

CHAPTER 6
AGRICULTURAL SECTOR

CHAPTER 6 AGRICULTURAL SECTOR
6.1 Present Situation of Agriculture**(1) Agriculture**

East Timor is a small and poor country with an economy dominated by agriculture, having limited public revenues to spend on this sector. The sector, in turn, is largely dominated by subsistence production of primary staples (maize, rice, cassava and sweet potatoes), employing family labor and limited finances.

Rice is an important food and cash crop. This important rice crop is growing during the wet season from November to March. In 1997, the total harvested area was reported at around 21,700 ha yielding an average of 3.3ton/ha (paddy) and total production was about 72,000 ton (paddy). Official trends (1992-1997) for main crop production are indicated by Table 6.1.

Table 6.1 Production of Main Crop in East Timor

(Unit: ton)

Crop	Unit	1992	1993	1994	1995	1996	1997	2000
Maize	Ton	94,000	104,400	115,700	103,000	122,400	126,300	94,565
Rice (paddy)	Ton	56,300	64,000	67,000	47,700	69,500	72,000	50,920
Cassava	Ton	51,500	70,000	74,300	75,600	78,100	82,300	-
Sweet Potato	Ton	10,400	19,100	18,000	18,200	17,100	17,600	-

Source: Timor Timor Dalam Angka. 1997 (BPS: Central Board of Statistics of East Timor Province)

In the mountainous area, coffees of Arabic variety are cultivated as a cash crop. Their production reached about 9,900 tons in 1997. Coffee is expected to be an important export crop in the future. Coffee production in the western area, four (4) districts of Emera, Manufahi, Ainaro and Liquica are 4,562 ton, 1,786 ton, 1,498 ton and 1,381 ton respectively. Thus their production amounts to 93 % of the total production.

(2) Irrigation

Irrigation in East Timor is confined, almost exclusively, to the production of paddy in the rainy season. Small areas for vegetables are also irrigated throughout the year where demand and water supplies are sufficient.

Most the irrigation systems for paddy were constructed from 1980 and there are 48 irrigation systems in East Timor. Total cultivation areas of those projects are estimated to be about 25,800ha, but only 15,600 ha is functioning i.e. a 60 % utilization ratio.

For selection of the irrigation rehabilitation project for the Three (3) Years Urgent Rehabilitation Plan, the inventory survey was carried out by the JICA study team. As inventory area, 20 irrigation systems having more than 100 ha, are selected from the

above-mentioned 48 irrigation systems. The locations of 20 irrigation systems are shown in Figure 6.1.

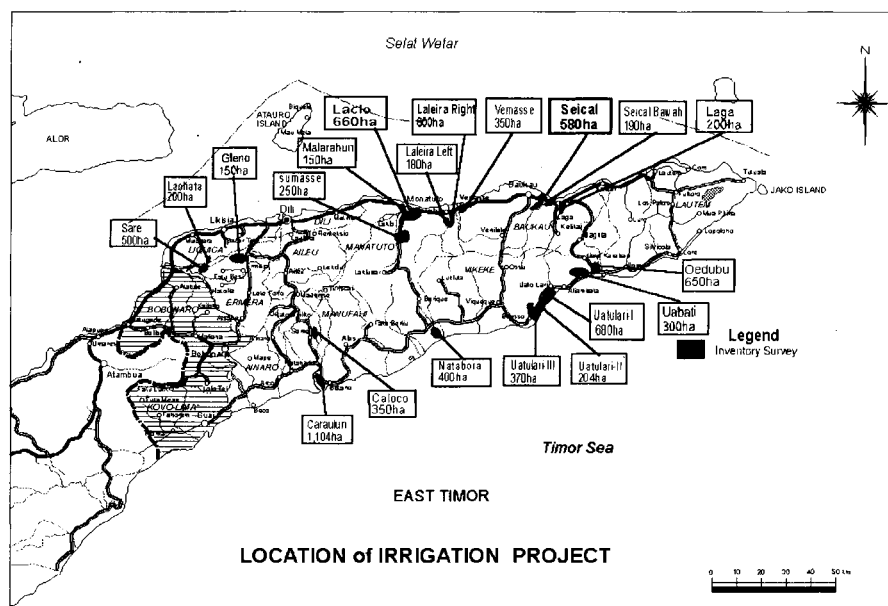


Figure 6.1 Location of 20 Irrigation Systems for Inventory Survey

6.2 3 Years Plan for Urgent Rehabilitation

6.2.1 Basic Concept for Urgent Rehabilitation Plan

The Three (3) Year Urgent Rehabilitation Plan for the irrigation sector is formulated based on the results of the inventory survey and the following basic concepts.

- ① To select only the irrigation rehabilitation plans necessary to the recovery food self-sufficiency in East Timor;
- ② To regain the rice productivity (72,000 ton of paddy) to level of 1997;
- ③ To implement operation and maintenance strengthening in the irrigation sector to ensure a participatory approach and sustainable development;
- ④ To ensure the rehabilitation plans are closely coordinated with other International Funding Agencies such as the International Development Association (IDA of the World Bank Group);

6.2.2 Formulation of Urgent Rehabilitation Plan

The Urgent Rehabilitation Plan for the irrigation sector is divided into the following two (2) types of project.

No.	Type of Project	Project
1	Construction	Urgent Irrigation Rehabilitation Project
2	Supply of equipment	Operation and Maintenance Strengthening Project

(1) Urgent Irrigation Rehabilitation Project

As a result of assessing each irrigation system under the above-mentioned conditions, their priorities in the urgent rehabilitation project can be classified and positioned as shown in Table 6.2.

Table 6.2 Summary of Inventory Survey

No	District	System	Function area for irrigation (ha)	Principal Contents of Facilities	Damage Assessment			Note
					High	Medium	Low	
1	Baucau	Seical	580	Weir, canal	○			3 year project
2	"	Seical Bawah	190	Intake, canal		○		
3	"	Vemasse	350	Intake canal		○		
4	"	Laga	200	Intake canal		○		
5	Viqueque	Uatulari - I	680	Weir, canal	○			3 year project
6	"	Uatulari - II	200	Weir, canal			○	
7	"	Uatulari - III	370	Weir, canal			○	
8	"	Uabati	300	Weir, canal		○		
9	"	Oedubu	650	Intake canal		○		
10	Manatuto	Laclo	660	Intake canal	○			3 year project
11	"	Sumasse	250	Intake canal		○		
12	"	Malarahun	150	Intake canal		○		
13	"	Laleia - L	180	Intake canal		○		
14	"	Laleia - R	600	Intake canal	○			3 year project
15	"	Natarbora	400	Weir, canal		○		
16	Ermera	Sare	500	Intake canal		○		
17	"	Gleno	150	Intake canal		○		
18	Liquica	Laohata	200	Intake canal		○		
19	Manufahi	Caraulun	1,100	Weir, canal	○			IDA
20	"	Caloco	350	Weir, canal		○		
	Total		8,060					

Source: JICA Study Team

Based on the inventory survey and assessment, the five (5) irrigation systems were classified as the high priority projects and the following four (4) irrigation systems, excluding the Caraulun irrigation system previously selected as an IDA project, were selected for the Three (3) Year Urgent Rehabilitation Project.

