

Figure 3.3.28 Design of Signboard for Reed Bed

3.3.7 Pilot Activity for Livestock Wastewater Treatment Facilities

(1) Objectives

Livestock waste is one of pollution sources in the basin of the Anzali Wetland. The waste shall be treated properly for the conservation of the wetland. However, owners of livestock do not have much information on the methods how to treat the livestock waste properly, and they can hardly have an incentive for the installation under their financial burden.

Under the above situation, a livestock waste treatment facility with biogas generation was proposed. The proposed treatment facility generates biogas through the treatment process and the waste is to be changed to compost. The biogas can be used for energy for cooking and heating for daily life, and the compost can be used for fertilizer for agricultural land. The generation of the biogas and compost were expected to be an incentive to installation of the treatment facility.

(2) Principal Features of Livestock the Wastewater Treatment Facility

The livestock wastewater treatment facility was constructed, as a pilot activity for promotion of livestock wastewater treatment. The livestock wastewater treatment system proposed is as shown in Figure 3.3.29.

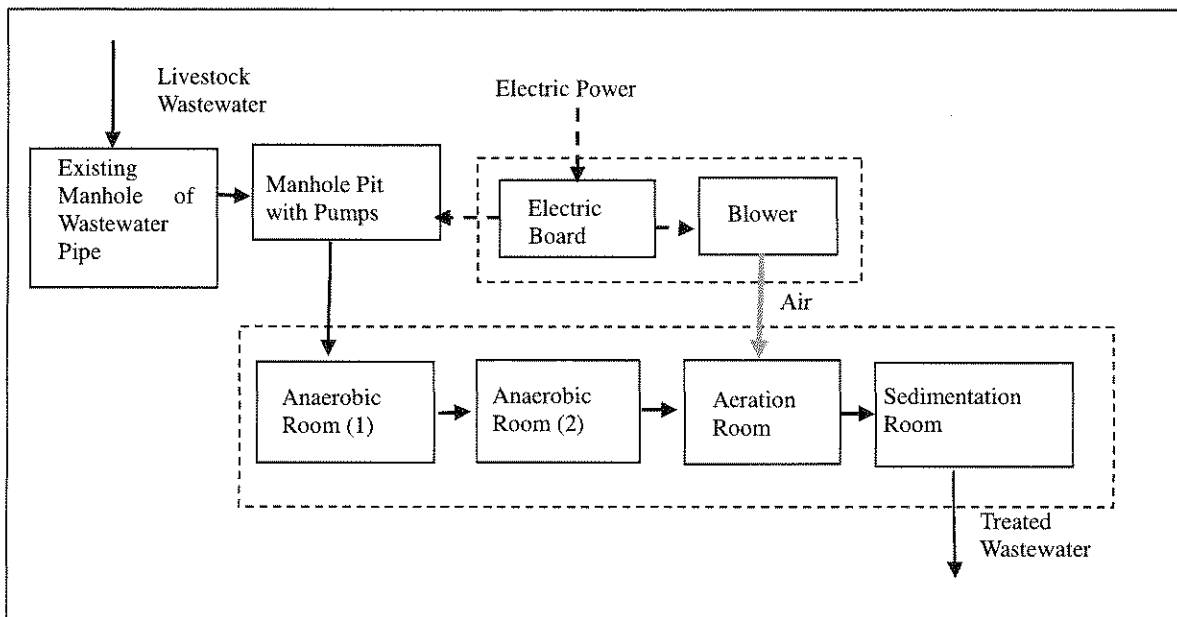


Figure 3.3.29 System Layout of Proposed Treatment Process

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 Table 3.3.18.

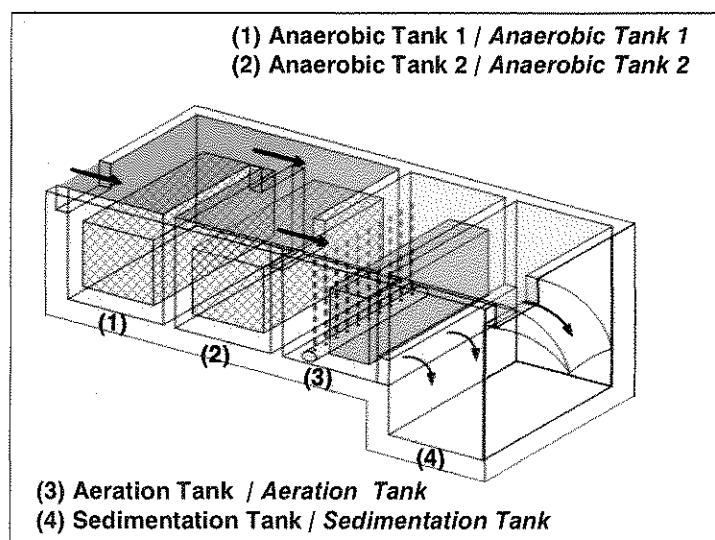


Figure 3.3.30 Outline of Proposed Wastewater Treatment Facility

Table 3.3.18 Specifications of the Livestock Wastewater Treatment Facility

Facilities	Specification
1) Manhole Pit	The manhole pit. Diameter: 1.2 m, Depth: 5.5 m
2) Submersible Wastewater Pump	Two submersible wastewater pumps shall be prepared. One is to be installed in the Manhole and one is to be stand-by. Type Submersible Wastewater Pump Number 2 units Water Head: 6 m Flow: 6 m ³ /h A timer shall be attached for flow amount control.
3) Tanks for the Wastewater Treatment Facility	The tanks for the wastewater treatment will be housed in the following four rooms (4). Anaerobic Room (1): W: 2.5 m x L: 1.4 m x D: 2.0 m Anaerobic Room (2): W: 2.5 m x L: 1.4 m x D: 2.0 m Aeration Room: W: 2.5 m x L: 1.4 m x D: 2.0 m Sedimentation: W: 2.5 m x L: 0.8 m x D: 2.5 m
4) Blower	The blower shall send air to the Aeration Room. Number One Type Two Cylinder Type Capacity: 3 L/second Power: One house power Air pipe shall be installed for sending air to the Aeration Room.
5) Contact Material	Contact material shall fill the Anaerobic Room (1) and (2), and the Aeration Room. For Anaerobic Room (1) and (2) Material: Plastic Bottles, Dia. about 10 cm Amount: 2.24 m ³ (1.6m x 1.4mx1.0m) 2.80 m ³ (2.0m x 1.4mx1.0m) For Aeration Room Material: Plastic Bottles, Dia. about 6 cm Amount: 2.25 m ³ (2.5m x 0.9mx1.0m) The contact material shall be fixed in each room by steel bars and plastic fences.
6) Connection Pipes	Connection pipes shall be prepared for wastewater connections. Diameter: 3 inches, Length: 6 m
8) Signboard	A signboard shall be installed in the open space for inspection. Board Size: L: 1.5 m, W: 1.0 m, Height: 2.0 m

(3) Progress of the Activity

Table 3.3.19 shows the overall progress of the activities.

Table 3.3.19 Progress of Pilot Activity on Livestock Waste Treatment

Work Item	2003				2004									
	9	10	11	12	1	2	3	4	5	6	7	8	9	10
1. Study & Design	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2. Construction														
3. Operation														
4. Manual & Report Preparation														

1) Original Plan: Bio-gas Generation System

In cooperation with the Natural Resource Research Center (NRRC), the livestock waste treatment facility with bio-gas generation was designed as below.

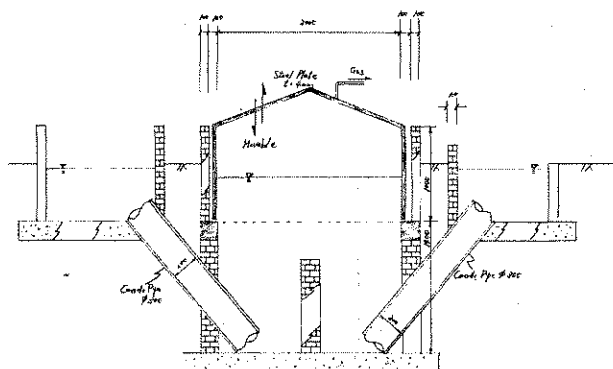


Figure 3.3.31 Design of Livestock Waste Treatment Facility with Bio-gas Generation

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

- 1) The facility may not operate properly in cold weather. On other hand, the gas is valuable for the mountain area, Guilan in winter. The system is not suitable in this condition.
- 2) It is easy to get national gas at cheap price in Iran. The gas generation is not expected as an incentive to operate the facility.

- 3) Sludge generated from the system can be used as fertilizer, but the management is difficult comparing with the compost method.

2) Construction and Operation

The construction was carried out under supervision of the JICA Study Team as shown in below figures.



Figure 3.3.32 Construction of Wastewater Treatment Plant

After completion of the construction works, the constructed wetland commenced to operate in October, 2004. The water quality of influent to the facility is as shown below.

Table 3.3.20 Water Quality Data of the Wastewater Treatment Plant

Sample	BOD (mg/L)	COD (mg/L)	TN (mg/L)	TP (mg/L)
Raw Wastewater from Sefidroud Industrial Animal Husbandry	650	1,550	96	5.5

(4) Final Evaluation

1) Participation and Commitment

DOE and NRRC participated in the planning and design procedure in the pilot activity. The site surveys on wastewater treatment facilities and the site selection surveys were carried out jointly.

2) Technical Effectiveness

The wastewater treatment facility with the Anaerobic Filter and Contact Aeration Process is a popular treatment process in Japan. This pilot activity proved that the anaerobic filter and contact aeration process can be constructed easily and be operated properly in Iran.

3) Education Benefit

Through the pilot activity, there were many discussions on designs of the livestock waste treatment facility with bio-gas generation between DOE, NRRC and the JICA Study Team. It is believed that the discussions and the design works contributed to expansion of knowledge of livestock waste treatment among Iranian Counterparts. The experience of design and operation of the wastewater treatment facility is expected to contribute to expansion of small scale wastewater treatment facilities with secondary treatment processes in Guilan. For the purpose of the public awareness on the wastewater treatment process, a signboard was designed as shown in Figure 3.3.33.

4) Sustainability

Proper maintenance is a key factor for sustainable operation of the treatment facility. Continuous monitoring on the treatment facility is required for leaning of proper maintenance and operation condition of the facility.



Figure 3.3.33 Design of Signboard for Livestock Wastewater Treatment Facility

3.3.8 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. The setting large dust boxes beside bridges this activity aims to prevent wastes from being thrown down to the rivers.

(2) Activity

1) Overall Progress of the Activity

Table 3.3.21 shows the overall progress of the activity.

Table 3.3.21 Progress of Pilot Activity on Waste Drop-off Center

Work Item	2003				2004									
	9	10	11	12	1	2	3	4	5	6	7	8	9	10
1. Preparation														
2. Production of Drop-off Box (5 place)														
3. Collection														
4. Monitoring/Questionnaire Survey														
5. Data Evaluation														

2) Preparation

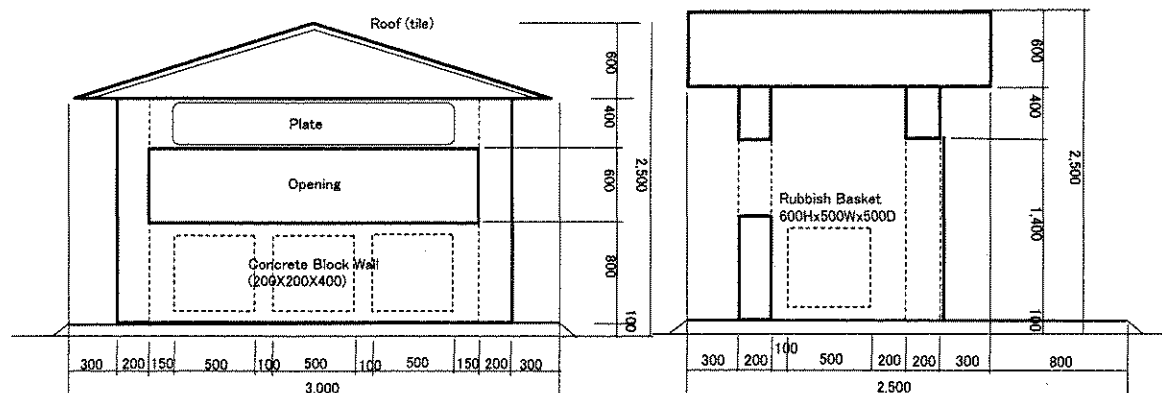
Through discussions in the meetings with municipalities and NGOs, the following municipalities were selected as target areas.

Table 3.3.22 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

3) Production of Drop-off Center

The design of the drop-off boxes is shown in Figure 3.3.34. A message saying "Please Do Not Throw Your Waste into Rivers" was designed.



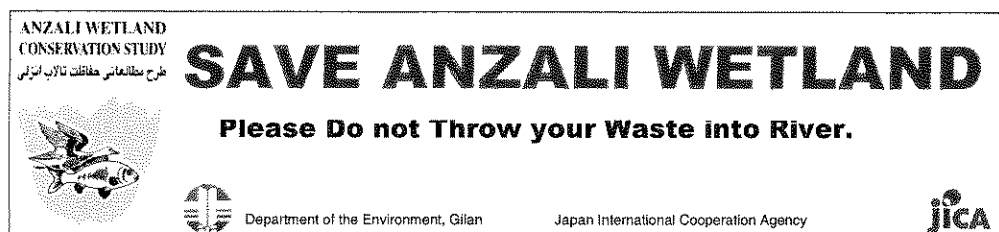
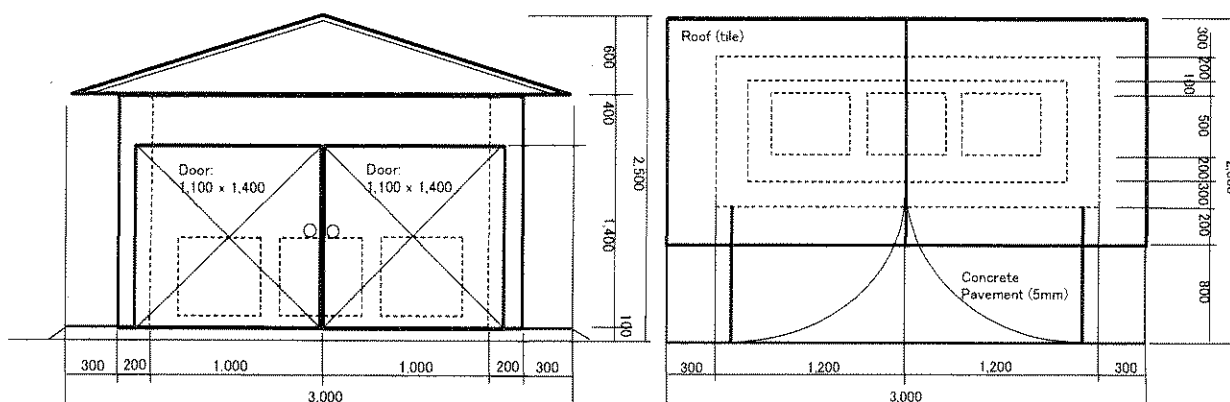
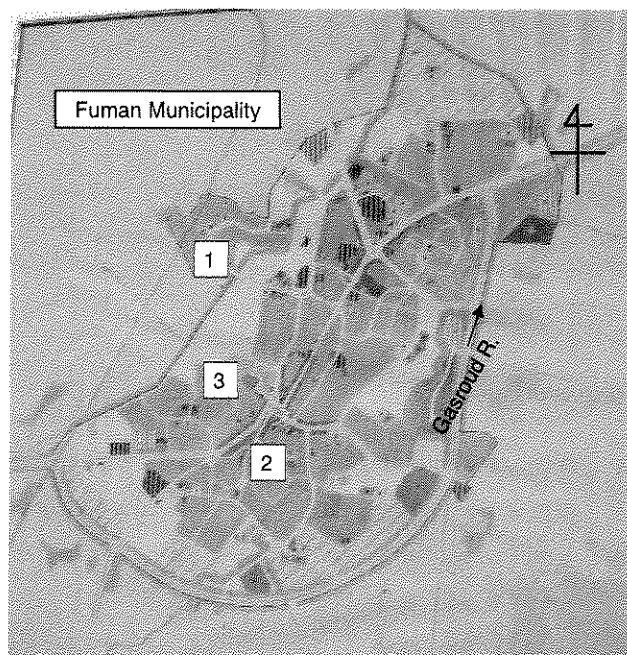


Figure 3.3.34 Design of the Drop-off Center

4) Location of Drop-off Box

The locations of drop-off centers were discussed with the mayors by consulting land availability and expected effects as follows.

a) Fuman

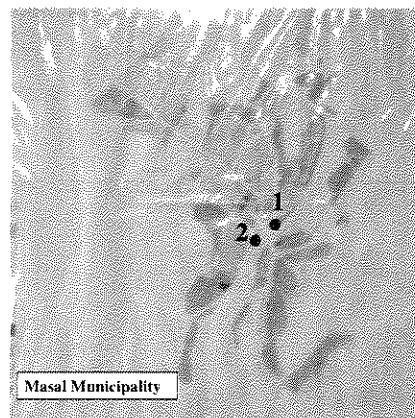




Note: From the far left No. 1, 2, 3

Figure 3.3.35 Proposed Sites for Drop-off Center in Fuman Municipality

b) Masal



Left: Along the Khalkai River (in the market place in every Saturday)



Right: Along the Khalkai River

Figure 3.3.36 Drop-off Center in Masal Municipality

(3) Final Evaluation

1) Participation and Commitment

The NGOs in Fuman and Masal actively participated in the activities. The collection of solid waste by municipalities was also reasonable, though there were occasions that waste overflowed from the centers despite daily collection, in part because the centers were used by more residents than originally anticipated.

2) Technical Evaluation

Figure 3.3.37 shows photographs of drop-off centers in use.

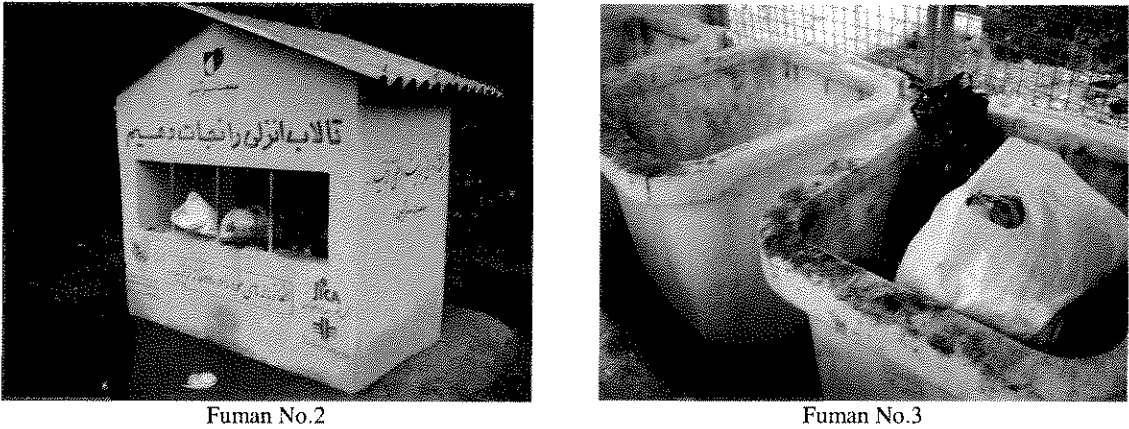


Figure 3.3.37 Waste Drop-off Centers in Use

The amount of waste collected was monitored weekly using the monitoring sheet as shown in Figure 3.3.38. .

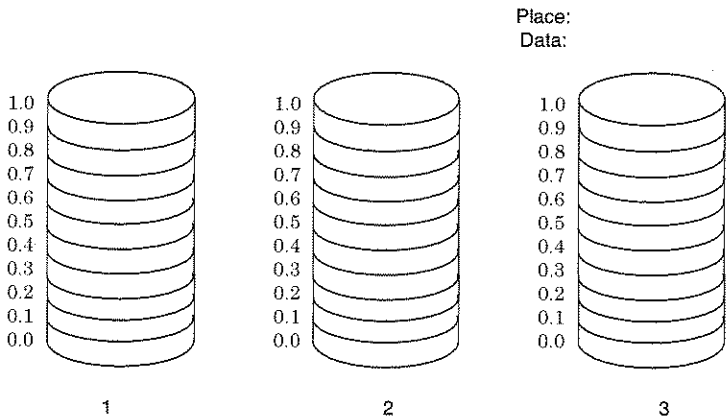


Figure 3.3.38 Monitoring Sheet for Drop-off Center

Based on the results of the monitoring, the amount of the waste collected daily averaged 95 kg/site, and around 100 persons are thought to use each drop-off center.

The amount of waste varied very much during a week as shown in Figure 3.3.39.

