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 human life, natural resources and the environment, EPU has aimed at preparing laws to provide environmental preservation and to monitor performances for the restoration and development of the country in cooperation with the authorities concerned such as the UNTAET itself, NGO's, academic sectors, local communities, the UN agencies and the private sectors. The action programs for environmental protection advocated by EPU are as follows;

- Ensure that UNTAET activities are environmentally sound.
- Ensure that private business activities are environmentally sound.
- Assesses the environmental quality & extent of East Timor's natural resource base and use this data to develop effective policies; plans and legislation that will create environmentally sound and economic development.
- Create Environmental Protection Agency to take over the work of the EPU after the end of the UNTAET mandate.
- Conduct investigations into, and dealing with, reports of pollution / environmental degradation as it occurs.

(Source: An Introduction to the Environmental Protection Unit (EPU) 09/05/2000)

EPU has a total staff of 13 consisting of 4 international staff and 9 local staff. The organization of the EPU is shown in Figure 7.1.1

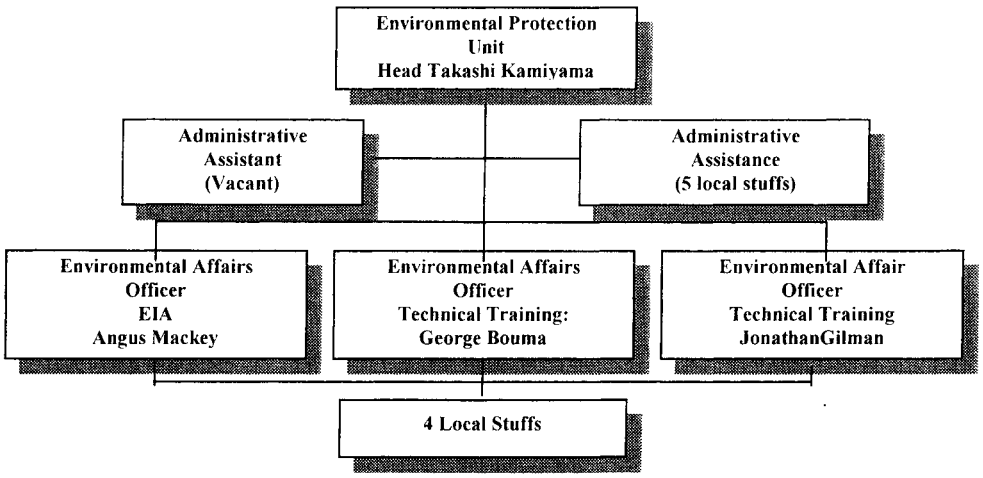


Figure 7.1.1 Organization of EPU in UNTAET

At present, EPU is proceeding with environmental laws, making organization charts and regenerating human resources.

(2) Situation of Natural Environment

1) Topography

Timor is a narrow & long island extending about 470 km in an east west direction with a maximum width of 100 km. East Timor occupies the east half of the island extending about 260 km to the east. The maximum width of 75 km is located on the east side of the country and about 13,000km 2 in acreage. There is a mountain range at the center of the island which has over 70 mountains higher than 1,000m. There are flat areas of alluvial plain in the basin of lows river at west side, southern coast plain (3 - 5 km in width), and in the delta area of big rivers and so on. River basins are comparatively small; most of the rivers in the less rainy northern area except Laclo River.

2) Climate

East Timor is situated within a rain forest area, but the average rainfall is 1,000 mm~1,200 mm, sometimes lower than 1,000 mm in the northern area. In the southern area, average rainfall is from 1,000 to 2,000mm with some mountain areas over 2,000 mm. There are definite rainy and dry seasons. Annual average temperature is between 24 to 27, with minimum temperature 18 to 23 and maximum temperature 28 to 32. The climate is characterized by strong precipitation, which drain across surface soil on bare land. In recent years, gully erosion has been spreading in mountain areas. Measures, such as tree planting, must be taken to combat gully erosion.

3) Situation of rivers

The rivers have steep slopes and their water flows cause flash floods. The central streams change directions every year because of meandering. As a result, the rivers cause damages including erosion of farmlands and destruction or sedimentation of irrigation facilities. Additionally, river floodwater contains much abrasive soil eroded in the mountains, causing damage to irrigation facilities, canals and bridges.

4) Situation of coast

East Timor's coast stretches over 660km, of which approximately180km consists of corals. Mangroves grow at estuaries. Valuable animal and vegetal life exist in coastal areas. These resources must be preserved. Therefore, when infrastructure development is needed in coastal areas, an assessment of the environment impact will have to be made.

(3) 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 2,000. The Regulation No.2000 ON PROTECTED PLACES aims at preservation or protection of 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 penal regulations supporting the Regulation.

1) Protected Wild Area

Land consisting of islands, beaches, mountains, sanctuaries, reserves and any other area are protected as protected wild areas. In addition, activities such as hunting, road construction and agricultural activities are prohibited to protect wild animals and plants in those areas. The locations of protected wild area are shown by Table 7.1.1.

Table 7.1.1 Location of Protected Wild Area

Protected Wild Areas	Location & Content
Land constituting beaches	Jaco island (locks, reefs, surface feature)
Beach	Tutuala (with forest), Com, Lautem (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, Cablaque and surrounding forests
Sanctuaries	Sungai Clere
Reserves	Tilomar, Lore, Manucoco

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

2) Protection of precious wild animals and plants

It is prohibited to catch or to collect precious wild animals, precious wild plants and endangered species in Timor without permission. Furthermore, people must not sell, kill and threaten them. Incidentally, the endangered species of animals are:

- Sea tortoises, turtles, Marine mammals (dolphins, Whales and Dugongs), Wallaies, Crocodiles;
- All animal and plant species listed in Convention on the International Trade in Endangered Species; and
- Any other plant or animal species designated as endangered by the Transitional Administrator.

3) Coral reef, wetlands and mangroves

The coral reef living in the area of sea around East Timor should be protected. Collections of coral, buying, selling and exporting of articles made of coral are

prohibited. 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, poor drainage and damage.

4) Historical, cultural and artistic sites

Sites of historical and cultural heritages in East Timor are designated and protected from negative influences of development to development.

5) Penalties

Offenders violating the environmental protection regulations are fined. The fine is from US$ 5,000 to a maximum of US$ 500,000.

The location map of environment Conservation areas including animals, plants, topography, scenery etc. is shown in Figure 7.1.2.