Table 6.3 Irrigation Systems of Urgent Rehabilitation Project

Irrigation System	District	Irrigation Area (ha)	Remarks
Laclo	Manatuto	660	Laclo project consists of Phase I (Laclo-I) and Phase II (Laclo-II). Phase I will be implemented by Japanese Fund
Seical	Baucau	580	Already this project was requested to Japanese government
Uatolari-I	Viqueque	680	Already this project was requested to Japanese government
Laleia-R	Manatuto	600	
Total		2,520	

Source: JICA Study Team

Location of these four (4) irrigation systems is shown in Figure 6.2.

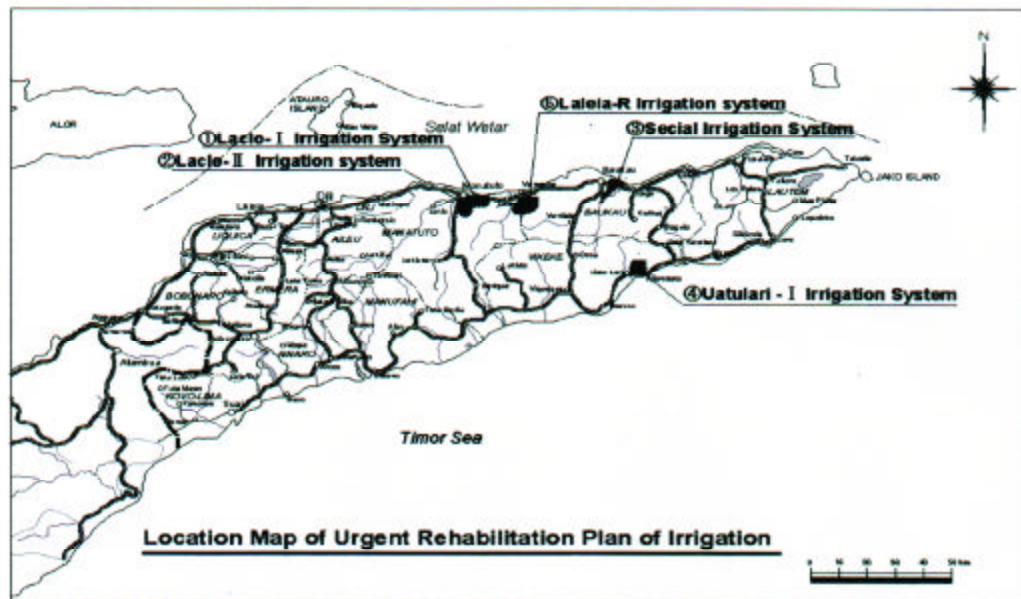


Figure 6.2 Location Map of Irrigation Urgent Rehabilitation Project

(2) The 20 Irrigation Systems O/M Strengthening Project

In order to strengthen the operation and maintenance (O/M) in irrigation sector and to ensure the sustainable agriculture, this project was proposed. One workshop and nine (9) O/M stations should be established by the government of East Timor.

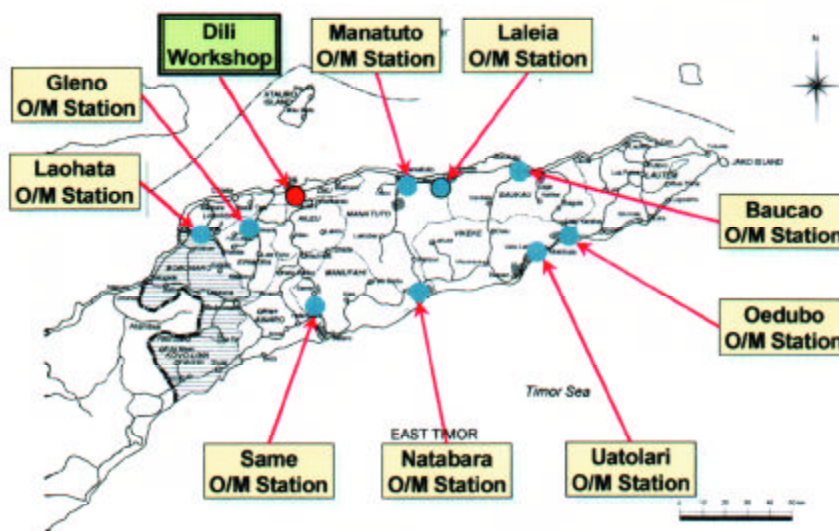


Figure 6.3 Location Map of O/M Stations

6.2.3 Preliminary Design

(1) Laclo Urgent Irrigation Rehabilitation Project

The Laclo Irrigation system lies east of 50 km from Dili. The irrigated area of 660 ha lies on the right bank of the Laclo river. The irrigation facilities including an intake structure were constructed by Portugal in 1960's. A siphon and part of the main canal were seriously destroyed by the flood in 1998. Therefore, the Laclo irrigation system is not functional at present.

Because of the limitation of budget and in order to provide effective implementation, this project is divided into the following two phases.

Lacló Irrigation System – Phase I (Laclo-I)

The route of Sumasse river is to be trained and the intake structure is to be constructed attaching to the Sumasse river. A conducting canal is to connect from the intake structure to the existing main canal for water flow. The paddy field of 420 ha will be irrigated by 2001 from this project. The following facilities will be rehabilitated.

Table 6.4 Main Rehabilitation Works for Laclo-I

Item	Structure Content	Scale	Remarks
Temporary intake	Gabion dike	H:2.0m, L:80m	New construction
Conducting canal	Masonry canal	H:1.8m, B:2.8m, L:300m	ditto
Bridge	Concrete culvert box	B:3.5m, L:9.0m	ditto
Canal	Main Canal & related structures	totally 100.0m	Rehabilitation
Repair gate	Scouring gate	B:1.0m 2 unite	Rehabilitation
Protection dike	Gabion Dike	H:3.0m, L:120m H:2.0m, L:800m	Rehabilitation & new construction
Farm road	Embankment & gravel pavement	B:3.0m, L:2,800m	Rehabilitation
Equipment	Backhoe, Rice mill		Procurement

Lacló Irrigation System-Phase II (Laclo-II)

Double rice cropping is possible for 660 ha by rehabilitation of the existing Lacló intake, settling pond, main canal, Sumasse siphon and culvert canal as well as rehabilitation and new construction of a protection dike. The following facilities are to be rehabilitated.

Table 6.5 Rehabilitation Works for Laclo-II

Item	Structure Content	Scale	Remarks
Intake	Conduction Gabion dike	H:1.0m, L:27.0	New construction
	Conduction Concrete dike	H:2.0m, L:5.0m, H:1.0m, L:21.0m	
	Scouring	B:1.6m, 2 unite	
Protection dike	Masonry	H:4m, L:30.0m, H:2.m, L:8.0m	Rehabilitaton & new construction
	Gabion	H:3.0m, L:150.0m, H:2.0m, L:600m	
Siphon	Concrete culvert box,	L: 100.0m	Reconstruction
Culvert Canal	Concrete culvert box	L:145.0m	Reconstrucuiin
Canal	Masonry	H:1.8m, B:2.8m, L:1,400m	Reconstrucuiin
Gate	Intake gate	B:1.4m, 2 units	Rehabilitation
	Scouring gate	B:1.4m, 2 units	
	Distribution gate	B:1.4m, 2 units	
Farm road	Embankment & gravel	B:3.0m, L:1,500m	Rehabilitation

(2) Seical Urgent Irrigation Rehabilitation Project

The Seical irrigation system lies to the east of Baucau City. This system irrigates 580 ha. This system was constructed in 1989. An existing weir of 2 m height and 95 m length was constructed normal to the river for intake. These structures function for stable intake and maintenance of a canal. However, this weir is in a dangerous condition because the rear apron was destroyed by a flood in 1998. The following facilities are to be rehabilitated.