Table 3.3.23 Amount of Waste Collected in Drop-off Centers

	Location	Average Daily Waste (kg/day)	Expected Annual Amount (ton/year)	Persons to Use (Persons)	Households to Use (Households)
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

Note: This table was made based on the data collected by the monitoring sheet with the following assumptions.

- 1) The container size used is 250 liter. The bulk density is 0.3 t/m³.
- 2) Average daily waste is the average amount over a week.
- 3) "Persons to use" is calculated based on the waste generation rate of 900 gram/person/day.
- 4) Number of households is calculated assuming 4 persons per household.

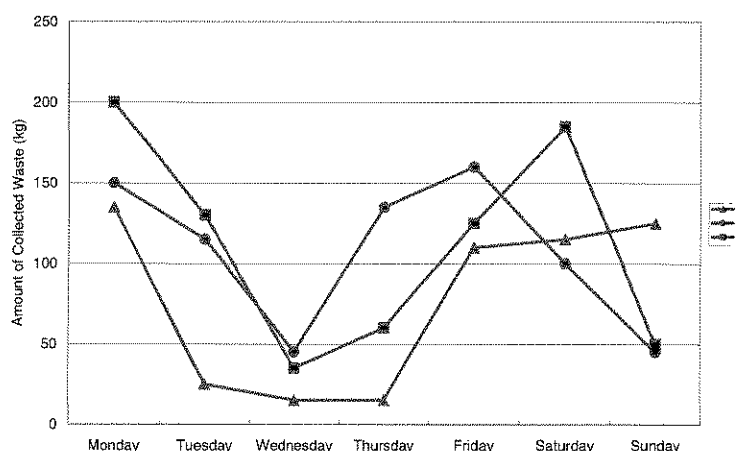


Figure 3.3.40 Trend of Collected Waste in Fuman

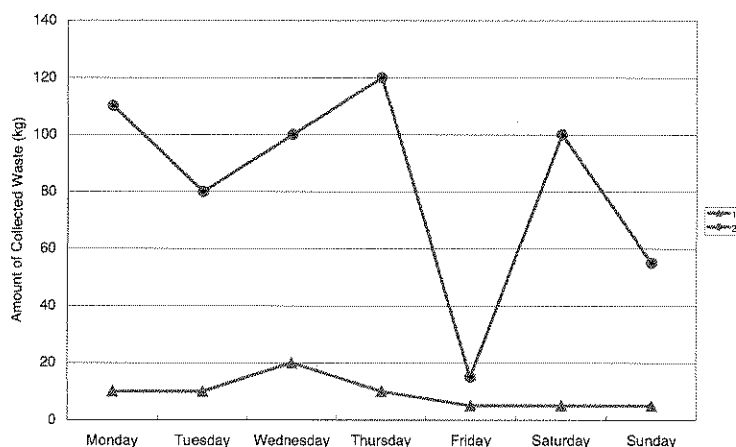


Figure 3.3.41 Trend of Collected Waste in Masal

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 of the existence of the drop-off centers. The respondents were 56 in Fuman and 25 in Masal.

Impression of Drop-off Centers: The drop-off centers were generally welcomed by the respondents. When asked whether more drop-off centers should be constructed, over 90% of the residents agreed as long as the municipality regularly collects waste from the centers.

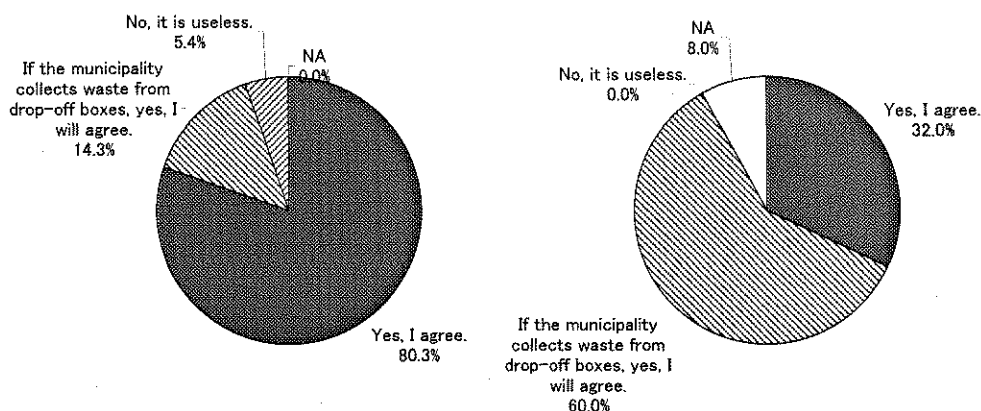


Figure 3.3.42 Do You Agree to Set More Drop-off Centers (left: Fuman, right: Masal)

Effectiveness of Drop-off Centers: The majority of the people felt that the drop-off centers were effective in conserving the Anzali wetland.

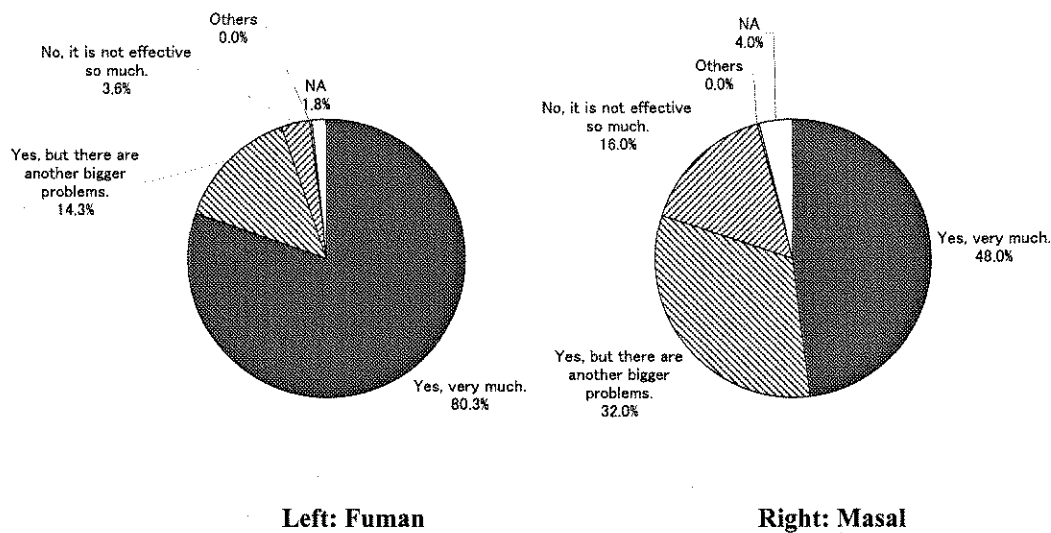


Figure 3.3.43 Effectiveness of Drop-off Centers to Conserve the Anzali Wetland.

Usage Rate of Drop-off Centers: 70% and 48% of the respondents use the drop-off centers in Fuman and Masal respectively.

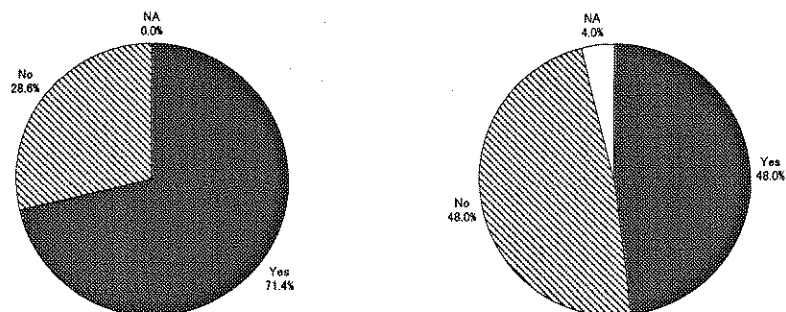


Figure 3.3.44 Usage Rate of Drop-off Center

Frequency of Use: With regard to the frequency of use, nearly a half of the residents around the centers used the centers almost everyday.

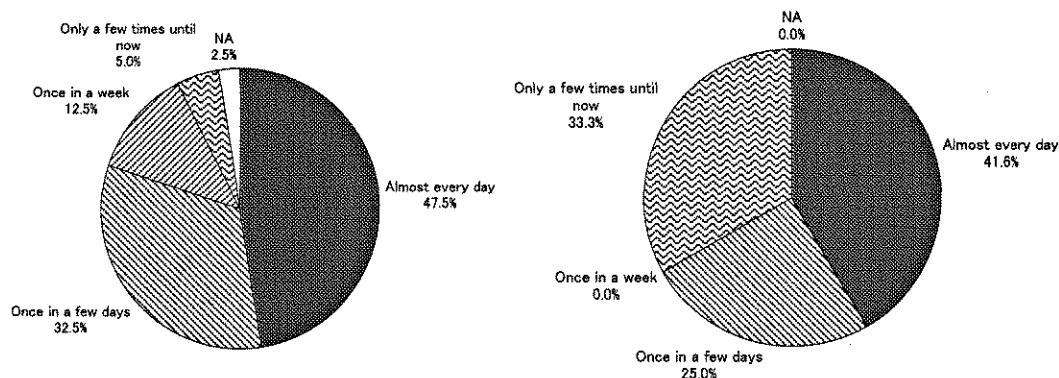


Figure 3.3.45 Frequencies to Use Drop-off Centers (left: Fuman, right: Masal)

Reasons to Use Drop-off Centers: The drop-off centers were more convenient for residents to discharge their wastes, even in the areas where waste collection service is provided.

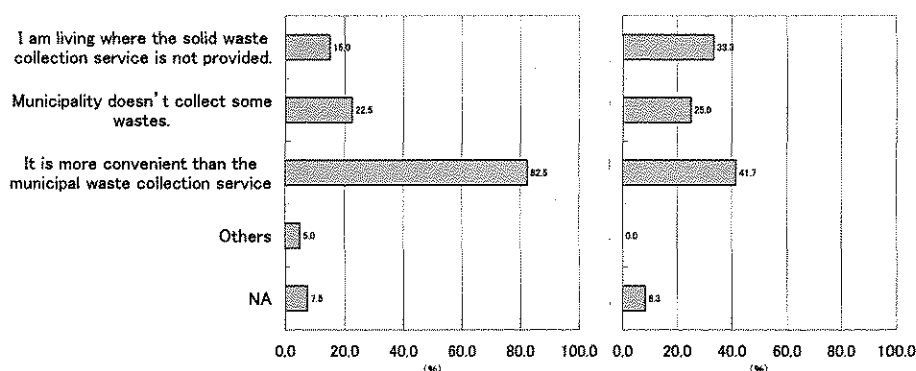
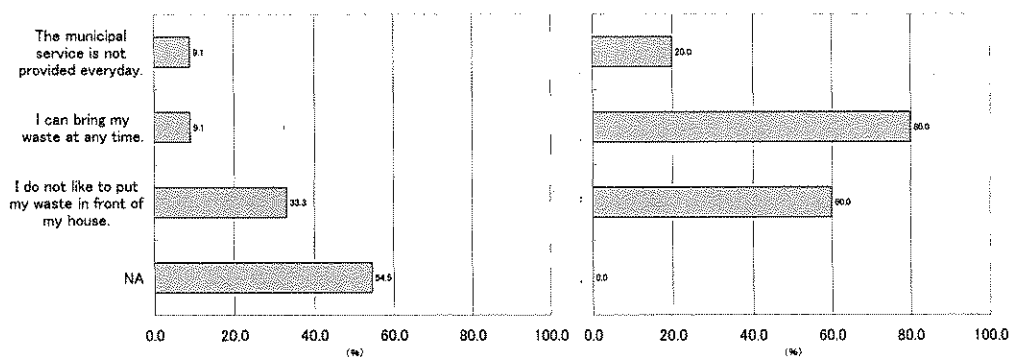


Figure 3.3.46 Reasons to Use Drop-off Centers (left: Fuman, right: Masal)

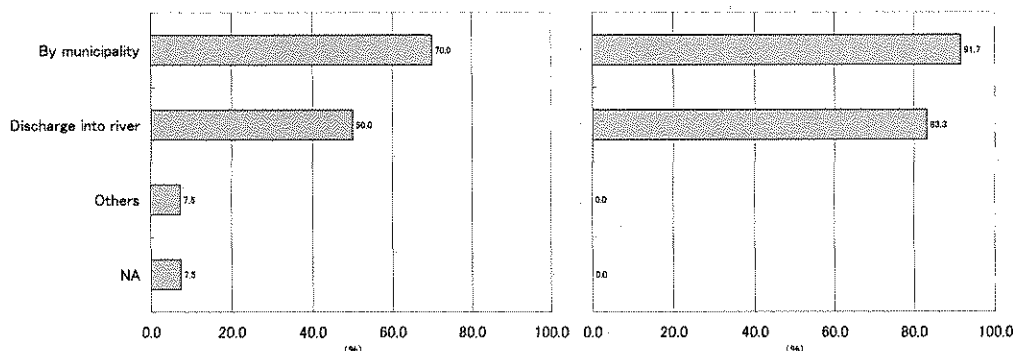
Problems with the Existing Collection Service: In Fuman, 30% of the respondents answered that they do not want to put their waste in front of their houses (The answers from Masal seem to suggest the same inconvenience as in Fuman, but the number of the respondents was too small to conclude this).



Note: The number of respondents in Masal was only 5 persons.

Figure 3.3.47 Why is the Municipal Service Inconvenient? (Left: Fuman Right: Masal)

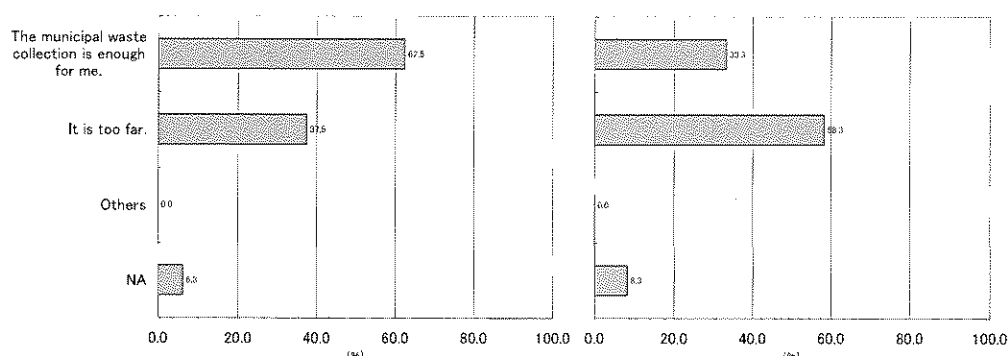
Before the drop-off centers were set, almost all respondents used both the municipal service and discharge to rivers.



Note: The number of respondents in Masal was only 12 persons.

Figure 3.3.48 Disposal Method before Drop-off Center (Left: Fuman Right: Masal)

Reasons for not to using drop-off center: 60% of the respondents who do not use the drop-off centers in Fuman think that the municipal waste collection is enough. In Masal, on the contrary, 60% of the respondents who do not use the centers think it is too distant.



Note: The number of respondents in Fuman and Masal were only 16 and 12 persons respectively.

Figure 3.3.49 Reason Not to Use Drop-off Center (Left: Fuman Right: Masal)

The comparison between “before” and “after” setting drop-off centers can tell us the direct effect of them to reduce the waste thrown into rivers. As shown in Figure 3.3.50, there were some waste bags before the drop-off center was constructed, but after the drop-off center was set, the areas seemed to be cleaner than before.



Figure 3.3.50 Comparison between “Before” and “After” in Fuman No.3



Figure 3.3.51 Comparison between “Before” and “After” in Fuman No.1

Based on the questionnaire data, the change of disposal methods before and after the construction of drop-off centers was estimated as shown in Table 3.3.24. Before the construction of the drop-off centers, 39% of the total waste around the drop-off center in Fuman was discharged to rivers. After the construction, this became essentially zero. The figure in Masal was 48%. In terms of the weight of wastes, 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 assuming that 95 kg/day/site of waste was generated around the site.

Table 3.3.24 Change in Disposal Methods in Fuman

	Rate in Disposal		Amount of Waste (kg/day)	
	Before	After	Before	After
By municipality	54.9	22.7	52	22
Discharge into river	39.2	0.0	37	0
Drop-off Center	0.0	71.4	0	68
Others	5.9	5.9	6	6
Total	100.0	100.0	95	95

Table 3.3.25 Change in Disposal Methods in Masal

	Rate in Disposal		Amount of Waste (kg/day)	
	Before	After	Before	After
By municipality	52.4	52.0	50	49
Discharge into river	47.6	0.0	45	0
Drop-off Center	0.0	48.0	0	46
Others	0.0	0.0	0	0
Total	100.0	100.0	95	95

3) Sustainability

The drop-off centers were proved to be effective to reduce the amount of waste thrown into rivers, and the mayors of Fuman and Masal with NGOs are considering increasing the number of the drop-off centers. This is a positive indication that the idea of drop-off centers is indeed sustainable.

The pilot activity showed that a number of factors influence the success of drop-off centers. Among them, the most critical factors are (i) participation of local residents and/or NGOs, and (ii) commitment of a municipality to collect waste from drop-off centers.

People around the drop-off centers came to recognize that to throw waste into rivers can be avoided by using the drop-off centers. This preliminary stage of participation can be linked and boosted to another activity. It can be proposed to link to the community-based recycling activity, which is addressed in the following section.

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 away, started to use the centers. Some residents complained about bad smells. Nonetheless, even these problems are 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.

3.3.9 Community-based Recycling

(1) Objective

This activity is the extension of the waste drop-off center activity. The drop-off center instilled environmental awareness and could lead to community-based waste management such as recycling. The objectives of this activity are (i) to reduce the amount of waste to extend the life of the landfill sites, (ii) to create responsibility for the waste among the community and (iii) to develop environmental awareness of their city and the Anzali Wetland within the people.

(2) Progress of the Activity

Table 3.3.26 shows the progress of the activity.

Table 3.3.26 Progress of Pilot Activity on Community-based Recycling

Work item	2003				2004									
	9	10	11	12	1	2	3	4	5	6	7	8	9	10
1. Selecting Target Areas (2sites)														
2. Selecting Recycler														
3. Designing Collecting system														
4. Environmental Education														
5. Collection and Monitoring														☆
6. Holding Workshops														☆

Note: ■ and ☆: Implementation

1) Selecting Target Areas

Some discussions with municipalities and NGOs have been held to design the activities, then, two recycling activities have been proposed. One is to promote an organized recycling activity in communities in Fuman city, as suggested in the Solid Waste Management Plan. The activity of waste drop-off centers in Fuman had been managed well by the NGO, Sabz Aien. One community with 50 households, which is next to one of the active drop-off centers, was selected as the target because it was suitable to start recycling activity. The other activity is to support an existing initiative to promote recycling through schools in Somehsara, which has been proposed by a local NGO, the Women's NGO Against Pollution. Somehsara municipality was eager to recycle paper and this NGO had some experience in environmental education in Rasht. Therefore, this NGO carried out this activity, in cooperation with the municipality and two primary schools. 2 classes of 5th grade in each school were selected.

2) Selecting the Recycler

In Fuman, the NGO had some troubles to find a recycler because of their optimistic design of collection. As a result, they found a collecting person who can buy recyclables from each household that he would then sell to the recycler. The municipality of Somehsara had known the paper recycler.

3) Designing the Collecting System

This process is the key to this activity. The system includes selecting target recyclables, places of collection, frequency of the collection and distribution of the income. In Fuman, the NGO selected three recyclables, cans, glass and paper. It was limited to these items because of the difficulty to find a recycler. A collecting person was found who visits each house once a week with an NGO ID card, he would pay each household according to the amount of recyclables. In Somehsara, recycle bins had been installed in the classrooms of the 5th grade by the municipality. The municipality of Somehsara sells the waste paper collected by the students. The income will be held stored by the municipality to get something as an incentive for the participating schools. It is essential for the children to have incentives for recycling activity, therefore, the NGO decides which incentive would be suitable for them.



Educational session with 5th grade classes by NGO



Recycle bin prepared by Somehsara municipality

Figure 3.3.52 Educational Activities in Somehsara City

4) Environmental Education

It takes a long time to inform people of the recycling concept and systems and to get results from this activity. In Fuman, the NGO prepared a big flag with a recycling slogan near the target community. Also educational pamphlets and three plastic bags to separate wastes were distributed along with explanations to each household. In Somehsara, the NGO provided two educational sessions in two weeks.



Information flag to encourage people to recycle



Distributing bags and pamphlet and explaining

Figure 3.3.53 Educational Activities in Fuman City

5) Collection and Monitoring

The first collections were done in October. Information about the activity had not been spread; therefore, only a few recyclables were collected at this time.

6) Workshop

Workshops will be carried out, such as visiting landfill sites or the compost plant to explain the solid waste lifecycle.

(3) Final Evaluation

1) Participation and Commitment

The participation of both NGOs was very active. The NGO in Fuman is eager to inform. They had visited every household, of target community and explained the activity directly. The schools, teachers and municipalities were involved in Somehsara, and they were aware of environmental problems close to them. However, at both sites, discussions among participants such as the municipalities, residents, recyclers, teachers and NGOs, seemed inadequate to design a satisfactory collecting system.

