

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)  
MINISTRY OF MARINE AFFAIRS AND FISHERIES(MOMAF)  
REPUBLIC OF INDONESIA

NO. 2

**THE STUDY ON FISHERIES INFRASTRUCTURE SUPPORT  
AND  
COASTAL COMMUNITIES DEVELOPMENT PLAN  
IN  
EASTERN INDONESIA**

**FINAL REPORT  
MASTER PLAN**

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OCTOBER 2002

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FINAL REPORT MASTER PLAN

OCTOBER 2002

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## Preface

In response to the request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct the Study on Fisheries Infrastructure Support and Coastal Communities Development Plan in Eastern Indonesia, and entrusted the study to Japan International Cooperation Agency (JICA).

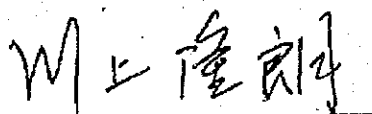
JICA sent to the Republic of Indonesia the study team headed by Dr. Tamotsu TOMIYAMA, System Science Consultants Inc., three (3) times between May 2001 and October 2002.

The team held discussions with the officials concerned of the Government of the Republic of Indonesia, and conducted field survey and investigation in the study area. After the team returned to Japan, further studies were made and this report was prepared.

I do hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

October 2002



Takao KAWAKAMI  
President of  
Japan International Cooperation Agency

October 2002

Mr. Takao KAWAKAMI  
President of  
Japan International Cooperation Agency  
Tokyo, JAPAN

Letter of Transmittal

Dear Sir,

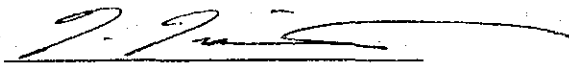
We are pleased to submit to you the report for "the Study on Fisheries Infrastructure Support and Coastal Communities Development Plan in Eastern Indonesia".

This report presents the result of all work performed in both Indonesia and Japan over 18 month period from May 2001 to October 2002. The report includes two volumes consisting of a master plan which covers the present conditions and issues of coastal fishing community of the East and West Nusa Tenggara (NTT and NTB), and a feasibility study of four priority areas.

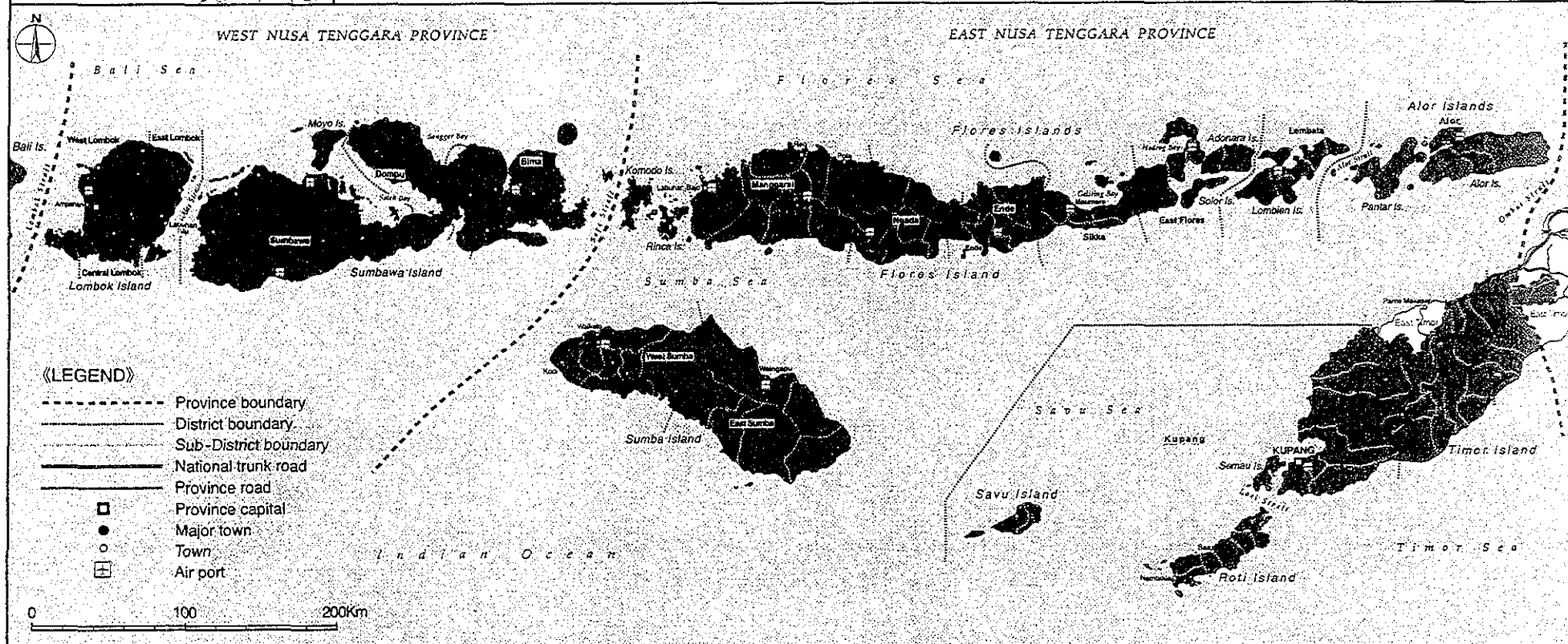
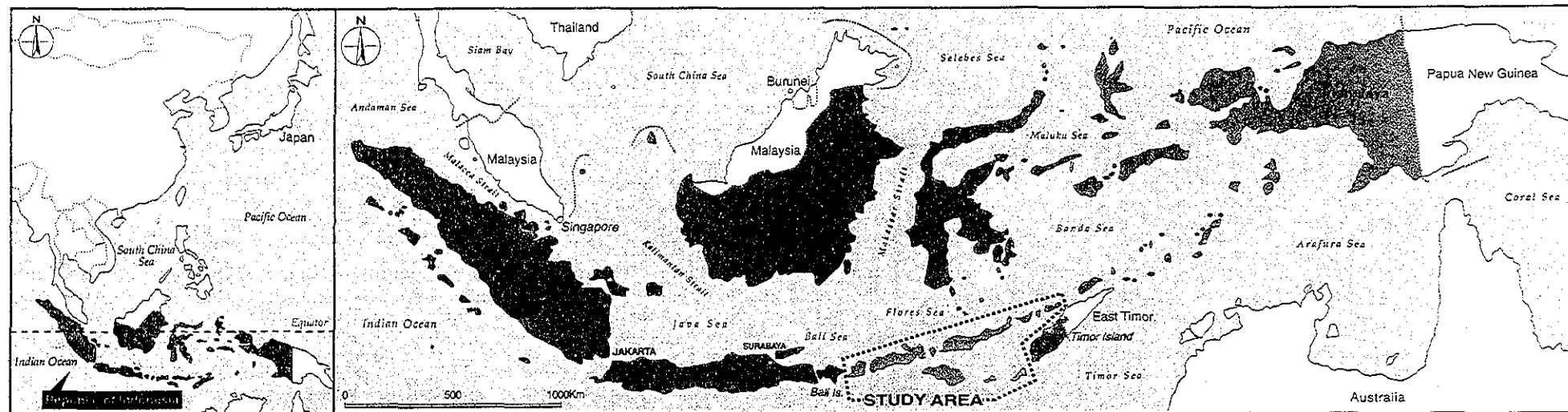
In view of the urgency of improving the socio-economic condition of coastal fishing community and marketing and distribution system in Eastern Indonesia, we recommend that the Government of Indonesia implement this Project as a priority.