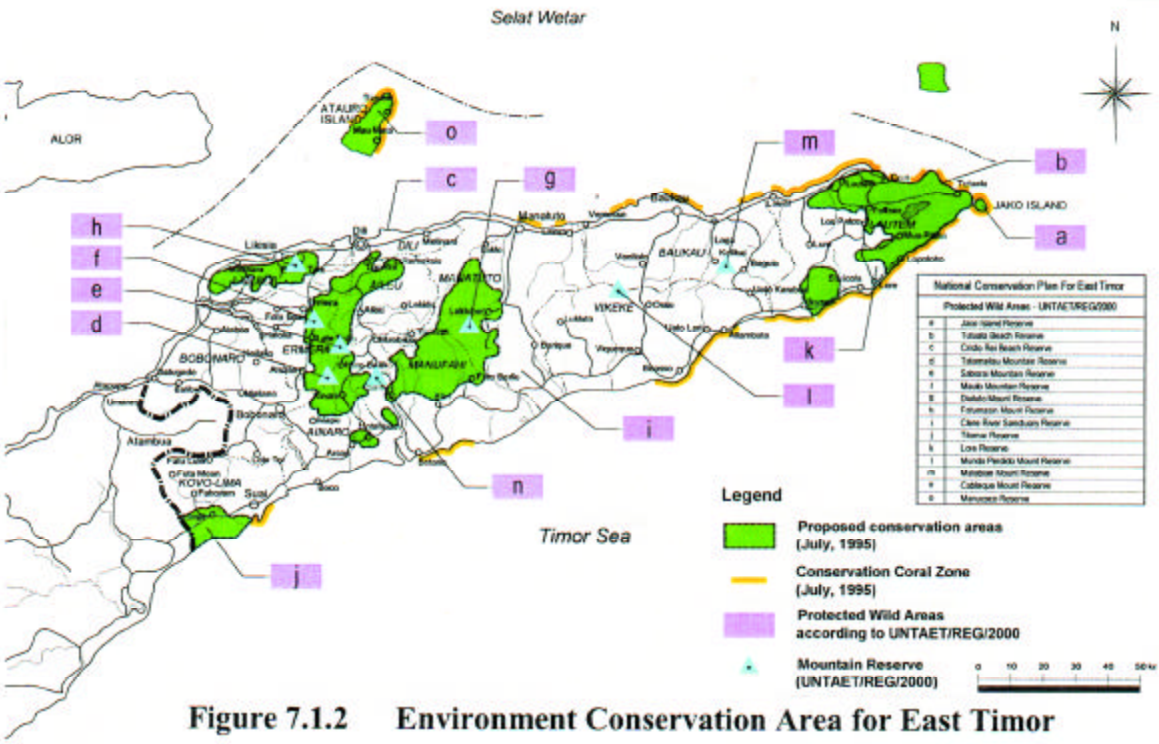


Figure 7.1.2 Environment Conservation Area for East Timor

7.2 Initial Environmental Examination

(1) Outline of the project

This initial environmental assessment is carried out for two (2) categorized project plans including the Quick Project and the Urgent Rehabilitation Project for infrastructure in East Timor in regard to natural and social environment. This assessment aims to provide necessary suggestions to consider environmental issues for the implementation of appropriate project. The two (2) categorized project consist of Quick Project and Three Years Urgent Rehabilitation Project.

1) Quick Project

The Quick Project will be implemented on road and irrigation sector as a quick countermeasure for restoration of East Timor. The road having an obstruction in 2 routes was rehabilitated. On the other hand, Laclo irrigation system in Manatuto district was rehabilitated from May to August 2000 so as to support water supply for the area.

2) Three Year Urgent Rehabilitation Project

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

(2) Methods of environmental assessment

1) Background

The Environmental Protection Unit (EPU) of UNTAET entrusts administrative management to consider environmental issues. The preparation of law regarding to environmental assessment is being processed. Accordingly, environmental assessment of rehabilitation project will be carried out based on the guidelines provided by Japan International Cooperation Agency in consultation with EPU. The rehabilitation projects mentioned above aim at restoration of existing facilities excluding a new development plans. The influences of natural and social environment due to rehabilitation project are expected to be minimal. The evaluation of environmental assessment on each project has been carried out by the following procedures and methods.

2) Initial Environmental Examination

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

(3) Quick Project

1) Road Rehabilitation

a) Project description

This Project is "Quick Project" for urgent repair and restoration of road at Dili – Aileu –Ainaro road (110 km) and Baucau – Laga – Baguia road (42 km) in East Timor as shown on the location map. The rehabilitation works of the project is comprised of embankment by gabion, road pavement, gabion causeway, pipe

culverts and etc. The rehabilitation works are to be carried out within the road area, providing no work outside. The major work consists of:

i) Ainaro road

Restoration of embankment failure by gabion including embankment fill (7 location along the road).

ii) Baucau – laga – Baguia

Restoration of embankment failure by gabion (5 Locations along the road); restoration of road surface of about 7km length, 2,5000m^3 embankment, placing 13,300m^2 road base, 2,300m^3 of gabion, 35pipe culverts installation and 6 gabion cause way constructions. The work was carried out under the supervision of the Study Team of JICA in coordination with UNTEAT, Dili, East Timor. The Location of the project is shown in the following Figure 7.2.1.

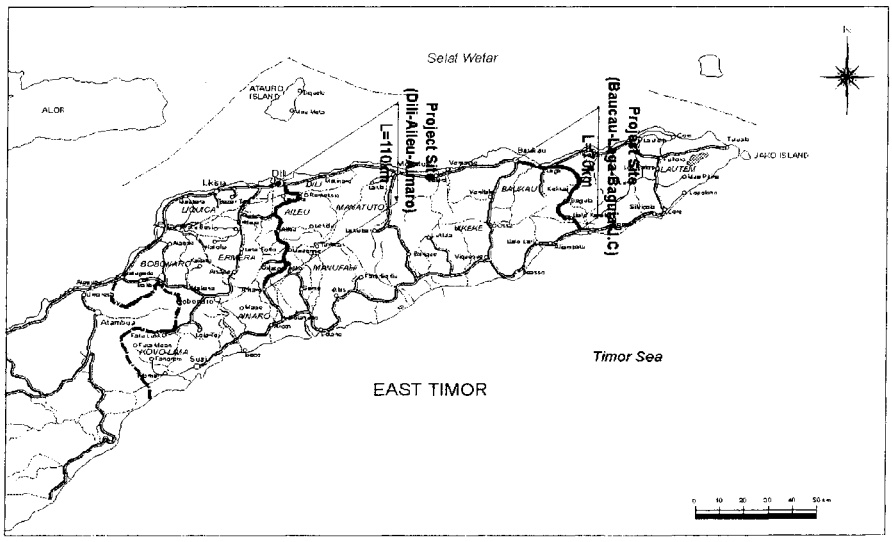


Figure 7.2.1 Location of Road Rehabilitation

b) Preliminary environmental assessment

Prior to the implementation of these rehabilitation works, screening and scooping on social environment, natural environment and public hazard in the project site were conducted, and no problems were encountered (The results of evaluation are attached in APP.7.2). Consequently, An Environmental Impact Assessment (EIA) is not required for the project.

c) Countermeasures on Environment Preservation

The environment preservation items, which should be considered, are the following.

- A traffic sign under construction is installed for the safety of traffic.
- A traffic control person is posted, and within traffic areas, safety must be implemented.
- In case of an irrigation canal located at the work area, countermeasure works for irrigation should be carried out to flow water.
- The Contractor should immediately contact UNTAET or the JICA Study Team in case plants and the endangered species are found within construction area.

2) Road Shoulder and Side Ditch Restoration

a) Project description

This project contains the works of weed slashing on road shoulders and removal of mud from the side ditches along the 123 km long Dili - Baucau road. The purpose of this work is to increase safety in transportation, since weed growth on the shoulders is making the driving sight distance too short. In addition, drainage of side ditches will be improved, since ditches are full of mud. Works was only to be carried out within road area. The location of Quick Project on Road Shoulder and Side Ditch Restoration is shown in the following Figure 7.2.2.

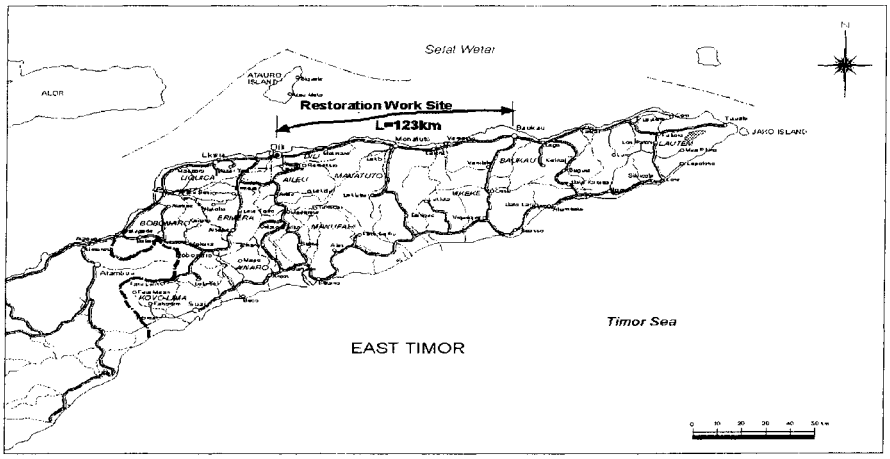


Figure 7.2.2 Road Shoulder and Side Ditch Restoration

b) Preliminary environmental assessment

Prior to the implementation of these works, screening and scooping on social environment, natural environment and public hazard were conducted, and no problems were encountered (APP.7.2).

c) Countermeasures on environment preservation

When these works are necessary, the restoration works will begin in consideration of the following items.

