
(2) Non-hazardous industrial solid waste management															
1) Promotion of reduction and recycling of industrial solid waste															
ENVIRONMENTAL EDUCATION PLAN															
1. Environmental Education															
(1) Environmental Education in Schools - Sub-measures 1) - 5)															
Environmental Education in Schools - Sub-measures 6) - 7)															
(2) Environmental Education in Higher Education. - Sub-measures 1) - 3)															
Environmental Education in Higher Education - Sub-measures 4)															
Environmental Education in Higher Education - Sub-measures 5)															
2. Public Awareness Raising and Participation															
(2) Religious Leaders - Sub-measures 1)															
Religious Leaders - Sub-measures 2) and 3)															
(6) NGOs and Journalists - Sub-measures 1) - 4)															

DISBURSEMENT SCHEDULE	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1) Project Cost	266	266	266	37,766	30,266	16,587	17,750	0	0	0	5,987	5,400	5,400	5,400	5,400	130,755
2) O&M Cost	1,329	1,379	1,414	2,258	2,358	2,280	2,752	2,129	2,607	2,285	2,431	3,174	2,756	2,698	2,861	34,708

Source: JICA Study Team

(2) Required Cost for Implementation

Other organizations should get budget for the project cost and O&M cost given in Table 11.2.5. Total project cost is 131,000 million Rials and the annual O&M cost ranges between 1,300 Rials/year and 2,900 Rials/year.

(3) Priority Projects to be carried out by Other Organizations

Ministry of Education, IMO, MOH and Rasht Industrial City Company are required to carry out the following projects as priority projects.

1) Centralized Wastewater Treatment in Rasht Industrial Cities (Wastewater Management Plan)

For effective wastewater treatment of industrial effluent in the biggest industrial city in the study area, construction of a wastewater treatment plant with a treatment capacity of 14,000 m^3/day is proposed. Basically, Rasht Industrial City Company shall construct it out of its own funds.

2) Environmental Education in School (Environmental Education Plan)

To increase the level of environmental awareness, activities relating to environmental education in schools are proposed under the responsibility of Ministry of Education. The environmental education in schools consists of seven activities as shown in Table 8.6.1.

3) Pre-treatment facility for solid waste containing heavy metals (Solid Waste Management)

For proper treatment of hazardous waste before land filling, a pre-treatment to mix with concrete cement is proposed. IMO/private companies are required to construct the pre-treatment facility with a total capacity of 104 kg/day.

4) Establishment of separation and collection systems for infectious waste (Solid Waste Management)

For safety treatment of the infectious medical waste, hospitals/MOH are required to establish a system to separate the infectious waste at the hospitals and collect them from hospitals. Separated waste will be sent to an incinerator.

CHAPTER 12 CAPACITY DEVELOPMENT

12.1 Introduction

12.1.1 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

12.1.2 Approaches

Figure 12.1.1 schematically shows the approaches to capacity development taken in this study.

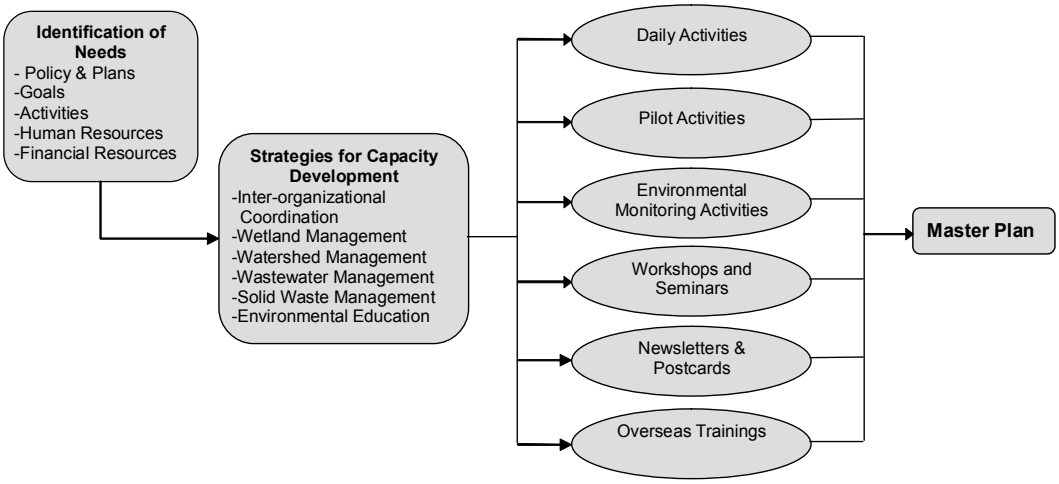


Figure 12.1.1 Approaches of Capacity Development Activities

The capacity development activities were implemented through six types of activities as explained in Table 12.1.1.

Table 12.1.1 Methods of Capacity Development Activities

Method	Summary
Daily Activities	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	These are small demonstration activities jointly implemented by the stakeholders, such as NGOs, contractors, government officials, and the JICA Study Team. Overall 11 pilot activities were carried out during the course of the study.
Environmental Monitoring Activities	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	In total, 7 workshops and 3 seminars were carried out in order to disseminate relevant information, such as the progress of the study, environmental management in other countries, etc. The workshops were also used to exchange opinions with stakeholders.
Newsletters and Post Cards	In total, 5 newsletters and 3 post cards were issued by the JICA Study Team to keep stakeholders informed, and to raise environmental awareness.
Overseas Trainings	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.

12.2 Daily Activities

Many capacity development activities were carried out daily through various joint activities, such as field surveys, data analysis, various meetings and joint development of the master plan. In this section, those that best illustrate the capacity development activities through daily activities are presented.

12.2.1 Development of Coordination Mechanisms

Many organizations are involved in environmental management activities in the Anzali Wetland and its watershed, as summarized in Table 12.2.1.

Table 12.2.1 Selected Organizations Involved in Environmental Management

Category	Organization	Major Responsibilities
Wetland Management	DOE	Management of protected area
	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 started in May, 2003, there was no organization or mechanism that could coordinate these organizations concerned. This was a major concern for the study that aimed to develop an integrated, multi-disciplinary master plan. Thus, the first step in development of the master plan was to establish coordination mechanisms. For this, the Iranian side organized the national steering committee meetings (in total 4 times), the local steering committee meetings (in total 12 times), and the technical committee meeting (one time).

As the study progressed, a decision-making body with sufficient authority became necessary to decide how to implement various plans proposed in the master plan. In particular, the establishment of the Anzali Conservancy (see Institutional Plan) was put forward to the first meeting of the Provincial Thematic Working Group on Land use, Environment and Population (WGLEP) in June, 2004. This working group is chaired by the provincial governor, and is the place to discuss such inter-organizational matters at the provincial level, though it had not met before. This event was a milestone toward integrated environmental management at the provincial level envisioned in this study.

At the end of 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 4th 5-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.

12.2.2 Involvement of Local Stakeholders

In additions to the various organizations mentioned above, the study involved NGOs, city council members, farmers, graziers, religious leaders, and other less organized stakeholders. It was not simple to coordinate such a wide range of stakeholders representing different interests. Thus, the study took a number of different approaches to gather opinions from stakeholders, such as, mass meetings, stakeholder meetings targeted to specific stakeholders, questionnaire surveys and workshops.

A stakeholder meeting on Aug.4, 2003. City council members, NGOs, local researchers, and other 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 12.2.1 Examples of Stakeholder Meetings

12.2.3 Participatory Study on Livelihood Development of Graziers

Overgrazing is the main cause of erosion in the watershed of the Anzali Wetland. However, the existing management of grazing activities in the rangelands and forests is mainly based on regulatory measures, such as licensing, and has not been able to deal with poverty and the related complex socio-economic issues of graziers that are behind the overgrazing problem. Thus, the study introduced a participatory planning method. In the pilot study implemented in summer 2004, a number of participatory rural appraisal (PRA) sessions were organized, and graziers analyzed their socio-economic issues, and considered various alternative livelihoods that may be introduced to ease the overgrazing problems.

A joint meeting of an NGO, NRGO and MOJA to plan the survey

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

Figure 12.2.2 Participatory Livelihood Development Planning

12.2.4 Environmental Surveys

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 12.2.2 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 the socio-economic conditions of stakeholders.
Institutional Survey	An interview survey of 22 organizations involved in environmental management of the Anzali Wetland and its watershed.

12.2.5 Analysis of Degradation Mechanisms of the Anzali Wetland and Its Watershed

The study team and the Iranian experts analyzed the degradation mechanisms of the Anzali Wetland and its watershed. Among the main topics were:

- Generation and inflow of pollution loads from point and diffuse pollution sources to the wetland
- Generation and transport of sediment from mountains to the wetland and the Caspian Sea
- Mechanisms of land slides and slope collapses in the mountains
- Deposition of sediment in the Anzali Wetland
- Flow of solid waste in the study area
- Ecological impacts of inflow of pollutants, sediments and solid waste

12.2.6 Joint Development of the Master Plan

The review of existing environmental management revealed that there were many plans (e.g., GWWC's plan to develop sewerage systems, Guilan University's wetland management study, and NRGO's plan for forest management). However, many of them had been developed independently, and there was no coordination among the various plans. Thus, the study organized numerous thematic meetings, such as meetings on wetland management, water quality, solid waste management, zoning in and around the wetland, agriculture, erosion control, etc. Then, the components of the master plan were developed jointly by the JICA Study Team and relevant stakeholders.

12.3 Pilot Activities

12.3.1 Objectives

During the initial phase of the Study, the JICA Study Team reviewed the current environmental management activities in Guilan, and identified a number of promising environmental measures that could be implemented with the current capacities of the Iranian organizations. Some of such promising environmental measures were implemented as pilot activities in order to:

- evaluate the effectiveness of promising environmental measures through trial implementations,
- gain real-life experience required to upscale such activities in the future,
- promote environmental education and public awareness of the Anzali Wetland conservation
- promote public participation in the conservation of the Anzali Wetland,
- promote coordination among various stakeholders, and
- incorporate the experiences of the pilot activities into the environmental master plan, and improve the effectiveness of the master plan.

12.3.2 Selection of Pilot Activities

In order to design effective pilot activities, many discussions with local stakeholders were carried out in June-August 2003, and the following 11 activities were selected at the 3rd local steering committee meeting held on August 10, 2003 and the first technical committee meeting held on August 19, 2003.

- Eco-tourism
- Wetland Education Program
- Beneficial Use of Azolla as Fertilizer
- Erosion Control
- Community Wastewater Treatment System Development
- Research on Water Purification Capacity of Reed Bed
- Pilot Activity for Livestock Wastewater Treatment Facility
- Waste Drop-off Centers
- Community-based Recycling
- States of the Environment Report
- Website Development

12.3.3 Ecotourism

(1) Objective

The main objectives of this activity were to

- develop a trial program for ecotours,
- confirm the feasibility of ecotourism, and
- establish a trial ecotourism network.

(2) Activity

1) Planning of the Ecotour Program

In the beginning of the planning session, ecotourism resources were arranged on the map of the wetland. Then, the following trial ecotour program was planned by a nature interpreter in association with JICA Study Team.

<u>Ecotour program</u>

1. 8:00 Meeting in Rasht
2. 8:15 – 9:00 Moving to Selkeh (Guard station)
3. 9:00 – 10:00 Educational activities
   (1) Explanation of program
   (2) Explanation of wetland
   (3) Explanation of wildlife (birds, fish and plants)
   (4) Bird watching
   (5) Quiz competition and Tea break

4. 10:00 – 12:00 Site Seeing and Fishing
   Selkeh – Fishing point – Lotus community in Sorkhankol – Siahkesim – Lagoon – Anzali port
5. 12:00 – 13:00 Lunch (Restaurant in Anzali)
6. 13:30 – 14:00 Ending activities
   (1) Questionnaire and discussion
   (2) Prize for winner of quiz competition
7. 14:00 – 14:45 Moving to Rasht

2) Establishment of Trial Ecotourism Network

A meeting on the development of ecotourism was held. The JICA Study Team presented the importance of the establishment of an ecotourism network. The participants, especially CHTO, are interested in the development of ecotourism. They reached an agreement to construct a trial ecotourism network for this pilot activity and implement it jointly.

3) Nature Interpreter Training

Two nature interpreters were trained. Training was implemented through the ecotourism activities such as preparation of the ecotourism handbook for the guide and the textbook for participants, planning of ecotour, management of ecotour, and practice of interpretation in the field.

4) Installation of Signboards

Twenty signboards were installed in the wetland. Eight signboards were prepared to give basic information for the tourists. Twelve signboards were prepared for environmental education.

Figure 12.3.1 Signboard for Ecotourism Activity

5) Implementation of Ecotours

The ecotours were carried out as shown in Table 12.3.1. Stakeholders such as CHTO, travel agencies, DOE, fishermen and restaurant joined.

Table 12.3.1 Implementation of Ecotour

Ecotour	Date	Participants
First ecotours	February 6, 2004	Guidance school and high school students
	February 7, 2004	People in Rasht
	February 8, 2004	People in Rasht
	February 9, 2004	DOE staff
	February 13, 2004	Teachers
Second ecotours	September 27, 2004	Travel agency owners
	September 28, 2004	Teachers
	September 29, 2004	University students
	September 30, 2004	NGOs
	October 1, 2004	Guidance school students

A trial eco-tour in February

Group picture

Figure 12.3.2 Photographs of Ecotourism Activities

(3) Final Evaluation

A questionnaire was written and collected at the end of the ecotour everyday. Results of the questionnaire for the second ecotour were evaluated. (There is no result from NGOs.) Overall, the activity went well, and most participants in the trial ecotours had a positive impression. Figure 12.3.3 shows participants satisfaction. No.1 is not at all satisfied and 5 is completely satisfied.