We wish to express our sincere appreciation and gratitude to the relevant official of JICA, the Ministry of Foreign Affairs, and the Ministry of Agriculture, Forestry and Fisheries of the Government of Japan for the courtesies and cooperation kindly extended to our team. We also wish to express our deep gratitude to the concerned officials of MOMAF, Provincial and District Department of Fisheries, local governments, and Jakarta Office of JICA, and Embassy of Japan in Indonesia for their close cooperation and assistance extended to the team during the study.

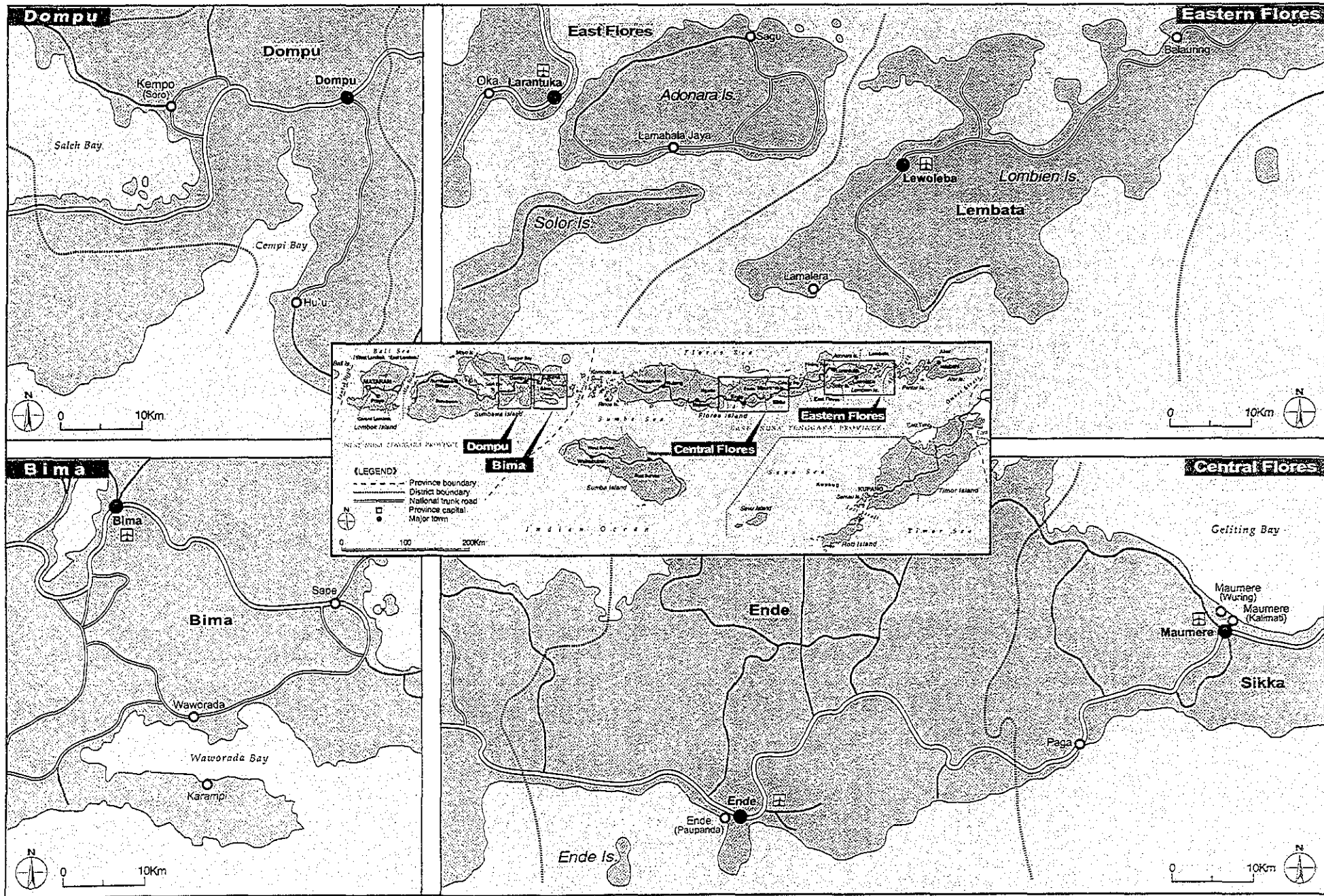
Very truly yours,



Tamotsu TOMIYAMA  
Team Leader of the Study on Fisheries Infrastructure Support and Coastal Communities  
Development Plan in Eastern Indonesia  
System Science Consultants Inc., in consortium with  
Overseas Agro-fisheries Consultants co., Ltd.

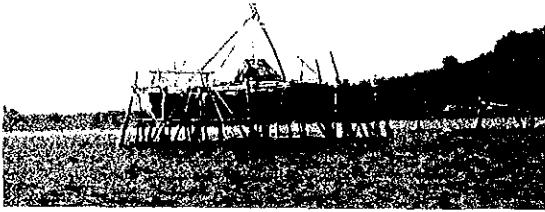


**LOCATION MAP OF THE STUDY AREA**

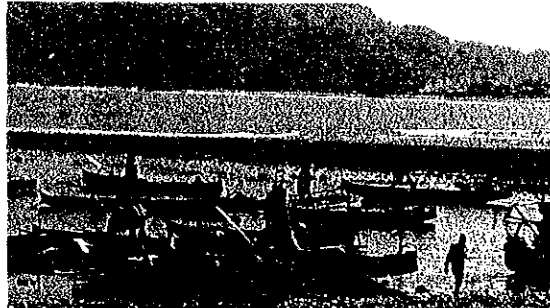


**LOCATION MAP OF THE PRIORITY ZONES**

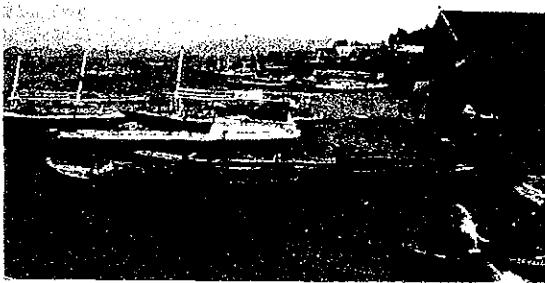
## Present Conditions in NTB Province



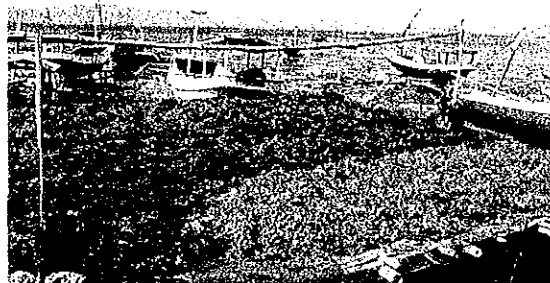
*Bagan (Lift net) – A popular fishing method using light during night in NTB  
(Alas, Sumbawa District)*