2) Technical Effectiveness

The amount and income of the first collection was only a little, as in the process of spreading education had just begun. According to the level of developing environmental awareness, the income would increase and this recycling activity would be more sustainable.

3) Educational Benefit

To sell recyclables, it is necessary to spend a few minutes of washing and separating waste in each household. This activity can be a good opportunity to think about their environment. This activity by children will show a good attitude for their family or community and it can be a strong influence on them. This activity can be expanded from primary school to the community, and finally to the whole city.

4) Sustainability

This activity is in the process of raising environmental awareness. The sustainability of this activity depends on two difficult factors; to create an adequate collecting system with more participation and to give non-economic incentives to the participants. However, the low price of recyclables is a serious obstacle to recycling. For example, 30kg of waste paper had been collected in one month by students in Rasht, and the income was 10,500 Rials (1.2 dollars). Therefore, through the recycling activity, not only environmental awareness but also active participation of the community needs to be raised. Non-economic incentives such as stimulation of the children and setting honorable and original objectives for the community would be essential to make the activity sustainable.

3.3.10 State of the Environment Report

(1) Objectives

Many organizations are involved in the environmental management of the Anzali Wetland and its basin. 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) Progress of the Activity

Table 3.3.27 shows the progress of the activity.

Table 3.3.27 Progress of Development of the State of the Environmental Report

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														■

Note: ■ : Implementation

1) Selection of Editors

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.

2) Detailed Planning of the Contents

The editors and the team discussed the contents of the report based on the Environmental Monitoring Activity.

3) Collection of Data and Information

The data and information were collected from various organizations as discussed in the section on the Environmental Monitoring Activity.

4) Drafting of the Report

In August, 2004, the editors drafted the report in Farsi.

5) Designing of the Report

A rough draft design was developed by the editors. Then, a local designer designed the report.

6) Printing and Distribution

The printing of the report was finished on October 9, and the report was distributed to stakeholders, such as schools, DOE, MOJA, municipalities, etc.

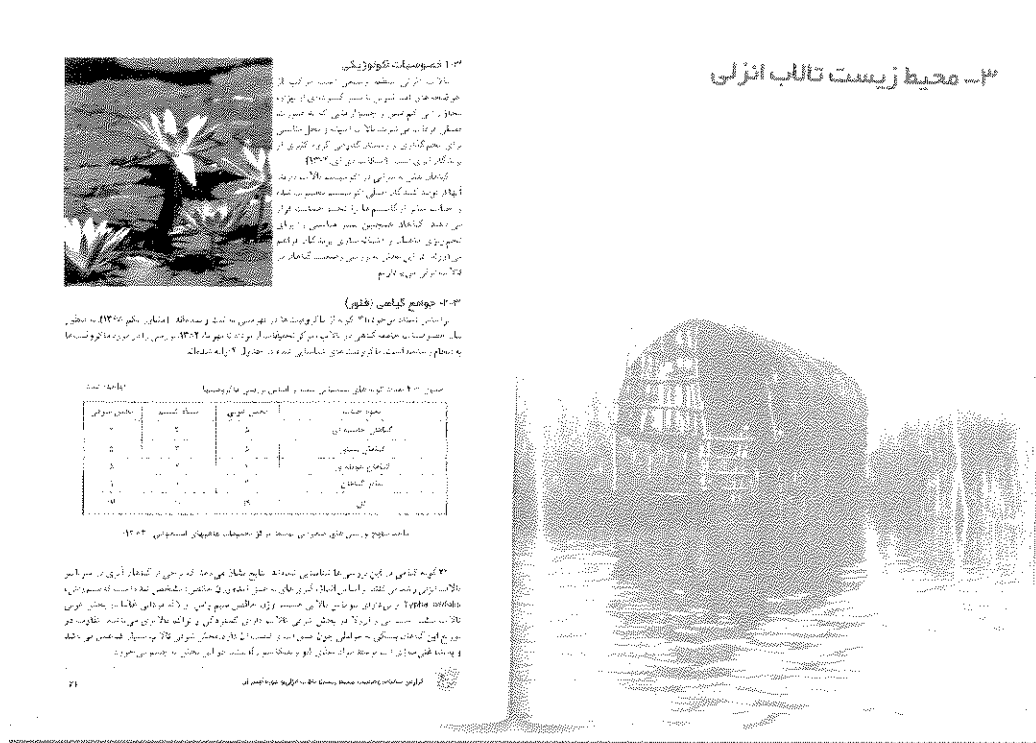


Figure 3.3.54 An Excerpt from the Environmental Report

(3) Final Evaluation and Recommendations

1) Participation and Commitment

The participation of relevant organizations was reasonable, and the activity was not difficult in the technical sense as most of the information needed for the preparation of the report had been collected by the team and was readily available. Nevertheless, many stakeholders did not fully understand the real objectives of this activity, namely dissemination and sharing of information and development of adaptive management mechanisms. The difficulty was compounded by the shortage of government staff that can type and edit files electronically. As a result, the commitment of many stakeholders was not as high as it was hoped.

2) Technical Effectiveness

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, by sharing the information, the report will help stimulate coordination among stakeholders. Thus, the report has far-reaching impact on conservation of the wetland and promotion of the regional environmental management.

3) Educational Benefit

The report has significant educational benefits. For example, teachers could talk about how our daily activities, such as discharging wastewater without treatment or throwing waste into rivers, could affect the wetland. Religious leaders can also preach about the importance of environmental conservation. Media can learn the status of the environment, and then cover important environmental issues, such as solid waste management, development of sewerage systems and the number of birds coming to the wetland.

4) Sustainability

As the first report has been published, the subsequent issues would be easier to make. 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 journalists or NGOs. Supports from decision makers are also essential. Under the current administrative system, it is quite difficult to manage such an inter-organizational task. Thus, it is suggested that the conservancy or the Provincial Working Group on Environment, Land Use and Population takes the lead on the preparation of the annual state of the environment report.

3.3.11 Website Development

(1) Objective

In this activity, a website for the study was developed jointly by the counterparts and the JICA Study Team. The objectives of the activity are (i) to develop a website to disseminate information about the environmental management of the Anzali Wetland and its basin and the activities of the study, and (ii) to promote environmental education and eco-tourism.

(2) Progress of the Activity

Table 3.3.28 shows the progress of the activity. The original schedule was to launch the website by late February 2004, and the activity was carried out more or less according to the schedule.

Table 3.3.28 Progress of Website Development

Work Item	2003				2004									
	9	10	11	12	1	2	3	4	5	6	7	8	9	10
1. Selection of Editors and Designers			■											
2. Planning of the Web Pages				■										
3. Drafting of the Web Pages				■ ■ ■ ■		■	■	■	■	■	■	■	■	■
4. Designing of the Web Pages					■ ■ ■	■	■	■	■	■	■	■	■	■
5. Launching of the Web Pages						●								

Note: ■ ■ ■ ■ : Implementation ■ ■ ■ ■ : Updating

1) Selection of Editors and Designers

The original plan was to select editors from relevant organizations, and hire a local expert for designing the web pages. However, there were essentially no stakeholders, such as staff members of DOE, who had enough computer skill to develop web pages, and who could also communicate with the team in English. Private web designers were available in Rasht, but the charge rate was high. Considering the various difficulties in developing the web site, the JICA Study Team led the activity.

2) Planning of the Web Pages

There were two potential alternatives for the overall contents of the site; one was the website of the Anzali Wetland focusing mainly on information about the wetland itself; the other was the website of the study focusing on activities of the study. In a long run, it may be desirable to develop a website for the wetland set up so that people who visit the wetland can learn about the wetland. However, a review of available information revealed that the information on ecological conditions of the Anzali Wetland was too limited to develop a website for the Anzali Wetland. Thus, it was decided that the project website with the following objectives, target audiences and general contents, be developed first. The site can be redesigned as a website for the wetland as more information becomes available.

Table 3.3.29 Objectives, Target Audiences and Contents of the Website

Category	Remarks
Objective	To disseminate information about the JICA Study
Target Audiences	<ul style="list-style-type: none"> - Counterpart personnel involved in the JICA study - Other government officials in Iran - Researchers - Environmental NGOs - Environmental education experts - Donors (JICA, JBIC, World Bank, UNDP, others) - Environmental consultants
General Contents	<ul style="list-style-type: none"> - Index - About our study - Present Conditions of the Anzali Wetland and Its Basin - Environmental Management Issues - Master Plan - Activities - Study Team and Committees - Contact us

3) Drafting of the Web Pages

Based on the available information, the JICA Study Team drafted the original English pages. Then, the Farsi pages were created based on the English pages.

4) Launching of the Web Pages

Because DOE-HQ hosts websites for the provincial DOE bureaus, the hosting of the Anzali website was entrusted to DOE-HQ. The English webpage was officially launched on February 15, 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.

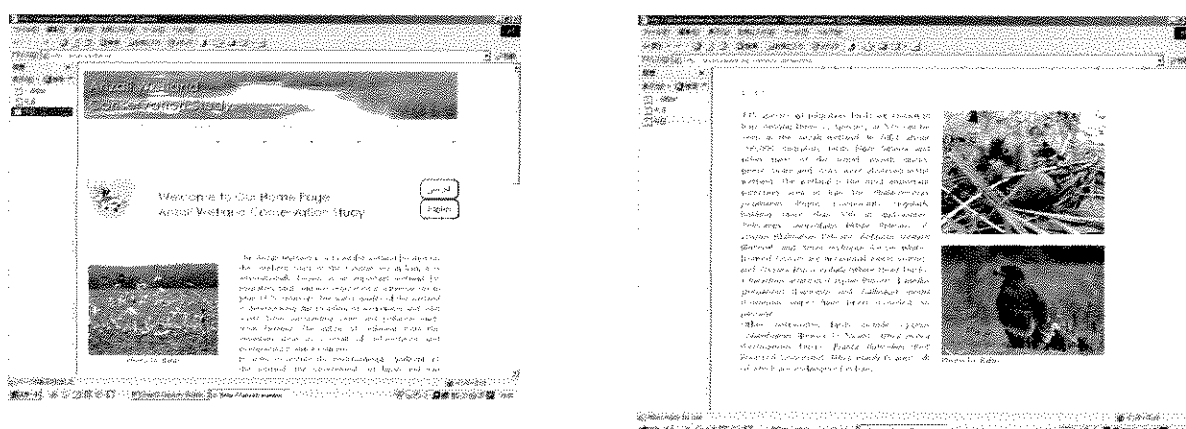


Figure 3.3.55 Web Pages

5) Training of Stakeholders

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.

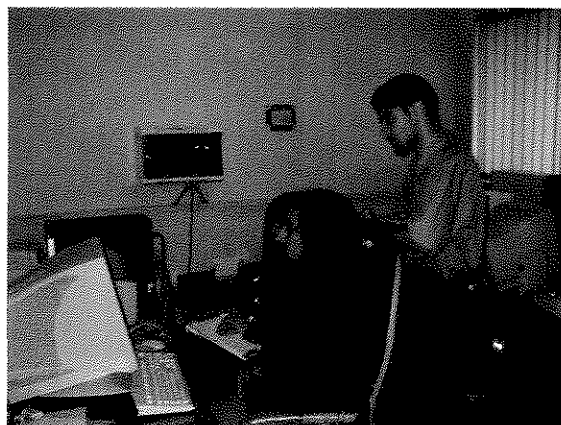


Figure 3.3.56 Training of DOE Staff

(3) Final Evaluation

1) Participation and Commitment

The participation in web site development was highly influenced by the availability of specialists. DOE in Guilan was the main partner in this activity, but it was difficult to find staff who knew enough about website development. So, the general design and the English pages were developed by the team. On the other hand, the DOE-HQ provided the study with a web space, and its specialist assisted the team to upload the files.

2) Technical Effectiveness

The website was very useful in explaining the contents of the study, especially to donors, government officials and experts. There is no need to prepare printed materials, which is costly, and all materials on the website are available 24 hours. Many experts have contacted the team after seeing the webpage.

3) Educational Values

The real potential of a website for environmental education has not been tapped in Guilan. However, there is already a web space dedicated for the environmental conservation of the wetland and its basin and many things can be done to promote

environmental education, 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.

4) Sustainability

DOE Guilan already has all the resources necessary to continue the web page development, such as computers, web design software, a modem, and a web space at the DOE-HQ. The cost for web page development is minimal, and a crush 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 to be in charge of web updating.

CHAPTER 4 ENVIRONMENTAL MONITORING ACTIVITIES

4.1 Objectives

DOE, MPJA, 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 for environmental monitoring through the 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.

4.2 Outline of Activities

4.2.1 Selection of Monitoring Items

(1) Framework for Environmental Monitoring Activities

A framework for environmental monitoring based on the following categories of indicators was introduced to each field of environmental management activities, namely wetland management, watershed management, wastewater management and solid waste management. Monitoring activities for environmental education and institutional development were discussed in each field of environmental management activities, and were not treated separately.

Table 4.2.1 Framework of Environmental Indicators

Category		Explanation
State	State of the Environment	The conditions of the environment
Pressure	Environmental Pressure	The causes of environmental problems
Response	Policies and Plans for Environmental Management	Adequacy of policies and plans for environmental management
	Resources for Environmental Management	Inputs of human and financial resources for environmental management
	Processes of Environmental Management	Actions taken for environmental management
	Performance of Environmental Management	Outcomes of the environmental management, such as the actual improvement in the environmental conditions

4.2.2 Organization Structure for Proposed Activities

Figure 4.2.1 shows the overall organizational structure for the monitoring activities. The DOE, MOJA, MOE, NGOs and a number of other organizations were the targets of the monitoring activities. In each organization/section, officers/persons were appointed for the monitoring activity. The monitoring activities of these officers were coordinated by two coordinators selected from DOE and MOJA.

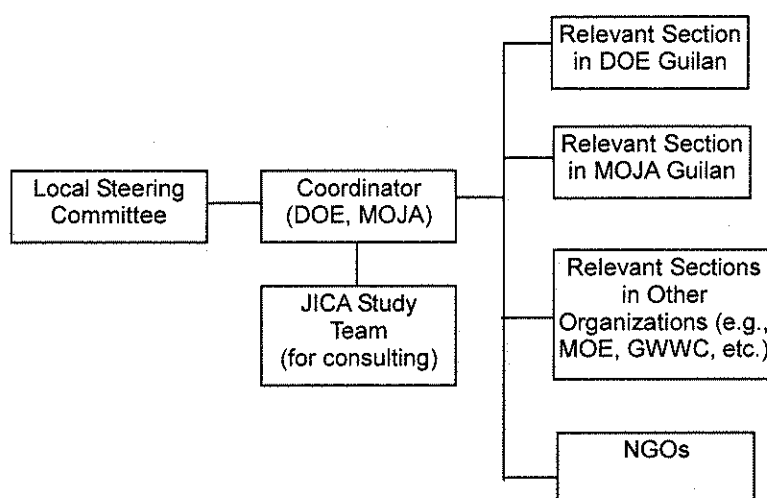


Figure 4.2.1 Organizational Structure for the Monitoring Activity

4.2.3 Implementation

Table 4.2.2 shows the progress of the environmental monitoring activities. 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, and the results were compiled into the state of the environment report in August, 2004. The compiled report was published as a part of a pilot activity proposed in the previous chapter.

Table 4.2.2 Progress 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													■	■

4.3 Environmental Monitoring Activities

4.3.1 Monitoring Activities on Wetland Management

(1) State of the Environment Indicators

With respect to the state of the environment relevant to the wetland, information on the ecological conditions of birds, macrophytes, fishes, and water and sediment quality were collected. The details of the monitoring activities and implementing organizations are shown in Table 4.3.1.

Table 4.3.1 Monitoring of State of the Environment Indicators Related to Wetland Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Birds, macrophytes and fishes</p> <p><Objective> To collect and summarize ecological information necessary to develop the zoning plan for the management of the wetland.</p> <p><Monitored Items> - Composition and habitats of local and migratory bird - Distribution and biomass of macrophytes - Composition and habitats of fishes</p> <p><Monitoring Sites> Siakeshim Protected Area, Selke Wildlife Refuge, and western part of the wetland</p> <p><Monitoring frequency> August 2003 and January 2004</p> <p><Outputs> The results of the monitoring were compiled as technical reports. See reports on the biological survey in the Data book. The results were also summarized in the Environmental Report.</p> <p><Evaluation> This was one of the most comprehensive ecological surveys in the recent years, and became a valuable source of ecological information on the wetland. The results were used to develop the zoning plan in the Wetland Ecological Management Plan.</p>	DOE Guilan (Natural Environmental Department) and Bony Fish Research Center
<p>Water and Sediment Quality in the Anzali Wetland</p> <p><Objective> A water and bottom sediment survey was implemented, and survey results were compared with international standards.</p> <p><Monitored Items> COD, T-P, T-N, Heavy metal (Cd, Pb, hexavalent-Cr, Hg, Cu) and pesticide (Diazinon) in water and bottom sediment, chlorophyl a in water, transparency, and water depth</p> <p><Monitoring sites> The Lagoon, Siakeshim Protected Area, central part of the wetland, eastern part of the wetland</p> <p><Monitoring frequency> Twice (dry season and rainy season)</p> <p><Outputs> The results of the monitoring were compiled as technical reports. See the results of the water and bottom sediment survey in the Data book. The results were summarized in the Environmental Report.</p> <p><Evaluation> This activity was carried out in parallel with the plankton and benthos survey by the Bony Fishes Research Center. The DOE laboratory and Bony Fishes Research Center were both involved in environmental research in the Anzali Wetland, though they seldom worked together before, and the activity provided an excellent opportunity for joint work.</p>	DOE Guilan (Water quality laboratory)

(2) Response Indicators

Three activities were proposed. Two of them involved gathering important information relevant to wetland management from the central government, and analyzing them in the context of the management of the Anzali Wetland. The third activity compiled a list of local resource persons for coordinating various wetland related activities.

Table 4.3.2 Monitoring of Response Indicators Related to Wetland Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Review of Case Studies of Wetland Management in Iran</p> <p><Objectives> There are a number of wetland management projects in Iran; however, information does not seem to be shared at the provincial level. In this activity, environmental management plans of other wetlands in Iran were collected from the central DOE as resources for environmental management, and reviewed by DOE Guilan in the context of the environmental management of the Anzali Wetland.</p> <p><Collected Information> - Reports on Uromiyeh Lake - Other relevant documents</p> <p><Output> No specific output was produced.</p> <p><Evaluation> The coordination between DOE Guilan and DOE HQ is not particularly strong, and it was difficult to gather information from the central DOE without the support of the team. This should be considered as a major weakness of the current administrative system.</p>	<p>DOE Headquarters</p> <p>DOE Guilan (Natural Environmental Department)</p>
<p>Collection of Information on Protected Areas</p> <p><Objectives> In this activity, the information about the boundaries of protected areas will be updated for better management of the wetland.</p> <p><Collected information> Official maps of protected areas, GIS data files, other relevant information</p> <p><Outputs> DOE Guilan dispatched an ecological expert to the wetland, and marked the boundaries of the wetland. Then, GIS data of the protected areas were created..</p> <p><Evaluation> DOE now has the capacity to generate GIS data based on field observations, and significant achievements were made.</p>	DOE Guilan
<p>List of Resource Persons for Wetland Management</p> <p><Objectives> Many people are involved in conservation of the Anzali Wetland, but their knowledge, activities and achievements are not known to others. Therefore, a list of local resource persons pertinent to wetland management was compiled, and the list is used to promote integrated management.</p> <p><Collected Information> - Names, affiliation, contact addresses, activities of NGOs, researchers, education experts, and others - It is the responsibility of the Natural Environment Department of DOE to compile information.</p> <p><Outputs> Some of the resource persons were listed in the Annual Environmental Report, but the list is not complete.</p> <p><Evaluation> There are a number of key people who know many stakeholders, and it was relatively easy to get in touch with many stakeholders through these key people. NGOs are also networked. However, some stakeholders, such as local hunters and fishermen, are not organized, and they were difficult to reach. In order to expand the network of people, it is suggested to organize these stakeholders.</p>	<p>DOE Guilan (Natural Environmental Department)</p> <p>NGO</p> <p>Researchers</p>

(3) Pressure Indicators

The major environmental pressures on the wetland include inflow of pollution loads to the wetland and the fluctuating level of the Caspian Sea. Therefore, both of these are monitored as the environmental monitoring activities (the pollution loads to the wetland will be monitored as a part of the wastewater monitoring).