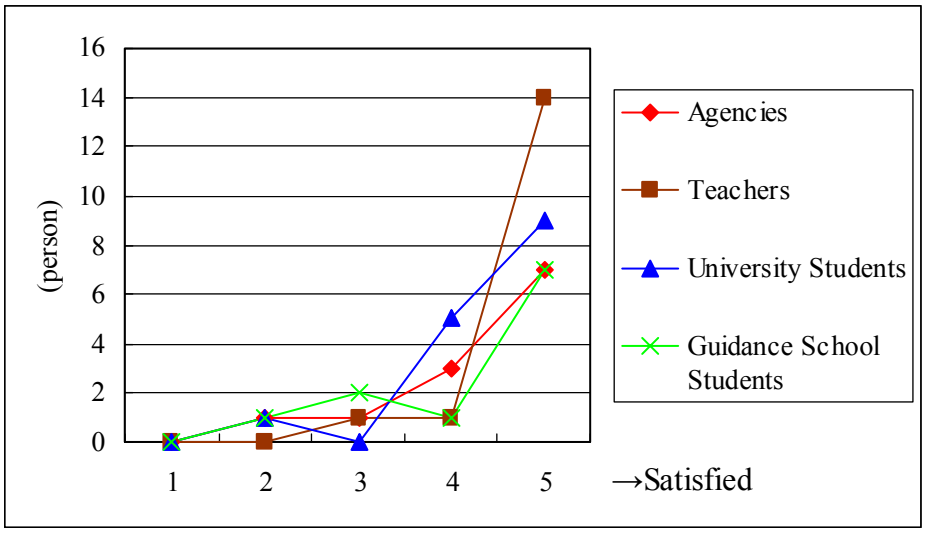


Figure 12.3.3 Satisfaction of the Participants

Desirable activities for the ecotours were chosen from fishing, kayaking, hunting and water skiing (multiple answers were possible.).

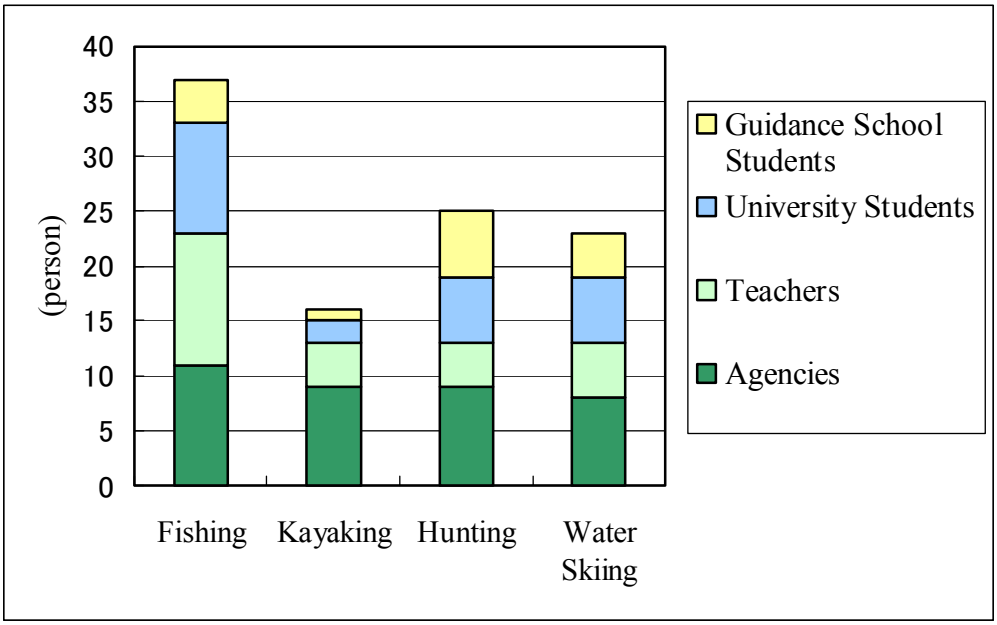


Figure 12.3.4 Desirable Activity

As for the feasibility of ecotourism in the Anzali Wetland, willingness to pay was asked. The average willingness to pay of each group is shown in Figure 12.3.5. Agencies indicated that they willing to pay about 70,000 Rials, but another group answered less than 50,000 Rials. The tour fee is approximately estimated by the implementation of ecotours, and it is about 200,000 Rials/person. Willingness-to-pay is much smaller than the proposed tour fee. In order to make the ecotourism feasible, the tour fee has to be reduced.

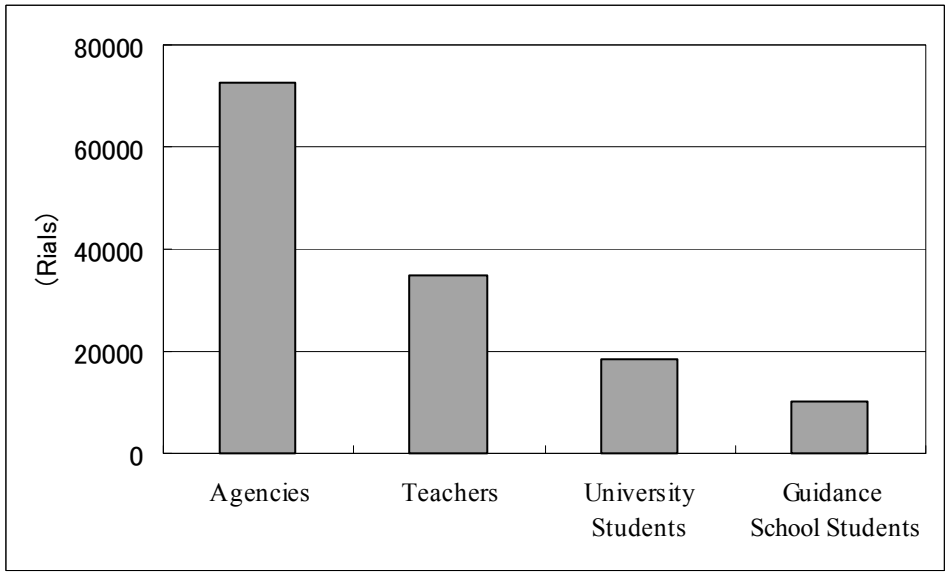


Figure 12.3.5 Willingness-to-Pay for the Ecotour

(4) Sustainability

Stakeholders are interested in the development of ecotourism, and almost all the participants of the ecotours answered that they would like to participate in the ecotour again. This means that ecotourism has potential in the Anzali Wetland. However there is a significant difference between the participants' willingness to pay and actual cost. In order to solve the problem, the following action should be taken.

- Preparation of attractive facilities
- Preparation of attractive programs
- Dissemination of the value of ecotourism
- Cost reduction

Attractive facilities and programs make people willing to pay higher fees. It takes time so that people understand the value of those attractive facilities and programs. Cost reduction is important to let the people participate and find the value, especially at the first stage. Furthermore there are the people who visit Anzali seaside from Tehran. Many of them can afford to pay the appropriate ecotourism fee. The people should be invited to the ecotours to secure the sustainability of ecotourism.

12.3.4 Wetland Education Program

(1) Objectives

The objectives of the Wetland Education Program were to:

- Create excitement and enthusiasm amongst children and young people for the natural environment,
- Develop awareness, knowledge and understanding of wetland ecology in Anzali in children and young people,
- Build the capacity of children and young people to apply this understanding through practical conservation activities and behavioral changes, and
- Provide a facility for raising public awareness of the wetland.

(2) Activities

1) Construction of Wetland Education Center and Related Facilities

At the heart of the Wetland Education Program was the construction of Iran's first Wetland Education Center, which finally opened in October, 2004 after a long delay due to a problem in deciding the location for the center. The Center is located on the southern edge of the Selkeh Wildlife Refuge, and consists of a small classroom which can hold a class of 35 students, an office and a kitchen area. The Center will be used as a base for education programs for teachers and school students, and also as a base for ecotourist activities for the general public.

The Wetland Education Center constructed in the Selkeh Wildlife Refuge.

The boardwalk and the bird hide.

Figure 12.3.6 Wetland Education Center and Related Facilities

In addition to the Wetland Education Center, the following facilities have been constructed near the Center.

- A one kilometer education trail with twelve A3 sized education signs.
- A 6.4 meter high observation tower
- A short boardwalk into the wetland
- A bird watching hide

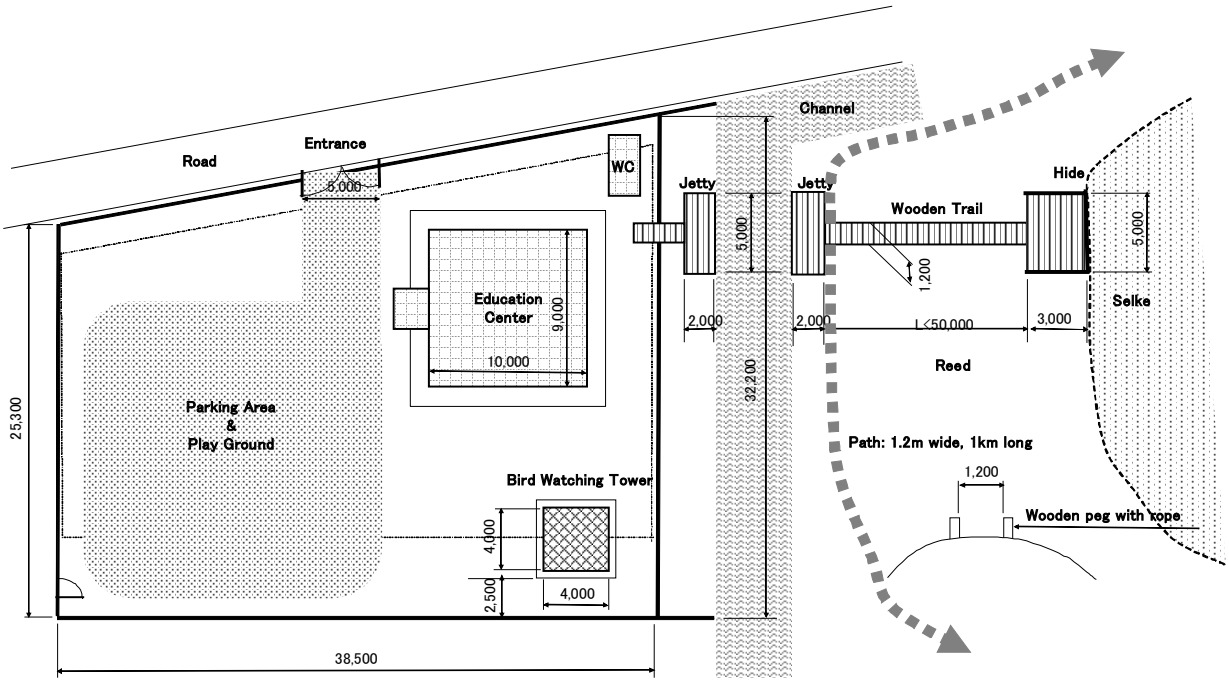


Figure 12.3.7 Layout of Environmental Education Facilities

2) Development of Educational Materials

Five hundred copies of an identification key for wetland birds and seven hundred and fifty copies of an A1 sized poster entitled "Anzali Wetland" have been produced and distributed to schools around the Anzali wetland by the Ministry of Education.

3) Teacher Training Program and School Students Program

A one day training course about the wetlands for teachers has been developed. This course was piloted at the Guard Station at Selkeh by 15 teachers who attended the workshop. In addition, two one day workshops were held at the DOE in Rasht to introduce teachers to environmental education and student centered learning. Visits were also made to three schools - an Elementary School for Girls, a boys' Guidance School and a High School for girls. The teacher participants gave very positive feedback to the Wetland Education Program. All the teachers said that they would be able to use the student centered environmental education methods in their classroom teaching and that they could bring students to the Center.

A one day course about the wetland for students has been developed. This course was piloted with two groups of students – one from a Guidance School and one from a High School with both groups visiting Selkeh and being taught from the Guard

station and outside in the Wetland. All the students said that they had enjoyed learning about the wetlands, and especially liked the web of life and camouflage games.

Identifying bird species in the field

Learning the importance of the ecosystem

Figure 12.3.8 Photographs of Environmental Education Activities

(3) Final Evaluation

As the construction of the center and related facilities were delayed due to the problems in choosing a site, it has not been possible to run activities based at the actual center and test out all the components of the program. Overall, however, the participants in the trial programs gave very positive feedback and the wetland education program is believed to have high sustainability as long as the following two critical issues for the future are looked after:

- The management of the Wetland Education Program
- Ensuring the use of the Center.

In order to ensure the sustainability of the wetland education program, a wetland expert team and wetland education center advisory groups have been organized, and the DOE has already promised to delegate a few staff for the management of the center. Further training of the center manager and his team is strongly recommended.

12.3.5 Beneficial Use of *Azolla* as Fertilizer

(1) Objective

Azolla is an invasive alien plant species that has spread all over the wetland. It is a major ecological problem in the wetland. On the other hand, Azolla associates with N-fixing blue-green algae and contains rich nutrients. In this activity, the potential of *Azolla* compost as fertilizer in rice cultivation was tested. If *Azolla* compost is proved to be a good fertilizer, a large-scale program to use the *Azolla* from the wetland in agriculture can be developed.