*Fishing boats kept directly on the beach – High tide allows fishermen to go fishing easily.  
(Nanganae, Dompu District)*



*High rate of motorized fishing boats in NTB than NTB  
(Waworada, Bima District)*



*Seaweed culture in NTB – Dried seaweed are sold to traders  
(Tanjung Belu, Bima District)*



*Fish catch landed directly on the beach in front of fishing village  
(Sape, Bima District)*



*Sales of fish by women on the beach  
(Sape, Bima District)*



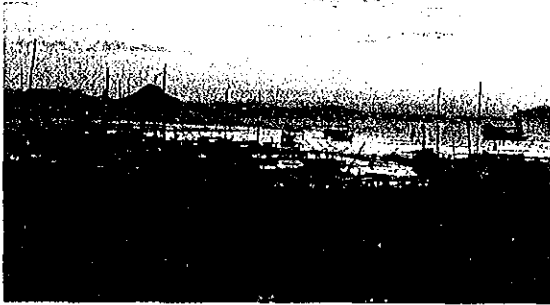
*Public fish landing place in Tanjung Luar  
(East Lombok District)*



*Fish retailing by women without use of ice in a market  
(Lombok Tengah District)*



## Present Conditions in NTT Province



A major fishing base (Labuan Bajo-Manggarai District) in Flores Island from where fish products are shipped to Bali and Java Island



High rate of non-motorized fishing boats in NTT than NTB (Sagu-Adonara Island, East Flores District)



Salting/Drying on the beach in front of a fishing village (Nangarelo, Ngada District)



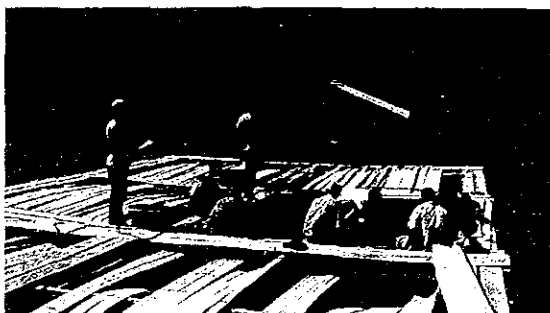
Immediate sales of landed fish catch on the beach (Luten, Manggarai District)



A number of large pelagic fish among fish landed (Mbongawani, Ende District)



Salted/dried fish, a valuable source of animal protein in inland market



Pilot Study on Grouper Cage Culture (Tapolang, Lembata District)



Seaweed culture in some fishing villages in NTT, though it is not as popular as in NTB (Prawsale, Ende District)

## **SUMMARY**

## **1. Summary of the Master Plan**

### **1.1 Objective of the Master Plan**

A Master Plan aimed at improving the income of small-scale fishermen and establishing a stable fisheries supply for the coastal fishing communities in East and West Nusa Tenggara provinces (Propinsi Nusa Tenggara Barat and Propinsi Nusa Tenggara Timur), henceforth referred to as NTB and NTT, respectively, was formulated. In addition, a feasibility study to develop fisheries related infrastructure in two priority districts selected from Sumbawa and Flores islands was also implemented.

### **1.2 Survey Study Area**

The M/P to develop small-scale fishing communities targeted the eastern coastal fishing communities in NTB and NTT (excluding Timor Island); and the feasibility study that was implemented, based on the M/P, focused on two districts each from Sumbawa and Flores islands.

## **2. Present Conditions of the Study Area and Issues Related to Fishing Community Development**

### **2.1 Existing Conditions of the Fishing Villages**

#### **(1) Economic situation of objective areas**

Both NTB and NTT are the least economically developed provinces in Indonesia; and the per capita GDP in 1999 was ranked 25th and 27th, respectively, out of all 27 provinces (the national average of Rp.5.54 million/year/person, in contrast to Rp.2.19 million/year/person for NTB and Rp.1.45 million/year/person for NTT). In addition, the poverty line for both provinces for the same year was Rp.74,677/month for NTB and Rp.66,143/month for NTT. This was equivalent to about one million people in NTB (about 33 percent of the population) and about 1.6 million people (49 percent of the population) in NTT, who were below this poverty line.

In 1999, the number of fishermen households engaged in marine fisheries and brackish water pond culture in both provinces was 20,688 and 28,735 households, respectively. In addition, the GRDP in that same year was Rp.8.2 trillion for NTB and Rp.5.6 trillion for NTT, of which approximately 3 percent was generated by the fisheries sector in both provinces.

## **(2) Present Conditions in Fisheries**

The fish catch volume for NTB and NTT provinces in 1999 was 65,152 tons and 79,598 tons, respectively. Coastal fisheries are predominantly conducted in both provinces. The major fishing methods that are employed are gill net, Bagan (lift-net fishing), and purse seines in NTB and gill net, purse seine, and tuna pole line fishing in NTT province. The fishing boat motorization ratio is about 86 percent in NTB, in contrast to NTT, where the ratio is a low 10 percent. Subsequently, the fish catch volume per fishing boat is higher in NTB province. Since lamp fishing is the major form of night fishing that is conducted in both provinces, the operations are concentrated during the phase of the new moon. In addition, fishing can not be conducted in many fishing grounds in January and February due to the monsoons.

In reviewing the development of fishery resources based on total allowable catch (TAC), approximately 80 percent of the TAC has been achieved in NTB, in contrast to about 30 percent in NTT; and unexploited development potential exists. However, fishing operations conducted in the inland water areas of NTB province are estimated to have exceeded the TAC levels.

Moreover, blast fishing and fishing methods employing the use of poisonous substances have been conducted over a lengthy period of time in each fishing ground in the study area. Although these illegal fishing operations have decreased due to guidance measures taken by the provincial and district governments, they continue to be carried out and is a major factor underlying the destruction of the coastal environment.

The two types of mariculture conducted in NTB and NTT provinces are brackish water pond culture centered on milkfish and prawns and seaweed culture. The production volume of brackish water pond culture in 1999 was 6,954 tons in NTB and 191 tons in NTT province. Seaweed culture has been mainly carried out in NTB province, and the production volume in 1999 was 21,052 tons (there was no statistical data for NTT province). In recent years, the Indonesian government has implemented measures to develop the culture of grouper species. Subsequently, cage culture activities of groupers have been conducted in both provinces, but they have not achieved self-sufficiency.

## **(3) Fish Marketing and Processing**

Fresh fish marketing activities in the study area are mainly centered on the district markets located in the district capitals, and only a segment of the fish is marketed to Bali Island, Jakarta, and other outside neighboring districts. Due to inadequate basic facilities and a transport network for fresh fish marketing activities, the fish catch must be sold to consumers on the day that it is landed. This has become one factor that has impeded the

development of a widespread fresh fish marketing network. Presently, fresh fish is marketed to outside areas through the marketing network of individual fish collectors.

In areas where the fish landing volume is small, the local fishing village women play a central role in fish marketing activities due to the minimal number of fish traders and collectors, whereas in fishing communities near the cities or in areas where the fish landing volume is large, the fish traders and collectors play a focal role in marketing activities.