Table 4.3.3 Monitoring of Pressure Indicators Related to Wetland Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Monitoring of Fluctuation of Water Level</p> <p><Objectives> The water level of the Caspian Sea is one of the most important determining factors of the wetland ecosystem, but its impact to the water level of the wetland has not been monitored in the past. As a part of this study, 4 staff gages were installed in the wetland. In this activity, the water levels of the wetland were monitored using these 4 gages, and compared with the water level of the Caspian Sea.</p> <p><Collected information> Water levels at 4 locations in the wetland and the Anzali Port</p> <p><Output> The results were tabulated.</p> <p><Evaluation> DOE started the monitoring of the water level in the wetland. However, many DOE staff still do not see the necessity of such basic information, and the monitoring was irregular and sporadic. In addition, there was a problem associated with the monitoring of the water level at the Anzali Port. The port authority did not know that the National Cartographic Center (NCC) had updated the national coordinate system. It is worth carrying out a reliable academic study of the hydrology in the wetland.</p>	<p>DOE Guilan (Natural Environmental Department)</p> <p>Anzali Port</p>

4.3.2 Monitoring Activities on Watershed Management

(1) State of the Environment Indicators

No state of the environment indicator was selected for the monitoring activities.

(2) Response Indicators

MOJA and NRGU in Guilan are large organizations, and carry out substantial activities related to environmental management, environmental education and sustainable development. However, their records of activities are scattered in various places, and it has been difficult to get a clear picture of their activities. Thus, this opportunity was used to review the activities of these organizations. In addition, GIS data produced by various organizations were reviewed.

Table 4.3.4 Monitoring of Response Indicators Related to Watershed Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Compilation of GIS Data</p> <p><Objective> MOJA Guilan, NRGO, DOE and MPO all have various GIS and satellite image data, but apparently they are not shared. In this activity, an inventory of GIS data was created to facilitate data exchange.</p> <p><Information to be Collected> - GIS data, satellite image data including system, data structure, details of stored data, and others</p> <p><Outputs> MPO's basic GIS data, such as population, administrative areas, etc., are now shared by other organizations, such as MOJA and DOE. In addition, the DOE's GIS expert was brought to the MOJA-WMD's GIS center.</p> <p><Evaluation> Overall, the activity prompted the inter-organizational cooperation of GIS experts. However, in most organizations, GIS is used in an ad-hoc way, with no long-term planning. This is partly because there is no formal framework for GIS works, and partly because the basic information, such as topographic maps, is highly limited. Thus, it is strongly recommended that GIS experts in the government sectors are to coordinate with the National Cartographic Center, and develop a general framework of GIS systems.</p>	MOJA, NRGO, MPO
<p>Summary of Forest Management Activity</p> <p><Objectives> Substantial forest management activities have been carried out by MJOA, however, information about forest management has not been compiled. In this activity relevant information was compiled into a concise summary.</p> <p><Collected Information> - A short account of forest management history in the South Caspian region. - Policy, laws and regulations for forest management - Current forest management plan - Others</p> <p><Outputs> The collected information was summarized in the Environmental Report.</p> <p><Evaluation> One of the major problems encountered was the shortage of experts who can summarize the forest management in broader perspectives, though many experts knew technical details of their activities. It is strongly suggested that NRGO summarizes the state of forest management every year, and make a small report for stakeholders outside of NRGO, such as decision makers, NGOs, DOE, etc.</p>	MOJA Guilan (NRGO)

Monitored Information and Monitoring Activities	Executing Organization
<p>Summary of Rangeland Management Activity</p> <p><Objective> Substantial rangeland management activities have been carried out by MJOA, however, information about rangeland management has not been compiled. In this activity relevant information was compiled into a concise summary.</p> <p><Collected Information> - A short account of rangeland management history in the South Caspian region. - Policy, laws and regulations for rangeland management - Current plan for rangeland management</p> <p><Outputs> The collected information was summarized in the Environmental Report.</p> <p><Evaluation> Again, few experts could summarize rangeland management in broader perspectives, and the shortage of information was more severe in rangeland management. For example, there was no reliable number of grazing livestock or graziers in the watersheds. It is strongly suggested that NRGO summarizes the state of rangeland management every year, and make a small report for stakeholders outside of NRGO, such as decision makers, NGOs, DOE, etc.</p>	MOJA Guilan (NRGO)
<p>Summary of Erosion Control Measures</p> <p><Objectives> In this activity, erosion control measures in the area are compiled into a concise summary.</p> <p><Collected Information> - A short account of erosion problems in Guilan. - Policy, laws and regulations for rangeland management - Measures being carried out (erosion control dams, terracing, reforestation, others) - Plan of future erosion control measures in the area</p> <p><Outputs> The collected information was summarized in the Environmental Report.</p> <p><Evaluation> MOJA-WMD should summarize the erosion control measures implemented every year, and make a small report for stakeholders outside of NRGO, such as decision makers, NGOs, DOE, etc.</p>	MOJA Guilan (WMD)
<p>Educational Activity for Promotion of Sustainable Agriculture</p> <p><Objectives and Activities> To get information for reviewing existing activities to promote sustainable agriculture</p> <p><Collected Information> - Information about the extension-based promotion of sustainable agriculture in Guilan - Case studies of sustainable agriculture activities in Guilan - Assessment of methods to disseminate information to farmers</p> <p><Outputs> The collected information was summarized in the Environmental Report.</p> <p><Evaluation> It seems the agricultural extension services in the area are active, and many farmers are aware of the activities of the extension services, such as promotion of Integrated Pest Management. Farther promotion of sustainable agriculture is desirable.</p>	MOJA Guilan (Cultivation and Agricultural Department)

Monitored Information and Monitoring Activities	Executing Organization
<p>Collection of information about overgrazing control in Mazandaran</p> <p><Objective> Mazandaran Province seems to be facing problems similar to those in Guilan of overgrazing in the rangelands. However, exchange of information and ideas between Mazandaran and Guilan has been limited. Thus, the objective of this activity is an exchange of information between the MOJA/NRGO Guilan and MOJA/NRGO in Mazandaran.</p> <p><Collected Information> - Approaches taken in Mazandaran to control overgrazing in rangelands - Case studies in Mazandaran</p> <p><Output> In December, 2003, two MOJA officials visited MOJA and NRGO in Mazandaran to exchange opinions and to visit an industrial animal husbandry developed for resettled graziers and a new-type of erosion control dam.</p> <p><Evaluation> Such activity is easy to organize and highly effective, because they can learn from the experiences of others. It is strongly urged that MOJA and NRGO in Guilan, Mazandaran and Golestan develop regular information exchange programs for experts.</p>	MOJA Guilan (WMD, MOJA)

(3) Pressure Indicators

Overgrazing and excessive use of agricultural chemicals were selected as the main pressure indicators to be monitored as shown in Table 4.3.5.

Table 4.3.5 Monitoring of Pressure Indicators Related to Watershed Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Number of Grazing Animals</p> <p><Objectives> To gather information about environmental pressure from grazing activity.</p> <p><Information to be Collected> - Number of grazing animals by each watershed</p> <p><Outputs> Efforts were made to gather relevant information, but NRGO had no information.</p> <p><Evaluation> NRGO should be aware of the seriousness of this lack of data essential for rangeland management. NRGO is urged to start gathering information on grazing animals and graziers in the mountains.</p>	MOJA Guilan (Livestock Affairs and NRGO)
<p>Use of Chemical Fertilizer and Pesticides</p> <p><Objectives> To grasp environmental pressure from agricultural activity, especially due to excessive use of chemical fertilizers and pesticides.</p> <p><Collected Information> - Amount of chemical fertilizer utilized by each type - Amount of pesticides utilized by each type for each crop</p> <p><Outputs> The collected information is reported in the Supporting Report in the section of Agriculture and Agricultural Chemical Administration.</p> <p><Evaluation> MOJA in Guilan seems to be successful in controlling use of fertilizers and pesticides. However, there are some information gaps between the central-level and the provincial-level. For example, information on micro-nutrients (e.g., suspected problems of zinc deficiency and cadmium toxicity in Guilan) and policy issues (e.g., reduction of subsidies on agrochemicals) were not available in Guilan. Thus, more intra-organizational coordination between MOJA-Guilan and laboratories at the central level is recommended in order to reduce the use of agrochemicals further.</p>	MOJA Guilan (Cultivation and Agricultural Department)

4.3.3 Monitoring Activities on Wastewater Management

(1) State of the Environment Indicators

Water and sediment qualities of tributaries of the Anzali Wetland were reviewed.

Table 4.3.6 Monitoring of State of the Environment Indicators Related to Wastewater Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Water and Sediment Quality in Rivers</p> <p><Objectives> In this activity, historical records of water and sediment qualities in the last 5 years were compiled.</p> <p><Monitored Item> - BOD, COD, T-P, T-N in river water, last 5 years</p> <p><Outputs> See Data book.</p> <p><Evaluation> The DOE regularly carries out environmental monitoring of rivers in the area, and some data were readily available from the DOE laboratory in Anzali. The problem is in the data analysis. DOE does not carry out any formal assessment of the pollution mechanisms of public water bodies in the area, and in the end, the pollution load analysis was done by the JICA Study Team. Another problem is the weak integration of efforts by relevant organizations, most notably by DOE and GWWC. Because GWWC does not carry out routine environmental monitoring, it would be difficult to evaluate the effectiveness of the wastewater treatment facilities which are under construction in Rasht and Anzali. Thus, it is strongly recommended that GWWC and DOE jointly design and carry out a baseline monitoring study of the water quality in the public bodies, including the Anzali Wetland, before the operation of the wastewater treatment facilities start.</p>	DOE Guilan (Human Environmental Department and water quality laboratory)

(2) Response Indicators

With regard to the response indicators, three activities related to sewer networks, activities of wastewater management in rural areas, and industrial pollution controls, were implemented.

Table 4.3.7 Monitoring of Response Indicators Related to Wastewater Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Expansion of Sewer Network</p> <p><Objectives> This activity was to collect information relevant to the progress of sewerage system development in urban areas of Rasht, Anzali, and Somehsara.</p> <p><Information to be Collected> - Information on the approximate number of people connected to combined sewer networks and separate sewer networks in Rasht, Anzali, Fuman and Somehsara. - Maps of the areas where a sewer network is installed</p> <p><Output> The collected information was summarized in the Wastewater Management Plan.</p> <p><Evaluation> GWWC is making good progress toward development of the sewerage systems in Rasht and Anzali. In the future, the household connection to the main sewer line should be monitored closely as a low connection rate could lead to low performance of the sewerage systems.</p>	GWWC
<p>Activities implemented by RWWC</p> <p><Objectives> This activity was to summarize the activities of RWWCG for management of wastewater management in rural areas.</p> <p><Collected Information> - Activities implemented for improvement of rural wastewater treatment by RWWC in 2003 (1382 in Iranian calendar).</p> <p><Outputs> The collected information was summarized in the Wastewater Management Plan.</p> <p><Evaluation> RWWC has a long-term plan to develop wastewater treatment systems in rural areas. However, the implementation of the plan has been delayed due to budgetary constraints. In order to promote development of wastewater treatment systems in rural areas, it is suggested that RWWC regularly reports the progress of the implementation to the Provincial Thematic Working Group on Environment, Land Use and Population, and get support from both the environmental and public health sectors.</p>	RWWCG
<p>Human Resource for Industrial Pollution Control</p> <p><Objectives> This activity was implemented to determine the capacities of the exiting human resource for industrial wastewater control.</p> <p><Collected Information> - Number of inspectors for industrial pollution control - Training of each inspector - Training program for new inspectors - Proposals for strengthening the capacities for industrial pollution management</p> <p><Outputs> Many experts involved in industrial pollution control were interviewed.</p> <p><Evaluation> Lack of information, expertise and funding are the main reasons for inadequate countermeasures against industrial pollution. More coordination between DOE and MOIM is needed in assisting industries to comply with the regulations. For example, MOIM at the central level has a special environmental loan program to promote cleaner production, and such program should be promoted by the provincial MOIM and DOE.</p>	DOE Guilan (Human Environmental Department)

(3) Pressure Indicators

The results of the water quality and bottom sediment survey were closely examined.

Table 4.3.8 Monitoring of Pressure Indicators Related to Wastewater Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Domestic and Industrial Wastewater Characteristic in Rasht City</p> <p><Objective> To determine the characteristics of domestic and industrial wastewaters in Rasht City.</p> <p><Monitored Items> COD, T-P, PO₄, T-N, NH₄, NO₂, NO₃, and heavy metals (Cd, Pb, hexavalent-Cr, Hg, Cu) in domestic and industrial wastewaters</p> <p><Monitoring sites> Domestic and industrial wastewaters in Rasht City</p> <p><Monitoring frequency> Once</p> <p><Output> See Data book for the results..</p> <p><Evaluation> The monitoring of domestic and industrial wastewater has been carried out by DOE, but in the future, GWWC will also have to monitor the quality and quantity of wastewater to be treated at the sewage treatment facilities.</p>	DOE Guilan (Human Environmental Department and water quality laboratory)

4.3.4 Monitoring Activities on Solid Waste Management

(1) State of the Environment Indicators

A map of areas where solid waste is illegally dumped was produced by DOE. The map was presented in the environmental report.

Table 4.3.9 Monitoring of State of Environment Indicators Related to Solid Waste Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Maps of Ares Polluted by Solid Waste</p> <p><Objectives> The objective of this activity was to produce of a map of illegal dumping sites; DOE should create a similar map for the wetland. As municipalities do not have a strong coordinating body, DOE will coordinate the activities.</p> <p><Monitored Information> - Area where solid waste is discharged or deposited - Types of wastes</p> <p><Outputs> DOE created a GIS map of illegal dumping sites around the Anzali Wetland, which was presented in the Environmental Report.</p> <p><Evaluation> There are as many as 20 illegal dumping sites around the Anzali Wetland. DOE should coordinate with municipalities and close down these sites as soon as possible.</p>	<p>Local DOE office (Anzali and Somehsara)</p> <p>Municipalities</p>

(2) Response Indicators

The information on solid waste management is highly limited, in part because solid waste management is carried out independently by different municipalities in a disorganized way. In this activity information on solid waste management was collected from municipalities. Also, information about NGOs' activities to control solid waste problem was reviewed.

Table 4.3.10 Monitoring of Response Indicators Related to Solid Waste Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Solid Waste Management by Municipalities</p> <p><Objective> Collection of information about solid waste management by each municipality will be continued. The collected information will be compiled and compared among the municipalities.</p> <p><Collected Information> <ul style="list-style-type: none"> - Areas where regular solid waste collecting service was provided in 2003 - Number of workers engaged in solid waste management - Equipment (trucks, carts, etc.) used for collection of solid waste - Sizes and remaining capacities of solid waste disposal sites use by municipalities </p> <p><Outputs> A number of meetings with municipalities were carried out, and DOE assisted with collection of the relevant information. The results were summarized in the Solid Waste Management Plan. It was quite difficult to gather information on existing solid waste management because there is no organization that oversees overall solid waste management in the area.</p> <p><Evaluation> It is suggested that the newly established provincial committee on recycling reviews the information in the Solid Waste Management Plan.</p>	<p>Municipalities (Rasht, Anzali, Fuman, Somehsara, Khomam, Shaft, Sangar, Masal, Masuleh)</p> <p>*DOE will assist to collect information as necessary.</p>
<p>Educational Activities for Improvement of Solid Waste Management</p> <p><Objectives and Activities> To get information on exiting educational activities for solid waste management, relevant information will be collected.</p> <p><Collected Information> <ul style="list-style-type: none"> - Examples of educational activities implemented by local NGOs to improve solid waste management - Experiences of NGOs </p> <p><Outputs> Several NGOs were interviewed, and the experiences of NGOs were reflected in the pilot activity, Community-based Recycling.</p> <p><Evaluation> It was found that many NGOs carry out good solid waste management activities. However, many activities can be refined if their activities were coordinated. It is suggested that these NGOs be given opportunities to present their activities at the Provincial Committee on Recycling, and discuss ways to build their activities into the provincial strategies for solid waste management.</p>	<p>NGOs</p> <p>*DOE will assist collect information as necessary.</p>

(3) Pressure Indicators

As an indicator of pressure/performance of solid waste management, the amount of solid waste brought to the landfill site in Anzali was monitored.

Table 4.3.11 Monitoring of Pressure Indicators Related to Solid Waste Management

Monitored Information and Monitoring Activities	Executing Organization
<p>Amount of Solid Waste Dumped in the Anzali Landfill Site</p> <p><Objectives> In this activity, the amount of solid waste brought to the landfill site in Anzali will be monitored in order to estimate the amount of solid waste generated in Anzali</p> <p><Monitored items> - Number and approximate size of collection vehicles entering landfill site - Type of waste brought to the landfill (pictures + notes)</p> <p><Monitoring Site> Anzali landfill site</p> <p><Monitoring Period> One week (Anzali municipality collects solid waste seven days in a week.)</p> <p><Output> See Solid Waste Management Plan for relevant data.</p> <p><Evaluation> The information on solid waste collected and disposed of is very important in operating the compost plant being constructed by Anzali municipality. All municipalities should carry out solid waste surveys so that the Solid Waste Management Plan can be refined based on actual information.</p>	<p>Anzali municipality</p> <p>*DOE will assist to collect information as necessary.</p>

4.4 Dissemination of Monitoring Information

(1) Annual State of the Environmental Report

The results of the monitoring activities were compiled in a state of the environment report, which was compiled and issued as a pilot activity. The main contents of the report are the environmental conditions of the Anzali Wetland and its basin, and activities of various stakeholders to conserve the environmental conditions of the Anzali Wetland and its basin. 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 on Pilot Activities.

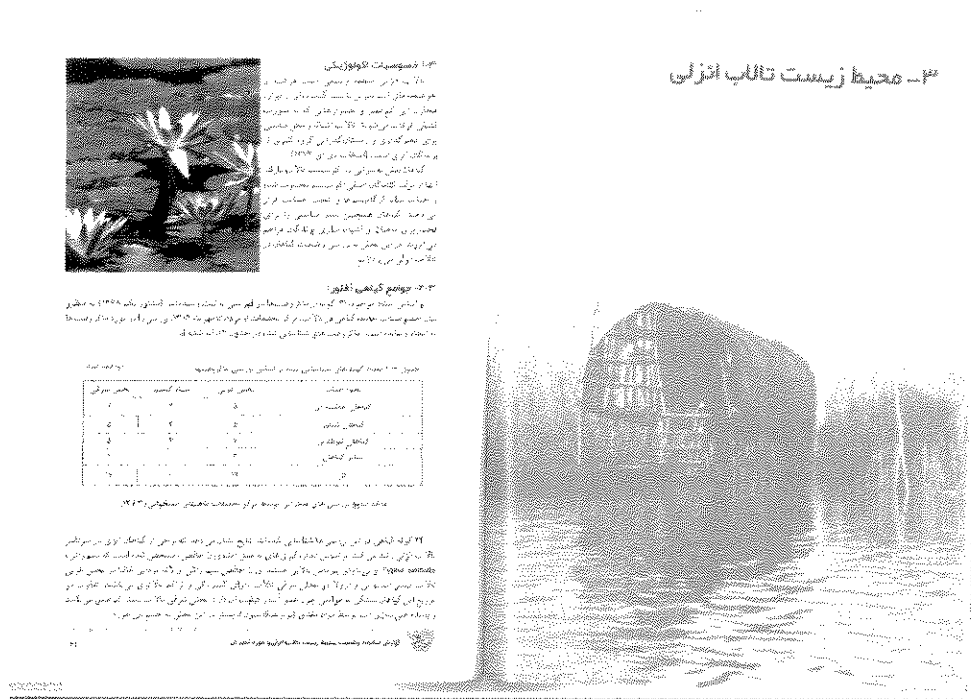


Figure 4.4.1 An Excerpt from the Annual Environment Report

(2) Website

The results of various surveys and other monitoring activities were also released in the study's website developed as a part of the pilot activities.

(3) Newsletters

Activities of various organizations and some of the important findings were also featured in the study's newsletters.

4.5 Final 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:

4.5.1 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, those who understand how the collected monitoring data could be used to improve the environmental management were limited. 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 the next plans based on the outcome of the 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.

4.5.2 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, 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 Annual Environmental Report. These efforts should be continued after the completion of this study.

CHAPTER 5 WORKSHOPS AND SEMINARS

5.1 Workshops

5.1.1 Workshop No.1

This was the first workshop organized by the JICA Study Team. The theme of the workshop was the “Importance of an Environmental Master Plan”, and it aimed to explain the background, purpose, contents, methods, etc. of the Study to the personnel concerned. The workshop also featured the examples of similar master plan studies in Latvia and Kenya.

Table 5.1.1 Program of Workshop No.1

No.	Date	Program	Total Participants
Workshop No.1	June 16, 2003	- Outline of the Study, by Mr. Sadamura (JICA Study Team) - Case 1: Environmental Master Plan of Lubana Lake (Latvia), by Mr. K. Naganuma, JICA Study Team - Case 2: Environmental Master Plan of Lake Nakuru (Kenya), by Dr. I. Okuda, JICA Study Team	72

In the workshop, a questionnaire survey was carried out in order to know the effect of the workshop and obtain the opinions of the participants. A total of 86% of the participants replied that the workshop was useful. Also, 81% of the participants replied that the Anzali Wetland is an important area for wildlife, but some economic development, such as eco-tourism, should be permitted

5.1.2 Workshop No.2

The theme for Workshop No.2 was the “realities of conservation and management of wetlands”. Table 5.1.2 summarizes the program of the workshop.