(2) Activity

1) Gathering and Composting

The *Azolla* was gathered from the wetland and carried into the Rice Research Institute of Iran (RRII) in December, 2003. 2903.5 kg of *Azolla* was mixed with 349.3 kg of rice straw*. The mixture of *Azolla* and rice straw were 50:50 by volume. The mixture was spread to make *Azolla* compost in the storehouse of RRII. The mixture was scattered for aeration. Watering and stirring were conducted twice per week.

Azolla carried into storehouse

Composting *Azolla*

Figure 12.3.9 Photographs of Compost of *Azolla*

2) Spreading

75 kg of paddy (Hasemi: local rice variety) was put in the nursery land in April. Then plowing of experimental land and creating boundaries between plots were implemented. Nine deferent experimental treatments were applied to three plots each for a total of 27 plots and each plot was 8m x 19m in the experimental land. Weighted compost was spread in each plot, and a certain amount of chemical fertilizer was also applied as shown in Table 12.3.2. Three bottles (0.5 liters each bottle) of herbicide (Saturn or Bentiocarb) were also applied on all plots.

Table 12.3.2 Treatment Area and Amounts of Chemical Fertilizer and Compost of Wet *Azolla*

Treatment	Plot area (m^2)	Compost (kg)	Fresh Azolla (kg)	Nitrogen (kg)	Phosphorus (kg)	Potassium (kg)
T1= Control= no fertilizer, no compost, no Azolla	152	0	0	0	0	0
T2= Chemical fertilizer (N. P. K.)	152	0	0	2	1	1
T3= Compost	152	47	0	0	0	0
T4= Compost	152	76	0	0	0	0
T5= Compost + Chemical fertilizer (N.)	152	76	0	2	0	0
T6= Compost + Chemical fertilizer (N. P. K.)	152	76	0	2	1	1
T7= Compost	152	107	0	0	0	0
T8= Compost	152	183	0	0	0	0
T9= Wet Azolla	152	0	92	0	0	0

Source: JICA Study Team (2004)

3) Cultivation

Five days after the application of herbicide in May, young rice plants were transplanted into the experimental land. Then, irrigation, pest control, weeding and observing conditions were implemented for the cultivation of rice.

4) Harvesting

The rice of each plot was harvested separately and weighted in September.

5) Analysis

Analysis was implemented as follows.

- Compost sample in the beginning and end of the process for determining contents of N.P.K., %O.C, electric conductivity, pH.
- Soil sample for determining contents of N.P.K., %O.C, electric conductivity, pH, CEC, texture, pb- pp and calculating of some properties.

(3) Final Evaluation

The composting of a mixture of *Azolla* and rice straw went well. Makeup of the compost was analyzed as shown in Table 12.3.3.

Table 12.3.3 Analysis of Compost

Item	Sample	pH of Paste	% O.C	10^3 × EC	Total.N %	Total.P %	Total.K %
Compost (Initial)	1	-	44.8	-	2.370	0.22	2.19
	2	-	43.3	-	2.370	0.27	2.19
	3	-	45.6	-	2.370	0.22	2.02
Compost (Final)	1	6.4	37.83	21.58	2.662	0.18	2.47
	2	6.8	30.53	18.26	3.127	0.21	2.35
	3	6.6	29.96	18.26	2.734	0.20	2.45

Source: JICA Study Team (2004)

Potential of *Azolla* as a fertilizer is described in terms of the grain yield. The result of grain yield is shown in Figure 12.3.10. Grain yield of T1 (control) was about 3,000 kg/ha. T3 (3 ton/ha of compost) and T9 (6 ton/ha of fresh *Azolla*) were lower, and the plots receiving other treatments were higher. Highest grain yield was T5 (compost and nitrogen) at about 4,000 kg/ha. Normal treatment with chemical fertilizer (T3) produced about 3,500 kg/ha. Since the treatment with compost produced about 3,350 kg/ha, differences of grain yields between chemical fertilizer and compost were small. As for the compost application, T3 (3 ton/ha of compost) showed a low yield, while T4 (5 ton/ha), T7 (7 ton/ha), T8 (12 ton/ha) are almost the same. The result shows that 5 ton/ha of compost is enough.

Treatment with compost and chemical fertilizer produced a high yield in one test (T5) and a low yield in another (T6). The reason is not identified, and the combination of compost and chemical fertilizer had better be investigated in detail. However it was confirmed that the application of more than 5 ton/ha of compost is as effective as the application of chemical fertilizer.

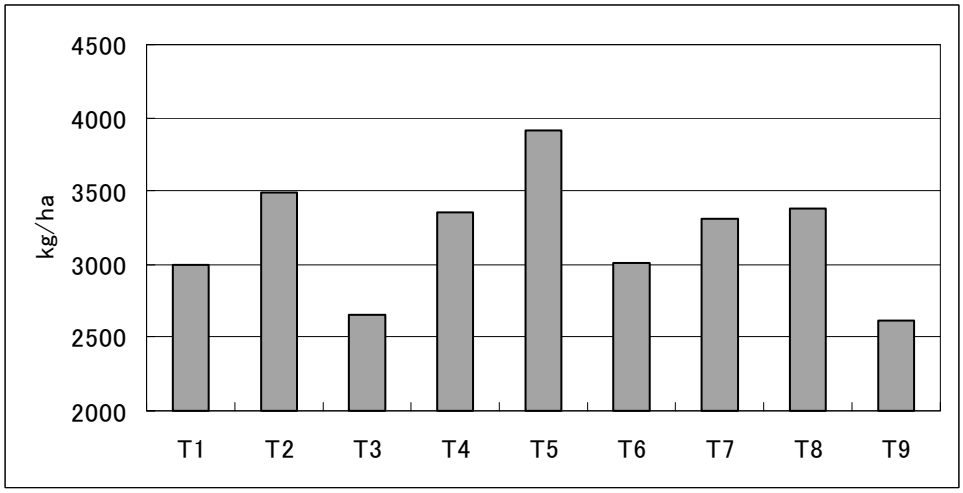


Figure 12.3.10 Mean Grain Yield of Each Treatment

(4) Sustainability

The potential of *Azolla* as a fertilizer was confirmed as it is effective. Farmers from Somehsara visited the experimental field in RRII, and their reaction was very positive. *Azolla* fertilizer can be promoted among local farmers through the extension services of MOJA. The difficulty of the promotion is the composting activity. It takes a long time and has a significant cost. Gathering of *Azolla* is heavy labor and not practical for farmers. One of the solutions is to use the *Azolla* that is planed for removal in the master plan (see part 3). Removed *Azolla* should be distributed to the farmers in the vicinity of the wetland (buffer zone) to make the compost. Application of compost in the buffer zone corresponds to the wetland ecological management plan. MOJA and DOE should discuss and collaborate to promote this activity and to make it sustainable.

Figure 12.3.11 Evaluation of Effectiveness of *Azolla* Fertilizer in Rice Production

12.3.6 Erosion Control

(1) Objective

The objective of this activity was to demonstrate the effectiveness of fencing, seeding, straw matting, check dams, and reforestation to reduce erosion from the mountain areas, and thus reduce sediment load to the Anzali Wetland.

(2) Activities

There are two types of erosion-related problems in the mountain areas of the watershed. The first type is erosion in the rangelands, which is triggered by overgrazing. The other is illegal felling of trees. Considering these problems, two pilot activity sites were selected in the Masulehroudkhan basin after a series of discussions with MOJA, NRGO and other stakeholders.

1) Erosion Control by Gabion Check Dams, Straw Mats and Fencing

The effectiveness of erosion control technologies was tested in an on site test (300 m x 200 m) that had been severely damaged by a gully in the upper Masulehroudkhan

basin. The selected technologies were (i) fencing to keep off livestock, (ii) seeding with grass seed to speed up vegetation recovery, (iii) straw matting to protect the area from sheet erosion, and (iv) gabion check dams to prevent progression of the gully erosion.

Straw matting to control erosion in Upper Masuleh

Construction of a gabion check dam

Figure 12.3.12 Erosion Control Activities in Upper Masuleh Watershed

2) Tree Planting

In total 110 ha in Masuleh town were planted by the joint efforts of this study (10 ha) and NRGO Guilan (100 ha), and 3 signboards explaining the activity were erected in the upper slope of Masuleh town. All seedlings were provided by NRGO. The tree planting was entrusted to a local contractor.

Tree planting in Masuleh Town

A planted seedling

Figure 12.3.13 Tree Planting Activities in Masuleh Town

3) Tree-Planting Ceremonies

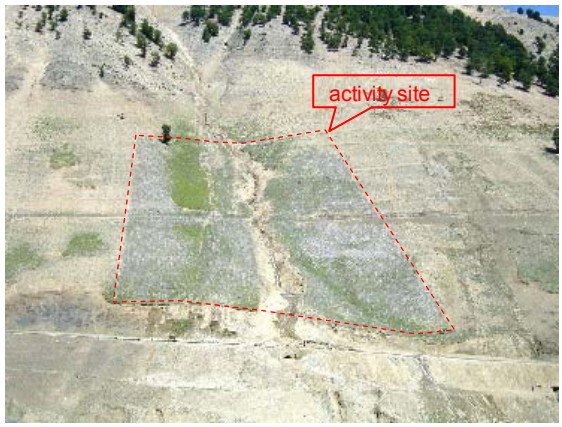
In order to promote the environmental awareness of the local residents, tree planting ceremonies were organized on September 6 and 7, 2004. Despite rainy weather,

about 110 graziers, local residents and other stakeholders participated in the ceremonies. A pamphlet explaining the problems of erosion was distributed, and the importance of watershed protection was discussed.

(3) Final Evaluation

It is still premature to evaluate the technical effectiveness of the erosion control measures, as it takes a long time, years or even decades, before the benefits of the erosion control measures and reforestation become apparent. However, as is evident from the following photographs, the recovery of vegetation at the pilot activity sites is taking place.

The site in May, 2004 before the implementation of measures.



The same site in September, 2004 after the implementation of the measures. The difference in vegetation cover in the activity site and outside is visible.

Figure 12.3.14 Vegetation Recovery at the Upper Masuleh Activity Site

The tree planting site before fencing/tree planting in Dec. 2003

The same site after fencing/tree planting in May, 2004. The recovery of vegetation was attributed to the fencing.

Figure 12.3.15 Recovery of Vegetation at the Tree Planting Site in Masuleh Town

Encouraged by the success of the pilot activities, the Masuleh town government reforested areas adjacent to the pilot activity site, and MOJA is constructing two gabion check dams at the upper Masuleh site to reinforce the check dams constructed in this activity. These are clearly signs that the activities are indeed sustainable, and readily expanded to other areas.

Based on these experiences, the most important factor determining the success of erosion control activities was the cooperation and participation of local residents, in particular, graziers. If graziers do not see the point in rehabilitating the rangelands, or if they had no option but let their livestock overgraze the rangelands to make living, the activity will fail. In order to gain the support of the graziers, it is recommended to involve graziers in such activities from the planning stage. They may be trained and employed in erosion control projects so the graziers learn how to protect the rangeland from erosion, and also become less reliant on grazing activities. These are elaborated in the Watershed Management Plan.

12.3.7 Community Wastewater Treatment System Development

(1) Introduction

For conservation of the Anzali Wetland, suitable wastewater treatment is required for residents in the basin of the wetland. However, small communities can hardly have an expensive treatment facility, because of financial reasons. The JICA Study Team therefore proposes a pilot activity on a low cost wastewater treatment system, which is called a community wastewater treatment system. The objectives of the works are to (i) study suitable treatment methods for a community wastewater treatment system, (ii) confirm the technical applicability of the proposed treatment system and (iii) raise public awareness about the necessity for wastewater treatment for conservation of the Anzali Wetland.

(2) Principal Feature of Community Wastewater Treatment Facility

The system layout of the proposed wastewater treatment system is as shown in Figure 12.3.16. The technical specification is described in the Supporting Report. The location of the activity is near Modaress Street in Masal Municipality.

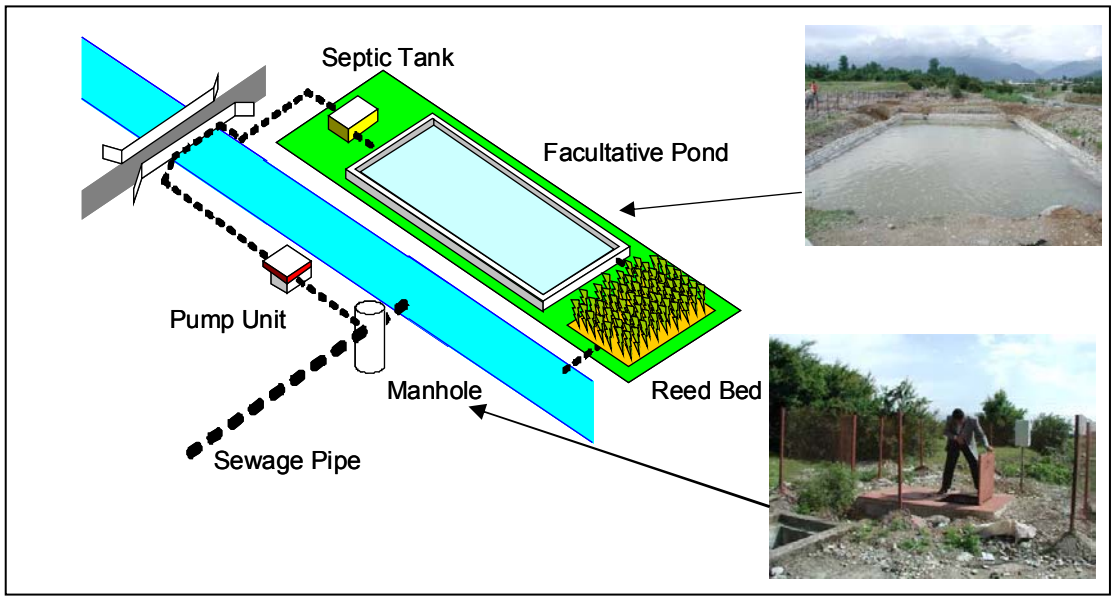


Figure 12.3.16 Outline of Community Wastewater Treatment System at the Site

(2) Progress of Activities

1) Study and Design

The community wastewater treatment system should satisfy the following criteria: (i) low construction cost, (ii) easy maintenance, and (iii) reasonable treatment level. The following three alternatives were discussed from a technical view point and cost effectiveness. A number of meetings have been held with DOE, GWWC and RWWC.