Fisheries companies and fish collectors provide block ice only for their consigned fishermen. Although the ice supply has improved due to increased ice production in the study area, much of the region utilizes ice sold in plastic bags made by local households. Subsequently, the absolute volume of ice is in shortage. The price of ice is very high (Rp.12- to 150/kg in Java/Bali islands, Rp.150 to 200/kg in Lombok island, Rp.330 to 500/kg in Sumbawa Island, and Rp.660 to 1,000/kg in Flores Island). In addition, the usage ratio of ice for fresh fish decreases eastward in the study area (30 to 60 percent in Sumbawa Island and 10 to 25 percent in Flores Island). Moreover, fish freshness drops quickly since the use of insulated fish boxes is minimal in the inland areas where fish is marketed.

The fish catch is basically marketed fresh in the study area; and fish that can not be sold fresh is processed according to traditional methods (mainly salt-dried). Approximately 40 percent of the annual fish catch volume is sold as processed fish in the study region. The price of dried and salted fish is about one-half to three-fourths the weight of fresh fish. The volume of processed fish increases notably during the peak fishing season; and due to the surplus fish available in the local market, the product is sold at even cheaper prices to large fish traders.

#### **(4) Fish Production Infrastructure**

The fishing ports in Indonesia are classified according to Classes A to D, based on the scope of the port facilities, the size and number of fishing boats that use the port, and the fish landing volume (Class D ports have public landing sites, henceforth referred to as PPI). In the study area, there is one Class C fishing port in both NTB and NTT provinces; and 41 of the smallest PPIs are located in NTB and 7 are found in NTT provinces.

The majority of the PPI has depreciated or damaged facilities or is completely unused in fishing activities. This is because the PPI have been designated as fish landing sites and the facilities are mainly comprised of piers and revetments that serve as landing sites with fish handling areas located behind these facilities, but without any functions such as ice production and supply, refueling facilities, fishing gear storage or net drying areas.

#### **(5) Fishing Community Society/Gender**

According to the data obtained from a socioeconomic survey of 33 major fishing communities in the study area, the average fishermen household is a nucleus family comprised of a married couple and their single children. The average number of family members per household was 3.18 people in NTB province and 3.34 people in NTT province.

The major source of water was either tap or well water and the overall ratio of fishermen using tap water in both provinces was about 40 percent. In addition, 288 out of 462 households in NTB province and 237 out of 540 households in NTT province did not utilize toilets.

The annual per capita income for fishermen in 25 fishing communities (75.7 percent) was lower than the annual per capita income of a farmer with less than 0.5ha of farmland (Rp.1.63 million/year). The per capita monthly income for fishermen in 9 fishing communities (27.2 percent) was lower than the national average poverty line income (Rp.1.89 million/year).

More than 60 percent of the fishing village women were engaged in the sale and processing of fishery products, farming, selling daily commodities, and other economic activities. However, due to the lack of employment opportunities for single women, many go abroad to work. Although women group activities were observed at each site, they were mainly conducted by village women groups (henceforth referred to as PKK) that were organized under the supervision of the district governor's office. The daily activities for both the men and women are comprised of waiting at the beach for the return of the fishing boats between fish retail activities, making round trips to the market, doing household chores, and there is very little collected time available. The men also spend half the day at sea, and subsequently, much of the work done on land is carried out by women.

#### **(6) Fishermen Cooperatives/Fisheries Extension**

There are three types of cooperatives in Indonesia—the KUD Mina, Koperasi Nelayan, and Kelompoks or fishermen groups. The activities of the KUD Mina and Koperasi Nelayan are similar, but the KUD has members other than fishermen. Both types of cooperatives provide small-scale loans and conduct purchasing activities, but the scope of the operations is small, and there are very few cooperative operations that are supported by fishermen. In the study area, there were 28 KUD Mina with a total of 4,362 members and 1,151 fishermen kelompoks. However, there are no statistical data on the Koperasi Nelayan.

Fisheries extension activities are conducted by the Agricultural Education, Training, and Extension Agency of the Ministry of Agriculture (BPLLP), which is responsible for planning and implementing extension activities, but extension officers, are under the

jurisdiction of the provincial government. Extension personnel are divided between the PPL (extension officer) and the PPS (experts from the special extensions sector). In NTB province, there are 112 PPL and 18 PPS and there are 64 PPL and 5 PPS in NTT province. The extension activities are dependent on budgets that are procured through existing programmes and projects.

There are three agencies that are involved in agricultural extension activities at the regional level—DIKLAT (educational, training center), BIPP (agricultural information extensions center), and the IPPTP (agricultural technical research center). These three agencies are involved in only inland water fisheries and aquaculture activities and they are not involved in mariculture/culture extension activities.

The fisheries educational, training, and extensions center of the Ministry of Marine Affairs and Fisheries, newly established in 2000, was re-established. The major activity of this center is to develop general manpower in the fisheries and aquaculture sector, and to conduct research and formulate extension measures and plans, and to review educational, training, and extension needs. As of 2002, the center is currently reviewing reforms of the fisheries extension system.

## **2.2 Fishing Community Development Issues**

The main issues in fishing community development in the study area are explained below.

### **2.2.1 Poverty of Fishermen Households**

- The per capita annual income of fishermen households in the study area is generally lower than the national average for small-scale farmers who own less than 0.5 ha of farmland (about Rp 1.6 million). The income level of fishermen in about half of the major fishing villages is on the poverty line (Rp 74,272/month).
- Because of poor fishing equipment such as boats and gears, fishing activities are limited to coastal fishing grounds, and the offshore resources have not been effectively utilized.
- Economic losses sustained during the marketing and processing stages are quite large due to the insufficient supply volume and high price of ice, inappropriate preservation methods of fresh fish, the rancid quality and low unit price of dried and salted fish.
- Available credit system for purchasing fishing gear and fishing operation is limited to KUD credit schemes with very high interest rates ranging from 25 to 100 percent per year. Subsequently, most of fishermen are economically isolated.

## 2.2.2 Future Deficit of Fish Supply in the Study Area

Based on the estimated demand and supply of fish in 2012, a fish supply shortage is expected in Lombok, Sumba and the western Flores. However, this shortage can be resolved by utilizing surplus fish from Eastern Flores. Thus, the demand and supply of fish in the survey area (excluding Timor Island) will be balanced in 2002.

Area	Unit: 1,000 ton								
	Total Fish Demand			Total Fish Catch			Demand & Supply Balance		
	1999 <sup>1)</sup>	2007 <sup>2)</sup>	2012 <sup>2)</sup>	1999	2007 <sup>3)</sup>	2012 <sup>3)</sup>	1999	2007	2012
Lombok	35.5	49.3	60.3	29.9	31.8	31.8	-5.7	-17.5	-28.5
Sumbawa	56.6	61.6	65.1	48.8	56.7	66.7	-7.8	-5.0	1.6
Sub-total in NTB	92.1	109.9	125.4	78.6	88.5	98.5	-13.5	-21.4	-27.0
Sumba	6.5	10.0	11.2	6.3	7.9	9.4	-0.2	-2.2	-1.7
Western Flores	9.0	18.3	21.6	9.8	9.7	9.6	0.8	-8.6	-12.0
Eastern Flores	19.6	22.8	23.1	26.2	37.5	48.8	6.6	14.7	25.8
Alor	6.4	6.7	6.9	6.8	13.8	19.8	0.3	7.1	12.9
Timor	23.4	55.8	60.5	30.5	41.4	50.8	7.0	-14.3	-9.7
Sub-total in NTT	65.1	113.6	123.2	79.6	110.3	138.4	14.5	-3.3	15.2
Total	157.1	223.5	248.7	158.2	198.7	236.9	1.1	-24.8	-11.8

Note: 1) Estimated fish consumption by area (1999 actual fish production + fish volume inflow – fish volume outflow) –

For details refer Table 1.1.3 of Master Plan

2) Details of fish demand for 2007 and 2012 refer Table 1.1.3 of Master Plan.