Table 5.1.2 Program of Workshop No.2

No.	Date	Program	Total Participants
Workshop No.2	July 27, 2003	<p>Presentations</p> <ul style="list-style-type: none"> - Iran's wetland management, by Mr. Karimi (DOE-HQ) - Sustainable management plan for soil and water resource in Hablehroud basin, by Mr. Mirkiaii (MOJA-HQ) - How environmental education and public participation contribute to wetland conservation, by Dr. Hindson (JICA Study Team) - Participatory wetland management in Asia, by Dr. Ando (Special Guest) - Anzali international wetland, the problems and solutions, by Mr. Sakari (DOE-Guilan) <p>Group Discussions</p>	100

In the morning, 5 presentations were given, including the one by a guest speaker, Dr. Ando of Tokyo University of Agriculture, who presented the importance of environmental education and participation of people in wetland management.

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 of Mr. Amirebrahimi (NGO). Each group was to discuss (i) what are the problems, (ii) what are the causes, (iii) what has to be done, and (iv) who should be in charge. At the end, moderators presented the results, and then they were summarized as the overall conclusions of the group discussions (see table below). Many participants pointed out the problems of management, and need for integrated management. Overall, the group discussions were well executed with good participation.

Table 5.1.3 Results of the Group Discussions

<p><u>Problems:</u></p> <ul style="list-style-type: none"> • Weak management • Unsuitable technology • Economic and social pressures • Population increase • Watershed destruction and damage • Lack of environmental awareness • Negative impacts to tourism • Damage to biodiversity • Impact to people's health • Solid waste and wastewater • Weak enforcement of laws and regulations 	<p><u>Causes:</u></p> <ul style="list-style-type: none"> • Poor and weak management • Lack of awareness and lack of capacity to implement environmental management • Economic and social problems • Overuse of resources • Lack of environmental evaluation • Lack of using experts (local, national, international) • Lack of participation by sections of departments • Planning from the top down • Lack of integrated projects • Problem with selection of suitable technology • Lack of training of people • Weakness of laws
<p><u>Solutions:</u></p> <ul style="list-style-type: none"> • Getting financial and technical assistance • Correct management by using experts and experienced people • Participation of residents and NGOs • Technology • Short-term training • Planning and management • Control and supervision • Education • Capacity building • Steady development • Reform of regulatory systems • Integrated management • Poverty reduction • Reconstruction of damaged natural resources 	<p><u>Responsibility:</u></p> <ul style="list-style-type: none"> • Local people • Government • Private sectors <p>Local and national and international</p>

5.1.3 Workshop No.3

Workshop No.3 covered two topics, i.e., landslides and conservancy. In the program for landslides, a technical lecture on control of erosion, landslides and slope collapses was given by Mr. Yokoyama, and a field excursion to landslide sites was organized. In the program for 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.

Table 5.1.4 Program of Workshops No.3

No.	Date	Program	Total Participants
Workshop No.3	Sept. 23, 28, 29, Oct. 4, 2003	Landslide and Countermeasures, by Mr. Yokoyama (JICA Study Team) Conservancy, by Dr. Driver (JICA Study Team)	83

5.1.4 Workshop No.4

The theme of Workshop No.4 was “study on wetland degradation”. The workshop intended to evaluate existing condition of the Anzali wetland and its watershed, and to identify the significance and causes of impacts on the wetland from its watershed, regarding the influence of wastewater, sedimentation and solid waste dumping.

Table 5.1.5 Program of Workshops No.4

No.	Date	Program	Total Participants
Workshop No.4	Nov. 30, 2003	<ul style="list-style-type: none"> - Progress of the study, by Mr. Sadamura (JICA Study Team) - Evaluation of Present Water Quality Condition in the Wetland, by Mr. Akbarazadeh (DOE-Guilan) and Mr. Naganuma (JICA Study Team) - Evaluation of Pollution Loads into the Wetland, by Mr. Fujii (JICA Study Team) - Evaluation of Soil Erosion and Sedimentation in the Wetland, Mr. Masulahadju (MOJA-Guilan) 	58

5.1.5 Workshop No.5

The JICA Study Team proposed the establishment of a conservancy to manage the Anzali Wetland. The idea was widely supported among the stakeholders. However, this involves coordination of many organizations, and thus the idea was submitted to the provincial governor for consideration. This workshop was organized to formally present the idea of the conservancy at the first meeting of the Provincial Thematic Working Group on Land Use, Environment and Population. The participants in the meeting were the provincial governor as chairperson, head of MPO Guilan as head of the meeting, and representatives from relevant agencies such as MOJA, DOE, NRGO, GWWC, ITTO, MOE, etc. The total number of participants was about 30 persons. The governor was supportive of the study, and requested that Dr. Nezami submit relevant documents to the governor.

Table 5.1.6 Program of Workshop No.5

No.	Date	Program	Total Participants
Workshop No.5	June 23, 2004	- Proposed Anzali Conservancy, by Mr. Aoki (JICA Study Team)	30

5.1.6 Workshop No.6

Workshop No.6 was a series of technical sessions to discuss crucial technical issues in the master plan, such as the control of agrochemical use in the proposed buffer zone and the environmental impacts of the treated wastewater from the sewage treatment plants in Anzali to the wetland. In order to make sure that the participants understood the details of the

issues, the team distributed 40 copies of the translated version of the Interim Report and 60 copies of the translated summary of the Interim Report to the main stakeholders. Then, the workshops were carried out with further presentations.

Table 5.1.7 Program of Workshops No.6

No.	Date	Program	Total Participants
Workshop No.6	Aug. 1, 2004	- Buffer Zone Management, by Dr. Okuda and Dr. Akbarinia (JICA Study Team) - Technical discussions (socio-economic issues in the buffer zone)	10
	Aug. 2, 2004	- Wetland Management, by Dr. Okuda (JICA Study Team) - Technical discussions (water quality, capacity of DOE)	13
	Aug. 4, 2004	- Wastewater Management, by Mr. Fujii (JICA Study Team) - Technical discussions (sewerage development, low-phosphorous detergents)	14
	Aug. 11, 2004	- Buffer Zone Management 2, by Dr. Okuda and Dr. Akbarinia (JICA Study Team) - Technical discussions (fertilizer and pesticide use)	6
	Aug. 15, 2004	- Solid Waste Management, by Mr. Wada (JICA Study Team) - Technical discussions (proposed solid waste management plan)	13

5.1.7 Workshop No.7

This workshop was designed to exchange opinions about wetland management with the local stakeholders, especially farmers, hunters and fishermen living around the wetland. In total, 23 stakeholders participated in the workshop. For these stakeholders, the wetland is a part of their lives, and they were eager to protect the wetland from environmental degradation. They expressed concerns about water pollution of the wetland and the resulting death of fishes, problems with speed boats, solid waste management in the upstream, over fishing, etc., and pledged their support to protect the wetland.

Table 5.1.8 Program of Workshop No.7

No.	Date	Program	Total Participants
Workshop No.7	Sept. 25, 2004	- Value of the Wetland, by Dr. Okuda and Dr. Driver (JICA Study Team) - Discussions with stakeholders	26

5.2 Seminars

In total, 3 seminars were organized in order to disseminate information about the study.

5.2.1 Seminar No.1

The 1st seminar was held in both in Rasht and Tehran. It consisted of a presentation by Mr. Sadamura on the proposed master plan, two presentations by the counterpart members (Mr. Bagherzadeh and Mr. Mohammadi), and a presentation by the guest speaker, Mr. Miwa.

Table 5.2.1 Program of Seminar No.1

No.	Date	Program	Total Participants
Seminar No.1	Feb. 19, 22 2004	<ul style="list-style-type: none"> - 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

5.2.2 Seminar No.2

The second seminar was held in December, 2004 both in Tehran and Rash. The seminar featured an invited speaker, Professor Ando of Tokyo University of Agriculture, who presented "adaptive management for wetlands".

Table 5.2.2 Program of Seminar No.2

No.	Date	Program	Total Participants
Seminar No.2	Dec. 19, 23 2004	<ul style="list-style-type: none"> 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. Urumich (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)

5.2.3 Seminar No.3

The participants to the JICA Counterpart Training in Japan in March 2004 presented what they learned in Japan including a video clip of environmental management in Japan they took in Japan.

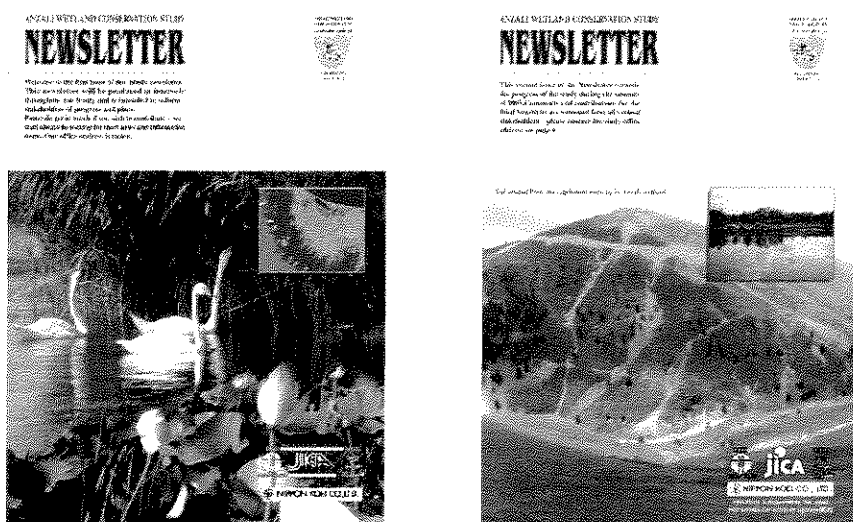
Table 5.2.3 Program of the Special Seminar

No.	Date	Program	Total Participants
Special Seminar	Sept. 16, 2004	<ul style="list-style-type: none"> - Mr. Mohammadi (MOJA-HQ), Watershed management on the Fuji mountain slope - Mr. Karimi (DOE-HQ), Biwa Lake and Kasumigaura wetland condition - Mr. Rafati (MOJA-Guilan), Watershed management on Non Tan San mountain slope - Mr. Pooyasefat (MOJA-Guilan), Watershed management around Biwa Lake. 	62

CHAPTER 6 NEWSLETTERS AND POSTCARDS

6.1 Newsletters

The JICA Study Team issued 5 newsletters in English/Farsi, and distributed to stakeholders 5,000 copies in total, or 1,000 copies each. 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.



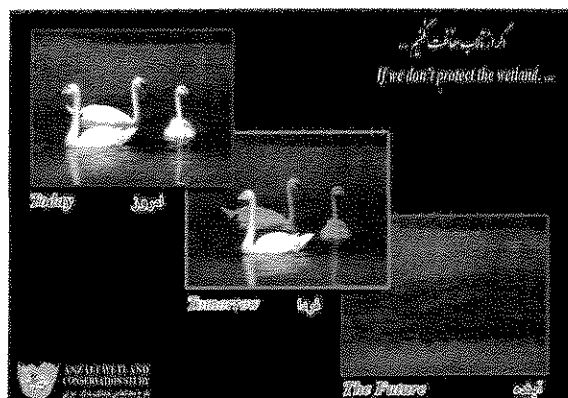
Front page of the Newsletter Issue No.1

Front page of the Newsletter Issue No.2

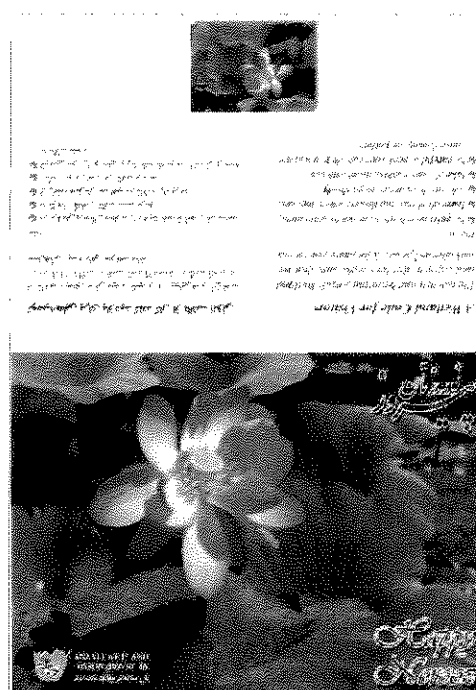
Figure 6.1.1 Front Pages of Newsletters

6.2 Postcards

So far, the JICA Study Team issued 2 postcards, and distributed 5,000 copies in total, 2,500 copies each, to local stakeholders, tourists, donors, and others. One more postcard (calendar) will be issued in December, 2004.



Postcard No.1: A postcard with the 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 6.2.1 Postcards

CHAPTER 7 COUNTERPART TRAINING

7.1 Counterpart Training in Japan

Counterpart training specifically designed for the study, was implemented twice in Japan, and nine Iranian counterpart personnel participated as shown in Table 7.1.1. 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 the Japanese experience in combating pollution and natural disasters, and Japanese efforts in restoring wetlands. Detailed schedules for the first and second counterpart training are shown in Table 7.1.2 and 7.1.3.

Table 7.1.1 Participants to Counterpart Trainings

	Period	Participants
1 st training	From 27 March 2004 to 25 April 2004 (30 days)	Dr. Nezami Balouchi Shabanali, DOE Guilan Mr. Karimi Masoud Bagher Zadeh, DOE HQ Mr. Mohammadi Hossein Ali, MOJA HQ Mr. Rafati Abatari Mohammad Bagher MOJA Guilan Mr. Pooyasefat feridoon, MOJA Guilan
2 nd 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, NRGU Guilan

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 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.

Table 7.1.2 Schedule of First Training

No.	Date		Venue	Institution/Agency
2	28-Mar	Sun	Arriving	
3	29-Mar	Mon	Visit to JICA. Briefing on the Training Orientation	JICA
4	30-Mar	Tue	Lecture: Wetland conservation policy in Japan with Ramsar convention Lecture: Watershed management policy in Japan	Ministry of Environment Ministry of Land, Infrastructure and Transport
5	31-Mar	Wed	Site visit: Lake Kasumigaura (Vegetation purification facility, Lakeside vegetation conservation, Biopark)	Kasumigaura River Office
6	1-Apr	Thu	Site visit: Lake Kasumigaura (Asaza project, Environmental education, Forest conservation)	Asaza Foundation (Non Profit Organization)
7	2-Apr	Fri	Site visit: Tokyo port wild bird park Meeting with JICA Study Team	Tokyo port wild bird park management section Nippon Koei
8	3-Apr	Sat	Move (Tokyo→Kyoto→Otsu)	
9	4-Apr	Sun	Holiday	
10	5-Apr	Mon	Meeting: Measures of watershed management in Shiga (Mother Lake 21 plan, Lake water quality conservation plan, Measures of ecosystem conservation) Site visit: Lake Biwa, Nishinoko (water quality survey Boat)	Department of Lake Biwako Environment, Shiga Prefecture
11	6-Apr	Tue	Meeting: measures of eco-friendly agricultural administration (Measures for agricultural drainage, Eco-farmer system, etc.) Site visit: Examples of environmental friendly agriculture	Department of Lake Biwako Environment, Shiga Prefecture Out-Shiga Agriculture Extension Center
12	7-Apr	Wed	Meeting: Aka-noi-Biwako Environmental Citizen's Initiative (Non Profit Organization) Visit: Reed museum	Aka-noi-Biwako Environmental Citizen's Initiative
13	8-Apr	Thu	Site visit: Tagamiyama erosion control facility (Hillside works)	Biwako River Office
14	9-Apr	Fri	Meeting: Measures of participatory type solid waste administration Site visit: Solid waste collection facility and landfill site	Department of Lake Biwako Environment, Shiga Prefecture
15	10-Apr	Sat	Visit to Kyoto	
16	11-Apr	Sun	Holiday	
17	12-Apr	Mon	Visit: Lake Biwa Museum Visit: Lake Biwa Aqua-Museum	Lake Biwa Museum Lake Biwa Aqua-Museum
18	13-Apr	Tue	Visit: Biwako Waterfowl Wetland Center	Biwako Waterfowl Wetland Center
19	14-Apr	Wed	Meeting: Lake Water Quality Conservation	International Lake Environment Committee
20	15-Apr	Thu	Move (Otsu→Kyoto→Gifu)	
21	16-Apr	Fri	Visit: Aqua Restoration Research Center	Aqua Restoration Research Center
22	17-Apr	Sat	Move (Gifu→Shizuoka)	
23	18-Apr	Sun	Holiday	
24	19-Apr	Mon	Site visit: Fuji erosion control facility Move (Shizuoka→Tokyo)	Fuji Erosion Control Office
25	20-Apr	Tue	Meeting: Activity of NGO concerning wetland conservation Move (Tokyo→Nikko)	Ramsar Center
26	21-Apr	Wed	Site visit: Mt. Nantai erosion control facility (Hillside works/erosion control dam)	Nikko Erosion Control Office
27	22-Apr	Thu	Move (Nikko→Tokyo)	
28	23-Apr	Fri	Meeting with JICA Study Team Evaluation meeting	Nippon Koei JICA
29	24-Apr	Sat	Leaving	

Table 7.1.3 Schedule of Second Training

No.	Date		Venue	Institution/Agency
2	17-Oct	Sun	Arriving JAPAN	
3	18-Oct	Mon	Briefing Visit to JICA HQ. Meeting with JICA Study Team	JICA
4	19-Oct	Tue	Lecture: Wetland conservation policy in Japan with Ramsar convention Lecture: Watershed management policy in Japan	Ministry of Environment Ministry of Land, Infrastructure and Transport
5	20-Oct	Wed	all	Move(Tokyo→Kushiro)
6	21-Oct	Thu	all	Site visit: Kushiro Wetland
7	22-Oct	Fri	am pm	Meeting:Activity of conservation for Kushiro Wetland Meeting:Ramsar Wetland conservation in Japan
8	23-Oct	Sat		Holiday
9	24-Oct	Sun		Move (Kushiro→Itami→Otsu)
10	25-Oct	Mon	am pm	Meeting: Measures of watershed management in Shiga (Mother Lake 21 plan, Lake water quality conservation plan, Measures of ecosystem conservation) Site visit: Lake Biwa, Nishinoko (water quality survey Boat)
11	26-Oct	Tue	am	Meeting: Measures of participatory type solid waste administration
12	27-Oct	Wed	all	Meeting: Akanoi-Biwako Environmental Citizen's Initiative (Non Profit Organization)
13	28-Oct	Thu	all	Site visit: Tagamiyama erosion control facility (Hillside works) Visit: Lake Biwa Aqua-Museum
14	29-Oct	Fri	am pm	Meeting: measures of eco-friendly agricultural administration (Measures for agricultural drainage, Eco-farmer system, etc.) Site visit: Examples of environmental friendly agriculture
15	30-Oct	Sat		Visit to Kyoto
16	31-Oct	Sun		Holiday
17	1-Nov	Mon		Move (Kyoto-Toyama)
18	2-Nov	Tue	all	Site visit:Tateyama erosion control facility
19	3-Nov	Wed		
20	4-Nov	Thu	all	Move(Toyama-Niigata) Meeting: Conservation plan for natural environment of Sakata
21	5-Nov	Fri	pm	Visit: Sakata water bird and wetland center
22	6-Nov	Sat		Move (Niigata→Tokyo)
23	7-Nov	Sun		Holiday
24	8-Nov	Mon	pm	Site visit: Water Reclamation Center
25	9-Nov	Tue	pm	Site visit: Final waste disposal field
26	10-Nov	Wed	am pm	Meeting: Activity of NGO concerning wetland conservation Site visit: Tokyo port wild bird park
27	11-Nov	Thu	pm	Move (Tokyo→Shizuoka) Site visit: Fuji erosion control facility Move (Shizuoka→Tokyo)
28	12-Nov	Fri	am	Evaluation meeting/ Meeting with JICA Study Team
29	13-Nov	Sat		Leaving JAPAN

CHAPTER 8 OVERALL EVALUATIONS

8.1 Achievements of Capacity Development Activities

Table 8.1.1 summarizes the overall achievements of the capacity development activities in this study in relation to the goals set in Section 1.1.1. Significant achievements were made during the course of the study in Iran, which lasted 18 months.

Table 8.1.1 Overall Achievements of Capacity Development Activities

Category	Status at the Beginning of the Study	Overall Achievements
Coordination	<ul style="list-style-type: none"> - No organization or mechanism to coordinate environmental management activities existed in the basin. 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - There were many plans, but they were not coordinated, and there was no umbrella plan to unify them. - Many activities were implemented without plans. 	<p>The Master Plan and the following components plans were jointly developed by participation of many counterpart personnel.</p> <ul style="list-style-type: none"> - Wetland Ecological Management Plan - Watershed Management Plan - Wastewater Management Plan - Solid Waste Management Plan - Environmental Education Plan - Institutional Plan for Implementation
Activities /Initiatives	<ul style="list-style-type: none"> - 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. 	<p>The study implemented 11 pilot activities:</p> <ul style="list-style-type: none"> - 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 <i>Azolla</i> (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

		<ul style="list-style-type: none"> - developed community- and school-based recycling schemes - issued the first environmental report for the area - developed a project web-site
Monitoring	<ul style="list-style-type: none"> - 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. 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Environmental information was scattered among relevant organizations, and was not available to people. 	<ul style="list-style-type: none"> - 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 also 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.