Alternative-1: "Septic Tank" + "Facultative Pond"
Alternative-2: "Imhoff type Septic Tank" + "Sand Filter"
Alternative-3: "Septic Tank" + "Reed Bed"
Alternative-4: "Septic Tank" + "Facultative Pond" + "Reed Bed"

Alternative-4 was proposed, because it was the most effective treatment process, even though the construction cost was little bit more expensive compared with the others. Detailed design of the wastewater treatment system has been carried out by a local contractor under supervision of the Iranian counterparts and the JICA Study Team.

2) Construction

Construction of the wastewater treatment system was carried out between February and April, 2004 under the supervision of the JICA Study Team. In order to prevent leakage from the facultative pond, a plastic sheet was installed over all the facultative pond in July 2003.

Figure 12.3.17 Construction of Community Wastewater Treatment System

3) Operation & Monitoring

After completion of the project, the operation of the system was commenced in May 2004. For monitoring the effectiveness of the operation, water sampling and analyzes were carried out on the 2nd and the 25th of August and the 25th of September 2004. The results of the water quality analysis are as shown in Figure 12.3.18.

(4) Final Evaluation

1) Participation and Commitment

The main stakeholders involved in this pilot activity were DOE, GWWC, RWWC and Municipalities staff. They jointed many discussions on the suitable type of wastewater treatment and selection of the activity site. Masal municipality provided the site for the activity and electric power supply for the pump for the system. GWWC attached maintenance staff for the system.

2) Technical Effectiveness

Figure 12.3.18 shows the reduction of the pollutants BOD, COD, T-N and T-P through the treatment process. The proposed wastewater treatment system is proved to be effective to reduce water pollution load. The effluent waster quality satisfies the effluent standard.

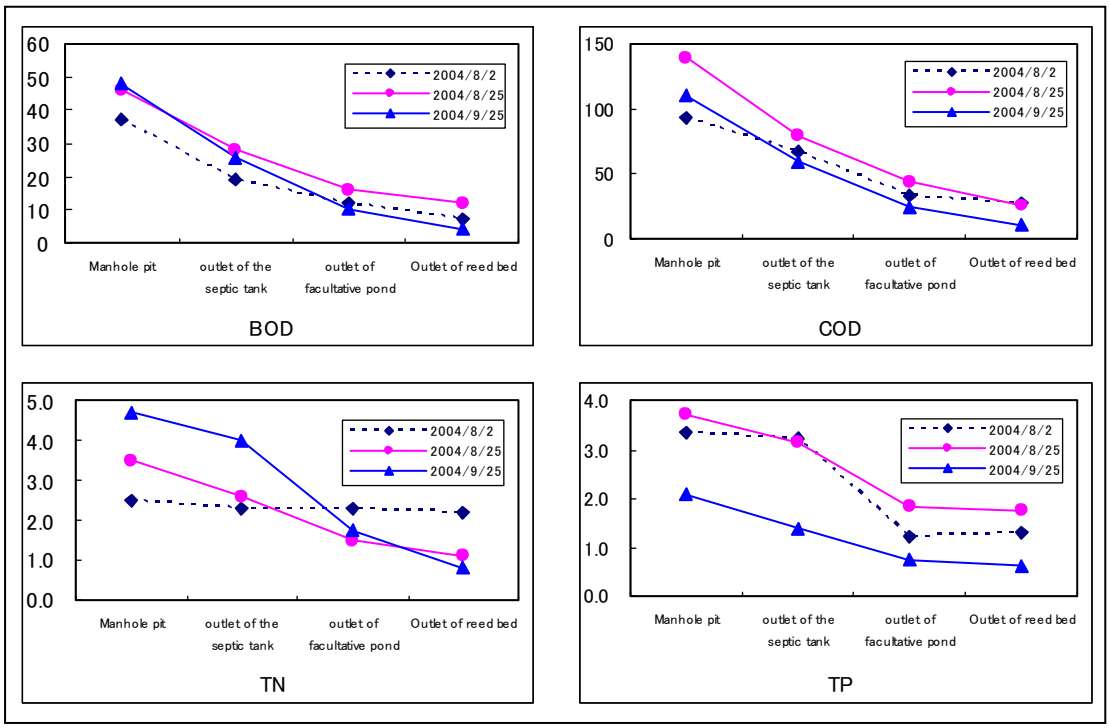


Figure 12.3.18 Water Quality Record in the Treatment Process

As shown Figure 12.3.19, large amount of algae have been growing in the facultative pond. The algae is removed by man power using net at present because the algae include large amount of organic and nutrient matters. More effective measures for removal of algae shall be considered.

Figure 12.3.19 Large Amount of Algae

3) Educational Benefit

Through the discussions for selection of the suitable wastewater treatment process, the stakeholders learned a lot about technical issues on treatment process. After commencement of the operation, a number of staff in DOE, GWWC, RWWC and Masal Municipality visited the site to see the actual structure and operation of the community wastewater treatment system. The staff of GWWC, Gilan will have experience to operate the treatment facility.

For the purpose of public awareness for the community people on the necessity of wastewater treatment, a signboard is installed as shown in Figure 12.3.20.

Figure 12.3.20 Signboard for Community Wastewater Treatment System

4) Sustainability

RWWC has a plan for installation of community wastewater treatment system in seven villages in the basin of the wetland. The sustainability is dependent on continuous investment and suitable operation of the treatment system. The experience gained in the activity are expected to contribute to sustainable operation of new community wastewater treatment systems and suitable operation will boost more investments for installation of the treatment systems.

12.3.8 Research on Water Purification Capacity of Reed Bed

(1) Objectives

It is believed that the macrophytes contribute to water quality purification in the Anzali Wetland. However, the function of macrophytes has not been evaluated quantitatively in the Anzali Wetland. Research work on the water purification capacity of constructed wetland was therefore proposed for the pilot activity. In addition to the research work, the reed bed will be used for environmental education for visitors to the Environmental Education Center constructed under the Wetland Education Program.

(2) Principal Feature of Reed Bed

The structure was constructed 200 m from the DOE Selke Guard Station on the environmental walk path constructed under the Environmental Education Program. The proposed layout is as shown in Figure 12.3.21. The specification of the reed bed is described in the Supporting Report.

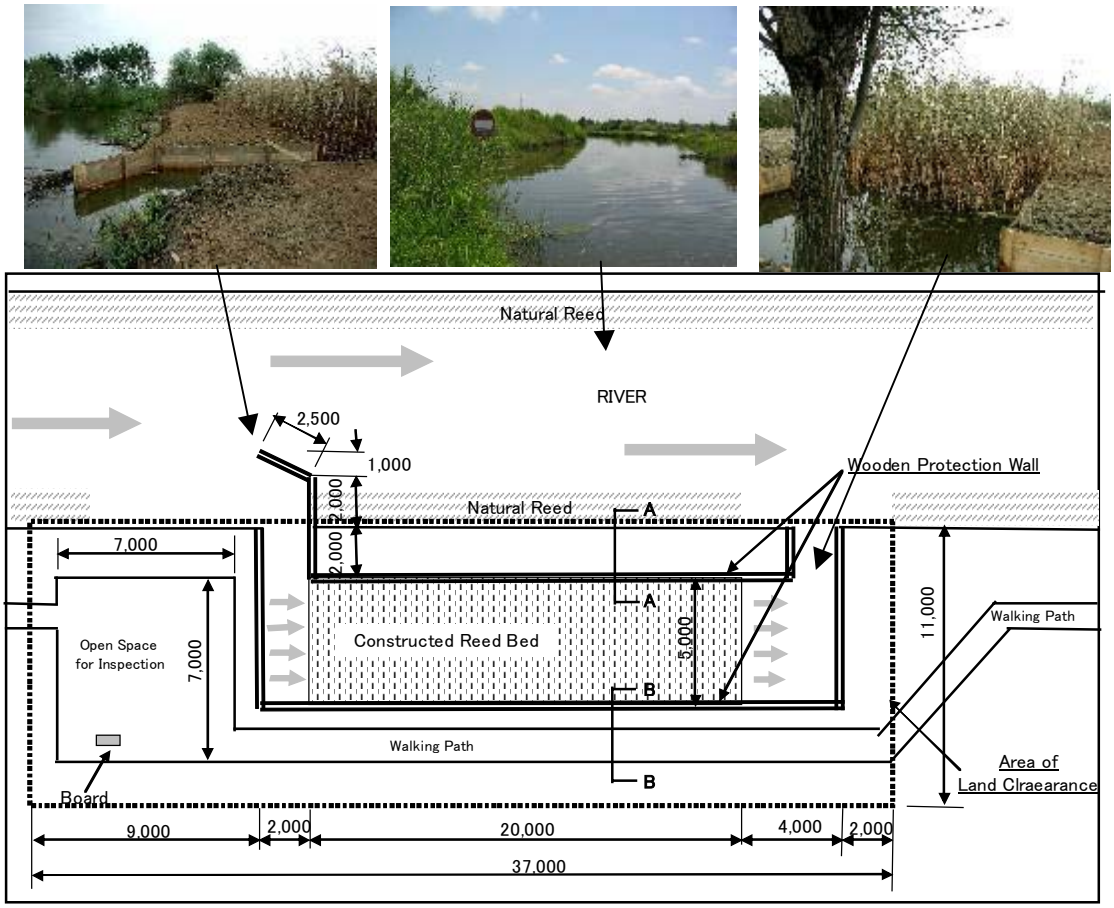


Figure 12.3.21 Schematic Diagram of Reed Bed Constructed at the Site

(3) Progress of the Activity

1) Study & Design

The concept of the activity was agreed with DOE at the beginning of the Study. It has taken about one year for selection of the site location for the activity through discussions and site surveys with DOE. From the view point of effectiveness of environmental education, the site was selected on the environmental walk path used for the Environmental Education Program within the Selke Wildlife Refuge. The design was carried out to meet the site condition.

2) Construction Works

The construction was carried out between July and August, 2004 under supervision of the JICA Study Team.

Figure 12.3.22 Reed Bed during Construction

3) Operation and Monitoring

After completion of the construction in September, 2004, the reed bed commenced to operate. The results of the water quality analysis are as shown below.

Table 12.3.4 Water Quality Data of Reed Bed

No.	Sampling Point	BOD (mg/L)	COD (mg/L)	TN (mg/L)	TP (mg/L)
October, 2004					
1	Inlet	6	13	2.3	0.18
2	Middle	6	12	3.0	0.16
3	Outlet	4	9	1.6	0.15
November, 2004					
1	Inlet	5	13	1.7	0.15
2	Middle	3	12	1.5	0.15
3	Outlet	2	9	1.3	0.13

Source: JICA Study Team (2004)

(4) Evaluation

Because the reed bed has only been operating for one month and only two water quality sampling was carried out, the technical evaluation has not been completed. As the results of the water quality survey shown in Table 12.3.4, the water purification function is identified as small. The monitoring will be continued until reaching a conclusion.

The reed bed has not been used for education purpose. The signboard as shown in Figure 12.3.23 was installed for a lecture on the eco-system of macrophytes in the Anzali Wetland. After commencement of the education program in the Environmental Education Center, many children and young people will have a lecture at the site.

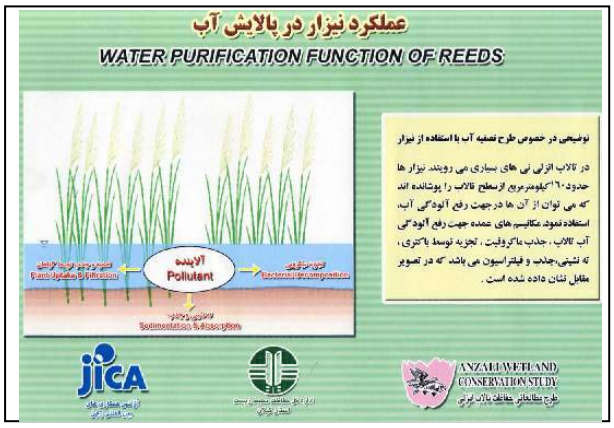


Figure 12.3.23 Design of Signboard for Reed Bed

12.3.9 Livestock Wastewater Treatment Facility Development

(1) Objectives

Livestock waste is one of the pollution sources in the basin of the Anzali Wetland. According to a DOE proposal for livestock wastewater treatment, industrial animal husbandry, which feed not less than 20 heads of cows, should have secondary treatment processes for environmental conservation. However, DOE Guilan do not have experience with small scale wastewater treatment facilities. The Anaerobic Filter and Contact Aeration Process is one of the small scale wastewater water treatment processes, and a very popular process in Japan. The advantage of the treatment facility is high efficiency of treatment, small scale of facility and relatively low construction cost. The objectives of the pilot activity are to carry out trial construction and operation of an Anaerobic Filter and Contact Aeration Process and to evaluate its treatment efficiency for promotion of livestock wastewater treatment.