Table 6.6 Main Rehabilitation Works for Seical

Facility Item	Structure Content	Scale	Remarks
Intake Dam facility	Rear apron (concrete) Rip Rap (Gabion)	A: 210 m ² A: 1,550 m ²	Rehabilitation ditto
Protection dike	Gabion Masonry	H:2.0m, L:50m, H:3.0m ,L:40m	Rehabilitation ditto
Repair Main Canal	Masonry	H:1.8m , B:1.8m Partly repair (L: 500m)	Rehabilitation
Maintenance & Farm road	Embankment & gravel pavement	B:3.0m, L:10 km	Rehabilitation
Equipment	Rice mill		New Equipment

(3) Uatolari-I Urgent Irrigation Rehabilitation Project

The Uatolari-I irrigation system lies southeast of Viqueque District. Its command area is 680ha. The irrigation system was constructed in 1983. The weir was washed away by a flood in 1989. Afterwards, the flood reconstruction works started in 1992 but construction was stopped and left. The following facilities are to be rehabilitated.

Table 6.7 Main Rehabilitation Works for Uatolari-I

Item	Structure Content	Scale	Remarks
Intake Weir	Weir with submerged bridge Riprap (gabion)	H:1.0m, B:4.0m, L:130m H:1.0m A:1,040m ²	New construction
Intake	Intake pipe Conducting canal(gabion dike)	Diameter:600mm, L:6.00m L:100m	Rehabilitation
Main canal	Masonry canal (partly :total:2.0km) Canal cleaning	H:1.5m B:1.6 ~ 1.0m L:2.50km	Rehabilitation
Farm road	Embankment & gravel pavement	B:3.0m, L:2.50km	Rehabilitation
Equipment	Back hoe	1 unit	Procurement

(4) Laleia-R Urgent Irrigation Rehabilitation Project

The Laleia -R irrigation system lies east of 50 km from Manatuto City. The target area of irrigation is 600 ha and reaches the right bank of the Laleia river and partly to the Vemasse River. The irrigation system was constructed in 1993. The intake facility was destroyed by flood and is not functional now. The following facilities are to be rehabilitated.

Table 6.8 Summary of Laleia-R Irrigation System

Item	Structure Content	Scale	Remarks
Intake facility	Conducting dike :gabion	H:1.0m, L: 8.0 m	New construction
	Ditto: concrete	H:2.0m, L: 25.0	
	Scouring gate	B:1.6m, 1 unit	
	Intake gate	B:1.0m, 1 unit	
Protection dike	Masonry wall	H:4-2m, L: 25.0 m	Rehabilitation
	Gabion wall	H:3-2m, L: 25.0 m	
Main Canal	Masonry	H:1.0m , B:1.5 m L: 3.5 km	Rehabilitation & new construction
Gate	Distribution gate	B:0.6m, 2set	Rehabilitation
Farm road	Embankment & gravel pavement	B:3.0m, L::2.0 km	Rehabilitation
Union's house	Steel Frame house	A: 50m ²	New construction
Equipment	Back hoe	Back hoe: 0.3m ³	Procurement

(5) Operation and Maintenance Strengthening Project for 20 Irrigation Systems

To strengthen operation and maintenance in 20 irrigation systems, this project was proposed. Beneficiaries of this project includes all irrigation systems which have more than 100 ha in East Timor except Bobonaro, Covalima and Ambeno Districts. Depending on the location of each irrigation system, one (1) workshop and nine (9) O/M stations will be installed by this project as shown in Figure 6.2.3.

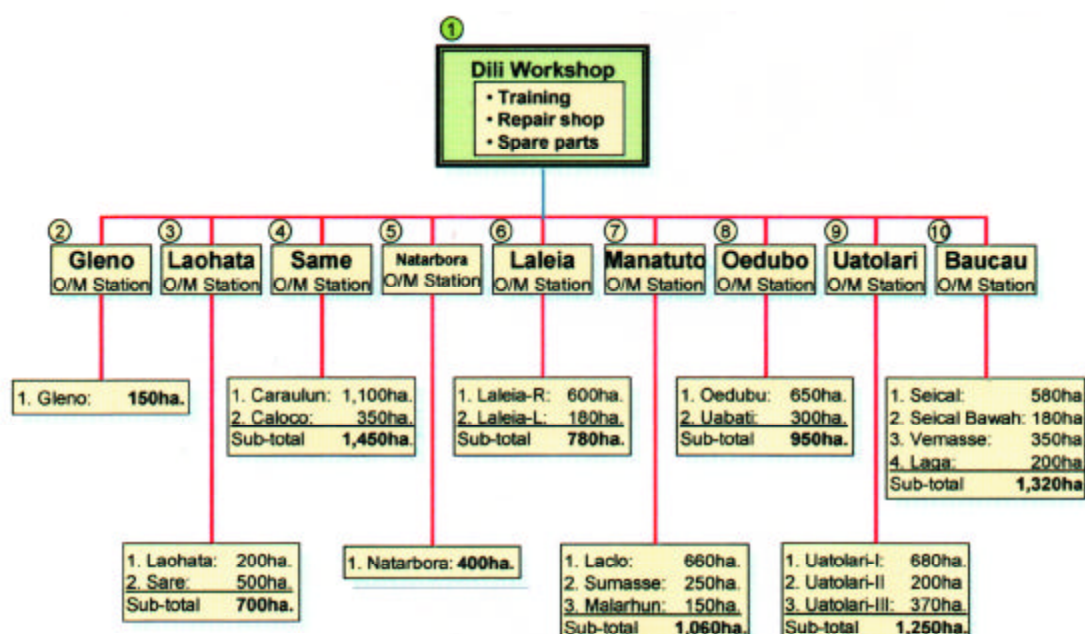


Figure 6.4 Organization Chart of Irrigation O/M Strengthening Project

Based on the results of field survey and questionnaire for this project, the following equipment are to be supplied and procured to Dili workshop and O/M stations.

Table 6.9 Major Component of Equipment

No	Equipment	Number of Equipment		Purpose
		Dili Workshop	O/M Stations	
1	Equipment for workshop	1	-	Delivery of excavators
2	Mobile workshop	1	-	Repair for equipment
3	Excavator (Back hoe)	-	5	Repair for temporary conduction canals and roads Dredging of sediment
4	4 ton cargo truck with crane	-	9	Transportation for equipment, agricultural products and inputs
5	Pickup	-	10	Transportation for agricultural products and inputs
6	Removable pump	-	9	Emergency irrigation pump
7	Rice mill	-	19	Milling of paddy
8	Power thresher	-	36	Threshing of paddy
9	Grass cutting machine	-	36	Maintenance & operation for canals and roads
10	Diesel oil	-	500	Fuel for O/M equipment

6.2.4 Project Cost

The Project Cost for Irrigation Sector Three (3) Year Urgent Rehabilitation Plan is summarized as shown in Table 6.10.