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 managers 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.

Part 11: Initial Environmental Examination

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

**FINAL REPORT
Volume III Supporting Report**

TABLE OF CONTENTS

PART 11 INITIAL ENVIRONMENTAL EXAMINATION

	Page
CHAPTER 1 INTRODUCTION	1-1
1.1 Introduction	1-1
1.2 Methodology	1-2
CHAPTER 2 REGULATORY CONSIDERATIONS.....	2-1
2.1 EIA Regulations	2-1
2.2 Environmental Permits	2-2
2.3 Development Activities in Legally Protected Areas	2-2
2.4 Social Impacts	2-2
2.5 JICA Guidelines for Environmental and Social Considerations	2-2
CHAPTER 3 ANALYSIS OF ALTERNATIVES	3-1
3.1 Wetland Ecological Management	3-1
3.1.1 Objectives and Strategies	3-1
3.1.2 Analysis of Alternatives	3-1
3.2 Watershed Management	3-3
3.2.1 Objective and Strategies	3-3
3.2.2 Analysis of Alternatives	3-3
3.3 Wastewater Management	3-4
3.3.1 Objective and Strategies	3-4
3.3.2 Analysis of Alternatives	3-4
3.4 Solid Waste Management	3-5
3.4.1 Objective and Strategies	3-5
3.4.2 Analysis of Alternatives	3-5
3.5 Prioritization of Proposed Measures	3-6

CHAPTER 4	CONSULTATION AND PUBLIC PARTICIPATION	4-1
4.1	Thematic Discussions on Environmental and Social Issues	4-1
4.1.1	Thematic Discussions with Stakeholders.....	4-1
4.1.2	Participatory Study on Livelihood Improvement of Graziers	4-2
4.2	Public Consultation in Initial Environmental Examination	4-3
4.2.1	Dissemination of Basic Information.....	4-3
4.2.2	Preliminary Scoping	4-3
4.2.3	First Stakeholder Meeting on IEE	4-4
4.2.4	Formation of IEE Team	4-7
4.2.5	Preliminary Evaluation of Environmental and Social Impacts	4-7
4.2.6	Review of TOR and Draft Scoping Document by Stakeholders	4-7
4.2.7	Second Stakeholder Meeting on IEE.....	4-8
4.2.8	Preparation of IEE Document	4-9
CHAPTER 5	KEY IMPACTS IDENTIFIED AND MITIGATION MEASURES	5-1
5.1	IEE on Wetland Ecological Management Plan.....	5-1
5.1.1	Construction Phase	5-1
5.1.2	Operation Phase	5-2
5.1.3	Without Project Case.....	5-3
5.1.4	Suggested Mitigating Measures for Environmental and Social Impacts	5-4
5.2	IEE on Watershed Management Plan	5-6
5.2.1	Construction Phase	5-6
5.2.2	Operation Phase	5-7
5.2.3	Without Project Case	5-8
5.2.4	Suggested Mitigating Measures for Major Environmental and Social Impacts	5-9
5.3	IEE on Wastewater Management Plan.....	5-11
5.3.1	Construction Phase	5-11
5.3.2	Operation Phase	5-12
5.3.3	Without Project Case	5-14
5.3.4	Suggested Mitigating Measures for Major Environmental and Social Impacts	5-14
5.4	IEE on Solid Waste Management Plan	5-16
5.4.1	Construction Phase	5-16
5.4.2	Operation Phase	5-16
5.4.3	Without Project	5-17
5.4.4	Suggested Mitigating Measures for Major Environmental and Social Impacts	5-18
5.5	Monitoring Programs.....	5-20

5.6	Environmental Education Plan.....	5-20
5.7	Institutional Plan for Implementation.....	5-21
5.8	Financing/Implementation	5-21

List of Tables

	Page
Table 2.1.1 List of Projects for which EIA is Mandatory	2-1
Table 3.4.1 Parameters Considered in Analysis of Alternatives	3-5
Table 3.5.1 Criteria for Prioritization of Proposed Measures.....	3-6
Table 4.1.1 Thematic Discussions on Environmental and Social Issues	4-2
Table 4.2.1 Participants to the First Stakeholder Meeting on August 10, 2004	4-5
Table 4.2.2 Major Environmental and Social Issues Addressed in the First Stakeholder Meeting	4-6
Table 4.2.3 Comments Raised During the First Stakeholder Meeting	4-6
Table 4.2.4 Participants to the Second Stakeholder Meeting on October 4, 2004.....	4-8
Table 4.2.5 Comments on the IEE Documents Submitted by Stakeholders	4-9
Table 5.1.1 Environmental and Social Impacts of Wetland Ecological Management Plan (With Project; Construction).....	5-2
Table 5.1.2 Environmental and Social Impacts of Wetland Ecological Management Plan (With Project; Operation)	5-3
Table 5.1.3 Environmental and Social Impacts of Wetland Ecological Management Plan (Without Project).....	5-4
Table 5.1.4 Suggested Mitigating Measures for Rehabilitation and Maintenance of Habitat	5-5
Table 5.1.5 Suggested Mitigating Measures for Establishment of Environmental Zoning	5-5
Table 5.1.6 Suggested Mitigating Measures for Sustainable Use of Natural Resources.....	5-6
Table 5.2.1 Environmental and Social Impacts of Watershed Management Plan (With Project; Construction)	5-7
Table 5.2.2 Environmental and Social Impacts of Watershed Management Plan (With Project; Operation)	5-8
Table 5.2.3 Environmental and Social Impacts of Watershed Management Plan (Without Project)	5-9
Table 5.2.4 Suggested Mitigating Measures for Soil Erosion Control	5-10
Table 5.2.5 Suggested Mitigating Measures for Prevention of Landslides.....	5-10

Table 5.2.6	Suggested Mitigating Measures for Improvement of Livestock Resettlement Program	5-11
Table 5.3.1	Environmental and Social Impacts of Wastewater Management Plan (With Project; Construction)	5-12
Table 5.3.2	Environmental and Social Impacts of Wastewater Management Plan (With Project; Operation)	5-13
Table 5.3.3	Environmental and Social Impacts of Wastewater Management Plan (Without Project)	5-14
Table 5.3.4	Suggested Mitigating Measures for Sewerage Development (Disposal of Sludge)	5-15
Table 5.3.5	Suggested Mitigating Measures Sewerage Development (Water pollution)	5-15
Table 5.4.1	Environmental and Social Impacts of Solid Waste Management Plan (With Project; Construction)	5-16
Table 5.4.2	Environmental and Social Impacts of Solid Waste Management Plan (With Project; Operation)	5-17
Table 5.4.3	Environmental and Social Impacts of Solid Waste Management Plan (Without Project)	5-18
Table 5.4.4	Suggested Mitigating Measures for Proper Disposal of Municipal Solid Waste	5-19
Table 5.4.5	Suggested Mitigating Measures for Provision of Efficient Municipal Waste Collection Service to the Whole Area	5-19
Table 5.5.1	Summary of Monitoring Programs	5-20
Table 5.8.1	Proposed Coordination Mechanisms	5-21

List of Figure

	Page
Figure 1.2.1 Processes of Environmental and Social Considerations	1-2

CHAPTER 1 INTRODUCTION

1.1 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. Nevertheless, it is important to carry out an environmental evaluation of the proposed projects for the following reasons:

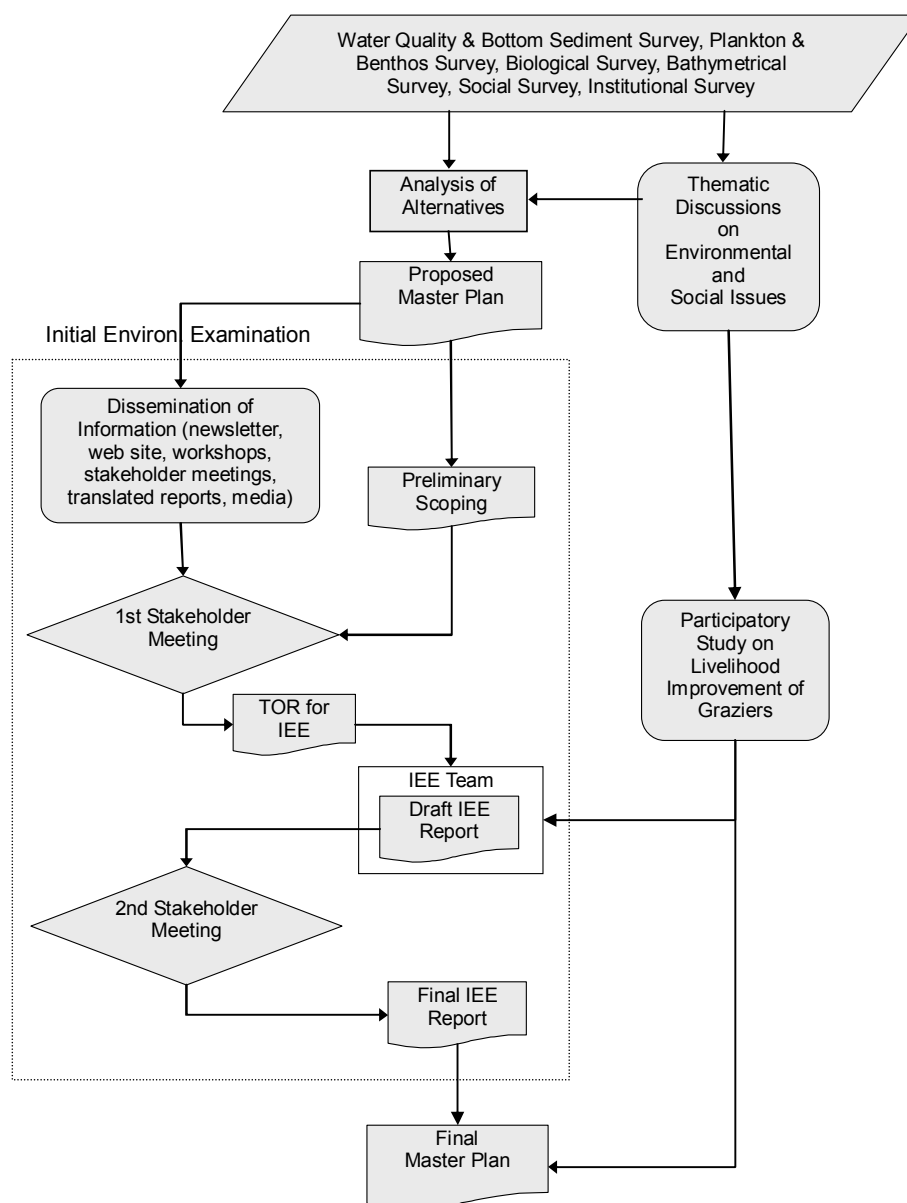
- Many projects are implemented in ecologically-sensitive areas, such as the wetland and the rangelands, and it is important to minimize any negative impact.
- Some measures, in particular sewerage and solid waste management projects, are potential causes of environmental pollution.
- In addition to 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. Among various projects in the master plan, resettlement of graziers in the Watershed Management Plan and environmental zoning in the Wetland Ecological Management Plan would have significant social impacts. 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, should also be taken into consideration.

For these reasons, the environmental and social impacts of the master plan was analyzed in this section.

1.2 Methodology

Figure 1.2.1 shows the steps of the environmental and social considerations in this study:



Source: JICA Study Team

Figure 1.2.1 Processes of Environmental and Social Considerations

In the earlier phase of the Study, a series of environmental and social surveys (water quality and bottom sediment survey, plankton and benthos survey, bathymetric survey, social survey, and institutional survey) were carried out (see Data Book). In addition, numerous discussions on environmental and social issues, some in the form of stakeholder meetings, were carried to

assist in the design the master plan. The IEE was carried out in the second phase of the study to assess the environmental and social impacts of the master plan and to develop mitigating measures. In parallel to the IEE, more discussions on environmental and social issues were carried out to improve the draft master plan. The results of these environmental and social considerations were reflected in the master plan.

CHAPTER 2 REGULATORY CONSIDERATIONS

2.1 EIA Regulations

The legal basis for EIA in Iran is established by Note 82 of the Law of the 2nd Development Plan 1994, amended by Note 105 of the 3rd Development Plan, and then implemented through Decree 138 of the Supreme Council for the Environment, 1994. Detailed requirements under the law are defined in the Code of Practice 1997, issued by the Supreme Council for the Environment. Manufacturing and major infrastructure projects are the main focuses of the regulation; the following projects are required to prepare a full EIA document:

Table 2.1.1 List of Projects for which EIA is Mandatory

No.	Type of Project for which EIA is mandatory	Relevance to the Master Plan
1	Petrochemical factories in all measures	No
2	Refineries in all measures	No
3	Power plants with the production capacity of over one hundred megawatt	No
4	Steel industry	No
5	Dams and other water structures	No
6	Industrial complexes (under any title) in an area of more than one hundred Hectares	No
7	Airports with runways longer than two thousand meters	No
8	Planting and industrial units in an area of more than five thousand Hectares	No
9	Major industrial slaughterhouses	No
10	Garbage disposal centers of cities with the population of more than two thousand people and new cities	Yes: Construction of 2 landfills proposed in the Master Plan.
11	Industrial recycling centers (compost factories)	No
12	Oil and gas pipeline plans	No
13	Oil rig plans	No
14	Oil storage plans	No
15	Major forestry plans	No: The Master Plan has a forest management component.
16	Major road projects	No
17	Major railway projects	No
18	Tourism plans	Maybe: Eco-tourism development is considered in the Master Plan.

Source: Administrative Methods and Guidelines on EIA, Environmental High Council, 1998

Apparently the only project in the master plan that requires a full EIA study is the construction of sanitary landfills (see Solid Waste Management Plan).

It was also noted that the Iranian EIA regulations have a number of weaknesses, such as lack of public participation processes, lack of requirements for environmental monitoring.

2.2 Environmental Permits

Aside from the EIA regulations, DOE Guilan requests submission of brief environmental impact statements to all proponents of major development activities, such as construction of an industrial animal husbandry. DOE issues an environmental permit based on this document.

2.3 Development Activities in Legally Protected Areas

The environmental impact of the projects implemented in the wetland should be studied and evaluated carefully in the feasibility studies, and adequate environmental monitoring should be carried out. These are done based on the internal regulation of DOE for management of legally protected areas, rather than the regulatory framework of the EIA.

2.4 Social Impacts

Social impacts of a project, e.g., on employment, revenues, local industries, etc., are addressed in the Iranian EIA regulation, but in reality, these issues are beyond the jurisdiction of DOE, and controlled separately by various relevant regulations. For example, NRGO has an internal regulation about resettlement and compensation. The land use in the urban areas are controlled by HUDO, and land use in the rural areas is controlled by MOJA.

2.5 JICA Guidelines for Environmental and Social Considerations

JICA, which is responsible for the implementation of technical cooperation and the preliminary study of grant aid projects in Japan's bilateral grants, prepared environmental guidelines for infrastructure projects in 1990, which introduced a screening and a scoping process to the preparatory study of development studies. In 2004, JICA revised the guideline, by adding and strengthening a number of important concepts in environmental and social considerations, such as transparency, accountability, and public involvement. The IEE in this study was thus implemented by referring to this new guideline, "Guidelines for Environmental and Social Considerations (2004)", though the study commenced in 2003, before the release of the new guideline.

CHAPTER 3 ANALYSIS OF ALTERNATIVES

In this sections, various alternatives considered in the following 4 sub-plans of the master plan are discussed:

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

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.

3.1 Wetland Ecological Management

3.1.1 Objectives and Strategies

The objective for the Wetland Ecological Management is to “secure the ecological balance to maintain the natural properties of the Anzali Wetland as far as future generations”. Under this objective, 4 strategies were set, i.e., (i) environmental zoning, (ii) adaptive management, (iii) wise use, and (iv) participatory management.

3.1.2 Analysis of Alternatives

The main management tool adopted for wetland conservation was environmental zoning. Three alternative zoning plans were developed and compared with the existing zoning program¹ considering (i) ecological diversity/sensitivity of habitats, (ii) requirements for designating a zone 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.

The actual delineation process was not merely a comparison of three alternatives, but a series of consultative sessions with many stakeholders (DOE, local ecological experts, NRGO, local residents, agricultural extension specialists, HUDO, PSO, CHTO, municipalities, etc.), and was interactive and dynamic. Some of the key issues were as follows:

¹ 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.

- Identification of Ecologically-sensitive Areas: Ecologically-sensitive areas were identified based on existing ecological data, results of biological surveys (birds, fish, macrophytes), and discussions with local ornithologists, ichthyologists, water quality experts, ecologists, and other experts. In addition to the existing legally protected areas, several ecologically sensitive areas (e.g., spawning grounds, areas important to migratory birds) were identified.
- Legal Protection of Ecologically-sensitive Areas: Some Iranian experts preferred designation of the entire wetland (193 km²) under legal protection, only allowing wise use activities under special permits. Others expressed concerns about i) the capacity of DOE to manage large areas and ii) the need to balance economic activities in the wetland with environmental conservation. After some discussions, it was decided to increase the number of legally protected areas, but not to designate the entire wetland under legal protection.
- Boundary of Core Protected Zone: The boundary of the core protected zone, which essentially corresponds to that of the wetland, was decided based on the current land use, distribution of wetland vegetation, and the zone prone to be affected by fluctuations in the level of the Caspian Sea. In order to identify the boundary, a detailed field reconnaissance study was carried out by local ecological experts. Some land areas adjacent to the wetland are part of important ecotones so were included in the core protected area, but most agricultural areas and residential areas around the wetland were excluded from the core protected zone.
- Land Tenure: Though the largest part of the wetland is owned by NRGU and DOE, there are abandoned private agricultural lands and lands sold to current owners with unresolved tenure issues. Land ownership is largely managed by traditional agreement among land owners without clear land registration documents/maps, and DOE Guilan is fighting many legal cases related to land ownership in the wetland. Realizing the difficulty of resolving the legal conflict between zoning regulations and property rights, the master plan generally aimed to promote environmentally-sound behavior of people, rather than to prescribe legally-binding regulatory measures.
- Social Impacts of Zoning and Delineation of Zones: The social impact of control over fishing and hunting in the wetland and use of chemical fertilizers and pesticides in the buffer zone was discussed with local farmers, hunters, fishermen, agricultural extension experts, and DOE. Local residents expressed active support for wetland conservation and willingness to abide by stricter

environmental regulations. Nevertheless, many of them may not be fully aware of the potential impacts of various activity controls on their lives.

3.2 Watershed Management

3.2.1 Objective and Strategies

The objective of the Watershed Management Plan is “to improve the wetland environment through reduction of sediment inflow from the watershed into the wetland, and restoration and protection of the fabric of the watershed”. The strategies were (i) control of further progression of soil erosion and landslides, (ii) promotion of participatory resource management, (iii) livelihood development of graziers and forest dwellers, (iv) improvement of livestock resettlement program, (v) establishment of an efficient institutional set-up, and (vi) capacity development of provincial and local offices.

3.2.2 Analysis of Alternatives

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 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.

3.3 Wastewater Management

3.3.1 Objective and Strategies

The objective of the Wastewater Management Plan is to “improve and maintain the water quality of the Anzali Wetland at a level acceptable for its ecosystem by implementing affordable and effective wastewater management. The strategies are (i) setting of targets, and (ii) measures for each pollution source, including domestic wastewater, industrial wastewater, livestock wastewater, and pollution from farmland.

3.3.2 Analysis of Alternatives

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. This goal aimed to improve the water quality of the eastern side of the wetland, which receives untreated wastewater from Rasht.

Meanwhile, a number of meetings with NWWEC (National Water and Wastewater Engineering Company) and MPO were held to discuss the national-level priority of sewerage development in the study area, and the potential for receiving the national funding for construction of sewerage facilities. While NWWEC has an ambitious national strategy to develop sewerage systems throughout the nation, the priority among the various cities across the nation could not be determined as the decision is political to some extent.

Considering these, it was decided to promote sewerage development in three major cities in

the watershed, i.e., the Rasht Phases 1 & 2, Anzali Phases 1 & 2, and the Somehsara projects, which will cover over 810,000 residents with sewage treatment service.

For industrial effluent control, centralization of the factories to industrial cities was the main approach considered in this study.