(2) Principal Features of Livestock Wastewater Treatment Facilities

A livestock wastewater treatment system with Anaerobic Filter and Contact Aeration Process proposed is as shown in Figure 12.3.24.

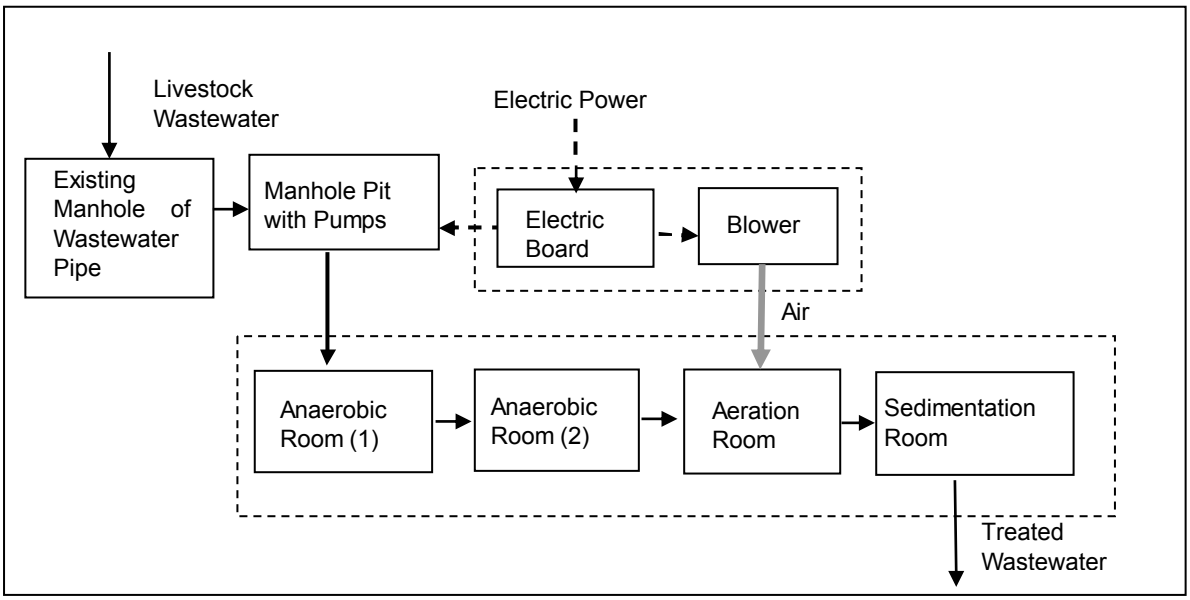


Figure 12.3.24 System Layout of Proposed Treatment Process

The construction site is in Sefidroud Industrial Animal Husbandry Company in Rasht. Sefidroud Industrial Animal Husbandry Company is the biggest industrial animal husbandry in Guilan, and feeds about 2,000 head of cows. The outline of the proposed wastewater treatment facility is as shown below. The specification of the treatment facility is described in the Supporting Report.

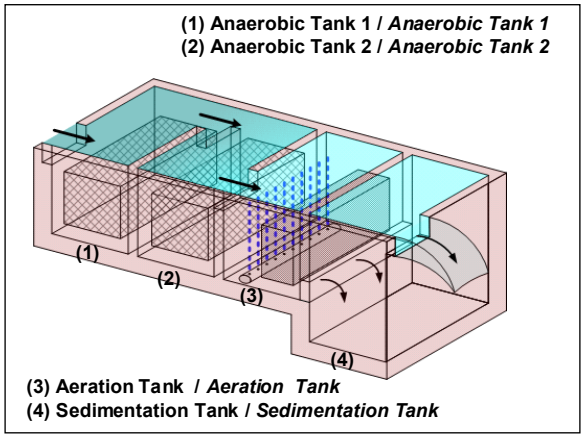


Figure 12.3.25 Outline of Livestock Wastewater Treatment Facility

(3) Progress of the Activity

1) Initial Proposal: Livestock Wastewater Treatment Facility with Bio-gas Generation

There were many discussions on livestock wastewater management among DOE, Natural Resources Research Center (NRRC) of MOJA and JICA Study Team. As the initial proposal, waste treatment with bio-gas generation was proposed, because the bio-gas generated in the process is expected to create incentive for installation of the treatment facility. The design works for the treatment system were carried out with cooperation with NRRC. The design is as shown below.

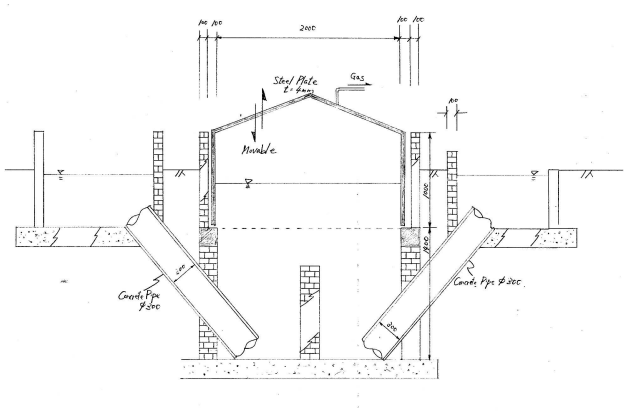


Figure 12.3.26 Design of Livestock Waste Treatment Facility with Bio-gas Generation

However, it is judged that the above system is not suitable for the study area, because of the following reason.

- The facility may not operate properly in cold weather, when gas is valuable.
- It is easy to get national gas at cheap price in Iran. The gas generation is not expected to be an incentive to operate the facility.
- Sludge generated from the system can be used as fertilizer, but the management is difficult comparing with the compost method.

After the decision, the pilot activity for Anaerobic Filter and Contact Aeration Process was proposed. The design works for the livestock wastewater treatment system was carried out by the JICA Study Team in corporation with DOE and Jihad University.

2) Construction

The construction was carried out between August and October, 2004 under supervision of the JICA Study Team.

Figure 12.3.27 Construction of Livestock Wastewater Treatment Facility

(4) Final Evaluation

Through the pilot activity, there were many discussions on design of livestock wastewater treatment facilities with bio-gas generation between the DOE, NRRC and the JICA Study Team. It is believed that the experience of the discussions and the design works contribute to expansion of knowledge of livestock wastewater treatment among the Iranian Counterparts. The experience in design and operation of the Anaerobic Filter and Contact Aeration Process is expected to contribute to future expansion of small scale wastewater treatment facilities with secondary treatment processes in Gilan.

12.3.10 Waste Drop-off Centers

(1) Objective

There are a lot of wastes thrown into rivers, and these wastes are eventually washed down to the wetland. Setting large dust boxes beside bridges aims to prevent wastes from being thrown down to rivers.

(2) Activities

1) Construction of Drop-off Centers

Figure 12.3.28 shows a photograph of a drop-off center. In total 5 drop-off centers were constructed in Fuman and Masal. A message saying "Please Do Not Throw Your Waste into Rivers" was painted on the wall.

Table 12.3.5 Outline of Drop-off Center Activity

Target Municipality	No. of Drop-off Boxes	Collected by	Constructed and Managed by	Constructed in
Fuman	3	Municipality	NGO (Sabz Aien)	February, 2004
Masal	2	Municipality	Municipality	February, 2004

Fuman No.2

Fuman No.3

Figure 12.3.28 A Solid Waste Drop-off Center Constructed in Fuman

2) Operation of Drop-off Centers

The solid wastes brought to the drop-off centers were collected by the Fuman and Masal municipalities everyday and the amount of waste collected was monitored weekly.

(3) Final Evaluation

Based on the results of the monitoring, the amount of waste collected daily averaged 95 kg/site, and around 100 persons are thought to use each drop-off center. There was a large daily fluctuation in the amount of waste brought to the centers.

Table 12.3.6 Amount of Waste Collected in Drop-off Centers

Municipality	Location	Average Daily Waste (ton/day/site)	Expected Annual Amount (ton/year/site)	Persons Used (persons/site)	Households Used (households/site)
Fuman	1	77	28	86	21
	2	107	39	119	30
	3	112	41	125	31
Masal	1	9	3	10	3
	2	83	30	92	23
Average*	-	95	35	106	26

* : Masal No.1 site was excluded from the calculation.
Source: JICA Study Team (2004)

In order to evaluate the effectiveness of the drop-off centers, a questionnaire survey was conducted in collaboration with NGOs in Fuman and Masal to persons who know about the existence of the drop-off centers. The respondents were 56 in Fuman and 25 in Masal. The results showed that the drop-off centers were generally welcomed by the respondents, and over 90% of the residents agreed to construct more drop-off centers as long as the municipality regularly collects waste from the centers, and over 80 % of the residents believed that the drop-off centers contributed to conservation of the Anzali Wetland. Figure 12.3.29 shows the comparison of sites "before" and "after" setting drop-off centers. Before the construction of drop-off centers, there were some waste bags around the sites and nearby rivers. However, the area became cleaner after the construction of the centers.

Figure 12.3.29 Comparison between "Before" and "After" in Fuman No.3

Figure 12.3.30 Comparison between "Before" and "After" in Fuman No.1

The effectiveness of the drop-off centers was also verified by the results of the questionnaire survey, which showed 39% of the total waste around the drop-off center in Fuman had been discharged to the rivers before the construction of the centers. After the construction, this became essentially zero. The figure in Masal was 48%. Assuming that 95 kg/day/site of waste was generated around a center, the result means that a drop-off center prevented 37 kg/day/site in Fuman and 45 kg/day/site in Masal of waste to be thrown into the rivers.

It has to be pointed out that the activity was not trouble free. Four out of the five centers were regularly used, but a center in Masal was not used much, presumably because the location was not ideal. The drop-off centers in Fuman tended to be overused because too many people, even those who live very far, started to use the centers. Some residents complained about a bad smell. Nonetheless, even these problems are the positive steps towards better management of solid waste because the activity forced the local residents to think seriously about the waste management in their neighborhood. In the future, the activity

can also be linked to another activity, such as the community-based recycling activity, addressed in the following section.

12.3.11 Community-based Recycling

(1) Objective

This activity was an extension of the waste drop-off center activity. The objectives of this activity are to:

- reduce the amount of waste to prolong the life of landfill site,
- be responsible for waste among the community, and
- develop the environmental awareness of their city and the Anzali Wetland.

(2) Activities

Two recycling activities have been proposed through the discussions with the municipalities and NGOs. One is to promote an organized recycling activity, as suggested in the Solic Waste Management Plan, in communities in Fuman City. One community with 50 households which is next to one of the active drop-off center was selected. The other is to support an existing initiative to promote paper recycling through schools in Somehsara, which has been proposed by a local NGO. Two 5th grade classes in each school were selected.

The collecting system was designed by the NGO in each city. It included selecting target recyclables, place of collection, frequency of the collection and distribution of the income. In Fuman, cans, glass and paper were selected as recyclables, the collecting person visits each house once a week to buy them. Educational pamphlets and three plastic bags to separate wastes were distributed with explanation to each household. In Somehsara, the NGO provided two educational sessions in two weeks with some materials. The municipality of Somehsara sells waste paper collected by students.

Educational session with 5th grade classes by NGO

Recycle bin prepared by Somehsara municipality

Figure 12.3.31 Educational Activity in Somehsara City

Information flag to encourage people to recycling

Distributing bags and pamphlet and explaining

Figure 12.3.32 Educational Activities in Fuman City

(3) Final Evaluation

The participation and commitment of NGOs was very active, so many ideas and educational materials were proposed by them. Other participants such as residents, students, teachers and municipalities were well involved and cooperative.

This activity is in the process of raising environmental awareness, and it is early to evaluate the effectiveness. Also it takes a long time for the community to be a matter routine. In this first process, continuous environmental education and discussion about incentive were essential.

The sustainability of this activity depends on two factors; to make sufficient collecting system with more participation and to give non-economic incentives to the participants. In order to make sufficient collecting system, it is necessary that participants arrive at a conclusion by themselves. Environmental awareness and feeling of unity can be produced as the number of discussion increases. However, it is difficult to have incentive only by the income from recyclables. Non-economic incentive such as stimulation by active children and setting honorable and original objective of community would be essential to be sustainable.

12.3.12 Report on State of the Environment

(1) Objectives

Many organizations are involved in environmental management of the Anzali Wetland and its watershed. However, their activities have not been coordinated, in part, because information relevant to environmental management has not been shared among these organizations. This pilot project was thus implemented to:

- compile information relevant to environmental management of the Anzali Wetland and its basin into a single report,
- stimulate coordination of activities and sharing of information among Iranian organizations, and
- develop a mechanism of adaptive management through planning, action, monitoring and improvement of environmental management activities to be proposed from the Master Plan.

(2) Activities

In the Local Steering Committee Meeting No.5 in November, 2003, relevant stakeholders were informed about the proposed environmental monitoring activities and the plan to develop a state of the environment report. Based on this discussion, DOE and MOJA selected the main editors, and collection of the information was started with participation of various stakeholders. The collected information was then summarized by the editors in August, 2004, and the report was printed and distributed to stakeholders, such as schools, DOE, MOJA, municipalities, etc, in October, 2004.