Table 6.10 Project Cost

Project			Project Cost (US \$ million)
Urgent Irrigation Rehabilitation Project	Laclo Irrigation System	Phase-I	3.155
		Phase-II	6.410
	Seical Irrigation System		2.143
	Uatolari Irrigation System		2.493
	Laleia-R Irrigation System		2.860
Sub-total			17.061
20 Irrigation System Operation and Maintenance Strengthening Project			4.920
Total			21.981

6.3 Quick Project

Having the following purposes, the quick project for Laclo irrigation system was conducted by JICA Study Team from June to July, 2000.

- ① It makes possible to supply water about one month earlier to Laclo irrigation system;

- ② It makes to learn canal management and maintenance since works will be carried out in priority for concerned farmers of the project site;
- ③ It can return the farmers to the farms which was abandoned two years ago;
- ④ It can give the social unrest to those farmers who didn't have a way of income.

The works of the quick project is to cut grass and to remove sediment along the canal of Laclo irrigation. The total canal length for quick project is 11.3 km. The volume of removal sediments and area of grass cutting was about 4,510 m³ and about 23,500m² respectively.

6.4 Operation and Maintenance Plan

Establishment of Organization for Operation and Maintenance

As part of the “20 Irrigation Systems O/M Strengthening Project”, one workshop in Dili and nine O/M stations for irrigation will be established by the government of East Timor (See Figure 6.4).

Operation and Maintenance Technicians

Up to 22 mechanics and assistants will be required. These technicians will be trained during implementation period of “20 Irrigation Systems O/M Strengthening Project”.

Training for Technicians

Training at Dili workshop of 2 month period for 22 technicians will be conducted at the end of “20 Irrigation Systems O/M Strengthening Project”. Training cost will be included in this project.

Water User Associations (WUA)

There are rudimentary farmer groups in many irrigation systems. Based on the special training, agricultural extension workers, irrigation technicians and farmers can expand these into WUA to take the responsibility for the operation and maintenance of their infrastructures and for management of the irrigation systems. These costs should be paid by farmers with a subsidization by the government of East Timor.

6.5 Implementation Plan

Implementation plan for the Three (3) Year Urgent Rehabilitation Plan for irrigation sector is proposed as shown in Figure 6.5.

Project	Name of Irrigation System	Project Cost (US\$-thausant)	First Year				Second Year				Third Year				
			2000		2001		2002		2003						
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
Urgent Irrigation Rehabilitation Project	Laclo-I	3,155													
	Seical	2,143													
	Uatolari-I	2,493													
	Laclo-II	6,410													
	Laleia-R	2,860													
20 Irrigation System Operation & Maintenance Strengthening Project		4,920													
Total/Disbursement		21,981	4,548				8,099				9,334				

Figure 6.5 Implementation Schedule

CHAPTER 7
ENVIRONMENTAL ASPECT

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7.1 General

(1) Environmental Administration

The Environmental Protection Unit of UNTAET (EPU) has been established as an organization to manage environmental preservation and administration of East Timor. Protecting a human life, natural resources and the environment, the EPU has aimed at promoting laws, educating the environmental preservation and monitoring environmental performances to restore and develop the country in cooperation with the concerned authorities concerned such as the UNTAET, NGO's, academic sectors, local communities, environmental UN agencies and private sectors. The EPU has been operating by 13 staff consisting of 4 international staff and 9 local staff.

(2) Regulation for Environmental Protection

UNTAET has made the Draft of UNTAET Regulation on Protected Places and sent it to MIYET, UNAYION, NEW YORK on 29, June 2000. The Regulation No.2000 ON PROTECTED PLACES aims at preservation or protection of protecting designated areas, endangered species, coral reefs wetlands, mangrove areas, historic, cultural and artistic sites, conservation of biodiversity and biological resources of East Timor. It has the penal regulations against the Regulation.

1) Protected Wild Area

Land consisting of islands, beaches, mountains, sanctuaries, reserves and any other area are protected as protect wild areas. In addition, production activities such as hunting, road construction and agricultural activities are prohibited to protect of precious wild animals and plants in those areas. The location of protected wild areas is shown as below Table 7.1.

Table 7.1 Location of Protected Wild Area

Protected Wild Areas	Location & Content
Land constituting beaches	Laco island (locks, reefs, surface feature)
Beach	Tutuuala (with forest), Cristo Rei (with hinterland)
Mountains	- Summit of Tata Malia, Sadoria, Malobu, Monte Matebein, and all elevation above 2000m and surrounding fores - Summit of Mount Daituto, Fantumasin, Perdito, Cblaque and surrounding forests
Sanctuaries	Sungai Clere
Reserves	Tilomar, Lore, Manucoco

Source: Regulation No. 2000 / ON PROTECTED PLACE: UNTAET)

2) Protection of specimens and wetland

It is prohibited to catch or to collect precious wild animals such as sea tortoises, turtles, - marine mammals (dolphins, whales and Dugongs), wallabies, crocodiles, precious wild

plants and endangered species in East Timor without permission. Furthermore, people must not sell, kill and threaten them. The coral reef living in the area of sea around East Timor should be protected. Wetlands and mangroves have to be protected in East Timor. For that purpose, the mangroves should not be cut, damaged and removed while wetlands have to be free from pollution by refuse, unjust drain and damage.

The location map of environment Conservation areas including animals, plants, topography, scenery and so on is shown in Figure 7.1.