3) Fish catch estimated based on increase rate for the past 10 years.

However, the surplus fish in Eastern Flores is used to produce inexpensive processed fish or is scraped due to the inability to transport fish from eastern to western Flores and Lombok Island.

## 2.2.3 Vulnerable Situation of Fisheries Resources in the Study Area

- A large volume of juvenile fish is harvested by specific fishing activities that are concentrated in coastal waters and the inland bay areas. Thus, fishing pressure on coastal resources is increasing.
- Blast fishing and fishing using poisonous substances that destroys the coastal environment is being conducted.
- A system of recording the daily fish catch in the study area does not exist. Subsequently, it is difficult to precisely assess the trends in coastal resources.

## 2.2.4 Delays in Organizing Fishermen

- Fishermen establish cooperatives with the objective of receiving government support. As a result, their motivation to conduct self-help efforts is nonexistent.
- Due to district government's insufficient experience in project management, there are only a limited number of district government officers capable of appropriately instructing, monitoring and evaluating projects.



- Fisheries cooperatives are unable to implement activities in sales, insurance and welfare to support members on an adequate scale.

#### **2.2.5 Inadequate Fisheries Infrastructure**

- Due to the lack of functional facilities such as ice plants, water tanks, fuel depots, fish handling sheds, and fishing gear repair and dry yard, the utilization rate for most of the existing PPI is low.
- Most of fish landing sites lack the functional facilities and equipment that help to reduce the economic losses of landed fish.

#### **2.2.6 Inconvenient Living Conditions of the Fishing Communities**

- Many coastal communities require fundamental improvements in their living environment such as water supply, sanitary condition, etc.
- Women communities in most coastal communities are very busy earning their livelihoods, and do not have enough time to consider measures to improve their living conditions.

### **3. Outline of the Master Plan**

#### **3.1 Development Goals**

The goals of this development plan are as follows.

- Raise the average income of fishermen in the target region by 1.6 times by 2012 or Rp.2.08 million in the next decade.
- Establish a regular and stable fish supply system in the study area.

#### **3.2 Major Strategic Components**

The major strategic components that will be pursued to achieve these goals are as follows.

- Establish a sustainable fisheries resources management system.
- Establish a widespread marketing network of fresh and processed fish products.
- Reduce marketing losses through improved quality control of landed fish.
- Give value-added to fishery products through improved processing methods.
- Cultivate operation and management capabilities and entrepreneurship of fishermen organizations by recruiting their participation in development projects.

#### **3.3 Plan to Improve Fishing Technology and Coastal Resources Management**

A segment of the fishery operations that utilize coastal resources will be extended to low usage, unexploited offshore water areas and a resources management system will be

created to promote the sustainable use of coastal resources. The main activities of the plan are as follows.

- Extend fishing activities to unexploited water areas and disperse the fishing pressure on coastal resources.
- Establish a fisheries loan system, which has a larger financing limit than the existing schemes.
- Establish a community based coastal resources management system.

### **3.4 Plan to Improve Aquaculture Technology**

The objective is to raise fishermen income through improved grouper culture techniques and to improve the productivity of brackish water pond culture by using fertilizer to expand milkfish culture.

- Improve the calculation method to determine the area of water bodies suited for aquaculture.
- Establish aquaculture related laws and regulations.
- Establish a technical training system for aquaculture.
- Improve the fish disease prevention system.
- Organizing and strengthen fishermen groups engaged in aquaculture.

### **3.5 Plan to Improve Fish Handling, Marketing and Processing**

This plan is composed of three components, specifically to improve fresh fish marketing, to improve fisheries processing technology, and to improve fish shipments and the information network.

#### **(1) Fresh Fish Marketing Improvement Plan**

The objective is to establish a sanitary and stable, high quality fresh fish supply in the region by reducing marketing risks and economic losses through an improved marketing system for fresh fish.

- Promote ice production and establish a supply system.
- Develop a fresh fish storage system.
- Disseminate fresh fish handling technology and improve awareness about fish freshness.
- Improve the fish marketing facilities.

## **(2) Fresh Fish Marketing Improvement Plan**

The objective is to improve and develop fish processing technology, to improve and diversify the quality of processed products, to eliminate economic losses, to effectively use raw fish and improve the income of the fishing villages.

- Improve the quality of existing processed products and disseminate the technology.
- Promote the development and sales of new processed products.

## **(3) Plan to Improve Fish Shipments and the Information Network**

The objectives are to expand the retail market through improvements in fish shipping, transport, and the information system and to correct the balance in the supply and demand of fish in the region.

- Improve the means of fresh fish shipments.
- Provide access to market information.

### **3.6 Plan to Improve the Fisheries Infrastructure**

- Effectively use fish landing facilities and activating fishing villages through development of fisheries infrastructure having appropriate roles and functions.
- To improve facilities of existing PPI
- To create suitable working environment for fishery activities by improving safety and efficiency.

### **3.7 Plan to Improve the Fishing Village Environment**

- Improve the working environment by creating public space along the coastline and improving accessibility between the coastline and the main community road.
- *Improve living conditions by improving the existing water supply/drainage and waste treatment condition*
- Promote community activities and foster community awareness about self-help measures.

### **3.8 Plan to Improve Fishermen Organizations and Fisheries Extension**

The fishermen and their organizations will play an active role in the proposed programmes. This plan aims to strengthen the existing organizations to become self-reliant and autonomous through the following measures.

- Strengthen and mobilize the cooperatives to provide credit, technical support and services for their members and to conduct economic activities.

- Employ a capable and competent person to serve as a “facilitator and mover” in the organization to oversee day-to-day operations and the management of activities.
- Implement continuous education and training to raise awareness and understanding of activities based on mutual cooperation and to increase skills and knowledge.
- Establish independent and self-reliant operations and management of commonly used facilities and infrastructure.
- Strengthen the financial base by mobilizing the task of collecting membership fees, mutual savings, and generating revenue through economic activities.

### **3.9 Educational and Training Plan**

Education and training in line with national and provincial government development strategies and policies will be implemented in each sector as explained above. Most important component of the educational and training plan is to strengthen the fishermen organizations since they are expected to play an active and dynamic role in developing the fisheries sector.