- Slashed weeds from road shoulders carried out in this project was collected at the lower potions of roadside; thus they were not scattered to be wind.
- The works were carried out with careful consideration of mangroves in the coast area.
- The road sign was utilized to avoid confusion of traffic the work site.

3) Laclo Irrigation Project

a) Project Description

In Laclo Irrigation area, farming has being stopped since 1998 due to inability to provide water into the field with the breakage of intake, siphon and sediment in the canal. In order to provide irrigation water, prompt cleaning of the canal, which is a part of works in Three Year Urgent Rehabilitation Plan, is necessary. The plan demarcation of canal for this project is 11.3 km downstream from Sumasse River. The location of Quick Project on Laclo irrigation system is shown in Figure 7.2.3.

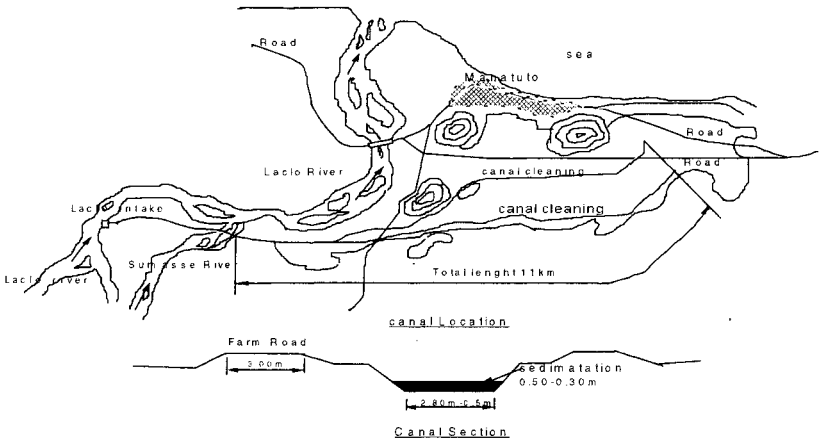


Figure 7.2.3 Quick Project of Laclo irrigation system

The contents of the urgent projects aimed at the cleaning and removing of grass sediments from irrigation canals. The volume of removed soil and the grass cutting area amounted to 4,510 m^3 and 23,500m^2 respectively

b) Preliminary environmental assessment

Before the start of construction mentioned above, the screening and scooping survey was conducted for natural conditions, public hazard, situations of land use and social environments in the project area (APP.7.2). Negative influences to the natural or social environment was judged not to occur when cleaning and removing of sediments for rehabilitation works of the canals.

c) Countermeasures on environmental preservation

The works does not need to acquire new lands and includes the construction of new facilities because the project is to rehabilitate the existing canals. In addition, the negative influence is not caused to users in terms of the socio-economic environment. Consequently, it can be judged that the monitoring on the natural and social changes is not necessary after the completion of a project.

The following points should be considered for the environmental preservation during construction works.

- The removed soil should not disturb traffic and be thrown away to the neighboring farmlands.
- The maintenance roads along the canals are used for daily life of inhabitants, too.
- Countermeasures such as construction of bypass is provided so that traffic can move during construction.
- The cut weeds should be properly disposed so as not to hamper the inhabitants.

(4) Three Years Urgent Rehabilitation Plan

1) The Rehabilitation Plan of Road and Bridge

a) Project description

The objective of the Three Year Urgent Rehabilitation Plan of Roads and Bridges is to rehabilitate the suspended construction portion of existing roads or to improve the roads. The total length of road to be rehabilitated is about 1,620 km and the numbers of target bridge are 68 in 13 districts. The rehabilitation work of roads consists of construction of drainage, retaining walls of gabion, gravel roads and simple asphalt roads.

The goal of works for bridges is to complete the suspended construction, submerged bridges, repairs bridge slabs and provide, bank protection and protection walls. The location of roads and the total length of roads and the bridges in every district are shown by Figure 7.2.4:

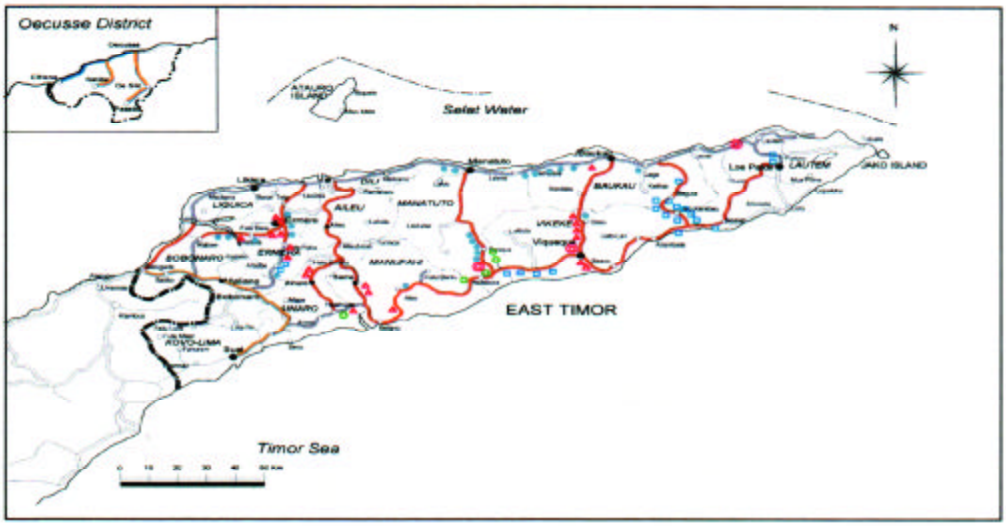


Figure 7.2.4 Location of Roads and Bridges for Rehabilitation

The road length and the number of bridges to be rehabilitated are shown in the following Table 7.2.1.

Table 7.2.1 Road Length and Number of Bridges for Rehabilitation

No.	District	Road length (km)	No of bridges
1	Ainaro	50.1	5
2	Aileu	161.1	-
3	Baucau	161.1	19
4	Covalima/Suai	162.6	-
5	Dili city	46.0	2
	Dili	122.3	2
6	Ermera	113.8	11
7	Lautem	75.8	1
8	Liquica	171.3	3
9	Manatuto	192.6	8
10	Same	130.8	3
11	Viqueque	101.2	12
12	Bobonaro	138.3	2
13	Oecussi	-	-
	Total	1627.0	68

b) Preliminary environmental assessment

At first, the impact evaluation as a Preliminary environmental assessment is done for society nature and pollution by screening and scooping (APP.7.2). The work concerned is the rehabilitation and improvement of the existing structures. Consequently, new land acquisition is not necessary. The environmental and

negative impact to nature from the lands for roads is considered to be not significant. The habitats of precious plants are not occupied while the survival roots of wild animals are not damaged. All of the project sites do not need discontinuance of rehabilitation works or route changes.

Points to consider in terms of environmental aspects are traffic obstacle during construction, the uses of temporary yards for construction, landslides during construction and the influences of the fences alongside the roads to plants. Rehabilitation works need the cooperation of inhabitants in the region concerned. In addition, publicity is necessary to increase the understandings of inhabitants.

The traffic is made heavier by road rehabilitation. In addition, many parts of the road will be improved in the future because of the road rehabilitation of the project. Consequently, it is important to provide data and information from regular traffic surveys to provide safe traffic and decide the of priority of improving works or the required scale of improvement. From the assessment of screening and scooping, the negative influences to be monitored can be determined.

c) Countermeasures on Environment Preservation

From the viewpoint of environment preservation, the following matters should be considered during the rehabilitation of road and bridge.

i) Road

- Quick and acceptable compensation for obstacle objects to the roads path (farm land, buildings).
- Watchmen and road signs are necessary to decrease traffic accidents during construction
- Temporary canals are used not to prevent interrupting flowing water necessary for drinking water or irrigation canals.
- The negative influences of quarrying from riverside, the uses of river water by people and the river flows that are eliminated.
- Dump yards for soil are prepared to prevent soil outflow to the river.
- Disposal of living trees and soil fences at the boundary of farm roads requires consent of the form inhabitants.

ii) Bridge

- Manual excavation power is adopted as much as possible instead of machinery excavation, which causes unnecessary excavation or landslides.