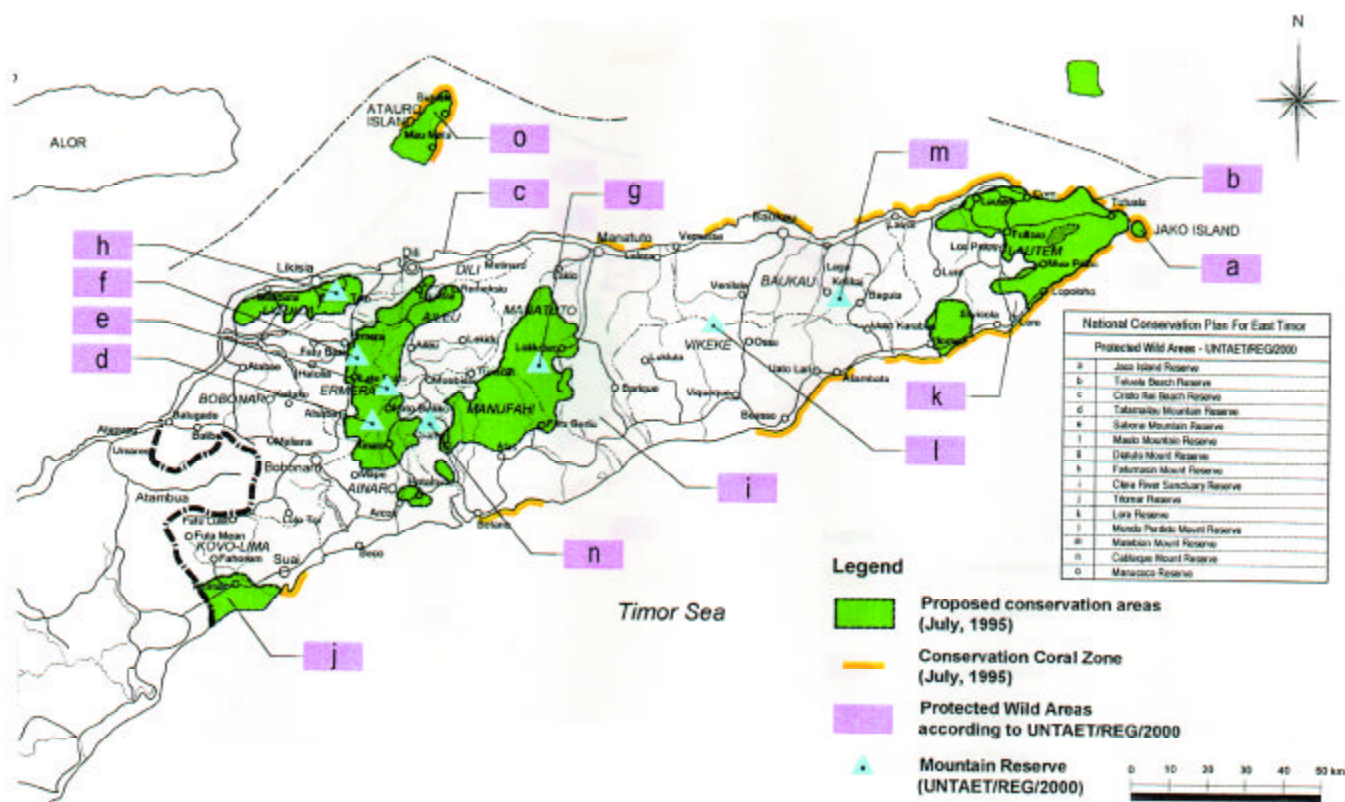


Figure 7.1 Environment Conservation Area for East Timor

7.2 Initial Environmental Examination

(1) Methods of environmental assessment

The Protection Unit (EPU) of UNTAET entrusts the administrative management on environmental issues. The preparation of law regarding to environmental assessment is being processed. Accordingly, environmental assessment of rehabilitation projects will be carried out based on the guidelines provided by Japan International Cooperation Agency in consultation with EPU.

Screening and scoping will be carried out using project site environmental survey sheets and outlined plans of the projects for the respective sectors (road & bridge, port, electricity, irrigation). Based for the results of scoping, countermeasures on environment preservation will be proposed for Quick Project and Three Year Urgent Rehabilitation Project in their respective sectors. Further, necessary recommendations will be made accordingly when environmental monitoring is required.

(2) Quick Project

1) Project description

The urgent project includes the total three(3) projects, namely, two(2) rehabilitation works of roads and one(1) rehabilitation work of irrigation canals. The urgent project targets rehabilitation of existing facilities. The roadwork aims at clearing grasses at a road shoulder, cleaning side ditches, rehabilitating the collapsed portion of earth protection walls and gravelling to strength the surface of roads. These Projects will be rehabilitated from May to August 2000. The project descriptions are shown in Table 7.2.

Table 7.2 Description of Three (3) Quick Projects

Project Description	Contents
<p>1)Road Rehabilitation :</p> <p>This Project is urgent repair and restoration of road at Dili – Aileu – Ainaro road (110km) and Baucau – laga – Baguia road (42Km). The rehabilitation works of the project is composed of embankment by gabion, road pavement, gabion causeway, pipe culverts and etc.</p>	<p>Pavement : 13,300m²</p> <p>Embankment : 2,500m³</p> <p>Gabion: 2,300m³</p> <p>Causeway: 6ways</p> <p>Pipe culverts : 35 Places</p>
<p>2)Road Shoulder and Side Dich and Side Ditch Restoration</p> <p>This project contains the works of weed slashing on road shoulders and removal of mud from side ditches along the 123 km long Dili - Baucau road</p>	<p>In order to supply irrigation water to Manatuto irrigation area promptly, the contents of the project aim at the cleaning of grasses, trees and removing sediments. Total length of cleaning is including 11.3km of canals.</p>
<p>3)Laclo irrigation system</p> <p>In Laclo Irrigation area, farming has being stopped since 1998 due to inability of leading water into the field with the brake age of intake, siphon and sediment in the canal.</p>	

2) Preliminary environmental assessment

The screening and scoping survey was made on the natural environment (precious animals and plants) and the social environment (consideration to the users). The influences are summarized as shown in the following Table 7.3.

Table 7.3 Evaluation by Screening and Scoping

Project name	Gist to be considered by screening and scoping		
	Social Environment	Natural Environment	Public hazard
Road rehabilitation	No negative influence - To ensure safe traffic	No negative influence - Few available data for protected areas and precious specimens	No negative influence -Necessity for consideration of waste treatment
Road shoulder and ditch Restoration	No negative influence Ditto	No negative influence Ditto	No negative influence Ditto
Laclo irrigation system	No negative influence Canal works by farmers' Participation	No negative influence Ditto	No negative influence Ditto

The result of the screening and scoping by the environmental survey indicates that there are no negative influences to the natural and social environmental conditions which need monitoring in the future. Consequently, the project is judged not to need the Environmental Impact Assessment (EIA). However, the following points should be considered in terms of the environmental protection during construction.

3) Countermeasures for environmental preservation

The three urgent projects are not a large-scale projects but small-scale civil work mainly constructed by manpower. However, the maintenance road along canals is used as a road for daily life while the road is rehabilitated. The waste treatment of construction should be considered. The Summarized points to be considered during construction are as follows.

- A traffic control person is posted, and within traffic areas, safety must be implemented.
- The Contractor immediately contact UNTAET or JICA Study Team in case plant and endangered species are found within the construction area.
- The works are carried out with careful consideration to conserving a mangrove growth along the coast area.
- The maintenance roads along the canals are used for daily life of inhabitants, too. Thus, countermeasure such as construction of a bypass should not interrupt the passengers during construction.

(3) Three Years Urgent Rehabilitation Plan

Three years urgent rehabilitation projects in four sectors (road & bridge, electricity, irrigation, port) are proposed to implement in three years between 2000 to 2003.

1) Project description

The description of the Three Year Urgent Rehabilitation Project to be implemented in the four (4) sectors of Road/Bridge, Power Station, Irrigation and Port are summarized as shown in Table 7.4. These projects are proposed to implement in three years between 2000 to 2003.