3.4 Solid Waste Management

3.4.1 Objective and Strategies

The objectives of the Solid Waste Management Plan are to reduce uncontrolled disposal of municipal solid waste by proper management, including the prevention of its flowing to the wetland, and to implement proper control of industrial solid waste. The strategies are (i) environmental awareness raising, (ii) provision of efficient municipal solid waste collection service to the whole area, (iii) proper disposal of municipal solid waste, and (iv) measures to achieve the targets of industrial solid waste management.

3.4.2 Analysis of Alternatives

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).

Table 3.4.1 Parameters Considered in Analysis of Alternatives

Factor	Parameters Considered
Recycling	Source-level recycling of recyclables (paper, can, organic, etc.) and resulting reduction in the amount of waste to be collected
Collection	Collection frequency per week (everyday – 3 times/week), number of collection points (every household – every 20 households)
Composting	Use of composting plant
Disposal	Number of sanitary landfills (1 to 9 locations), how landfills are shared among municipalities

Source: JICA Study Team

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

plan 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 (i.e., station collection rather than collection from each household), (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.

3.5 Prioritization of Proposed Measures

The master plan proposed many environmental measures essential for conservation of the Anzali Wetland and its watershed. However, it is difficult to implement them all at once. Thus, the proposed measures were prioritized based on the following criteria:

Table 3.5.1 Criteria for Prioritization of Proposed Measures

Criteria	Criteria for Prioritization
Effect	How effective is the proposed measure to control environmental problems in the wetland
Efficiency	Timeframe that the proposed measure starts to make an impact on the environmental problems
Urgency	Urgency to implement the measure
Cost	Whether the cost of implementing the measure is reasonable
Capacity of Executing Organization	Whether the capacities of the executing organization are sufficient to implement the measures and if there is a need for trainings
Conformity with Existing Policy	Whether the proposed measure is in conformity with the existing policy framework
Environmental Impact	Negative environmental impacts and positive environmental impacts other than those on the wetland
Social Impact	Whether the proposed measure have unwanted social impact, or positive social impact, such as improvement of the regional economy or sanitary conditions
Other Criteria	Other criteria

Source: JICA Study Team

Because the main goal of the master plan is conservation of the Anzali Wetland, the criteria related to conservation of the wetland (effect, efficiency, and urgency) were included in the evaluation criteria. In addition, criteria on environmental impacts other than on the wetland and social impacts were also adopted.

For each criterion, a score was given, and the total score was used to evaluate the priority of each project/measure. Because the objectives, implementing organizations, financial sources and available human resources for these projects/measures are diverse, the prioritization was done within each sub-plan rather than across the sub-plans. For the details of the prioritization, please see Chapters 4 – 9 of the Main Report.

CHAPTER 4 CONSULTATION AND PUBLIC PARTICIPATION

4.1 Thematic Discussions on Environmental and Social Issues

4.1.1 Thematic Discussions with Stakeholders

The main objective of this study was to develop an environmental master plan for conservation of the Anzali Wetland and its watershed. Numerous discussions with stakeholders were organized prior to the release of the JICA Guidelines for Environmental and Social Considerations in April, 2004, to develop a master plan that is environmentally and socially sustainable.

It was noted that a mass meeting is not necessarily the best approach to communicate with stakeholders because of limited availability of detailed administrative information (information asymmetry) and lack of regular public consultation processes in Iran. Moreover, this master plan involved an extremely wide range of environmental/social issues, and it was necessary to discuss these issues separately with those who are involved in or affected by such issues. Therefore, many of these meetings were carried out on specific issues with selected target stakeholders. Table below summarizes the issues discussed at such thematic discussion sessions.

Table 4.1.1 Thematic Discussions on Environmental and Social Issues

Sub-plan of Master Plan	Remarks
Wetland Ecological Management Plan	<ul style="list-style-type: none"> - Two stakeholder meetings (total participants about 80 persons) were held in August, 2003 and September, 2004 targeting stakeholders living around the wetland, such as farmers, fishermen, hunters, and village council members. The main agenda of these meetings were local environmental problems, zoning plans, illegal activities in the wetland, and pollution control. These stakeholders who are familiar with and depend on the wetland are supportive of better management of the wetland and are willing to get involved in wetland management activities. - About 10 joint discussion sessions were organized with DOE, Bony Fishes Research Center, agricultural extension experts, and other stakeholders to discuss the details of the wetland and buffer zone management, including ecological issues, environmental zoning, encroachment control, control of fishing and hunting, and use of agrochemicals in the buffer zone.
Watershed Management Plan	<ul style="list-style-type: none"> - Various technical meetings were held, mainly with NRGO and MOJA, on natural resources management issues, such as carrying capacity of the rangelands, forest management by NRGO, erosion control measures, etc. - Many discussions were held with NRGO and graziers on the social impacts of the livestock resettlement program approved by the government. This lead to a participatory study on livelihood improvement of graziers, as explained below.
Wastewater Management Plan	<ul style="list-style-type: none"> - Several joint meetings were organized with DOE, GWWC, RWWC and other organizations to discuss water quality issues, environmental impacts of pollution on the wetland ecosystem, locations of wastewater treatment facilities, and other technical issues.
Solid Waste Management Plan	<ul style="list-style-type: none"> - Four Solid Waste Improvement Meetings (SWIMs) were organized to jointly discuss solid waste management issues with municipalities, DOE and NGOs. The topics included change in waste collection frequency, locations of composting plants and sanitary landfills, construction of sanitary landfills, etc. While all municipalities are responsible for domestic waste management, there appeared to be little interaction among them; stronger coordination of municipalities is clearly needed. Several NGOs have active programs related to solid waste management/recycling.
Urban Development	<ul style="list-style-type: none"> - For land use management issues, several meetings were held mainly with HUDO and DOE. The main topics were urbanization control, environmental zoning around the wetland and the siting of landfills.

Source: JICA Study Team

4.1.2 Participatory Study on Livelihood Improvement of Graziers

One of the most serious social issues related to this master plan was the anticipated impact of the NRGO-proposed livestock resettlement program for the purpose of reducing grazing pressure on forests and rangelands in the upper watershed of the wetland. The program involves resettlement of about 1,450 graziers out of the mountain area and a change in livelihood for some 2,150 graziers in the area. Though this program has already been approved by the “Presidential Decree of the Council of Ministries of MOJA-DOE-MPO on the Management of the Northern Forest (No. 26239/16276), 2003”, the social impact of the

program was a major concern. In order to discuss this program with the graziers and to consider possible alternative livelihoods, a series of Participatory Rural Appraisal (PRA) sessions and a livelihood improvement survey of graziers in six villages were carried out by an NGO.

Many graziers already knew about the livelihood resettlement plan and expressed major concerns. Alternative livelihoods identified which held some potential included cattle farming, sericulture, poultry, fish culture, and tree planting. These findings and recommendations from the participatory study were also taken into consideration in the master plan as programs for participatory resources management and livelihood development.

4.2 Public Consultation in Initial Environmental Examination

4.2.1 Dissemination of Basic Information

Before the 1st stakeholder meeting on IEE, the information related to the study and the proposed Master Plan was distributed to stakeholders in the following ways:

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

4.2.2 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 NRGGO, as well as other local specialists and NGOs. The results of the social survey conducted in 2003 were also taken into consideration. The 12 selected types of impacts are divided into four 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 12 items 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 tables one by one.

4.2.3 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 4.2.1 Participants to 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, Nejahresabz 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 4.2.2 Major Environmental and Social Issues Addressed in the First Stakeholder Meeting

Management Plan	Major Issues
Wetland Ecological Management Plan	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 about the Guilan Province?
Solid Waste Management Plan	<ul style="list-style-type: none"> - 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 4.2.3 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.

(continued)

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

4.2.4 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.

4.2.5 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.

4.2.6 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.

4.2.7 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 4.2.4 Participants to 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 NRGGO
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. Esmail Tahsini	Expert, HUDO
12	Mr. Azadeh Amed	Women 's NGO
13	Mr. Adel Kazemi	Expert, NRGGO
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 4.2.5 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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

4.2.8 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.

CHAPTER 5 KEY IMPACTS IDENTIFIED AND MITIGATION MEASURES

In order to evaluate environmental and social impacts of the proposed master plan, an IEE was carried out based on the master plan projects presented in the Interim Report. The steps of the IEE are described in Section 9 below. In the IEE, both positive and negative aspects of the environmental and social impacts were evaluated on a scale of –H (significantly negative) to +H (significantly positive). Then, the overall ratings for each sub-plan were given.

One should be aware that this is a master plan study, and the IEE was carried out to identify major environmental and social issues and to evaluate whether the proposed plans are worth implementing from environmental and social points of view. Some plans may have significant overall benefit, but also have localized negative impact. Such impacts could not be fully addressed in this study because the details of each project are yet to be developed. Thus, project-level environmental and social impact assessments are essential in the feasibility study stage.

5.1 IEE on Wetland Ecological Management Plan

Tables 5.1.1, 5.1.2 and 5.1.3 compare the overall environmental and social impacts of the projects proposed in the Wastewater Management Plan for the scenarios: “with project in construction phase”, “with project in operation phase” and “without the proposed projects”.. The project components related to monitoring and research and institutional and organizational aspects were not included in the assessment.

5.1.1 Construction Phase

Many programs considered in the Wetland Ecological Management Plan are regulatory measures. Thus, the overall impacts of the plan were relatively small. Nevertheless, environmental monitoring is essential to evaluate the effectiveness of the proposed programs. Also, civil works, such as dredging to recreate diverse habitats and construction of facilities for eco-tourism, have to be carried out carefully as these works are done in the wetland. The proponents of these programs shall obtain permission from the central DOE.

**Table 5.1.1 Environmental and Social Impacts of Wetland Ecological Management Plan
(With Project; Construction)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use	
1. Zoning													
Zoning	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Conservation of Wildlife													
Conservation of Threatened Species	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3. Conservation of Habitats													
Increase in Size/Number. of Gazetted Areas	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Control of Human Activities in the Wetland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Control of Speed Boat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Control of Solid Waste	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Making Boundaries	-L	-L	+/-	+/-	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-
Improvement of Habitat	-L	-L	+/-	+/-	-M	-M	-M	+/-	+/-	+/-	+/-	+/-	-L
Control of Overgrowth of Plant	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4. Promotion of Wise Use													
Eco-tourism	-L	-L	+/-	+/-	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-
Controlled Hunting and Fishing	-L	-L	+/-	+/-	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-
Beneficial Use of Natural Resources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overall	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-

note: + : positive impact; -: negative impact; L: low; M: medium; H: high; N/A: not applicable (no construction)
example: -M : medium negative impact

Source: JICA Study Team

5.1.2 Operation Phase

During the operation phase, the proposed projects are expected to bring significant positive environmental impacts, especially to the natural environment. Although most of the wetland is owned by DOE and NRGGO and the wetland is uninhabited, some social impacts are anticipated because the environmental zoning would restrict some economic activities in and around the wetland, such as fishing and hunting in the wetland, agricultural activities, and other development. Thus, the social aspects of the zoning regulations need careful consideration. In the buffer zone and transition zone, the sectoral development strategies have to be in aligned with the concepts of sustainable development and environmental conservation.

**Table 5.1.2 Environmental and Social Impacts of Wetland Ecological Management Plan
(With Project; Operation)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use	
1. Zoning													
Zoning	+L	+M	+/-	+L	+M	+M	+M	+L	-M	+L	-M	-M	+M
2. Conservation of Wildlife													
Conservation of Threatened Species	+/-	+/-	+/-	+/-	+H	+H	+M	+/-	+/-	+/-	+/-	+/-	+L
3. Conservation of Habitats													
Increase in Size/Number of Gazetted Areas	+/-	+/-	+/-	+/-	+M	+H	+H	+/-	+/-	+/-	+/-	-L	+M
Control of Human Activities in the Wetland	+/-	+/-	+/-	+/-	+M	+H	+H	+/-	-M	+L	-L	-L	+M
Control of Speed Boat	+/-	+L	+L	+L	+L	+M	+M	+/-	+/-	+L	+/-	+/-	+L
Control of Solid Waste	+L	+L	+/-	+L	+L	+L	+L	+M	+L	+L	+/-	+/-	+L
Making Boundaries	+/-	+/-	+/-	+/-	+L	+M	+M	+/-	+/-	+/-	+/-	-L	+L
Improvement of Habitat	+L	+L	+L	-M	+M	+H	+H	+/-	+L	+L	+/-	+/-	+M
Control of Overgrowth of Plant	+L	+L	+L	+L	+L	+H	+H	+/-	+/-	+/-	+/-	+/-	+M
4. Promotion of Wise Use													
Eco-tourism	+/-	-L	-L	-L	-L	-L	-L	-L	+M	+M	+L	+L	+M
Controlled Hunting and Fishing	+L	+L	+L	+L	-L	-M	-M	+/-	+L	+L	+L	+L	+L
Beneficial Use of Natural Resources	+/-	+L	+/-	+L	+M	+L	+M	+/-	+L	+/-	+/-	+/-	+M
Overall	+/-	+L	+L	+L	+M	+M	+M	+/-	+L	+L	+/-	+/-	+M

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.1.3 Without Project Case

If the projects were not implemented, there could be significant loss of habitats and threatened species due to hunting, fishing, encroachment and other environmental pressures. This clearly indicates the benefits of implementing the proposed Wetland Ecological Management Plan.

**Table 5.1.3 Environmental and Social Impacts of Wetland Ecological Management Plan
(Without Project)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use	
1. Zoning													
Zoning	-L	-M	+/-	-L	-M	-M	-M	-M	-M	-M	+L	+/-	-M
2. Conservation of Wildlife													
Conservation of Threatened Species	+/-	+/-	+/-	+/-	-M	-H	-M	+/-	+/-	+/-	+/-	+/-	-M
3. Conservation of Habitats													
Increase in Size/Number of Gazetted Areas	+/-	+/-	+/-	+/-	-M	-H	-H	+/-	+L	-L	+/-	+/-	-M
Control of Human Activities in the Wetland	+/-	+/-	+/-	+/-	-M	-H	-M	+/-	+/-	-L	+/-	+/-	-M
Control of Speed Boat	+/-	-M	-M	-M	-M	-M	-M	+/-	+/-	-L	+/-	+/-	-M
Control of Solid Waste	-L	-M	-L	-L	-M	-M	-M	-M	-L	-M	-L	-L	-M
Making Boundaries	-L	-L	+/-	-L	-M	-M	-M	+/-	+/-	+/-	+L	+L	-L
Improvement of Habitat	-L	-L	+/-	-L	-M	-H	-M	+/-	+/-	-L	+/-	+/-	-M
Control of Overgrowth of Plan	-L	-M	-L	-L	-H	-H	-H	+/-	-L	-L	+/-	-L	-M
4. Promotion of Wise Use													
Eco-tourism	+/-	+/-	+/-	+/-	-L	+/-	-L	+/-	-L	-M	-L	-L	-L
Controlled Hunting and Fishing	+/-	+/-	+/-	+/-	-L	-M	-M	+/-	+L	-L	+/-	+/-	-L
Beneficial Use of Natural Resources	-L	-L	-L	-L	-M	-M	-M	+/-	-M	-L	-L	-L	-L
Overall	-L	-M	-L	-L	-M	-H	-M	+/-	-L	-L	+/-	-L	-M

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.1.4 Suggested Mitigating Measures for Environmental and Social Impacts

In this section, mitigating measures for projects in the construction and operation phases that have adverse environmental and social impacts with ratings of “-M” or worse are discussed.

Table 5.1.4 Suggested Mitigating Measures for Rehabilitation and Maintenance of Habitat

Project	Conservation of Habitats, Improvement of Habitat (Interim Report) Rehabilitation and Maintenance of Habitat (Final Report)
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 5.1.5 Suggested Mitigating Measures for Establishment of Environmental Zoning

Project	Environmental Zoning (Interim Report, Final Report)
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 5.1.6 Suggested Mitigating Measures for Sustainable Use of Natural Resources

Project	Control of Human Activities (Interim Report) Controlled Hunting and Fishing (Interim Report) Sustainable Use of Natural Resources (Final Report)
Impact Category	S 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 ² . 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

5.2 IEE on Watershed Management Plan

Tables 5.2.1, 5.2.2 and 5.2.3 compare the overall environmental and social impacts of the projects proposed in the Wastewater Management Plan for the scenarios: “with project in construction phase”, “with project in operation phase” and “without the proposed projects”.

5.2.1 Construction Phase

The Watershed Management Plan involves many construction works, such as construction of 131 concrete check dams, 2,836 gabion dams, 920 wooden dams, 192 km of contour bund, and countermeasures against landslides. These works might disrupt the area around the sites, and turbid water may be released to rivers. The landslide measures should be implemented properly, otherwise they could induce further landslides. These construction works would be

² A stakeholder meeting with fishermen, hunters and farmers was 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 5.2.1 Environmental and Social Impacts of Watershed Management Plan
(With Project; Construction)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall	
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use		
Rangeland Management														
	Balancing Number of Livestock	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Erosion Control Work	-L	-L	+/-	+/-	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L
Forest Management Plan														
	Conservation of Protected Forests	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Reforestation	-L	+/-	+/-	+/-	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-
	Environmentally-sustainable Forestry	-L	+/-	+/-	+/-	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-
	Prevention of Landslides and Slope Collapses	-M	-L	+/-	+/-	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	-L
Management of Plain Area														
	Counter-measures for Sediment Runoff	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Urbanization Control														
	Control of Urban Development in Anzali	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Land Use Control in Watershed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Securing Regional Ecological Network														
	Regional Ecological Network	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overall		-L	-L	+/-	+/-	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-

note: + : positive impact; - : negative impact; L: low; M: medium; H: high; N/A: not applicable (no construction)
example: -M : medium negative impact

Source: JICA Study Team

5.2.2 Operation Phase

The proposed projects of the Watershed Management Plan will bring positive impacts, especially to the physical and natural environments. This is because the Watershed Management Plan focuses on recovery of vegetation in the mountains and erosion control. The main concern is the resettlement of an estimated 1,450 families of graziers, which could result in significant social impacts. This program (the livestock resettlement program) has already been approved by presidential decree and was considered to be a given condition for the master plan. Nevertheless, the program has been designed without much consultation with graziers and has a weak social safety net. Thus, programs for participatory natural resources management and livelihood development were added to the master plan in the Final Report, Main Report, Chapter 5, Watershed Management Plan.

**Table 5.2.2 Environmental and Social Impacts of Watershed Management Plan
(With Project; Operation)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall	
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use		
Rangeland Management														
	Balancing Number of Livestock	+H	+L	+/-	+M	+H	+M	+M	+/-	-M	-M	+L	+H	+M
	Erosion Control Work	+H	+L	+/-	+L	+L	+L	+L	+/-	+L	+L	+L	+M	+M
Forest Management Plan														
	Conservation of Protected Forests	+M	+M	+L	+L	+H	+M	+H	+/-	-L	+L	+L	+L	+M
	Reforestation	+M	+M	+M	+M	+H	+M	+M	+/-	+L	+L	+L	+M	+M
	Environmentally-sustainable Forestry	-L	-L	-L	-L	-L	-L	-L	+/-	+L	+/-	+L	-L	+L
	Prevention of Landslides and Slope Collapses	+M	+L	+/-	+L	+L	+L	+L	+/-	+L	+L	+L	+L	+L
Management of Plain Area														
	Counter-measures for Sediment Runoff	+L	+L	+/-	+/-	+/-	+/-	+/-	+/-	+L	+L	+/-	+L	+L
Urbanization Control														
	Control of Urban Development in Anzali	+L	+L	+L	+L	+L	+L	+L	+L	-L	+/-	-L	-L	+L
	Land Use Control in Watershed	+L	+L	+L	+L	+L	+L	+L	+/-	-L	+/-	-L	-L	+L
Securing Regional Ecological Network														
	Regional Ecological Network	+L	+M	+L	+L	+L	+M	+M	+/-	-L	+L	-L	-L	+L
Overall		+M	+L	+L	+L	+M	+L	+L	+/-	+L	+L	+L	+L	+L

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

Assuming that adequate compensations is paid in a timely manner, and proposed measures in the Watershed Management Plan, such as empowerment of graziers, training of NRGO officers and livelihood development, are implemented, the social and cultural impacts could be reduced. However, even with these measures, the social and cultural impacts are significant, and the rating “-M” was given to these items. If these measures are not adequately applied, the impacts will be even larger. Thus, the NRGO is strongly urged to take every possible precaution to implement the livestock resettlement program³.

5.2.3 Without Project Case

Some parts of the watershed have been degraded beyond the level of natural recovery. If the proposed measures are not implemented, there will be further degradation of the vegetation cover of the watershed, resulting in erosion, increased natural disasters, and negative impacts on water resources. Also, the social and cultural impacts of the on-going livestock resettlement plan would be very high.

³ Similar statements for social considerations were incorporated into the Minutes of Meeting on the Draft Final Report agreed among the Department of the Environment, Ministry of Jihad-e-Agriculture and the JICA Study Team.