- Civil works are implemented in the dry season to prevent the outflow of excavated soil with rainwater.

- Contaminated water caused by washing a concrete mixer is disposed in earthen settling pits

- Temporary bridges or roads are provided to allow safe traffic during construction. Patrolmen are attached to the construction sites during floods.

2) The Rehabilitation Plan of Port

a) Project description

East Timor has 12 Ports including small fishing ports and landing points. Among those ports, Dili Port is equipped with civil engineering structures such as a quay wharf. Though this port was not damaged during the disturbances, the port become less functional for loading and unloading of commodities sent by the United Nations by the transportation operation of private enterprise. There is an urgent need of rehabilitation of port facilities in order to regenerate and revitalize economic activities for the restoration of East Timor. The location of port for rehabilitation is shown in Figure 7.2.5

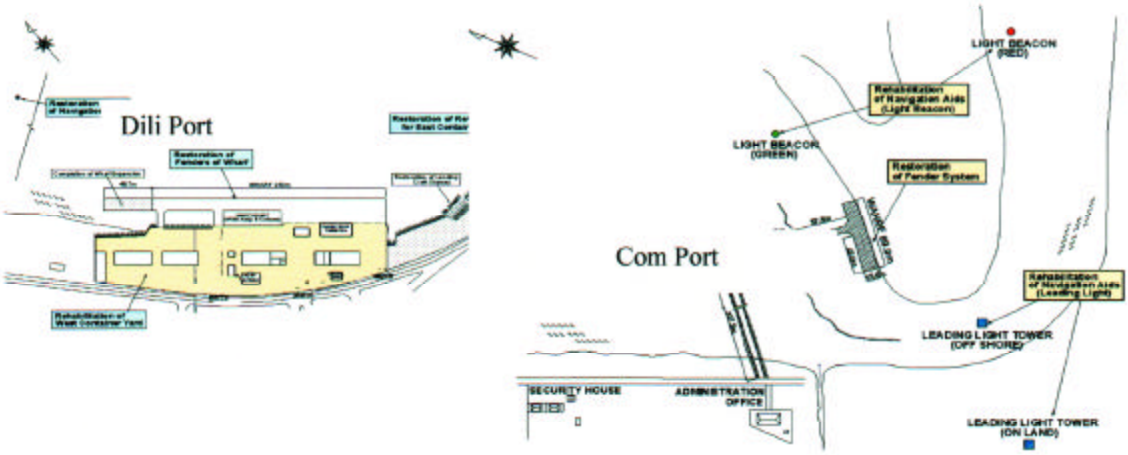


Figure 7.2.5 Location of Port Rehabilitation

The contents of undertakings for rehabilitation as Three Year Plan for Urgent Rehabilitation Plan of JICA Study are shown in the following Table 7. 2.2.

Table 7.2.2 Rehabilitation Infrastructure of Port

Port	Rehabilitation work	Structure	Dimension
Dili Port	Restoration of Navigation Aids & Fenders	Foundation of Steel Pile for Navigation Aids & Rubber Fender	Steel Pile: ϕ350 * L17m Fender: H500 * L 2,000
	Rehabilitation of West container Yard	Asphalt & Interlocking Concrete Block (ICB) Paving	Asphalt: 4,500 m2 ICB: 5,500 m2
	Restoration of East container yard revetment	Revetment of Gravity Type	Length = 180m Height = 2.8m Crest Width = 0.5m
Com Port	Rehabilitation of Navigation Aids & Fenders	Solar Panel & Battery for Navigation Aids & Rubber Fender	Fender: H500 * L 1,600

Existing pile foundations for Navigation Aids and Revetment of East container Yard at Dili Port have been become overloaded. These facilities need to be restored to prevent the collapse of the structure. Many of fenders at Dili Port and Com Port have been broken and necessary to restore. Existing condition of the present west container Yard at Dili port is not efficient for Container cargo handling because it is not paved. This area shall be paved with Interlocking Concrete Block and Asphalt Concrete. The scope of work shall include the rehabilitation of utilities including water supply, lighting systems etc.

b) Preliminary environmental assessment

The screening and scooping survey was conducted on the proposed project under the urgent rehabilitation plan of port (APP.7.2). The negative influence of rehabilitation project due to the quality of water, an ocean current, landscape, precious lives (fish, plants) are not recognized as a results of the survey. The following 2 points are considered for the environmental preservation.

- Countermeasures to prevent outflow of used or contaminated water to the ocean when concrete works and pavement works are in operation.

- Disposal of waste construction materials for the removal of existing facilities.

The rehabilitation project of Dili and Com port will bring about a decrease of ship accidents, increased vessels and increased cargoes. The statistic survey will be done in the future.

c) Countermeasures on Environment Preservation

From the viewpoint of environmental preservation, the following matters should be considered during construction of rehabilitation of Deli and Com port.

- Prior announcement to limits of the port utilization due to rehabilitation.

- Waste materials and equipment should be disposed according to the environmental plan and conditions will be reported to UNTAET (EPU)

- Watchman and road signs are provided to minimize obstacles of traffic associated with rehabilitation works.

- The dump yards of soil are prepared to prevent soil outflow.

- Contaminated water caused by washing of concrete mixer should be disposed in earthen settling pits.

3) Rehabilitation Plan of Power

a) Project description

There are 60 power stations existing in East Timor. Many of then were damaged or their capacity has declined due to damaged/destruction independence civil war in 1999. Urgent rehabilitation of 13 power stations is proposed by Japanese grant aid. The Komoro power station in Dili will be rehabilitated to increase the power capacity. The generating systems of those power stations are of diesel oil generator with maximum capacity range of 3.0Mw to 25kw.

The rehabilitation plan of the power stations includes replacement or improvement of damaged engines, control equipment and so on. Consequently, new constructions of power station or civil works to expand power distribution are not included. The location of the power station of rehabilitation is shown in Figure 7.2.6.

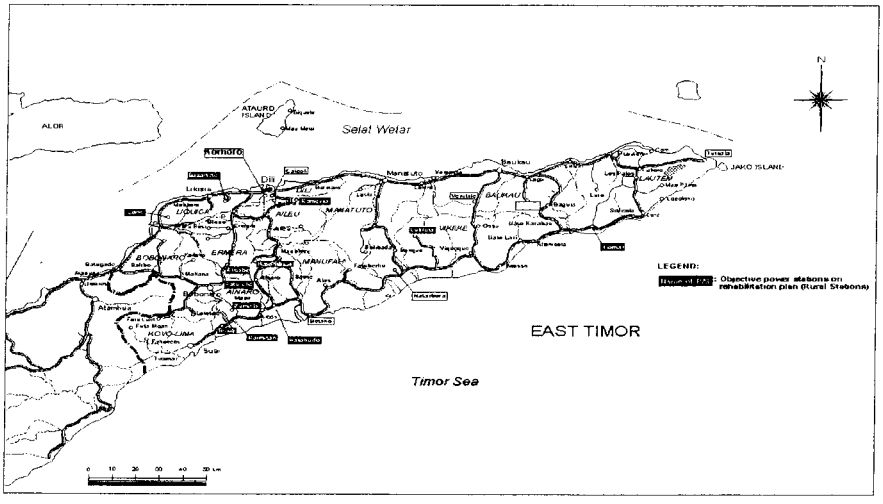


Figure 7.2.6 Location of Power Station of Rehabilitation

The 13 power stations to be restored under the plan are listed in the Table 7.2.3.