Table 7.4 Project description of Three Years Urgent Rehabilitation Project

Summary of Project Description	Content
<p>1) Rehabilitation of Road</p> <p>The objective of the Rehabilitation Plan of Roads and Bridges is to rehabilitate the suspended portion of existing roads or to improve them with obstacles. The rehabilitation work of roads consists of construction of gutters for drainage, retaining walls of gabion, gravel roads and simple asphalt roads.</p>	<p>Rehabilitation road : 1,627km Road width : 4.0m Bridges and Cause way: 68 place</p>
<p>2) Rehabilitation of Port</p> <p>Existing pile foundations for Navigation Aids and Revetment of East container Yard at Dili Port have been become superannuated. These facilities need to restore to prevent the collapse of the structure. Many of fenders at Dili Port and Com Port have been broken. These also shall be necessary to restore.</p>	<p>Dili port; Navigation aid & rubber Fender : 2,000m Asphalt : 4,500m² Com Port; Navigation aid rubber Fender 1,600m</p>
<p>3) Rehabilitation of Power</p> <p>There are 60 power stations exist in East Timor. Many of them were damaged or capacity has been declined due to the destruction during independent civil war in 1999. Urgent rehabilitation of 13 power stations are proposed. The Komoro power station in Dili will be rehabilitated to increase the power capacity. The generating system of those power stations are of diesel oil generator with maximum capacity range of 3.0Mw~25kw.</p>	<p>Komoro power station : Replacement damage engine (3.0 Mw) 13 Rural power station : Replacement damage engine (60 kw-20kw)</p>
<p>4) Rehabilitation of Irrigation</p> <p>Rehabilitation Plan of Irrigation aims at the rehabilitation of the existing four irrigation systems in Lacro, Seical, Viqueque, and Laleia. The content of rehabilitation projects consists of the rehabilitation of dams and intake facilities, main canals, gates, distribution works and farm roads</p>	<p>Lacro (Phase I , Phase II) : 660 ha Seical : 580 ha Viqueque : 680 ha Laleia : 600 ha</p>

2) Preliminary environmental assessment

The Preliminary environmental assessment by screening and scoping was made on the environmental impact to the precious animals and vegetation and the social impact to the users. The influences are summarized as shown in the following Table 7.5

Table 7.5 Evaluation by Screening and Scoping

Project name	Gist to be considered by screening and scoping		
	Social Environment	Natural Environment	Public hazard
Rehabilitation of road	<p>Minimum influence</p> <ul style="list-style-type: none"> - To ensure safe traffic - To entrance of private area - To leased land 	<p>Minimum influence</p> <ul style="list-style-type: none"> - Few available data protected areas and precious specimens 	<p>No negative influence</p> <ul style="list-style-type: none"> -Necessity for consideration on waste treatment
Rehabilitation Of port	<p>No negative influence</p> <ul style="list-style-type: none"> - Safe navigation during construction (No negative influence) 	<p>No negative influence</p> <ul style="list-style-type: none"> -ditto- 	<p>No negative influence</p> <ul style="list-style-type: none"> -ditto-
Rehabilitation Of Power	<p>No negative influence</p> <ul style="list-style-type: none"> -Public information on stoppage of power supply 	<p>Minimum influence</p> <ul style="list-style-type: none"> - Pollution of water and soil by leaking wasted oil 	<p>Minimum influence</p> <ul style="list-style-type: none"> - Water & Air pollution - Noise
Rehabilitation Of Irrigation	<p>Minimum influence</p> <ul style="list-style-type: none"> -To confirm water right and ownership of canals and right of way -To entrance to private area and to lease land 	<p>No negative influence</p> <ul style="list-style-type: none"> - Few available data protected areas and precious specimens 	<p>No negative influence</p> <ul style="list-style-type: none"> - Necessity for consideration on waste treatment

The above mentioned projects of the four (4) sectors include rehabilitation of damaged facilities and nonfunctional facilities. As they do not include the new works, the negative influences to the natural environment and the social environment such as resettlement and social security are very little. Consequently, it is judged that the Environmental Impact Assessment (EIA) on those projects is not needed. Regarding the construction of road, port and irrigation sector, the following countermeasures will be considered for the environmental protection. In the case of power station, however, the trouble of waste oil has occurred because of the existing deterioration of disposed oil. Though there are no complaints and actual injuries, it is needed to monitor the water quality and soil pollution. The countermeasures for each sector are described as follows.

3) Countermeasures on Environment Preservation

a) Environment preservation during construction

From the viewpoints of environment preservation, the summarized considerable items and countermeasures are as follows;

- Temporary canals are prepared not to interrupt flowing water if there are structures crossing roads, sources of drinking water or irrigation canals.
- The negative influences of quarrying from rivers, the uses of river water by people and river flows are eliminated.
- Dump yards of soil prevent soil outflow to the river and the contaminated water caused by washing a concrete mixer is disposed in the earthen settling pits.
- The waste materials and equipments should be disposed according to the plan and information regarding place and conditions and will be reported to UNTAET(EPU).

b) Necessity of monitoring at Comoro Power Station

The Comoro Power Station, the largest in Dili city, East Timor needs to be monitored on negative environmental influences such as air pollution, water pollution and noise.

CHAPTER 8
CONCLUSION AND RECOMMENDATION

CHAPTER 8 CONCLUSION AND RECOMMENDATION

8.1 General

In order to achieve the objectives of projects that are to facilitate efficient national security and provide humanitarian aid and ensure salvage of the road, bridge, port, power and irrigation assets and to induce revival of economic activity, it is vital not only to implement the three years urgent rehabilitation program formulated in the Study, but also to establish institutional framework including capacity building of Timorese engineers simultaneously as both wheels of a vehicle.

8.2 Recommendation for Roads and Bridges Sector

(1) Implementation of Three Years Urgent Rehabilitation Program

The 18 sub-projects formulated in this Study covering all kinds of roads and bridges rehabilitation and maintenance in the 13 districts in East Timor shall be implemented over three Timorese financial years from July 2000 to June 2003.

Route No	Road Section	Capital Cost US\$ Mill	2000		2001		2002		2003		Committed Agency
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
(1)	Dili-Aileu-Aituto-Ainaro-Cassa	4.82									JAPAN
(2)	Laga-Baguaia-Afaloicai	6.54									QP by Japan
(3)	Tibar-Ermera	3.12									(JICA STUDY)*
(3)-1	Ermera-Hatolia	1.65									(JICA STUDY)*
(4)	Ermera-Letefoho-Atsabe	2.41									(JICA STUDY)*
(5)	Laga-Lautem-Los Palos	2.72									(JICA STUDY)*
(6)	Manatuto-Cribas-Natabora	1.88									ADB-TFET
(7)	Dili-Tibar-Liquica-Maubara-Loes	3.04									(JICA STUDY)*
(8)	Baucau-Venilale-Viqueque	4.97									ADB-TFET
(9)	Aituto-Same-Betano	2.16									ADB-TFET
(10)	Cassa-Betano	0.74									(JICA STUDY)*
(11)	Betano-Natabora	0.41									(JICA STUDY)*
(12)	Natabora-Viqueque	0.63									(JICA STUDY)*
(13)	Viqueque-Beacu-Uatolari-Irabinleteria	1.09									(JICA STUDY)*
(14)	Irabinleteria-Illiomar-Los Palos	2.08									(JICA STUDY)*
(15)	Dili-Manatuto-Baucau-Laga	4.28									(JICA STUDY)*
	Dili city	3.37									(JICA STUDY)*
	Bobonaro, Suai, Oecusse Districts road	9.13 18.00									ADB-TFET ADB/OTHERS
	Total	73.04			24.65	31.69	16.67				

Note: (JICA STUDY) does not mean a commitment of funding for D/D and construction works of the above projects

Figure 8.1 Implementation Plan of Road and Bridge Sectors

The capital cost in total required for the project implementation is estimated to be US\$ 73 million at June 2000 price, which is more or less equivalent to UNTAET's road budget including World Bank Trust Fund over three years period.