Education and training activities will be solicited from formal and informal sources. The formal sources are existing education and training institutions and/or research and extension institutions under the provincial or central governments that have on-going programmes in fisheries and aquaculture and extension services. The leaders of fishermen organizations and the extension staff of the district fisheries office will be sent to these institutions and they are expected to disseminate the skills and knowledge that they have learned to their members. Informal education and training will be conducted at the sites on the basis of their needs and requirements, and NGO assistance will be solicited to provide the needed services and support for the community.

## **4 Outline of the Project Design by Specific Areas in the Districts**

### **4.1 Setting Up of Development Zones, Model Sites and Model Areas**

Based on the existing fish marketing and natural conditions, a total of 24 development zones were created in nine districts located in Sumbawa and Flores islands that were designated in the Scope of Works for this study. In each development zone, one model site that best illustrated the characteristics of the zone and was representative as its regional center was selected; and the area surrounding each model site was designated as a model area.

District	No	Development Zone	Model Site (Sub-district)	Model Area	Future Extended Areas
Sumbawa	1	West Coast	Lab.Lalar (Taliwang)	Kec. Taliwang coast	South coast (camp fishing abse)
	2	North Coast	Lab.Sumbawa (Sumbawa)	Kec. Sumbawa coast	North-west coast (Lab.Alas, etc.)
	3	Tl. Saleh	Santong (Plambang)	Kec. Plampang coast	Tl. Saleh mouth (Terata, etc.)
Dompu	4	North Coast	Kilo (Kilo)	(To be extended from Bima north coast area, together with Sanggar area of Bima district)	
	5	Tl. Saleh	Soro (Kempo)	Kec. Kempo coast	Pekat area (Tl. Saleh mouth)
	6	Tl. Cempi	Hu'u (Hu'u)	Inner area of Tl.Saleh	South coast of Sumbawa district (camp fishing base)
Bima	7	Tl. Bima	Bima (Rasanae Barat)	Tl.Bima & North coast	Kilo (Dompu), Sanggar (Bima)
	8	Tl. Sape	Bugis (Sape)	Tl. Sape & its vicinity	
	9	Tl. Waworada	Waworada (Rangle)	Tl.Waworada & its vicinity	
Manggarai	10	Komodo/Rinca	Lab.Bajo (Komodo)	Kec.Komodo coast	Terang area
	11	North Coast	Reo (Reo)	Kec.Reo coast	Pota area
	12	South Coast	Mborong (Mborong)	(To be extended from Aimere area (Ngada district))	
Ngada	13	North Coast	Kotajoko (Aiesa)	Whole north coast (Transfer of fishermen)	
	14	South Coast	Aimere (Aimere)	Kec. Aimere coast	Maumbawa & Nangaroro areas, and south coast of Manggarai
Ende	15	North Coast	Maurelo (Maurelo)	(To be extended from north area of Sikka district)	
	16	South Coast	Paupanda (Ende)	South-west coast	South-east coast (Maubasa area)
Sikka	17	North Coast	Kalimati (Maumere)	Kec.Maumere & Kec. Alo coast	Gelitung area
	18	South Coast	Paga (Paga)	Kec. Pag coast	Leta & Bola areas
Flores Timur	19	Mainland	Oka (Larantuka)	Larantuka & its vicinity	Waiklibang & Waiteba areas
	20	North Coast	Sagu (Adonara T.)	North coast of Adonara	
	21	Sel. Solor	Lamahara (Adonara .)	Sel. Solor area	
Lembata	22	North Coast	Balauring (Omesuri)	North-east coast of Lembata	Tokojaeng area
	23	Tl. Lewoleba	Lewoleba (Nubatukan)	Tl. Lewoleba area	Tl. Hadakew area
	24	South Coast	Lamalera (Nubatukan)	South coast of Lembata	East coast (camp fishing base)

## 4.2 Classification of the Model Site

### (1) Fish Production Increase

Type	Criteria
Type A: Diversification of fishing ground	Use of existing unutilized resources outside the bay or coastal waters within the accessible range by existing fishing boats
Type B: Propagation of aquaculture	Fish catch over the potential resources and non-existence of utilizable resources within the accessible range

### (2) Fish Landing and Shipment

Type	Criteria	
Type a: Fish landing and marketing center	Main fish landing and consumption area in urban area and social infrastructure is relatively developed	
Type b: Fishing landing and shipment center	b-1: Medium scale	Main fish landing within the rural area as well as collection and shipment centre. Accessible to consumption market is relatively good.
	b-2: Small scale	Condition is same as above, but the scale of fish landing volume is small.
Type c: Fishing Village Center	Main fishing village is among the villages with difficult to access to consumption market and social infrastructure.	

Note: The difference of development policy between b-1 and b-2 is explained on page III-85 of the Master Plan.

### (3) Operation/Management Body

Type		Criteria
Type x: Fishermen Organization	x-1: Strengthening of existing cooperatives	Cooperative only composed of fishermen and active
	x-2: Establish new fishermen organization	Non-existence of cooperative only composed of fishermen but can be organized into an association of existing kelompok (groups)
Type y: Operated by village administration and community		Main activity is fishing-cooperative composed of fishermen does not exist and difficult to coordinate the existing kelompok.
Type z: Operated by district government		Model site located in district capital, and the site used by stakeholders from many places and no fishermen cooperatives

Each model site was categorized according to the three criteria shown above and classified as shown in the table below.

Classification of Model Site

District	No	Development Zone	Model Site (District)	Functions		
				Fish Production	Fish Landing & Shipment	O/M organization
Sumbawa	1	West Coast	Lab.Lalar (Taliwang)	A	b-2	y
	2	North Coast	Lab.Sumbawa (Sumbawa)	A	a	z
	3	Teluk Saleh	Santong (Plambang)	B	b-1	x-2
Dompu	4	North Coast	Kilo (Kilo)	A	c	y
	5	Teluk Saleh	Soro (Kempo)	B	b-1	x-1
	6	Teluk Cempi	Hu'u (Hu'u)	A	b-2	y
Bima	7	Teluk Bima	Bima (Rasanae Barat)	B	a	x-2
	8	Teluk Sape	Bugis (Sape)	B	b-1	x-2
	9	Teluk Waworada	Waworada (Rangle)	A	b-1	x-2
Manggara	10	Komodo/Rinca	Lab.Bajo (Komodo)	B	b-1	x-2
	11	North Coast	Reo (Reo)	A	c	y
	12	South Coast	Mborong (Mborong)	A	c	y
Ngada	13	North Coast	Kotajoko (Aiesa)	A	b-2	x-2
	14	South Coast	Aimere (Aimere)	A	c	y
Ende	15	North Coast	Maurelo (Maurelo)	A	b-2	y
	16	South Coast	Paupanda (Ende)	A	b-2	x-1
Sikka	17	North Coast	Kalimati (Maumere)	A	a	z
	18	South Coast	Paga (Paga)	A	b-2	y
Flores	19	Mainland	Oka (Larantuka)	A	a	x-1
Timur	20	North Coast	Sagu (Adonara T.)	A	c	x-1
	21	Sel. Solor	Lamahala (Adonara T.)	A	c	x-1
Lembata	22	North Coast	Balauring (Omesuri)	A	c	y
	23	Teluk Lewoleba	Lewoleba (Nubatukan)	A	b-1	x-1
	24	South Coast	Lamalera (Nubatukan)	A	c	y

### 4.3 Selection of Priority Model Areas

Priority Model Areas are selected based on the following selection criteria.