Table 7.2.3 Target Power Stations for Restoration

Sr. No.	District	Power Station	Rated Output Capacity (kW)	Present Capacity (kW)	Present Condition		Status
					Operated	Not Operated	
1	Lospalos	Iliomar	40	0	-	*	Totally burnt
2	Aileu	Remexio	40	0	-	*	Totally burnt
3	Viqueque	Lacluta	50	0	-	*	Heavily destroyed
4	Ainaro	Hato udo	60	0	-	*	Totally burnt
5	Ainaro	Hato bilico	20	0	-	*	Damaged
6	Ainaro	Fatululic	40	0	-	*	Lost all equipment
7	Ermera	Atsabe	50	0	-	*	Totally burnt
8	Maliana	Atabae	60	0	-	*	Lost all equipment
9	Suai	Zumalai	80	0	-	*	Damaged
10	Suai	Beco	40	0	-	*	Damaged
11	Suai	Raimean	80	0	-	*	Damaged
12	Liquica	Loes	50	0	-	*	Totally burnt
13	Liquica	Bazartete	20	0	-	*	Totally burnt
	Total		630	0			

b) Preliminary Environmental Assessment

The survey on screening and scooping was conducted on the proposed project under three (3) Years Plan for Urgent Rehabilitation Plan of Power (APP.7.2). As a result of the survey, proper disposal of used oil after combustion is an important consideration of environmentally sound practices.

Waste oil is presently stored in oil drums due to the low capacity of incinerators at Komoro power station in Dili city where 73% of power is consumed. Negative influence is expected to water, soil and seawater if no countermeasures are taken. The PLL will equip the proper processing plant of waste oil with assistance of Australia. This equipment will allow reclaiming waste oil to fuel again. No processing plant is equipped at other power stations. Waste oil will be processed at Komoro power station since scale of operations at other stations is relatively small.

Regarding the air pollution caused by exhausted gas of diesel oil, no special equipment is considered necessary the since amount of exhausted gas is not high because of the power station capacity. No complaint from inhabitants on this matter is reported. Negative influence of soot and smoke to environment will be controlled by the rehabilitation of the existing equipment and the introduction a modern diesel engine.

No complaint from inhabitants reported against noise/sounds of existing power station because a big area has a relatively small engine. The Komoro power station in Dili city is restricted to an industrial zone. The habitat of precious animals and plants are not expected to have a negative influence. From the result of assessment, the omoro power station, the largest in Dili city is considered to be monitored for the negative environmental influences such as air pollution, water pollution and noise.

c) Countermeasures on Environment Preservation

From the viewpoint of environment preservation, the following measures should be taken during the rehabilitation of power stations.

- Dig a ditch around power station to avoid an outflow of oil during rehabilitation operation.
- Provide public announcement of power outage schedule due to rehabilitation operation.
- Equipment and materials to be abandoned should be treated in place for disposal and conditions met to conform to requirements. The disposal methods should be reported in advance.
- The waste oil of small-scale power stations in the districts will be transported and processed in Dili city. Proper guidance is needed for implementation of the project.

4) The Rehabilitation Plan of Irrigation

a) Project description

The Urgent 3 Years Rehabilitation Plan of Irrigation aims at the rehabilitation of the existing four irrigation systems in Laclo, 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. All of the proposed works are necessary to rehabilitate the existing facilities. Consequently, the new construction works are not included. The location of four irrigation systems are shown Figure 7.2.7

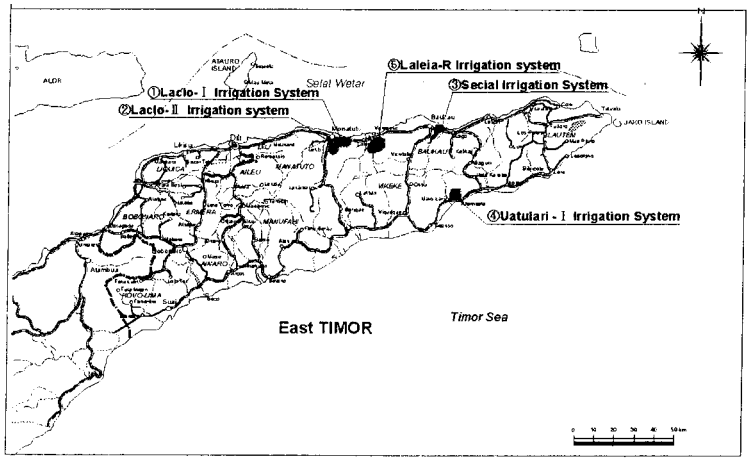


Figure 7.2.7 Location of Irrigation System

The scope and content of the projects are shown in the following Table 7.2.4.

Table 7.2.4 Content of Irrigation Rehabilitation Project

Name of Irrigation System	District	Total Irrigation Area (ha)	Rehabilitation work
Laclo - I	Manatuto	420	1)Temporary intake at the Sumasse river 2)Protection of gabion dike , Repair works of existing canal
Seical	Baucau	580	1)Repair works of rear apron , Gabion works for existing weir 2)Repair works of existing canal, Maintenance road
Uatolari-I	Viqueque	680	1)Intake facility, Conducting canal 2)Repair works of existing canal, Repair works of existing canal
Laclo-II	Manatuto	900	1) Gabion dike and concrete wall, Construction intake 3) Siphon and Culvert, Reconstruction main canal
Laleia-R	Manatuto	600	1)Gabion Dike and Conducting intake dike, Intake gate 2)Repair works of existing canal, Maintenance road

b) Preliminary environmental assessment

At first, the impact evaluation of a Preliminary environmental assessment is conducted for society, considering nature and pollution, by screening and scooping (APP.7.2). Judging from the Appendices, the rehabilitation projects mentioned above do not badly affect the social or natural conditions.

i) Intake and canal works

The works of free intake and dam facilities will rehabilitate the existing structures. Consequently, the influence of changing the river stream is not significant. In addition, new land acquisition is not necessary. Furthermore, the rehabilitation of the main canal does not change the location of the existing canal. Consequently, the rehabilitation works will never bring about a negative impact since the plan considers the facilities for the convenience of the people using the irrigation canal (water for livestock, laundry, etc.)

ii) Farm road works

The farm road will be partly widened. The farm road is essential for the effective water management, access for agricultural inputs and for farming management. In addition, the farm road will contribute to increased productivity and labor saving. It is desirable to provide the land for farm road on the basis of farmers' cooperation and understandings.

iii) Influence to the nature

Considering the influence to the nature, precious animals and plants are not recognized in the project area because the area is under rice cultivation for a long time. Small fishes in rivers and canals are never eradicated because the main

rehabilitation work is gabion or masonry works. In addition, the habitats of precious plants are not affected while the survival routes of wild animals are not amputated.

iv) Influences of rehabilitation works to rural community and life

The rehabilitation project of irrigation facilities aims at rehabilitating of intakes, canals and maintenance farm road, which will not cause negative influences to destruction of natural environment for precious species and separation of communities of the village. In addition, rehabilitation of canals will scarcely become a cause of malaria in East Timor. The rehabilitation works needs the cooperation by the inhabitants of the region concerned. Thus publicity is necessary to obtain understandings of inhabitants.

From the above assessment, the rehabilitation project will not bring about negative influences to the environment.

c) Countermeasures on Environment Preservation

From the viewpoint of environmental preservation, the considerable items and countermeasures are as follows;

- The main construction method of intake, bank protection and main canal is gabion or masonry works. Construction materials of stone, gravel and sand are gathered from the river. They have to be gathered from safe location in terms of river management and protection. In addition, the quarry rights have to be legally affirmed.

- It is necessary to obtain advance consent of farmers when water is temporary interrupted due to canal rehabilitation. It is desirable to promote a publicity work and to hold a workshop in order to facilitate participatory projects.

- In places where irrigation water is used for other purposes such as laundry and domestic water supply, facilities are to be rehabilitated in consideration of the inhabitants' requirements.

- Watchmen and road signs are to be provided for safe traffic if farm road are used as a public road

- A soil dump yard is necessary to prevent soil outflow to the river.

- The trees and the soil fences in the boundary of canals and farm road are moved or taken away only after obtaining the consent of the inhabitants concerned.

- Cement milk during concrete works is deposited in a temporary settling pool.

5) Necessity of Monitoring on the Project

The above mentioned projects of the four (4) sectors are the rehabilitation of damaged facilities and facilities not functioning. As they do not include new works, the negative influences to the natural environment and the social environment such as resettlement and social security are very little. It is judged that the Environmental Impact Assessment (EIA) on those projects is not needed. However, the Komoro Power Station, the largest in Dili city, East Timor is necessary to be monitored based on negative environmental influences such as air pollution, water pollution and noise.