Figure 12.3.33 An Excerpt from the Environmental Report

(3) Final Evaluation

Overall, the state of the environment report was highly praised by the stakeholders because the report was novel in that:

- It was the first state of the environment report in the region,
- It comprehensively covered environmental information related to the Anzali Wetland and its watershed,
- It featured activities of many stakeholders beyond the traditional boundaries of organizations.

- It was designed for a wide range of readers with general knowledge of environmental issues rather than for specialists, and
- It was visually appealing with many color photographs and graphs.

The report would help decision-makers become environmentally conscious and make informed decisions. Also, the report will help stimulate coordination among stakeholders by sharing the same information. The educational benefit of the report is also obvious; teachers can use the report to talk about how our daily activities, such as discharging wastewater without treatment or throwing waste into rivers, could affect the wetland, and religious leaders can preach about the importance of environmental conservation.

The sustainability of the activity is dependent on the capacity of editors who should be able to integrate a vast quantity of information from various organizations into a comprehensive report. One idea is to outsource this task to local journalists or NGOs. The support from decision makers of relevant organizations is also essential, because under the current fragmented administrative system, it is quite difficult to manage such an inter-organizational task. Thus, it is suggested that the proposed conservancy or the Provincial Thematic Working Group on Land Use, Environment and Population takes the lead on the preparation of the annual state environment report in the future.

12.3.13 Website Development

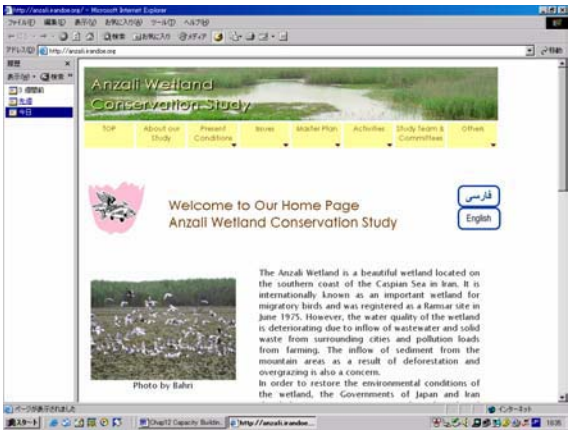
(1) Objective

In this activity, a website of the study was developed jointly by the counterparts and the JICA Study Team. The objectives of the activity are to:

- develop a website to disseminate information about environmental management of the Anzali Wetland and its basin and the activities of the study, and
- promote environmental education and eco-tourism.

(2) Activities

Based on the available information, the JICA Study Team drafted the original English pages. Then, the Farsi pages were created by translating the English pages. The hosting of the Anzali website was entrusted to DOE-HQ. The English webpage was officially launched on February, 2004, and the Farsi was launched in June, 2004. The URL of the site is **http://anzali.irandoe.org.** The web pages have been periodically updated to reflect the progress of the study.



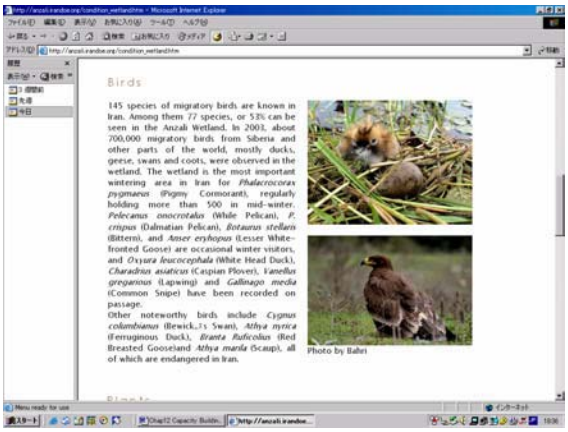


Figure 12.3.34 Web Pages

It was evident that the DOE Guilan lacked the capacity to develop and maintain a web site. Thus, a one-day training course on website development and updating was organized by inviting a local expert. Considering the large digital divide among the staff of the DOE, the training was targeted to the computer section of the DOE.

Figure 12.3.35 Training of DOE Staff

(3) Final Evaluation

The website was very useful in explaining the contents of the study, especially to donors, government officials and experts, though the real potential of the website is yet to be seen with the explosion of internet population in the near future. Also, there are endless ways to improve the web contents in the future, such as:

- to make education materials downloadable,
- to develop a web space for teachers and students, and
- to develop a bulleting board for information exchange.

DOE Guilan has all the resources necessary to continue the web page development, such as computers, web design software, modem, and a web space at the DOE-HQ. The cost for web page development is minimal, and a crash course on website development has been given to the computer section of the DOE. However, web pages have to be updated regularly.

Thus, it is suggested that the general director of the DOE Guilan appoints a person in charge of web updating, and make updating of the web as a part of his/her routine job.

12.4 Environmental Monitoring Activities

12.4.1 Introduction

(1) Introduction

DOE, MOJA, MOE and various other organizations have environmental monitoring programs. However, many of them are not coordinated, and the results of such monitoring activities have not been used to improve the environment of the study area. Thus, the study supported environmental activities of these organizations with the objectives to:

- develop a basic system of environmental monitoring through structured activities of collecting, analyzing, disseminating, and reflecting the results of the environmental monitoring back to the management activities, and
- foster active cooperation and sharing of information among the stakeholders.

12.4.2 Selection of Monitoring Items

(1) Framework of Environmental Monitoring Activities

The monitoring indicators were selected based on the concept of "Pressure-State-Response" relationship of environmental issues, considering the capacities of relevant Iranian organizations to implement them within the existing technical and financial resources. The following environmental items were selected for the activities.

Table 12.4.1 Items Selected for Environmental Monitoring Activities

Category	Monitoring Items
Wetland Management	- Birds, macrophytes and fish in the Anzali Wetland - Water and Sediment Quality in the Anzali Wetland - Review of Case Studies of Wetland Management in Iran - Information on Protected Areas and Foundation of a GIS Map - List of Resource Persons for Wetland Management - Monitoring of Fluctuation of Water Level
Watershed Management	- Inventory of GIS Database - Forest Management Activity - Rangeland Management Activity - Erosion Control Measures - Educational Activity for Promotion of Sustainable Agriculture - Use of Chemical Fertilizers and Pesticides
Wastewater Management	- Water and Sediment Quality in Rivers - Expansion of Sewer Network - Activities implemented by RWWC - Human Resources for Industrial Pollution Control - Domestic and Industrial Wastewater Characteristics
Solid Waste Management	- Maps of Areas Polluted by Solid Waste - Solid Waste Management Activities by Municipalities - Educational Activities for Improvement of Solid Waste Management - Amount of Solid Waste Dumped at Anzali Landfill Site

(2) Implementation

Table 12.4.2 shows how the environmental monitoring activities were implemented.

Table 12.4.2 Timetable of Environmental Monitoring Activities

Work Item	2003				2004									
	9	10	11	12	1	2	3	4	5	6	7	8	9	10
1. Selection of Editors				■										
2. Detailed Planning of the Contents					■									
3. Collection of Data and Information		■	■	■	■	■	■	■	■	■	■			
4. Drafting of the Report Articles											■	■		
5. Designing of Report by Designers												■	■	
6. Printing and Distribution													■	

The activities were introduced at the Local Steering Committee Meeting No.5 held on November 22, 2003. Most monitoring data were collected between December, 2003 and May, 2004. As substantial amount of information was gathered, the details are not explained in this report. Please see the Supporting Report for the details.

A staff gauge installed in the lagoon to monitor the water level in the wetland.

A water sampling in the Anzali Wetland.

Figure 12.4.1 Photographs of Environmental Monitoring Activities

(3) Dissemination of Information

The results of the monitoring activities were compiled in a state of the environment report for the region, entitled "Annual Environmental Report of the Environmental Situation in the Anzali Wetland and its Catchment". Unlike the report of the JICA Study Team, this report was jointly drafted by the efforts of the Iranian organizations, and it is in Farsi. In total, 200 copies were produced and distributed to various stakeholders in the area. This report was produced as a part of the pilot activities. See section above on Pilot Activities. In addition, some of the collected information was made available through the project website and the newsletters.

12.4.3 Evaluation

Overall, good efforts have been made to collect information, and the participation of relevant organizations was reasonable. Nevertheless, there seem to be two major issues that hinder the effective environmental management based on monitoring data:

(1) Development of a System for Environmental Management Based on Monitoring Data

Iranian environmental experts readily understood the technical aspects of the monitoring activities, such as the monitoring items, locations, frequencies, etc. However, not many experts understood how the collected monitoring data could be used to improve the environmental management. This is because the tasks of many experts are to solve existing problems in a reactive manner, and they are not familiar with structured management based on (i) developing policies and plans, (ii) implementing the plan, (iii) analyzing the effectiveness of measures, and (iv) developing following plans based on the outcome of original plan.

In order to improve this, the study stressed the importance of adaptive management, which may be roughly defined as a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. These were

elaborated in the environmental monitoring sections of the Wetland Ecological Management Plan and Watershed Management Plan.

(2) Lack of Information Sharing

Another major problem is the lack of information sharing among stakeholders, and even the information sharing within a ministry is often not adequate. For example, many staff of the DOE Guilan have no idea how wetlands are managed elsewhere in Iran. Similarly, the experts of MOJA Guilan have limited information exchange with other southern Caspian states, namely Mazandaran and Golestan, which are facing similar overgrazing and erosion problems. Inter-organizational coordination is far worse than the intra-organizational problems.

In the Environmental Monitoring Activity, thus, various efforts were made to improve this situation. For example, MOJA Guilan staff were sent to MOJA Mazandaran to gather information. Many field surveys in the wetland were carried out jointly rather than independently by the DOE laboratory and the Bony Fishes Research Center; two laboratories which complement each other. The results of the Environmental Monitoring Activities were compiled into the state of the environment report. These efforts should be continued after the completion of this study.

12.5 Workshops and Seminars

12.5.1 Workshops

In total, 7 workshops were held during the course of the study. They are summarized in Table 12.5.1.

Table 12.5.1 Workshops

No.	Date	Contents	Total Participants
Workshop No.1	June 16, 2003	In the first workshop, the team (Mr. Sadamura) explained the overall scope and schedule of the study. Then, the team (Mr. Naganuma and Dr. Okuda) presented examples of similar studies in Latvia and Kenya.	72
Workshop No.2	July 27, 2003	The second workshop featured 5 speakers, - Mr. Karimi (DOE-HQ), Iran's wetland management - Mr. Mirkiaii (MOJA-HQ), Sustainable management plan for soil and water resource in Hablehroud basin - Dr. Hindson (JICA Study Team), How environmental education and public participation contribute to wetland conservation - Dr. Ando (Special Guest), Participatory wetland management in Asia - Mr. Sakari (DOE-Guilan), Anzali international wetland, the problem and solutions In the after noon, the participants were separated into four groups (wetland, watershed, wastewater, and solid waste), and participatory group discussions were carried out. The group discussions were moderated by Mr. Sakari (DOE-Guilan), Mr. Mohammadi (MOJA-HQ), Mr. Momenpour (GWWC), and Mr. Alizadeh (DOE-Guilan), under the general guidance by Mr. Amirebrahimi (NGO).	100
Workshop No.3	Sept. 23, 28, 29, Oct. 4, 2003	The third workshop covered two topics: Landslides and Countermeasures: A technical lecture on control of erosion, land slides and slope collapses were given by Mr. Yokoyama, and a field excursion to landslide sites was organized. Conservancy: Dr. Driver explained the idea of wetland management by a conservancy, and the participants discussed the applicability of the idea in the Anzali Wetland.	83
Workshop No.4	Nov. 30, 2003	The team (Mr. Sadamura) presented the progress of the study. Then, the following presentations were made: - Mr. Akbarazadeh (DOE-Guilan) and Mr. Naganuma (JICA Study Team), Evaluation of Present Water Quality Condition in the Wetland - Mr. Fujii (JICA Study Team), Evaluation of Pollution Load into the Wetland - Mr. Masulahadju (MOJA-Guilan), Evaluation of Soil Erosion and Sedimentation in the Wetland	58
Workshop No.5	June 23, 2004	The study team (Mr. Aoki) presented the proposed conservancy at the Provincial Thematic Working Group on Land Use, Environment and Population, chaired by the provincial governor. The working group decided to follow this idea and asked Dr. Nezami (DOE-Guilan) to prepare a paper on conservancy.	30
Workshop No.6	August 1, 2, 4, 11, 15, 2004	In total 5 thematic sessions were held on wetland ecology, water quality management, buffer zone management, and solid waste management.	58
Workshop No.7	Sept. 25, 2004	The seventh workshop was a stakeholder meeting on wetland management. Dr. Okuda (JICA Study Team) presented the proposed Wetland Ecological Management Plan with focus on wetland value. The participants (farmers, fishermen and hunters) explained the historical changes in the wetland environment, and pointed out the need to control activities that pose negative impacts to the wetland, such as inflow of untreated sewage, speed boats, over fishing, and excessive use of agrochemicals.	26

12.5.2 Seminars

In total 3 seminars were organized in order to disseminate the information about the study. They are summarized in Table 12.5.2.