#### (1) Fishing Technology and Resources

##### (1)-1 Access to Potential Resources

Point 3: Area with potential resources that can be exploited by the local fishermen with minimal input (small boat engines and improved fishing gear)

Point 2: Area with potential resources that can be exploited by the local fishermen at high cost (larger fishing boats and engines)

- Point 1: Area with potential resources that can be exploited by the local fishermen with limited fishing technology (fishermen require training)
- Point 0: Area that is distantly located from potential resources

(1)-2 Resources Management Level

- Point 3: Area where 1) coastal environment and/or resources management projects are under implementation, 2) village regulations related to resources management are executed, and 3) the district government's activities (collection of daily fish landing data, allocation of extension officer on full-time basis) are well conducted.
- Point 2: Area that satisfies either of the two conditions above.
- Point 1: Area that satisfies one condition in the above.
- Point 0: Area that does not satisfy any of the conditions above.

(2) **Fish Marketing**

(2)-1 Expected Benefits Derived from the Use of Ice

- Point 3: Area where the ice supply is limited due to small domestic freezers and high price (Rp.500/kg or more) and where the ratio of ice to fish will improve to more than 50 percent.
- Point 2: Area where ice supply is limited due to small domestic freezers and high price (Rp.500/kg or more).
- Point 1: Area where ice is sold at reasonable prices (less than Rp.500/kg) but limited in quantity or vice-versa.
- Point 0: Area where it is easy to obtain ice at a reasonable price.

(2)-2 Scope of Fish Landing

- Point 3: Areas where the landed catch by boats from the surrounding villages amounts to an annual landing volume of more than 1,500 tons, or areas where the annual fish landing volume by local boats is more than 3,000 tons.
- Point 2: Areas where the landed catch by boats from the surrounding villages amounts to an annual landing volume of 500 - 1,500 tons, or areas where the annual fish landing volume by local boats is 1,500 - 3,000 tons.
- Point 1: Areas where the landed catch by boats from the surrounding villages amounts to an annual landing volume of less than 500 tons, or areas where the annual fish landing volume by local boats is of 500 - 1,500 tons.
- Point 0: Area where only local fishing boats land their fish catch (annual fish landing volume of less than 500 tons).

(3) **Social Factor**

Areas where the project will directly benefit fishermen households.

- Point 3: Area where fish marketing activities are carried out predominantly by women.
- Point 2: Area where fish marketing activities are carried out by both local fish traders and village women (mainly for local consumption).

Point 1: Area where the activities of fish collectors for exported fish are notable, in addition to the village women and local fish traders.

Point 0: Area where most of the fish catch is handled by private fish collectors/traders.

**(4) Institutional Factor**

Areas where fisheries cooperatives are active.

Point 3: Area where the fishermen's cooperatives with more than 100 members that are currently active in credit/deposit, purchase and sales activities

Point 2: Area where there are active fishermen's cooperatives with less than 100 members

Point 1: Area where fishermen's groups (kelompok) exist, but fishermen's cooperatives are inactive or non-existent

Point 0: Area where fishermen's organizations do not exist.

**(5) Infrastructure**

**(5)-1 Availability of Electricity and Water**

Point 2: Area where power is available from electricity company and city water can be supplied.

Point 1: Area where power is available from electricity company, but wells or mountain spring water must be developed as the water supply.

Point 0: Area without electricity supply.

**(5)-2. Natural Conditions suited to construction of marine civil structure**

Point 2: Area where countermeasures are not needed to control the natural conditions.

Point 1: Area where countermeasures are needed, but with minimal cost.

Point 0: Area where costly countermeasures are required to control the natural conditions.

Based on the above selection criteria, the model sites in Sumbawa Island were prioritized. Rompo (Waworada) in Bima district is the first priority, and Soro (Kempo) and Hu'u in Dompu district are the second priority.

Model Site	Points given by criteria								Total	Priority
	(1)-1	(1)-2	(2)-1	(2)-2	(3)	(4)	(5)-1	(5)-2		
Lab.Lalar	3	0	2	1	2	1	1	0	10	5
Lab.Sumbawa	2	0	1	1	1	1	1	0	7	7
Santong	1	1	1	3	1	1	1	2	11	4
Soro	2	1	1	3	1	3	1	1	13	2
H'uu	3	0	1	3	3	1	1	1	13	2
Kel.Tanjung	1	0	1	2	1	1	2	0	8	6
Bugis	2	1	1	3	1	2	2	0	12	3
Rompo	3	1	1	3	1	3	1	1	14	1

Similarly, based on the above selection criteria, the model sites in Flores Island were prioritized. Oka (Larantuka) in East Flores district is the first priority, and Kalimati/Wuring and Paga in Sikka district and Paupanda in Ende district are the second priority.



Model Site	Points given by criteria								Total	Priority
	(1)-1	(1)-2	(2)-1	(2)-2	(3)	(4)	(5)-1	(5)-2		
Lab. Bajo	2	1	1	3	1	1	1	2	12	4
Reo	1	0	2	2	2	1	1	1	10	6
Kotajoko	1	2	3	3	2	1	0	0	12	4
Aimere	1	1	3	0	3	1	1	1	11	5
Paupanda	3	1	2	3	0	1	2	2	14	2
Kalimati/Wuring	2	1	2	3	1	1	2	2	14	2
Paga	3	0	2	0	0	2	1	1	9	7
Sagu	3	0	2	0	2	2	0	2	11	5
Lamahala Jaya	2	0	2	2	2	3	1	1	13	3
Oka	3	0	2	3	1	3	2	2	16	1
Balauring	3	0	2	1	2	1	1	2	12	4
Lewoleba	1	0	2	0	3	2	2	1	11	5
Lamalera	3	1	2	0	3	1	0	0	10	6

#### 4.4 Analysis of Linkage between Selected Priority Zone and its Environs

##### (1) Sumbawa Island

##### 1) Rompo (Waworada), Bima District (First Priority Zone)

###### Linkage with other areas

- Landed fish is mainly distributed to Bima and other towns (Renda, Ngali, Tente) on the way.
- Nearly all fish caught in and around Teluk Waworada are collected and/or directly landed at Rompo (Waworada).
- Local fish collectors sell fish to buyers from Bima (once a week) at the site (ice is supplied by buyers free of charge).

###### Condition of existing facilities

- The existing market in Bima appears to be operating beyond its holding capacity. (Women sell fish along the street outside the market.)
- The fish handling shed at Rompo (Waworada) is depreciated, but there is no surplus land area around the site.

###### Conclusion

A priority zone consisting of Rompo, located along Waworada Bay, as the core of fishermen village and Bima Fish Market was created.

##### 2) Soro (Kempo) and Hu'u (Hu'u), Dompu District (2nd Priority Zone)

###### Linkage with other areas

- Both sites are located in the same district (Kab. Dompu) and supply fresh fish to the Dompu market.
- Kempo is a major supplier of small pelagic (catch of Bagan and purse seine), while large pelagic fish are mainly supplied from Hu'u.