(2) Expediting Establishment of Institutional Framework

The organization and staffing for the road sector, for instance, have been changed several times and a concrete blue print of the future organization and staffing has not been issued yet as of the end of June,2000.

Following recommendations are made by JICA Study Team for UNTAET's attention and consideration.

- Institutional frameworks, even transitional one, together with the future road sector organization with staffing shall be established and taken place within the earliest possible time.
- East Timorese capacity building and localization is of vital important to facilitate that the East Timorese will be capable of planing, implementing and managing the sector in near future.
- In establishment of the institutional frameworks for the road sector, the District Office is responsible for maintenance of roads and bridges in its jurisdiction and also be equipped with a set of equipment and tools. Thus maintenance capacity shall be established in each district office since the routine, periodical maintenance is absolutely required for the roads and bridges in East Timor because of its fragile geology and steep topography.

(3) Maintenance and Operations

It is recommended from capacity building aspect that the routine types of maintenance works shall be carried out on a force account basis by the Department of Transport and Works (ETW)'s District Office, while the sophisticated work (incidental maintenance) requiring heavy construction equipment or periodical maintenance work in bulk shall be carried out on a contract basis.

8.3 Recommendation for Ports Sector

Based on the findings and study of ports in East Timor that the JICA Team has recommended the following:

(1) Implementation Schedule of Recommended Projects

The basic concepts for formulating the Project Implementation Plan in the study are as follows:

- The implementation period to materialize the plan is over three Timorese financial years starting from July 2000 to June 2003.
- The implementation priority is; 1) to secure safety navigation and berthing of Vessels, 2) to secure safety and efficiency of Cargo Handling.

The implementation plan is recommended as summarized in Figure 8.2.

	Task Name	Capital Cost US\$ Mill	2000				2001				2002				2003				Committed Agency
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
			PY1				PY2				PY3								
Dili Port	Completion of Wharf Extension	0.40	■																ADB-TFET
	Restoration of Landing Craft Slipway	0.04	■																ADB-TFET
	Rehabilitation of East Container Yard	0.20	■																ADB-TFET
	Emergency Repairs and Equipment	1.33			■														ADB-TFET
	Equipment (Assessed budget)	0.40	■																UNTAET
	Restoration of Navigation Aids & Fenders	2.50		■															Gov. of JAPAN
	Rehabilitation of West Container Yard	4.55						■											—
	Restoration of East Container Yard Revetment	1.89															■		—
	Interim Port Management Services	N/A	■																Portugal
	Port/Maritime Institutional Development	0.15	■																ADB
	Institutional "Operationalization" and Training	inc		■				■											ADB-TFET
	Port/Maritime Sector Development Plan	0.15	■																ADB
	Com Port	Rehabilitation of Navigation Aids & Fenders	1.37														■		—
Others	Beach Matting : Suai, Betano, Beacu	0.09	■															ADB-TFET	
Total of Capital Cost		13.07	0.30	4.96				2.54				2.20				3.26			
			Total of Three Years 9.70																

Figure 8.2 Implementation Plan of Port Sector

- (2) Dili Port is standing as the Lifeline port of East Timor after social confusion of 1999, so that the number of vessels has increased to the port every day. The port must be rehabilitated to function effectively as the Lifeline port of East Timor.
- (3) Extension of the wharf should be considered without any delay. The wharf occupancy ratio is more than 95% since February 2000, so that the wharf does not have enough time for the maintenance (any occupied records do not exist from the social confusion of 1999 to January 2000).
- (4) The permanent structure of Port Management and Operation should be organized as soon as possible. At least the staff of operation department should be able to communicate either English or Portuguese.

The arrangement of pilots and pilot boats are recommended;

- To solve a difficult problem of the calling vessels to enter the port; and
 - To prevent marine accidents.
- (5) The port does not have any tariff system after the social confusion of 1999, so that UNTAET must decide the port tariff as soon as possible. In this connection that the owners of called vessels and/or shippers have no objection to pay the port tariff.

- (6) The port should be offered to the vessels as the safe call port, so that a top priority of the rehabilitation should be to operate as a safe port, which includes safe navigable, safe berthing, safe loading and unloading, security against seawater and theft, and against fire fighting.
- (7) The port should have at least one (1) tugboat to offer safe berth/unberth, and/or less waiting time of the called vessels. In this regard that transportation cost of the imported commodities will become less, and this is of benefit to lighten the burden of East Timorese. 1,500hp to 2,000hp tugboat is needed.

8.4 Recommendation for Power Sector

PAET, as the Power Authority of East Timor who is responsible for operating, managing and controlling of power supply facilities, has not yet sufficient manpower and capitals. However, it will be necessary for PAET to establish a resolute organization, as well as further improving the following points to ensure the smooth and truly effective implementation of the formulated plans under this study.

- (1) The following implementation schedule shown in Figure 8.3 is recommended for 5 projects formulated under this study as “Power Sector 3 years Plan for Urgent Rehabilitation” together with aid projects undertaken by ADB and Portugal for the power sector.

No.	Project Name	Capital Cost (Million US\$)	2000		2001		2002		2003		Committed Agencies
			1-6	7-12	1-6	7-12	1-6	7-12	1-6	7-12	
1	Restoration of rural power stations	5.18									Rehabilitation Plan - 1
	(1) Two (2) P/S funded by UNTAET	0.30		0.30							UNTAET
	(2) Fifteen (15) P/S funded by ADB	2.33		1.33	1.00						ADB
	(3) Two (2) P/S funded by Portugal	0.30		0.30							PORTUGAL
	(4) Thirteen (13) P/S funded by Japan	2.25		1.25	1.00						JAPAN
2	Maintaining of present output capacity of Komoro power station	2.91		1.50	1.41						Rehabilitation Plan - 2 JAPAN
3	Institutional study for PAET by Portugal Consultant	1.00	0.50	0.50							PORTUGAL
4	Rehabilitation of Switchgears of Komoro P/S, etc	0.43			0.43						ADB
5	Upgrading of Komoro power station	7.20			2.40	2.40	2.40				Rehabilitation Plan - 3 (JICA STUDY) *
6	Upgrading of three(3) major power stations	7.63			2.63	2.50	2.50				Rehabilitation Plan - 4 (JICA STUDY) *
7	Reinforcement of 20kV distribution networks	5.50					2.00	2.00	1.50		Rehabilitation Plan - 5 (JICA STUDY) *
Total of Capital Cost		29.85	0.50	5.18	6.24	5.03	6.90	4.50	1.50		
note : (JICA STUDY) * does not mean a commitment of funding for D/D and construction works			5.68		11.27		11.40		1.50		