- Air observation

The size of power station is small. Judging from the geographical conditions of Dili city, the negative influences to the environment and the inhabitants is thought to be small. Taking increase of future demand of power into consideration, a monitoring system, however, will be necessary to observe the change of air quality in the future.

- Monitoring of water quality and soil

The wasted oil is treated at the inside of the power station. However, the oil infiltrates into the underground or flows to the outside through the small ditches because of incomplete disposal caused by the old facilities. There are shallow wells nearby the power station. At present, the damage by the wasted oil is not recognized, however, it is necessary to regularly monitor water quality and soil for the effects of the infiltration.

- Noise

Regarding noise from the power station, the site is not considered large enough to affect the environment outside the station. However, it has no facilities to prevent noise. The inhabitants do not complain of noise. However, noise is not measured. Consequently, it becomes necessary to measure the volume of noise from the station.

CHAPTER 8

CONSTRUCTION COST ESTIMATES

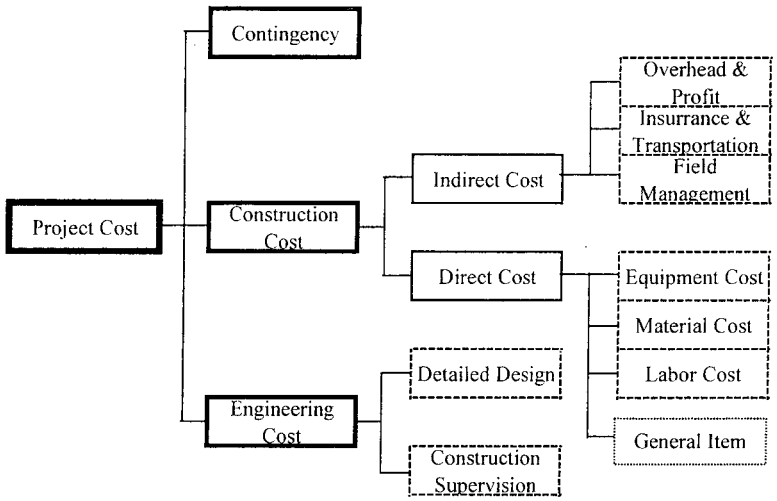
CHAPTER 8 CONSTRUCTION COST ESTIMATES

8.1 Composition of Project Cost

The Project cost comprises the sum of construction cost, engineering service cost and contingency. The construction cost is divided into direct and indirect cost. The direct cost is calculated as the sum of the multiplication of the unit rate and quantity of each work item. The unit price is subdivided into material, labor and equipment cost of each pay item, and also for so called as general item covering mobilization, demobilization, local communication, site office and laboratory installation and maintenance.

Due to the lack of construction equipment and to provide job opportunities for the East Timorese, the works have been planned to be carried out by labor intensive method as much as possible. The project cost component is depicted in the figure below:

Project Cost Component



8.2 Construction Cost

Direct Cost

The direct cost which is a part of the construction cost is calculated as the sum of the multiplication of the unit price and estimated work quantity derived from the design. The unit price is estimated using standard production ratio in Asian counties and application of unit rates of labor, equipment and material as tabulated below.

- Labor Rate

The labor rate set by UNTAET is applied in the estimates as listed below:

Category	Unit	Rate in US$	Remarks
Unskilled	day	3.20	
Semi skilled	day	4.16	
Qualified	day	5.91	
Administrator/Manager	day	8.83	
Senior Administrator	day	13.20	

- Material Rate

Material costs are based on local market price or FOB price at Dili Port for imported materials.

Item	Unit	Rate (US$)	Remarks
Gasoline	Lt	0.61	
Diesel Oil	Lt	0.61	
Asphalt	t	254.00	
Tar	Lt	0.84	
Chatcut 40kg	bag	9.61	
Cement w=40kg	bag	6.50	
Sand for concrete	m3	18.00	
Sand for backfilling	m3	4.50	
Aggregate d=25mm	m3	32.00	
Aggregate d=40mm	m3	30.00	
Gravel d=0-50mm	m3	53.00	
Stone d=100mm	m3	25.00	
Cobble d=50-100mm	m3	35.00	
Concrete pipe ϕ =1000mm, L=1000mm	each	60.10	
Concrete pipe ϕ =600mm, L=1000mm	each	45.50	
Corrugate pipe ϕ =500mm, L=1000mm	each	77.43	
Corrugate pipe ϕ =800mm, L=1000mm	each	116.60	
Wire rope d=13mm	m	3.10	
Plywood t=3.0mm, 1.8m x 2.4m	each	15.20	
Plywood t=12.0mm	m2	22.80	
Wood pile ϕ =100mm	each	15.20	
Gabion 1.0x1.0x2.0m	each	45.00	
Geotextile	m2	3.95	
Delineator Post, reflection type	each	45.28	
Gabion 0.5mx2.0x2.0m	each	45.00	
Reinforcement Bar	t	280.00	

Note: The exchange rate applied in the Study is US1.0 $=Indonesia 8,550 Rp = Japanese 106 Yen

- Equipment Rate

Equipment costs include equipment depreciation, fuel and lubricant consumption, operator, etc.

Item	Unit	Rate (US$)	Remarks
Excavator, 10t	day		
Excavator, 10t	hr	70.00	
Mini Excavator, 0.2m3	day	360.00	
Mini Excavator, 0.2m3	hr	65.00	
Dozer Shovel, 1.0m3	hr	70.00	
Dump truck, 4t	day		
Dump truck, 4t	hr	40.00	
Generator, 60kvA	day	76.00	
Generator, 60kvA	hr		
Concrete Mixer, Engine type 0.1m3	day	42.00	
Concrete Mixer, Engine type 0.1m3	hr		
Plate compactor	day	200.00	
Plate compactor	hr	25.00	
Roller, 1t	day	152.00	
Roller, 1t	hr	13.00	
Rock breaker	day		
Rock breaker	hr	91.00	

- General Item

This item covers mobilization and demobilization of staff, equipment and material including building, maintenance and dismantling field office, laboratory and local communication. The cost of general item is estimated at 10 % of the direct cost.

Indirect Cost

The indirect cost includes overhead & profit, insurance, field management expense, inland transportation cost, etc. to complete construction work and is estimated at following percentage of the direct cost.

Project Type	Percentage	Direct cost
Civil Work	40 %	Less than 0.5 million US $
	30 %	More than 0.5 million US $ but less than 10 million US$
	25 %	More than 10 million US$
Equipment Procurement	20 %	Regardless

8.3 Engineering Services

The engineering service cost of detailed design including topographic survey and subsoil investigation and construction supervision is estimated using following percentage of the total construction cost.

Project Type	Percentage
Civil Work	20 %
Equipment Procurement	15 %

8.4 Contingency

The physical contingency is estimated using following percentage of the construction cost.

Project Type	Percentage
Civil Work	10 %
Equipment Procurement	8 %

8.5 Unit Price of Major Work Items

Through the unit price calculation practice using above unit rate and production rate of each item, the unit price of major work item has been computed accordingly.