**Table 5.2.3 Environmental and Social Impacts of Watershed Management Plan
(Without Project)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall	
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use		
Rangeland Management														
	Balancing Number of Livestock	-H	-M	-L	-M	-H	-M	-M	-L	-H	-M	-M	-M	-M
	Erosion Control Work	-H	-M	-L	-M	-M	-L	-M	+/-	-M	-L	-L	-L	-L
Forest Management Plan														
	Conservation of Protected Forests	-L	-L	-L	-L	-H	-M	-M	+/-	-L	-L	-L	-M	-L
	Reforestation	-M	-M	-M	-M	-M	-M	-M	+/-	-L	-L	-L	-M	-M
	Environmentally-sustainable Forestry	-L	-L	-L	-L	-L	-L	-L	+/-	-M	-L	-L	-L	-L
	Prevention of Landslides and Slope Collapses	-M	-L	-L	-L	-L	-L	-L	+/-	-M	-M	-M	-L	-M
Management of Plain Area														
	Counter-measures for Sediment Runoff	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	-L	-L	+/-	-L	-L
Urbanization Control														
	Control of Urban Development in Anzali	-L	-L	-M	-L	-L	-M	-M	-L	-L	-L	+/-	-H	-M
	Land Use Control in Watershed	-L	-L	-L	-L	-L	-L	-L	-L	-L	-L	-L	-L	-L
Securing Regional Ecological Network														
	Regional Ecological Network	-L	-M	-L	-L	-L	-M	-M	+/-	-L	-L	-L	-L	-L
Overall		-M	-M	-L	-L	-M	-M	-M	+/-	-L	-L	-L	-M	-L

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.2.4 Suggested Mitigating Measures for Major Environmental and Social Impacts

In this section, mitigating measures for projects in the construction and operation phases that have adverse environmental and social impacts with ratings of “-M” or worse are discussed.

Table 5.2.4 Suggested Mitigating Measures for Soil Erosion Control

Project	Erosion Control Works (Interim Report) Soil Erosion Control (Final Report)
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 5.2.5 Suggested Mitigating Measures for Prevention of Landslides

Project	Prevention of Landslides and Slope Collapses (Interim Report) Prevention of Landslide (Final Report)
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 Final Report, Executive Summary, Section 10.6, Technical Evaluation.
Responsible Organization	MORT, MOJA

Source: JICA Study Team

Table 5.2.6 Suggested Mitigating Measures for Improvement of Livestock Resettlement Program

Project	Balancing the Number of Livestock (Interim Report) Improvement of Livestock Resettlement Program (Final Report)
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 NRGGO’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 ⁴ : 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 ⁵ : 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

5.3 IEE on Wastewater Management Plan

Tables 5.3.1, 5.3.2 and 5.3.3 compare the overall environmental and social impacts of the projects proposed in the Wastewater Management Plan for the scenarios: “with project in construction phase”, “with project in operation phase” and “without the proposed projects”.

5.3.1 Construction Phase

There are a number of construction projects in the Wastewater Management Plan. They include construction of sewerage systems in Rasht, Anzali and Somehsara, as well as construction of community wastewater treatment systems in rural areas and construction of industrial wastewater treatment facilities. These projects could bring a number of relatively

⁴ 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.

⁵ A program for livelihood development, which consisted of (i) capacity development of NRGGO provincial and local offices and (ii) livelihood improvement of local people in forest and rangeland management, was proposed in the Watershed Management Plan.

small environmental and social problems, such as disruption of local traffic for construction works, noise and dust due to construction works, disposal of excavated soil, disposal of pumped water from the construction sites, etc. These problems can be minimized by careful planning and advance notification of local residents about the construction works. As substantial parts of the construction works have already been completed, the future environmental impact would be limited. Most land needed for the sewerage systems has already been acquired, though minor acquisition of private properties might be needed for construction of community wastewater treatment systems and other facilities.

**Table 5.3.1 Environmental and Social Impacts of Wastewater Management Plan
(With Project; Construction)**

	Physical Environment				Natural Environment			Social and Cultural		Develop. Plans		Overall		
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan		Land Use	
Management of Domestic Wastewater in Urban Areas														
	Sewerage Development in Rasht, Anzali and Somehsara	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
	Individual Wastewater Treatment outside Service Area	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
	Promotion of Use of Detergents with Low Phosphorous	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Management of Domestic Wastewater in Rural Areas														
	Community Wastewater Treatment System in Rural Area	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Management of Industrial Effluents														
	Centralization of Industrial Factories	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
	Strengthening of DOE Monitoring	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Management of Livestock Waste														
	Use of Livestock Waste in Agriculture	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treatment of Wastewater from Industrial Animal Husbandry	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
	Measures to Protect Rivers from Livestock Waste	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
Management of Pollution from Farmland														
	Strengthening of MOJA Extension	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
	Integrated Pest Management and Farmer Field Schools	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Overall		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-

note: + : positive impact; - : negative impact; L: low; M: medium; H: high; N/A: not applicable (no construction)
example: -M : medium negative impact

Source: JICA Study Team

5.3.2 Operation Phase

The Wastewater Management Plan is expected to bring major improvements in the water quality of the wetland and rivers, resulting in improvement of the ecological conditions of the

wetland (e.g., less eutrophication), and improvement in health and hygiene. Considering the fact that there is no sewage treatment facility in the area and wastewater is discharged without treatment, the plan will significantly contribute to the improvement of the regional environment.

There will be a number of environmental issues that need attention, such as (i) disposal of sludge generated from the wastewater treatment processes (about 16 tons/day), (ii) water pollution around the discharge points where treated wastewater is discharged, and (iii) odors around the wastewater treatment plants. The relatively high cost of sewerage development and O&M, which has to be borne by the users and the government, is also a concern, and this issue was addressed in the financial evaluation. Assuming that the users bear the entire O&M cost, the estimated user charge would be in the range of 31,000-233,000 Rials/year/household, which is about 1% of estimated disposal household income or below, and is believed to be acceptable.

**Table 5.3.2 Environmental and Social Impacts of Wastewater Management Plan
(With Project; Operation)**

	Physical Environment				Natural Environment			Social and Cultural		Develop. Plans		Overall		
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan		Land Use	
Management of Domestic Wastewater in Urban Areas														
	Sewerage Development in Rasht, Anzali and Somehsara	+/-	+H	-L	-M	+M	+M	+M	+H	-L	+M	+H	+M	+H
	Individual Wastewater Treatment outside Service Area	+/-	+M	+L	+L	+L	+L	+L	+H	-L	+M	+L	+/-	+L
	Promotion of Use of Detergents with Low Phosphorous	+/-	+H	+L	+L	+M	+L	+M	+L	-L	+L	+/-	+/-	+L
Management of Domestic Wastewater in Rural Areas														
	Community Wastewater Treatment System in Rural Area	+/-	+M	+/-	+L	+L	+L	+L	+H	-L	+M	+M	+L	+M
Management of Industrial Effluents														
	Centralization of Industrial Factories	+/-	+M	+/-	+/-	+L	+L	+L	+M	-L	+L	+L	+M	+L
	Strengthening of DOE Monitoring	+/-	+/-	+/-	+L	+/-	+/-	+/-	+/-	-L	+L	+/-	+/-	+L
Management of Livestock Waste														
	Use of Livestock Waste in Agriculture	+L	+L	+/-	+L	+L	+L	+L	+/-	+/-	+/-	+/-	+/-	+L
	Treatment of Wastewater from Industrial Animal Husbandry	+/-	+M	+L	+L	+L	+L	+L	+L	-L	+/-	+/-	+/-	+L
	Measures to Protect Rivers from Livestock Waste	+L	+M	+L	+L	+L	+L	+L	+L	-L	+/-	+/-	-L	+L
Management of Pollution from Farmland														
	Strengthening of MOJA Extension	+/-	+M	+/-	+L	+L	+L	+L	+/-	+/-	+L	+L	+/-	+M
	Integrated Pest Management and Farmer Field Schools	+/-	+M	+/-	+L	+L	+L	+L	+/-	-L	+L	+/-	+/-	+L
Overall		+/-	+M	+L	+L	+M	+L	+M	+H	-L	+L	+L	+/-	+M

note: + : positive impact; - : negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.3.3 Without Project Case

If the plan were not implemented, there would be a significant deterioration of water quality of rivers and the wetland and an increase in eutrophication problems. Without the proposed sewerage systems, the public health and sanitary conditions would worsen. The release of heavy metals in industrial wastewater and pesticides in agricultural wastewater is also a major threat to the regional environment.

**Table 5.3.3 Environmental and Social Impacts of Wastewater Management Plan
(Without Project)**

	Physical Environment				Natural Environment			Social and Cultural		Develop. Plans		Overall		
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan		Land Use	
Management of Domestic Wastewater in Urban Areas														
	Sewerage Development in Rasht, Anzali and Somehsara	+/-	-H	-M	-M	-H	-M	-H	-H	+/-	-M	-H	-M	-H
	Individual Wastewater Treatment outside Service Area	+/-	-M	-L	-L	-M	-L	-M	-M	+/-	-L	-L	+/-	-L
	Promotion of Use of Detergents with Low Phosphorous	+/-	-M	+/-	-L	-M	-L	-M	-L	+/-	-L	+/-	+/-	-L
Management of Domestic Wastewater in Rural Areas														
	Community Wastewater Treatment System in Rural Area	+/-	-M	-L	-L	-M	-L	-M	-H	+/-	-L	-L	-L	-M
Management of Industrial Effluents														
	Centralization of Industrial Factories	+/-	-M	-L	-L	-L	-H	-M	-L	+/-	-L	-L	-M	-M
	Strengthening of DOE Monitoring	+/-	-L	+/-	-L	-L	-L	-L	-L	-L	-L	+/-	+/-	-L
Management of Livestock Waste														
	Use of Livestock Waste in Agriculture	-L	-L	+/-	-L	-L	-L	-L	+/-	+/-	-L	+/-	+/-	-L
	Treatment of Wastewater from Industrial Animal Husbandry	+/-	-L	-L	-L	-L	-L	-L	-L	+/-	-L	+/-	+/-	-L
	Measures to Protect Rivers from Livestock Waste	+/-	-L	-L	-L	-L	-L	-L	-L	+/-	-L	+/-	-L	-L
Management of Pollution from Farmland														
	Strengthening of MOJA Extension	+/-	-M	+/-	-L	-L	-L	-L	+/-	+/-	-L	-L	+/-	-L
	Integrated Pest Management and Farmer Field Schools	+/-	-M	+/-	-L	-L	-M	-M	+/-	+/-	-L	+/-	+/-	-L
Overall		+/-	-M	-L	-L	-M	-M	-M	-H	+/-	-L	-L	-L	-M

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.3.4 Suggested Mitigating Measures for Major Environmental and Social Impacts

In this section, mitigating measures for projects in the construction and operation phases that have adverse environmental and social impacts with ratings of “-M” or worse are discussed.

Table 5.3.4 Suggested Mitigating Measures Sewerage Development (Disposal of Sludge)

Project	Sewerage Development (Interim Report) Sewerage System Development Projects (Final Report)
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 5.3.5 Suggested Mitigating Measures Sewerage Development (Water pollution)

Project	Sewerage Development (Interim Report) Sewerage System Development Projects (Final Report)
Impact Category	Physical Environment: Water ⁶
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. 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 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

⁶ 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”.

5.4 IEE on Solid Waste Management Plan

Tables 5.4.1, 5.4.2 and 5.4.3 compare the overall environmental and social impacts of the projects proposed in the Wastewater Management Plan for the scenarios: “with project in construction phase”, “with project in operation phase” and “without the proposed projects”.

5.4.1 Construction Phase

The main issue would be the environmental impacts related to the construction of the two landfills, in particular opposition from the local residents about construction of the landfills in their neighborhoods.

**Table 5.4.1 Environmental and Social Impacts of Solid Waste Management Plan
(With Project; Construction)**

	Physical Environment				Natural Environment			Social and Cultural		Develop. Plans		Overall		
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan		Land Use	
Environmental Awareness Raising														
	Participatory Recycling Activities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Linkage to Environmental Education	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Provision of Efficient Waste Collection Services to Whole Area														
	Waste Collection Services in Villages	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
	Change in Collection System	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-
Sanitary Landfill Construction														
	Composting of Municipal Solid Waste	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	-L	+/-
	Construction of 2 Sanitary Lanfills	-L	-L	+/-	+/-	-L	-L	-L	+/-	-M	-L	-L	-L	-L
	Closure of Present Dumping Sites	-L	-L	-L	-L	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L
Proper Treatment of Hazardous Industrial Solid Waste														
	Pre-treatment Facility for Hazardous Waste	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
	Proper Treatment of Infectious Waste	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Non-hazardous Industrial Waste Management														
	Promotion of Reduction/Recycling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Regulation to Control Industrial Solid Waste	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overall		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	+/-	+/-	+/-	+/-

note: + : positive impact; -: negative impact; L: low; M: medium; H: high; N/A: not applicable (no construction)
example: -M : medium negative impact

Source: JICA Study Team

5.4.2 Operation Phase

In the operation phase, the Solid Waste Management Plan is expected to bring significant improvement in public health, reduce solid waste pollution of water, and improve environmental awareness. The anticipated major environmental and social problems for the

proposed Solid Waste Management Plan are odor, increased traffic, and noise or other nuisances around the solid waste disposal sites and composting plants. Water pollution around these facilities are also important. These problems are expected to be minor as long as these facilities are constructed in remote areas and managed properly.

**Table 5.4.2 Environmental and Social Impacts of Solid Waste Management Plan
(With Project; Operation)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall	
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use		
Environmental Awareness Raising														
	Participatory Recycling Activities	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+L	+M	+H	+/-	+/-	+L
	Linkage to Environmental Education	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+M	+M	+H	+L	+/-	+M
Provision of Efficient Waste Collection Services to Whole Area														
	Waste Collection Services in Villages	+/-	+L	+L	+L	+/-	+L	+L	+H	+M	+M	+L	+L	+M
	Change in Collection System	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	-M	+L	+/-	+/-	+L
Sanitary Landfill Construction														
	Composting of Municipal Solid Waste	+/-	-L	-L	+/-	+/-	+/-	+/-	+L	-L	+M	+/-	+/-	+L
	Operation of 2 Sanitary Lanfills	-L	-M	-L	+L	+L	+L	+L	+H	-M	+M	+L	+L	+M
	Closure of Present Dumping Sites	+/-	-L	-L	-L	+/-	+/-	+/-	+L	+L	+/-	+/-	+L	+L
Proper Treatment of Hazardous Industrial Solid Waste														
	Pre-treatment Facility for Hazardous Waste	+/-	+L	+/-	+/-	+/-	+L	+L	+L	+/-	+L	+/-	+/-	+L
	Proper Treatment of Infectious Waste	+/-	+L	-L	+/-	+/-	+/-	+/-	+M	+L	+L	+/-	+/-	+L
Non-hazardous Industrial Waste Management														
	Promotion of Reduction/Recycling	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+L	+L	+L	+L	+/-	+L
	Regulation to Control Industrial Solid Waste	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+L	+L	+L	+/-	+/-	+L
Overall		+/-	+L	+/-	+/-	+/-	+L	+L	+M	+M	+M	+L	+L	+M

note: + : positive impact; - : negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.4.3 Without Project

If the plan were not implemented, there would be a breakdown in the solid waste collection services, and it would create major public health problems and impair the environmental sustainability of the area. The problem could even make the area less attractive for investment, especially for foreign investment, because many foreign companies are serious about environmental performance.

**Table 5.4.3 Environmental and Social Impacts of Solid Waste Management Plan
(Without Project)**

	Physical Environment				Natural Environment			Social and Cultural			Develop. Plans		Overall		
	Soil	Water	Air	Secondary	Plants	Animals	Ecosystems	Health and Hygiene	Social	Cultural	Sectoral Development Plan	Land Use			
	Environmental Awareness Raising														
	Participatory Recycling Activities	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-M	-L	-M	-L		+/-	-L
	Linkage to Environmental Education	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-M	-M	-H	-L		-L	-M
	Provision of Efficient Waste Collection Services to Whole Area														
	Waste Collection Services in Villages	+/-	-M	-M	-L	-L	-M	-M	-H	-L	-H	-L		+/-	-M
	Change in Collection System	+/-	-M	-L	-L	-L	-M	-M	-M	-M	-H	-L		-M	-M
	Sanitary Landfill Construction														
	Composting of Municipal Solid Waste														
	Construction of 2 Sanitary Lanfills	-L	-H	-H	-M	-L	-M	-M	-H	-M	-M	-M		-M	-M
	Closure of Present Dumping Sites	-M	-H	-M	-M	-L	-L	-L	-L	-L	-L	-L		-L	-L
	Proper Treatment of Hazardous Industrial Solid Waste														
	Pre-treatment Facility for Hazardous Waste	+/-	-H	-L	-M	-M	-H	-M	-H	-M	-M	-M		-L	-M
Proper Treatment of Infectious Waste	+/-	-L	+/-	-L	+/-	-L	-L	-H	-L	-M	-L	-L	-L		
Non-hazardous Industrial Waste Management															
Promotion of Reduction/Recycling	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-L	-M	-L	-L	+/-	-L		
Regulation to Control Industrial Solid Waste	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-M	-M	-L	-L	-L	+/-		
Overall	+/-	-M	-M	-L	-L	-M	-M	-H	-M	-H	-M	-L	-M		

note: + : positive impact; -: negative impact; L: low; M: medium; H: high
example: -M : medium negative impact

Source: JICA Study Team

5.4.4 Suggested Mitigating Measures for Major Environmental and Social Impacts

In this section, mitigating measures for projects that have adverse environmental and social impacts with ratings of “-M” or worse are discussed.

Table 5.4.4 Suggested Mitigating Measures for Proper Disposal of Municipal Solid Waste

Project	Construction of Sanitary Landfills (Interim Report) Proper Disposal of Municipal Solid Waste (Final Report)
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 5.4.5 Suggested Mitigating Measures for Provision of Efficient Municipal Waste Collection Service to the Whole Area

Project	Change in Collection Service (Interim Report) Provision of Efficient Municipal Waste Collection Service to the Whole Area (Final Report)
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

5.5 Monitoring Programs

Environmental monitoring programs were developed for each of the sub-plans of the master plan. The proposed monitoring programs include:

Table 5.5.1 Summary of Monitoring Programs

Sub-plan	Monitoring programs
Wetland Ecological Management Plan	Wetland ecological census, annual ecological monitoring, eco-tourism monitoring program, environmental monitoring by universities
Watershed Management Plan	soil erosion control, land use control, rangeland management, forest management, livestock resettlement plan
Wastewater Management Plan	Domestic wastewater treatment, industrial factories, agricultural activities, pollution load to the wetland, ambient water quality
Solid Waste Management Plan	Municipal waste management in urban area, municipal waste management in rural areas, recycling activity, leachate, industrial solid waste, medical waste management

Source: JICA Study Team

These programs were designed to monitor (i) the state of the environment in the wetland and its watershed, (ii) environmental pressures to the wetland and its watershed, and (iii) performance of proposed components of the master plan in response to the environmental problems in the wetland and its watershed. More detailed, project-level monitoring programs should be developed at the feasibility study stage.

5.6 Environmental Education Plan

Environmental education, awareness raising, and public participation are three vitally important aspects of the master plan, and are also essential to minimize environmental and social impacts of the master plan. Thus, the Environmental Education Plan was developed as a sub-plan of the master plan. The plan proposes specific programs for the following stakeholders: (i) students, (ii) teachers, (iii) decision-makers, (iv) Islamic leaders, (v) business leaders, (vi) farmers and rural communities, (vii) general public and tourists, (viii) NGOs and journalists.

5.7 Institutional Plan for Implementation

In order to improve inter- and intra-organizational coordination for integrated environmental management, an Institutional Plan for Implementation was developed. Central to this plan is the establishment of an independent organization known as the “Conservancy” for wetland management and coordination of all stakeholders. Considering that establishment of a new organization takes time, a series of preparatory steps were proposed. These include i)

establishment of an Anzali Wetland Section in the DOE Guilan; ii) formation of an Anzali Subgroup within the Provincial Thematic Working Group on Land Use, Environment, and Population (WGLEP) headed by the provincial governor; iii) organization of an annual “Anzali Forum”; and iv) publication of a “State of the Anzali Environment Report”. The plan also proposes capacity development programs, such as cross-sectoral training, DOE apprenticeship training, and overseas exchange visits.

In addition to the Environmental Education Plan and the Institutional Plan for Implementation, various capacity development programs were proposed within each sub-plan of the master plan.

5.8 Financing/Implementation

A large part of the master plan will be implemented with government funding. In order to secure budget allocation, the relevant organizations decided to organize implementation committees at three levels.

Table 5.8.1 Proposed Coordination Mechanisms

Level	Proposed Coordination Mechanism
National	A coordination mechanism is organized within the Supreme Council for the Environment.
Provincial	A coordination mechanism is organized under the Provincial Governor.
Community	Community-level committees to ensure participation of the local stakeholders and to reflect the voices of local stakeholders at the decision-making level.

Source: JICA Study Team