Table 12.5.2 Seminars

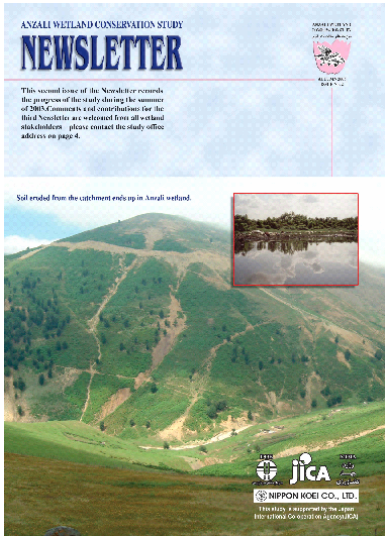
No.	Date	Contents	Total Participants
Seminar No.1	Feb. 19, 22 2004	The 1st seminar was held in February, 2004 both in Rash and Tehran. The following presentations were made. - Mr. Miwa (JICA Advisory Committee), Our Challenge for Comprehensive Conservation of Lake Biwa - Mr. Sadamura (JICA Study Team), Interim Results of the Study - Mr. Bagherzadeh (DOE-Guilan), Solid Waste Management - Mr. Mohammadi (MOJA-HQ), Watershed Management	89+
Seminar No.2	Dec. 19, 23, 2004	This was the last seminar of the Study. - Dr. Okuda (JICA Study Team), Outline of the Study - Dr. Ando (Tokyo Univ. Agr.), Adaptive management for wetlands - Mr. Fujii (JICA Study Team), Introduction of advanced treatment process to wastewater treatment plant - Mr. Urumieh (MOJA, Tehran), Watershed management in Northern Provinces - Mr. Aoki (JICA Study Team) and Ms. Naghizadeh (CENESTA), Participatory management of environmental resources in watershed of Anzali wetland	94 (Tehran), 110 (Rash)
Special Seminar	Sept. 16, 2004	The participants in the JICA Counterpart Training in Japan in March 2004 presented what they had learned in Japan including video clips of environmental management in Japan. - Mr. Mohammadi (MOJA-HQ), Watershed management on the Fuji mountain slope - Mr. Karimi (DOE-HQ), Biwa and Kasumigaura wetland condition - Mr. Rafati (MOJA-Guilan), Watershed management on Non Tan San mountain slope - Mr. Pooyasefat (MOJA-Guilan), Watershed management around Lake Biwa.	62

12.6 Newsletters and Postcards

12.6.1 Newsletters

The JICA Study Team issued, in total, 5 newsletters in English/Farsi, and distributed in total 5,000 copies, or 1,000 copies each, to stakeholders. The newsletters were very useful to disseminate information about the outline of the study and present the findings and environmental issues in the Anzali Wetland and its basin.

Front page of the Newsletter Issue No.1

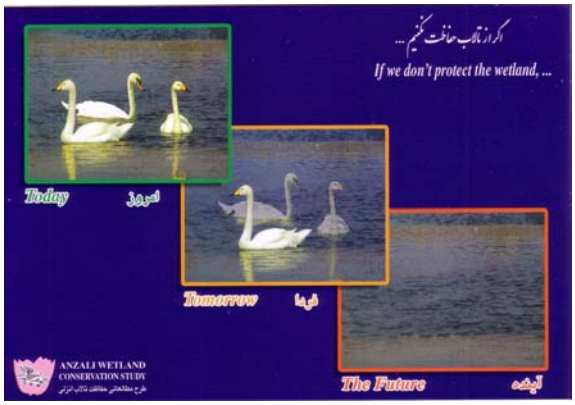


Front page of the Newsletter Issue No.2

Figure 12.6.1 Front Pages of Newsletters

12.6.2 Postcards

The JICA Study Team issued, 3 postcards in total, and distributed 7,500 copies, in total, 2,500 copies each, to local stakeholders, tourists, donors, and others. The second postcard was a Norooz card (new year card). The last card, which is under preparation, is a desktop calendar.



Postcard No.1: A postcard with a sentence "if we don't protect the wetland…" and photographs of disappearing swans.

Postcard No.2: A foldable Happy Norooz (new year) card with "A Wetland Code for Visitors"

Figure 12.6.2 Post Cards

12.7 Overseas Training

12.7.1 Counterpart Training in Japan

Counterpart training specifically designed for the study, were implemented twice in Japan, and nine Iranian counterpart personnel participated as shown in Table 12.7.1. This technical training is one of the programs of JICA, and the purpose is the transfer of knowledge and technology required. The counterparts visited many places and studied Japanese experience in combating pollution and natural disasters, and Japanese efforts in restoring wetlands.

Table 12.7.1 Participants of Counterpart Training

No.	Period	Participants
1st Training	From 27 March 2004 to 25 April 2004 (30 days)	- Dr. Nezami Balouchi Shabanali, DOE Guilan - Mr. Karimi Masoud Bagharzadeh, DOE HQ - Mr. Mohammadi Hossein Ali, MOJA HQ - Mr. Rafati Abatari Mohammad Bagher MOJA Guilan - Mr. Pooyasefat Feridoon, MOJA Guilan
2nd Training	From 17 October 2004 to 14 November 2004 (30 days)	- Mr. Mohammad Alizadeh, DOE Guilan - Mr. Ghodrat Jabari, DOE West Azerbaijan - Mr. Ahmad Reza Adadi, MOJA Fars - Mr. Adel Kazemi, NRGO Guilan

12.7.2 Counterpart Training in the UK

Three experts were invited to the UK by the British Council in December 2003. Dr. Nezami and Mr. Sakari from the DOE Guilan, together with Mr. Amirebrahimi from an NGO (SCIENSE) visited the UK on a wetland education study visit. The visit was organized by the UK NGO. The Iranian counterparts visited different Wetland Centers around the UK, and saw an example of a Wetland Conservancy.

12.8 Overall Evaluations

12.8.1 Achievements of Capacity Development Activities

Table 12.8.1 summarizes the overall achievements of the capacity development activities in this study in relation to the goals set in Section 12.1.1. Significant achievements were made during the course of the study in Iran, which lasted 18 months.

Table 12.8.1 Overall Achievements of Capacity Development Activities

Category	Status at the Beginning of the Study	Overall Achievements
Coordination	- No organization or mechanism to coordinate environmental management activities existed in the basin.	- The local and national steering committees and a technical committee were organized for the study. - The study was implemented mainly at the provincial level by the participation of many local organizations, NGOs, and other stakeholders. - High-level inter-ministerial discussions were carried out towards the implementation of the master plan. - The study stimulated the organization of the first meeting of Provincial Working Group on Environment, Land Use and Population.
Planning	- There were many plans, but they were not coordinated, and there was no umbrella plan to unify them. - Many activities were implemented without plans.	The Master Plan and the following components plans were jointly developed by participation of many counterpart personnel. - Wetland Ecological Management Plan - Watershed Management Plan - Wastewater Management Plan - Solid Waste Management Plan - Environmental Education Plan - Institutional Plan for Implementation
Activities /Initiatives	- Some environmental conservation activities had been implemented by the government offices, but most of them were reactive measures. - There were limited activities related to wise use and sustainable use of natural resources - Many activities were implemented within boundaries of ministries with little coordination with other organizations.	The study implemented 11 pilot activities: - implemented 10 trial eco-tours to develop eco-tourism in the wetland - developed wetland environmental education programs and constructed the first wetland education center in Iran - demonstrated the effectiveness of composted Azolla (invasive species in the wetland) as fertilizer - demonstrated the effectiveness of erosion control with fencing, seeding, straw matting, gabion check dams and tree planting - developed a prototype rural wastewater management system with septic tank and constructed reed bed system - developed a prototype livestock waste management system with anaerobic/aerobic system - constructed wetland for environmental research and education - tested the effectiveness of waste drop-off centers - developed community- and school-based recycling schemes - issued the first environmental report for the area - developed a project web-site
Monitoring	- There were limited monitoring activities (e.g., annual bird counting in January, industrial effluent surveillance) by relevant organizations. - However, overall there was significant lack of information for environmental management. - Many monitoring data were not used for management.	- A comprehensive monitoring of water and sediment quality, plankton and benthos. - A biological survey of birds, fishes and macrophytes. - Surveys on activities of various organizations - Surveys on resources for environmental management
Dissemination of Information	- Environmental information was scattered among relevant organizations, and was not available to people.	- Environmental information disseminated to stakeholders through newsletters (total 5,000 copies), postcards (total 7,500 copies), 7 workshops, 3 seminars, translated reports, environmental report (200 copies), and media coverage.

There are a number of important points to be highlighted:

First, the study was implemented by coordinated efforts of many local organizations, NGOs and other stakeholders, and this by itself is a major achievement given the highly centralized administrative systems in Iran. In particular, the joint development of the master plan should be highlighted as a major accomplishment of such coordinated efforts; the developed master plan is one of its first kind that unites views of many organizations into a common goal to achieve conservation of the Anzali Wetland and its basin.

The study initiated various environmental activities, including 11 pilot activities with vibrant participations of many local residents, NGOs and government offices in the fields of solid waste management, environmental education and awareness building, wastewater management, eco-tourism, etc. These were major endeavors, and took a lot of time and efforts. Nevertheless, the practical experiences gained through these activities were irreplaceable to build action-oriented environmental management with participation of stakeholders. These activities also provided good opportunities to build environmental awareness among stakeholders.

The study also emphasized the importance of environmental monitoring and dissemination of information, and the Environmental Report for the area in Farsi was drafted, compiled, designed and issued by the efforts of stakeholders.

12.8.2 Recommendations on Capacity Development

Despite these achievements made in such a short period, it was felt that the capacities of the local stakeholders could not be developed to the level that allow a higher level of environmental governance by the stakeholders. As the results, it is possible that the momentum built during the course of the study is lost once the study is terminated. There are a number of reasons for this, such as (i) most stakeholders are bound to the vertical organizational structures, and cannot coordinate across the boundaries of ministries like the international experts of the study team, (ii) there are very few capable managers/technocrats who can control budgets and also understand how the environmental systems work, and they are extremely busy, (iii) the mechanisms to support activities of NGOs and CBOs are not well-developed, and opportunities for NGOs and CBOs to participate in environmental management activities are limited, and (iv) not all stakeholders are motivated to get involved in capacity development activities. Thus, the following recommendations are given on capacity development.

(1) Support by Decision Makers

In order to continue capacity development activities, understanding and support of decision makers, in particular general mangers of provincial offices, is important. For regional/local issues and cross-sectoral coordination, the role of the provincial governor and the governors of

Shahrestants (townships) and Bakshes (districts) are also significant.

(2) Support by International Donors

International donors do not belong to any domestic hierarchy, and they can facilitate activities that involve many organizations. Because capacity development takes long-time, the donors should coordinate and provide long-term supports for environmental management activities.

(3) Development of a Network of Key People

There are many enthusiastic community leaders, active NGOs, talented people in private sectors, and motivated government officials. The capacity development should first focus on these key people, and then spread to others by developing a network of key people.

CHAPTER 13 CONCLUSIONS AND RECOMMENDATIONS

13.1 Conclusions

The master plan was evaluated with respect to economic, financial, environmental, social and technical aspects (see Chapter 10). Though quantitative analyses of economic and financial aspects of the master plan were limited due to lack of information, the overall results indicated that the master plan is economically justifiable, financially feasible, and there are no major technical issues that would prevent its successful implementation. Because the master plan was designed to improve the environmental conditions of the wetland and its watershed, negative environmental impacts of the master plan are considered to be limited, though the social impacts, in particular relating to the livestock resettlement plan, need due attention as explained in the Initial Environmental Examination. In conclusion, the master plan is worth implementing, and relevant organizations are urged to take necessary actions to initiate the implementation of the master plan.

The six component plans in the master plan, i.e., the Wetland Ecological Management Plan, Watershed Management Plan, Wastewater Management Plan, Solid Waste Management Plan, Environmental Education Plan, and the Institutional Plan for Coordination, are evaluated as follows:

(1) Wetland Ecological Management Plan

This plan consists of environmental zoning, conservation of wildlife, conservation of habitats, promotion of wise use, and monitoring and feedback. The combination of the environmental zoning and conservation of wildlife and habitats enable effective management of the ecosystem, while the wise use of natural resources is also essential to gain wider support from the stakeholders.

(2) Watershed Management Plan

The inflow of sediment into the wetland would gradually make the wetland shallower, and affect the ecological character of the wetland. It is not possible nor desirable to completely stop the release of sediment from the watershed, though the management of the watershed, especially the upper-watershed is important to prevent further deterioration of the wetland by sedimentation.

(3) Wastewater Management

One of the most serious environmental problems in the wetland is the water pollution caused by the inflow of wastewater from the watershed. Domestic wastewater treatment in Rash (population 650,000) and Anzali (population 130,000) has high priority to improve the water quality in the wetland. In addition, careful management of other pollution sources, such as domestic wastewater in rural areas, industrial wastewater, livestock wastewater, and wastewater from agricultural fields, are also essential.

(4) Solid Waste Management Plan

Inflow of waste into the wetland is caused by illegal waste dumping by local residents. In order to minimize this problem, provision of waste collection services in rural areas is important as currently there is no such services in the rural areas. In addition, environmental awareness of both urban and rural populations should be raised.

(5) Environmental Education Plan

Environmental education is essential for sustainable conservation of the Anzali Wetland and its watershed. However, the present level of environmental education in Iran is still relatively low, and further efforts in the areas of environmental education in the formal education sector, creation of networks of stakeholders, awareness raising for residents, establishment of public participation mechanisms, etc., are required.

(6) Institutional Plan for Implementation

The master plan involves many organizations from various sectors; establishment of a coordination mechanism is crucial for smooth implementation of the master plan. Thus, to unite the activities of these organizations, the proposed Anzali Wetland Conservancy or a similar organization should be established.