- Road Sector

Description of work	Unit	Rate (US$)	Remarks
Restoration of cut slope slip	l.m.	18.30	
Restoration of shoulder slip down	l.m.	665.50	H=1-3m, W=5m
Restoration of land slide section	〃	129.30	H=1-3m, W=20m
Installation of pipe culvert (ϕ 1.0m)	per place	1,024.00	L=6.0m
Installation of inlet & outlet	each	1,790.00	
Lined ditch	l.m.	31.20	
Overlay	sq.m.	14.20	
New pavement	sq.m.	34.80	
Safety device	l.m.	13.90	
Shoulder repair	l.m.	15.40	

- Bridge Sector

Description of work	Unit	Rate (US$)	Remarks
RC slab	per bridge	20,720	W=6.0m, L=5.0m Spread Footing
RC T-shaped girder bridge	〃	171,890	W=6.0m, L=23.4m Spread foundation
RC T-shaped girder bridge	〃	234,940	W=6.0m, L=23.4m Caisson foundation
Two span RC T-shaped girder bridge	〃	403,060	W=6.0m, L=46.8m Caisson foundation
Box culvert bridge	〃	73,790	3- 4.5×2.5
Bed-level causeway	〃	40,390	W=6.0m, L=40.0m
Vented causeway	〃	42,720	W=6.0m, L=40.0m
Standard steel truss in place	〃	630,000	W=6.0m, L=60.0m
Deck slab of standard steel truss	〃	116,530	W=6.0m, L=60.0m
River bank protection (Gabion)	m	590	H=3.0m
River bed protection (Gabion)	m^2	35	50cm thick

-Port Sector

Description of work	Unit	Rate (US$)	Remarks
Fender H500 x 2.0 m	Nos.	27,403.00	Dili Port
Fender H500 x 1.6 m	Nos.	22,378.00	Com Port
Foundation for Navi. Aids	Nos.	199,906.00	Dili Port
Entrance Light Beacon	Nos.	34,756.00	Com Port
Leading Light	Nos.	8,771.00	Com Port
ICB Pavement	M2	76.30	West Container Yard
Asphalt Pavement	M2	70.10	- ditto -
Water supply	M	130.00	- ditto -
Drainage	M	234.00	- ditto -
Power Distribution	M	32.00	- ditto -
Lighting Tower (H=20m)	Nos.	37,700.00	- ditto -
Warehouse	Nos.	104,000.00	- ditto -
Revetment	M	3,951.00	East Container Yard

-Agriculture Sector

Description of work	Unit	Rate (US$)	Remarks
Protection dike (Gabion :H=3m)	m	400.6	
Protection dike (Gabion :H=2m)	m	288.5	
channel work	m	461.5	
Culvert canal (bridge B=3.0m)	m	4,567.9	
Erosion protect sheet	m2	10.4	
Asphalt Pavement	m2	65.0	
Apron work (L=12.0m)	m	4,214.9	
Intake Channel (b=10m)	m	706.9	
Maintenance road(3.0m)	m	78.0	
River bed protection (b=4m)	m	152.1	
Concrete protection wall (H=4m)	m	1,387.5	
Retaining wall work (H=3m)	m	1,447.0	
Siphon work (Dam :H=2.5m)	m	13,612.7	
Concrete canal (culvert:river cross)	m	5,315.1	
Culvert canal (U flume type))	m	2,781.5	
Intake (B=1.5, With Gate)	1lot	65,500.0	

CHAPTER 9

CONCLUSION AND RECOMMENDATION

CHAPTER 9 CONCLUSION AND RECOMMENDATION

9.1 General

In order to achieve the objectives of projects that are to facilitate efficient national security and provide humanitarian aid and to 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.

9.2 Roads and Bridges Sector

9.2.1 Effect of Urgent Rehabilitation Plan

The direct impacts and effects generated by the project implementation are as follows:

- Decreasing the probability of the road closing which in turn facilitate efficient transport of humanitarian aid and security cargo and further generate early socio - economic recovery in East Timor,
- Saving of travelling time and vehicle operation costs, and
- Reducing of traffic accident and road maintenance cost and increasing driving comfort and driver's physical fatigue.

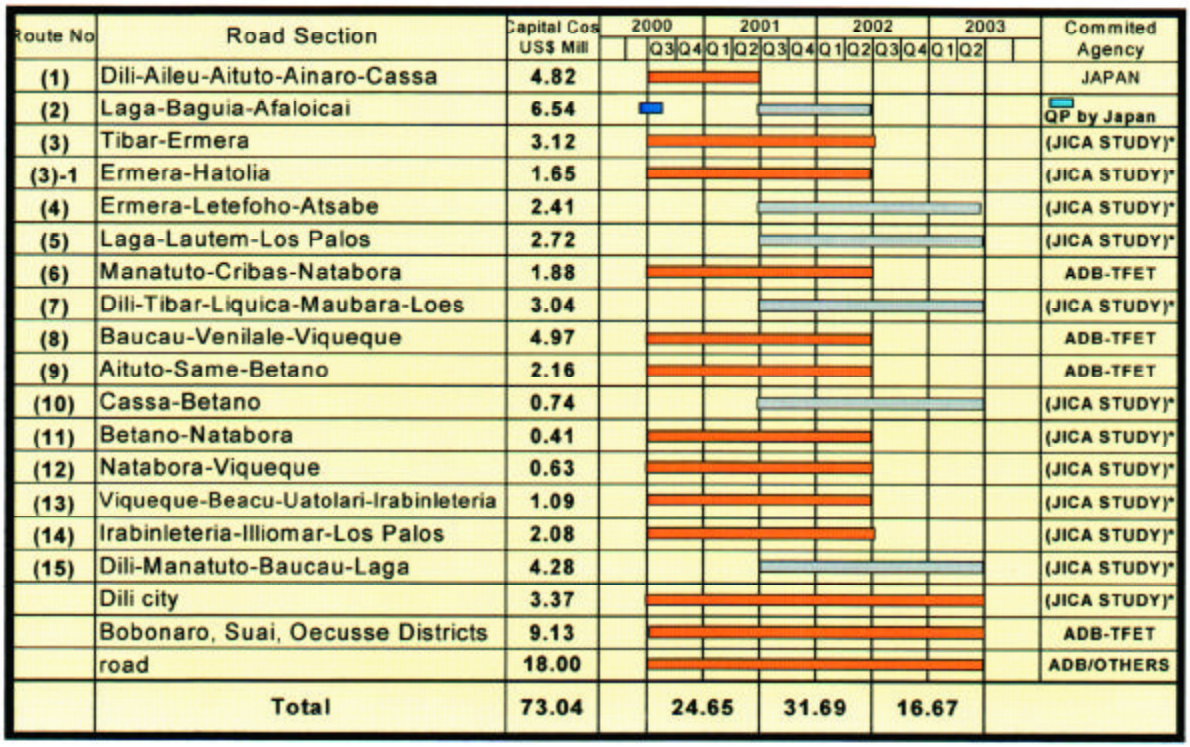
In addition to the above, the indirect effect and impact expected are as follows;

- Securing of emergensy access to disaster areas: storms, landslides, fires, etc.
- Improving of living standards and opportunities for cultural and economic exchange: living standards, employment, new business
- Improvement of public services: hospitals, schools, telephone, ports, etc.
- Improved productivity: agro-industries, agriculture, etc.
- Growth in opportunities to local industries: agriculture, tourism, agri-forest, fishery, etc.
- Businesses benefiting from road construction: construction, quarring, cement, etc.
- Effective land use: horticulture, agriculture, etc.

9.2.2 Recommendation for Roads and Bridges Sector

(1) Implementation of Three Years Urgent Rehabilitation Program

The 18 sub-projects formulated in the 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.



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

Figure 9.2.1 Implementation Plan

The capital cost in total required for the project implementation is estimated at US$ 73.0 million at June 2000 price, which is more or less equivalent to UNTAET's budget including World Bank Trust Fund over three years period. The annual budget allocation of each year is shown in Table 9.2.1.

Table 9.2.1 Annual Budgetary Allocation

Unit : Million US$

Category	Length (km)	FY00	FY01	FY02	Total
Urgent Rehabilitation of Arterial Roads	1,449	16.5	22.4	14.5	53.4(13.6)
Routine Maintenance and Restoration of Rural Roads	6,363	8.0	6.0	5.0	19.0(3.0)
Total		24.5	28.4	19.5	72.4(16.6)

Note: The figure in ( ) means component of capital cost for bridge rehabilitation.

Among the 18 sub-projects, the Government of Japan (GOJ) has committed to provide grant aid for urgent rehabilitation of Dili – Ailue – Ainaro – Cassa through UNDP as a project implementing agency. In addition to this, it is strongly recommended by the Study Team that one of the important North-South penetration roads, Laga- Baguia – JC of South Coastal Road implemented under QPs during the Study period but still being not passable due to a large scale land slide would be selected as second urgent rehabilitation project funded by the Government of Japan.