Figure 8.3 Implementation Plan of Power Sector

- (2) In order to achieve financial independence, PAET shall, in the possible shortest timeframe, commence to collect revenue from consumers and shall cover all the operation cost (salary, fuel cost, spare part costs, depreciation, etc.) and construction cost including restoration and rehabilitation cost of damaged facilities by the collected electricity tariff, and to minimize the assistance from the donor countries and organizations.
- (3) However, when the first electricity tariff is examined, all the operation cost shall, at minimum, be covered by the electricity charge collected from consumers, although a low tariff shall be applied to domestic household and social and public facilities and comparatively high tariff shall be applied to industry and commercial consumers into consideration.
- (4) In addition to the above, it is necessary for PAET to constantly review the need to maintain the electricity tariff at a reasonable level to achieve financial independence, taking all operation cost including equipment replacement cost, maintenance cost, etc. into consideration.
- (5) It will be necessary for PAET to install a watt-hour meter for all consumer premises and to strictly conduct meter readings and billing in order to establish a fair electricity charge collection system.
- (6) It will be necessary for PAET to hold and continue the technical training (both On-the Job Training and Classroom Training) for staff in order to improve their technical skill.
- (7) It will be necessary for PAET to promote plans to expand the generating capacities and distribution grids as well as providing the necessary budget, by means of preparing appropriate power demand forecasts from time to time to prevent a power shortage, PAET shall take into carefully consideration increasing trend of new power demand as well as the existing load following extension of the distribution networks.
- (8) In addition to the above, it will be necessary for PAET to change/replacement, without any delay, malfunctioning or old parts/consumables, which are found during the periodic inspection for the power generating facilities. PAET should inspect distribution lines including the felling of trees along its routes, in order to prolong the equipment life, to reduce consumption ratio of fuel oil and decrease the number of accident occurring.

8.5 Recommendation for Agricultural Sector

In connection with the implementation of the Project, the following matters should be carefully taken into consideration by the UNTAET, CNRT and/or the project implementing agency of the new governmental organization of East Timor.

(1) Implementation of the Project

The Project should be implemented as soon as possible in consideration of the following matters:

- The Project is very important to provide food self-sufficient and reconstruct East Timor;
- Some of the decrepit old irrigation facilities are in danger of destruction by next flood;
- The Project is expected to be a model agricultural development plan for transition from traditional agriculture to mechanical/technical agriculture.

	Name of Irrigation System	District	Capital Cost US\$	Stage	First Year		Second Year		Third Year		Committed Agency		
					2000		2001		2002			2003	
					Q3	Q4	Q1	Q2	Q3	Q4		Q1	Q2
Urgent Irrigation Rehabilitation Project	Laelo-I	Manatuto	3.2	D/D & Tendering							Gov. of JAPAN		
				Construction									
	Seical	Baucau	2.2	D/D & Tendering							(JICA Study)		
				Construction									
	Uatolari-I	Viqueque	2.6	D/D & Tendering							(JICA Study)		
				Construction									
	Laelo-II	Manatuto	6.4	D/D & Tendering							(JICA Study)		
				Construction									
	Laleia-R	Manatuto	2.9	D/D & Tendering							(JICA Study)		
				Construction									
20 Irrigation System Operation & Maintenance Strengthening Project			6.4	D/D & Tendering							(JICA Study)		
				Construction									
Total			22.0			4.55	8.10	9.33					

Note: (JICA Study) does not mean a commitment of the funding for D/D and construction works

Figure 8.4 Implementation Plan of Agricultural Sector

(2) Establishment of O/M Organization and WUA

For sustainable agriculture and food self-sufficient, an organization for irrigation maintenance and operation (O/M) should be established as soon as possible before delivery of equipment. Also, The water user association (WUA) is to be established in near future.

(3) Establishment of Pilot/Experimental Farm

In order to realize the smooth and effective introduction of new high yield varieties specially paddy and mechanical agriculture to farmers in the Project area, it is strongly recommended that the pilot and experimental farm is to be established within an association farm under the new governmental organization. Furthermore, it is also important theme of the pilot farm to train the extension workers who will directly visit

the farms and train the farmers in and around the Project area and transfer the advanced techniques to introduce new crops and provide new agricultural techniques.

(4) Needs for Study on Bobonaro, Covalima and Ambeno Districts

The JICA Study Team could not investigate in the Bobonaro, Covalima and Ambeno districts in this study due to security conditions in these districts. However, farmers and agricultural infrastructures in these three (3) districts were most seriously damaged by the civil conflict in August/September 1999. Trans-immigrated settlements were completely destroyed. A study for reconstruction of agriculture sector in these districts should be conducted as soon as possible. Also, more Quick Impact Projects for these areas are needed.

(5) Needs for Flood and Erosion Control Project

Many irrigation facilities and rural roads were damaged by floods and landslips occurring in every year due to poor management of rivers and its basins. Therefore, flood and erosion control projects including reforestation are needed in the near future.

(6) Restoration of Weather and Hydrological Stations

Before 1975, East Timor had a network of 67 weather stations under the Indonesian administration. In the civil conflict in 1999, many weather and hydrological stations were destroyed. Moreover, almost of weather and hydrological records were burned and lost. The recovery of weather and hydrological records and restoration of weather and hydrological stations is important.

(7) Necessity of Integrated Agricultural Development Master Plan

The scope of works, of this study focused on the formulation of an urgent irrigation rehabilitation project. The *Integrated Agricultural Development Master Plan Study* including river and basin management should be conducted as soon as possible.

8.6 Recommendation for environmental Aspect

The Three Years Urgent Rehabilitation Plan of East Timor aims at implementing the infrastructure project of five (5) sectors of roads, bridges, ports, power and irrigation. The following considerations are proposed for the natural and social environment in the implementation of the rehabilitation projects.

(1) Necessity of EIA

The above mentioned projects of the four (4) sectors are the rehabilitation of damaged facilities and facilities out of function. As they do not include the new works, the negative influences to the natural environment and the social environment such as -

resettlement and social security are very little. Consequently, it is judged that the Environmental Impact Assessment (EIA) on those projects will not be needed.

(2) Consideration to natural environment (Project along with sustainable natural environment)

The construction works of the project consist of the rehabilitation of existing facilities and has no plan of new construction. Consequently, it is judged that there are few factors to largely affect the natural environment. However, the data of precious natural resources to be protected is under pigeonholing. In principle, EPU will manage the environmental preservation in the future. The active cooperation among the authorities concerned of project, the donor countries, the consultant companies and the contractors directly related to the projects will be required.

(3) Consideration to social environment (Approach of people's participation to rehabilitation project)

People's participation to the project is not sufficient at the present. The rehabilitation works of each sector target the existing facilities under utilization. They will be temporally restricted to use in the implementation. Consequently, it is essential to explain the planning to the users and inhabitants concerned, which will accelerate the people's participation and gain the cooperative mind to the environmental preservation.

(4) Future consideration for environment

The basic data collection, analysis and monitoring are needed for the preservation of natural precious species, environmentally protected area, water quality and soil. So as to realize the preservation, fostering of the human resources and provision of proper equipment is important. Accordingly, the fulfilling of the environment sector is important in parallel with the progress of the restoration plan of the country. The education of the people regarding environment is an important issue for the preservation of environment of East Timor.

NOTE

The following exchange rate is applied.

US\$ 1.00 = Yen 106 (as of June 2000)