13.2 Recommendations

The following actions are recommended for the implementation of the master plan.

(1) Early Establishment of Coordination Mechanism

The master plan proposed the establishment of the Anzali Wetland Conservancy as a mechanism to coordinate effective and sustainable actions. However, establishment of a new organization takes time. Therefore, as a preparatory step, the proposed Anzali subgroup of the Provincial Working Group on Land use, Environment and Population should be established as suggested in the Institutional Plan.

(2) Securing the Budget

In Iran, major public investment projects are implemented by the state budgets, and the provincial development budget, which is currently around 500 billion Rials/year, is not sufficient to cover the required investment cost of implementing the master plan of about 3,350 billion Rials[1] in 15 years. Obviously the master plan cannot be implemented without financial support from the central government. In order to secure the budget both at the central and the provincial levels, the following actions are recommended:

[1] The cost was estimated based on June 2004 price without price escalation.

1) Add the components of the master plan to the fourth 5-year development plan at the national and provincial levels
2) Establish special committees at the central and the provincial levels to coordinate actions to secure the budgets.
3) Consider international loans and other financial sources for implementation of large projects, such as the construction of the sewerage systems.

(3) Capacity Development of Provincial Offices

Many projects implemented in the study area have been lead by the central government, and the capacities of the provincial offices to develop plans/programs, manage projects, and coordinate with other organizations have not been fully developed. This is a major concern for the implementation of the master plan to be implemented mainly at the provincial level. Thus, the relevant ministries and departments are urged to develop capacity at the provincial level by dispatching competent specialists and managers from the central offices, and also by providing internal and cross-sectoral training.

(4) Promotion of the Participation of Stakeholders

The majority of local stakeholders are enthusiastic about conserving the wetland and its watershed. However, there are few opportunities for these stakeholders to participate in environmental conservation activities or to have their voices heard. Because the support of stakeholders is essential for successful implementation of the master plan, it is important to create opportunities for stakeholders to participate in the implementation of the master plan. The 11 pilot activities, 7 workshops, 3 seminars, and other activities carried out during the course of the study were very useful in promoting public participation, and such activities should be continued in the future.

(5) Improvement of the Livestock Resettlement Plan

The successful implementation of the livestock resettlement program by NRGO is essential for forest and rangeland management. However, the current program does not have a social safety net, and forces the affected people to look for new livelihood by themselves after receiving compensation, even though finding livelihood is expected to be difficult. In order to minimize social impacts and to support the affected people, the program should be improved by incorporating a consultation process and long-term support mechanisms.

APPENDICES

APPENDIX 1
LISTS OF JICA STUDY TEAM AND JICA ADVISORY COMMITTEE MEMBERS

(1) JICA Study Team

Name	Position
1. Mr. Hirofumi SADAMURA	Team Leader
2. Dr. Itaru OKUDA	Deputy Team Leader/Environmental Conservation
3. Mr. Masayuki FUJII	Sewage Management
4. Mr. Kaoru YAJIMA	Water Management / Hydrology
5. Mr. Noboru YOKOYAMA	Soil Erosion/Watershed Management
6. Mr. Hideki WADA	Solid Waste Management
7. Mr. Kengo NAGANUMA	Water and Sediment Quality Analysis
8. Mr. Tomoo AOKI	Socio-economy
9. Dr. Moslem AKBARINIA	Wetland Ecosystem
10. Dr. James HINDSON	Environmental Education
11. Dr. Paul DRIVER	Institutional Development
12. Mr. Shinichiro TANIMOTO	Agriculture/Agricultural Chemical Administration
13. Mr. Yoji MIZUGUCHI	Natural Resources Management
14. Mr. Tetsuo KUYAMA	Junior Environmental Conservation Expert (Human Environment)
15. Ms. Yukiko WATANABE	Junior Environmental Conservation Expert (Natural Environment)

(2) JICA Advisory Committee

Name	Position
1. Mr. Kenichi TANAKA	Chairperson
2. Mr. Koji MIYATAKE	Watershed Management
3. Mr. Nobuhiko MIWA	Environmental Administration

APPENDIX 2
LISTS OF STEERING COMMITTEES AND COUNTERPART MEMBERS

(1) National Steering Committee

Chairperson Co-chairperson	*Department of the Environment* Mr. Anoshrivan Najafi and Dr. Hadi Soleymanpour	Deputy for Natural Environment and Biodiversity
	Ministry of Jihad-e-Agriculture Dr. Forood Sharifi	Deputy for Watershed Management, Forest, Rangeland and Watershed Management Organization
Members	*Ministry of Jihad-e-Agriculture* Mr. Reza Soharabi	Director General, Study and Evaluation Department, Watershed Management Deputy
	Mr. Mostafa Behbahani	Advisor on International Affairs
	Mr. Senoubar Nader	General Director, Executive Affairs
	Mr. Siyed Atah Rezaii	Public Relation and International Affair Bureau
	Mr. Seyed Abolfazl Mirghasemi	Planning and Coordination, Watershed Management Deputy
	Mr. M. Urunmieh	Director of Erosion and Sedimentation Group
	Mr. Hossein Ali Mohammadi	Expert, Study and Evaluation Department, Watershed Management Deputy
	Mr. Parviz Salehi	Deputy for North Forest
	Mr. Reza Roshani	Expert
	Mr. Jahangir Jahandar	Reforestation and Park Bureau
	Mr. Mohammad Jafair	Conservation and Land Affair Deputy
	Mr. Mahmoud Sarabi	Deputy for Chalous Forest
	Mr. Ali Osat Montazeri	Forest Affair Deputy
	Department of the Environment Mr. Farhang Ghasiriani	General Director of Protected Area and Habitats
	Dr. Shaban Ali Nezami	General Director, DOE Guilan
	Dr. Hossein Seradjzadeh	GEF/Wetland Project Manager
	Ms. Abolghasemi	Deputy Head for Protected Area and Habitats
	Mr. Masoud Bagherzadeh Karimi	Expert
	Mr. Mehran Niazi	Expert
	Mr. Gh. A. Haghgu Rostami	Habitats and Protected Areas Affair Bureau
	Mr. Saleh Dadjoui	Expert
	Ministry of Interior Mr. Nasser Hajmohammadi	General Management in the Urban Service
	Dr. Gh. Asadollah Fardi	Expert, General Management in the Urban Service
	Mr. Ali Reza Moradzadeh	Expert

	Ministry of Foreign Affairs	
	Mr. Ahmad Rajabi	Expert, International Department
	Management and Planning Organization	
	Mr. Adl Hamid Reza	Expert
	Ministry of Health	
	Mr. Seyed E. Asaei	Chief Expert, Environmental Health, Environmental and Occupational Health Center
	Mr. M. J. Dast Amooz	Expert, Education and Medical Service Department
	Ministry of Energy	
	Mr. Jabbar Vatanfada	General Director, River & Coastal Engineering Bureau
	Mr. Ali Reza Nejafi	River Engineering Bureau

(2) Local Steering Committee

Chairperson Co-chairperson	*Department of the Environment* Dr. Shaban Ali Nezami	Director General, Department of the Environment, Guilan
	Ministry of Jihad-e-Agriculture Mr. Reza Soharabi	Director General, Study and Evaluation Department, Watershed Management Deputy
Members	*Department of the Environment, Guilan* Mr. Mahyar Sakari	Expert, Natural Environmental and Biodiversity
	Ministry of Jihad-e-Agriculture, Guilan Mr. Mohammad Reza Taherzadeh	Head of Provincial MOJA, Guilan
	Mr. Rasoul Mohammadi	Manager of Watershed Management Department
	Mr. Hossein Ali Mohammadi	Expert, MOJA-Headquarters
	Mr. Adili	Management, Cultivation and Horticulture Department
	Mr. Hadi Rafiee	Deputy for Livestock Affair
	Dr. Mir Hosseini	Natural Resource and Livestock Research Center
	Mr. Kazerooni	Director, Fishery General Office
	Mr. Hamid Nasri	Extension and Cooperative Director
	Mr. Gholam Hossein Kordafshari	Director General, NRGO Guilan
	Government of Guilan Mr. Mehrdad Lahooti	Government of Guilan
	Water and Wastewater Company, Guilan Mr. Mohammad H. Mehdizadeh	Managing Director

	Regional Water Organization, Guilan *Mr. Morteza Haghighat* *Management and Planning Organization, Guilan* Mr. Hossein Arami *Bony Fishes Research Center* Dr. Ali Asghar Khanipour Director *Port and Shipping Organization* Mr. Hadi Haghshenas *Universities* Dr. Davoud Ahmadi Dastjerdi Guilan University Dr. Ali Mohammadzadeh Guilan University Mr. Ali Meraji Guilan Jihad-e-University *Industrial and Mining Organization, Guilan* Mr. Gholamhosein Ahadi *Cultural Heritage and Tourism Organization, Guilan* Dr. Hossein Ali Atef

(3) Technical Committee

Chairperson	*Department of the Environment* Dr. Shaban Ali Nezami General Director, DOE Guilan
Co-chairperson	*Ministry of Jihad-e-Agriculture* Mr. Reza Sohrabi Director General, Study and Evaluation Department, Watershed Management Deputy MOJA Headquarters
Members	*Department of the Environment* Dr. Farhang Ghasriani Director General of Protected Area and Habitats , DOE Headquarters Dr. Hossein Seradjzadeh GEF/Wetland Project Manager Mr. Masoud Bagherzadeh Karimi Expert, DOE Headquarters Mr. Mahyar Sakari Expert, DOE Guilan *Ministry of Jihad-e-Agriculture* Mr. Mohsen Urumieh Expert, MOJA Headquarters Mr. Hossein Ali Mohammadi Expert, MOJA Headquarters Mr. Mohammad Cheraghcheshm Faculty Member, Natural and Livestock Resources Research Center, MOJA Guilan Mr. Ataollah Maslahatjo Expert, Watershed Management Department, MOJA Guilan *Regional Water Organization, Guilan* Mr. Rahim Khorasani Manager, Water Quality Section

	Water and Wastewater Company Guilan Mr. Farhad Momenpour Deputy of Planning *Bony Fishes Research Center* Dr. Maryam Fallahi Expert Mr. Seyyed Hojat Khodaparast Expert *Universities* Dr. Mohammad Mahdavi Tehran University Dr. Kamran Taghavi Guilan University Mr. Babak Tavakoli Guilan University Dr. Bahman Ramzany Rasht Azad University Dr. Jalillodin Sorour Rasht Azad University *Mining and Industrial Organization, Guilan* Mr. Esmaeil Javadi Expert

(4) Counterpart Personnel

JICA Study Team		Iranian Counterpart Personnel	
Title	Name	Name	Organization
Team Leader	Hirofumi Sadamura	Shaban Ali Nezami	Department of the Environment Guilan
		Reza Sohrabi	Watershed Management Deputy, Ministry of Jihad-e-Agriculture
Deputy Team Leader/Environmental Conservation	Itaru Okuda	Rasoul Mohammadi	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
		Mahyar Sakari	Department of the Environment Guilan
Sewage Management	Masayuki Fujii	Mr. Safakar	Department of the Environment Guilan
		Farhad Momenpour	Water and Wastewater Organization of Guilan
Water Management /Hydrology	Kaoru Yajima	Mr. Khorasani	Regional Water Organization of Guilan
		Freidoon Pooya Sefat	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
Soil Erosion/Watershed Management, and Natural Resources Management	Noboru Yokoyama and Yoji Mizuguchi	Hossein Ali Mohammadi	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Headquarters
		Ali Jamali	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
		Asan Bagherzadeh	Department of the Environment Guilan

Solid Waste Management	Hideki Wada	Representatives of municipalities	Guilan Provincial Government, Rasht Municipality, Anzali Municipality
		Balal Dayan	Department of the Environment Guilan
Water and Sediment Quality Analysis	Kengo Naganuma	Seyed Hojat Kheda Parast	Bony Fish Research Center
		Mohammad Alizadeh	Department of the Environment Guilan
Socio-economy	Tomoo Aoki	To be appointed	Guilan Provincial Government
		Mohammad Bager Rafati	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
Wetland Ecosystem	Moslem Akbarnia	Shaban Ali Nezami	Department of the Environment Guilan
		Mahyar Sakari	
Environmental Education	James Hindson	Hosseini	Department of the Environment Guilan
		Ali Asghar Ghasemi	Extension Dept. of Watershed Management DeputyMinistry of Jihad-e-Agriculture Guilan
Institutional Development	Paul Driver	Fariborz Jamalzad	Jihad-e-University
		Azim Zarei	Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
Agriculture/Agricultural Chemical Administration	Sinichiro Tanimoto	Esmail Moshir Talesh	Extension Dept. of Watershed Management Deputy, Ministry of Jihad-e-Agriculture Guilan
		Amir Akbarzadeh	Department of the Environment Guilan

APPENDIX 3 LIST OF LAWS

(1) The Environmental Protection Act (1974, amended in 1992)

(2) The Executive By-Law on the Environmental Protection Act (1975, amended in 1995)

(3) The Game and Fish law (1967, amended in 1996)

(4) The Executive By-Law on the Game and Fish law (1967)

(5) The Executive By-Law on the Prevention of Water Pollution (1994)

(6) The Environmental Protection Act (1974, amended in 1992)

(7) Section 55 of Municipal Law (1955)

(8) Law of Land Affair (1962)

(9) Law on Exploitation and Protection of Forestry and Rangelands (1967, amendment in 1997)