Even after QIPs and the urgent rehabilitation works have been completed, the road and bridge failures will be occurred every after heavy rain because of the steep topographic and fragile geological conditions where the roads and bridges are located. Hence, the road maintenance is requisite especially in East Timor to keep the roads open. For this purpose, the maintenance works divided into routine, periodical and incidental type maintenance shall be requisite to be carried out timely and properly in accordance with standard procedure.

(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.

9.3 Ports Sector

9.3.1 Effect of Urgent Rehabilitation Plan

The effects of implementation of the Urgent Rehabilitation would be itemized to two- (2) categories which are 1) Restoration of Navigation Aids, and 2) Restoration of Fender System. The effectiveness of the Plan is classified into direct and indirect.

(1) Direct effects

1) Restoration of Navigation Aids

- The port can offer as a 24 hours safe navigable port.
- If the stage had been collapsed the port would be closed from sunset to sunrise. Then any calling vessels are unable to enter the port from sunset to sunrise.
- The present light beacons can be transferred to the new stage to save the cost of these light beacons.

2) Restoration of Fender System

- The calling vessels are able to berth without any damage to own body.
- The wharf will be able to keep long life, due to berthing impact which is able to be absorbed by those fenders.
- The wharf cycle time would be minimized, to shorten the berthing time. Therefore, the port can expect more income caused by the port receiving more vessels.
- The captains and owners of the calling vessel will not complain of the safe berthing facility.

(2) Indirect effects

- The daily imported commodities can be offered to East Timorese regularly.
- The market prices of imported commodities are not drastically changed through the year.
- The suppliers of imported commodities are able to offer the prices and time easily to the consumers.

9.3.2 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 9.3.1.

	Task Name	Capital Cost US$ Mill	2000 Q1 Q2 Q3 Q4	2001 Q1 Q2 Q3 Q4	2002 Q1 Q2 Q3 Q4	2003 Q1 Q2 Q3 Q4	Committed Agency
			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 9.3.1 Implementation Schedule

(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 safe 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.

9.4 POWER SECTOR

9.4.1 Effect of Urgent Rehabilitation Plan

The establishment of stable, constant and regular power supply will constitute part of social infrastructure, which is essential to improvement of living standards, stable operation of social and public facilities and industrial development. Therefore, implementation of formulated plans under this study as "Power Sector 3 years Plan for Urgent Rehabilitation" will lead to re-establishment of power supply for rural areas and to restore power supply capacities of major cities up to those before conflict.

The following are the effects of the each urgent rehabilitation plan formulated under this study.

(1) Restoration of Rural Power Stations (Restoration Plan No.1)

The effect of restoring 32 power stations on pre-conflict conditions which had suspended their operations after the conflict, as of the end of June 2000, are as follows:

- To be essential for improvement of citizen's living standards.
- To ensure the stable operation of social welfare facilities such as school, clinic, district center, churches, etc.
- To improve agriculture and local industries development.

(2) Maintaining of Performance at Komoro Power Station (Restoration Plan No. 2)

The effects of the maintaining of performance at Komoro Power Station are as follows:

- To ensure the present output capacity of Komoro Power Station and the stable power supply conditions in the metropolitan area (Dili and surrounding areas).
- To implement periodic inspections and/or maintenance and overhauls which will be expected to catch up the operating efficiency and lead to long lives of all the equipment and machinery.
- To ensure less consumption of fuel and lubricating oil as well as those of cooling water.

(3) Komoro Power Station Strengthening Plan (Restoration Plan No. 3)

The effects of strengthening the output capacity at Komoro Power Station are as follows:

- To ensure expanded capacity for Komoro Power Station against the demand increase in the metropolitan area (Dili and surrounding areas) for the upcoming three (3) years.

- To ensure the stable power supply conditions in line with the restoration of government-related facilities, commercial and industrial facilities, and social welfare facilities.

- To terminate operation of Caicoli Power Station which is located in the city center and likely to provide environmental problems to the neighbors.

(4) To Provide an Output Capacity Strengthening Plan for Major Cities (Restoration Plan No.4)

The effects of the Strengthening of output capacity at Baucau, Manatuto and Ermera, Power Station are as follows:

- To recovery rated output capacity of the targeted power stations (Baucau, Manatuto and Ermera) to pre-conflict levels and ensuring the 24 hours power supply.
- To ensure the stable power supply conditions in line with the restoration of local government facilities, commercial and industrial facilities, and social welfare facilities, as provincial capital power stations.
- To implement periodic inspections and/or maintenance and overhauls which will increase operating efficiency and lead to the long life of all the existing equipment and machinery.

(5) Strengthening of Medium Voltage Distribution Lines (Restoration Plan No.5)

The effects of the restoration and strengthening of Medium Voltage Distribution Lines are as follows:

- To ensure stable power supply to existing consumers.
- To provide electricity to waiting consumers and to increase capacity with the advancement of restoration and recovery in the country.
- To reduce the distribution losses.

9.4.2 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 9.4.1 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 1-6	2000 7-12	2001 1-6	2001 7-12	2002 1-6	2002 7-12	2003 1-6	2003 7-12	Committed Agencies
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) majar 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		
				5.68		11.27		11.40	1.50		

note : (JICA STUDY) * does not mean a commitment of funding for D/D and construction works

Figure 9.4.1 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.

9.5 Agricultural Sector

9.5.1 Effect of Urgent Rehabilitation Plan

The rehabilitation project of irrigation facilities as a component of the agricultural restoration in East Timor is a primary issue for the recovery of rice production which is a staple food in the country. The rice production from May 1,999 to April 2,000 decreased to 510,000 tons because of the civil conflict while it was 720,000 ton in 1997. Out of the several factors of production decrease, the main critical factor is insufficient irrigation water supply due to the deterioration of the irrigation facilities as well as a drought, which changed arable lands to sleeping areas.

The inventory survey was made in the twenty (20) areas of the main irrigable areas except three (3) districts of Covalima, Bobonaro and Ambeno. The irrigation facilities will be rehabilitated in the four (4) irrigation with an urgent and high priority as the 3 years urgent rehabilitation project. Furthermore, the "20 Irrigation Systems Operation and Maintenance Strengthening Project" will be implemented, which aims at providing the machinery and equipment for operation and maintenance of the facilities and structures of irrigation systems and farm roads. The direct and indirect effects and the beneficiaries are shown as follows:

(1) Direct effects

- Increasing of the rice production to 71,000 ton from 51,000 ton;
- Improvement of the rice self-sufficient rate and the reduction of the amount of import rice; and
- Reduction of the maintenance works and cost by the improvement of the irrigation facilities.
- The growth of local area economy by the rice production increase;
- Preventing to wash away farm land and soil from flood by protection dike construction which is a part intake facilities.

(2) Indirect effect and impact

- Improvement the living standards of farmers by the provided machinery and equipment which will be used to rehabilitate the roads used for farming or daily life;
- Effective using of water resource and expansion of agricultural land by the irrigation facilities improvement;
- Improving of living standards and opportunities for cultural and economic exchange by increase of farmer's income;
- The improvement of the land use rate (double Cropping) and cultivation technologies by ensuring irrigation water;

- Improvement of farming technologies for cash crops (vegetables and fruits) and livestock due to access distribution/marketing and increase of farmer's income;

- Rebuilding of collapsed organizations (Farmers' organizations, water use association);

- Phased transition from traditional farming to modernized farming (introduction of improved varieties and improvement of cultivation technologies).

9.5.2 Recommendation

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.

Implementation Schedule of Irrigation Sector

	Name of Irrigation System	District	Capital Cost US$	Stage	First Year 2000 Q3	Q4	2001 Q1	Q2	Second Year 2001 Q3	Q4	2002 Q1	Q2	Third Year 2002 Q3	Q4	2003 Q1	Q2	Committed Agency
Urgent Irrigation Rehabilitation Project	Laclo-I	Manatute	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													
	Laclo-II	Manatute	6.4	D/D & Tendering													(JICA Study)
				Construction													
	Laleia-R	Manatute	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 9.5.1 Implementation Schedule

(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 apossible 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 nes 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.

9.6 Recommendation for environmental Aspect

The Three Years Urgent Rehabilitation Plan of East Timor aims at implementing the infrastructure project of four (4) sectors of roads, 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.