###### Condition of existing facilities

- The existing Dompu market does not have enough space to sell fish and it lacks a suitable area to stock fresh fish.
- There is a depreciated PPI at Soro (Kempo) constructed in 1983 (with jetty, fish handling shed, office space, small fishmeal plant, etc.). Due to its inconvenient design, the fish landing facility at the PPI has not been used.

- There is only a small fish-handling shed (approx. 50 sq. m) in Hu'u. Measures to counter the large swells that are generated in front of Hu'u will be costly (i.e., the cost of constructing a fish landing jetty).

### Conclusion

A priority zone consisting of the main fish supply areas, namely Kenpo and Hu'u and the Dompu market, was created.

### **(2) Flores Island**

#### **1) Oka (Larantuka), Flores Timur District (First Priority Zone)**

#### Linkage with other areas

- Larantuka serves as the main gate for fish from the eastern islands (Adonara, Solor and Lembata).
- Large pelagic fish is collected by fishing companies from local fishermen in Sagu, Balauring, etc.
- Fresh and dried fish is usually marketed by local traders (women) in Maumere and Ende, and it is also sold in the local market in Larantuka.

#### Condition of the existing facilities

- Fisheries infrastructure related facilities do not exist in Flores Timur and Lembata (with the exception of facilities that belong to private fishing companies).

### Conclusion

A priority zone consisting of Oka in Larantuka as a fish collection point, Larantuka and central /western Flores, and the remote fishing villages (Lamahala Jaya, Sagu, Lewoleba, Balauring, and Lamalera) was created.

#### **2) Kalimati/Wuring (Maumere), Sikka District and Paupanda (Ende), Ende District (Second Priority Zones)**

#### Linkage with other areas

- More than 1,000 tons of fish are supplied annually from Larantuka and Maumere, and all fish including locally landed fish are consumed within Ende at present. Based on fish demand projections, it is expected that Ende will play a key role as a transition market to distribute fish from the eastern (Larantuka and Maumere) to the western regions of Flores (Bajawa and Ruteng).
- Although it is low in priority as a model area (seventh), Paga, located between Maumere and Ende, will also play an important role to increase fish production not only as an additional supply source to the western region, but also to supply export-oriented fish (tuna) to Maumere.

#### Condition of the existing facilities

- The existing PPI in Paupanda that was constructed in 1994 has not been utilized due to the lack of an ice plant and fish storage facility. Additionally, the jetty is unsuitable for use by fishing boats.
- In 2001, the district government of Sikka reclaimed the landing facility in Kalimati, which has not been rehabilitated since its destruction by the 1992 tsunami.

- Wuring is a main supply source of both fresh and processed fish to Kalimati. Fishermen in Wuring live in houses built over waters located in the tidal zone, subsequently, there is insufficient space for fish processing and fishing gear repair activities.

### Conclusion

The priority zone, which consists of Kalimati, Wuring, Paga and Paupanda, was created as a fish supply point for two district capitals (Maumere and Ende) and western Flores.

## **5. Feasibility Study**

A feasibility study was implemented for the four-selected priority zones mentioned above.

### **5.1 Bima Priority Zone**

#### **5.1.1 Current Conditions and Issues**

- 1) Rompo is categorized as a core fishery community among the several fishery communities in the area.
- 2) There are seven fishing villages along the Waworada Bay comprised of 782 fishermen households in four sub-villages in three villages, of which 311 households are located in the Rompo sub-village.
- 3) The fishing season in Waworada Bay varies according to the type of fishing gears that is employed. The peak fishing season for Bagan fishing is from March to June, and from June to September for purse seine and gill net fishing and from September to March for bottom long line and hand line fishing for demersal fish.
- 4) There are 40 Bagan boats, 44 purse seine boats, and 14 gill net / bottom long line boats operating in Waworada Bay. Bagan operations are carried out in the coastal waters during the night and purse seine is conducted in the central area of the bay during the day. About 50 percent of the Bagan boats (22 boats) move to Sape Bay during the lean fishing season (January to March).
- 5) Most of the fish harvested by Bagan operations are sold to fish collector boats (25 boats) at the sea during the night. The fish catch of purse seiners is directly landed at Rompo.
- 6) Since the size of the catch is larger than other areas, the fishery resources of Waworada Bay have not been fully exploited. In addition, the potential fishery resource of the coastal waters outside the bay is estimated at about 3,000 tons.
- 7) Fish catch in Waworada is rich in variety. About 60% of the catch is small pelagic fish (anchovies, sardines, round scads, etc). Others are large migratory fish (13%), demersal fish (5%), squids (4%), and others.

- 8) Landed fish is mainly transported to and sold in district capital Bima and in surrounding retail markets as well as inland villages along the way to Bima city. In addition, the annual exported volume of demersal fish to Bali is estimated to be about 60 tons.
- 9) During the peak season, about 11.2 tons/day of fresh fish is handled by about 100 fish traders and retailers.
- 10) Some small pelagic fish is salted and dried, and frigate tuna and skipjack are used for salted and baked products, and 43 percent of the catch is used in processing. About 10 percent of the catch remains unsold and is the source of economic loss.
- 11) Fisheries related facilities are nonexistent with the exception of a small fish auction hall (TPI) in Rompo. This auction hall is also used as meeting place.
- 12) A KUD has been organized and conducts small scale credit and savings and runs a kiosk shop in Rompo. It has 232 members, of which 75 percent are fishermen. The technical and managerial capabilities of the KUD are not trusted among the fishermen.
- 13) Due to the lack of fresh water, the water supply is insufficient. The lack of toilets and human waste disposal into the sea are other issues.
- 14) The village residents' motivation to resolve such issues within the community is low.
- 15) Fish is sold in unhygienic condition in the existing Bima Market which is congested.

### **5.1.2 Development Concept**

- 1) An initial coastal resource management system that can be implemented by the fishermen and the local government will be established, in conjunction with measures to improve the knowledge of fishermen about coastal resources management and to improve the local government's fisheries licensing system.
- 2) The facilities related to the fishing activities of the fishing villages within the bay such as fish landing, shipping, marketing, and processing will be developed. Technical training for fishermen and fishing village women and extension activities to improve fisher income will also be developed.
- 3) Based on a performance review of past fishing village cooperative activities, a new fishermen association will be created that will produce benefits for the fishermen. The local government and other local organizations will assist this organization until it has developed sufficiently to operate independently.
- 4) A programme to strengthen the self-motivation of the fishermen to improve their living environment and village infrastructure will be developed.

- 5) A training and extension programme to disseminate the activities described above to other districts and sub-districts will be developed.
- 6) Improve the condition for fish sales in Bima Market.

### 5.1.3 Approach

- 1) The introduction of model fishing boats and FADs will promote the development of offshore fishing grounds and fishermen training and help establish a system of fishing ground management by fishermen. It will also help the model coastal communities to draft regulations on coastal resources management.
- 2) Fish landing, marketing, processing, and other fisheries related facilities will be developed at the sub-village of Rompo in Waworada village aimed at raising fishermen income by improving the inland bay fisheries activities of this sub-village.
- 3) A joint management and operations system by the government and fishing community will be established that will enable the fishermen organization to operate the facilities and equipment independently in future.
- 4) Infrastructure related model projects that promote the fishing community's motivation to implement improvements in their living environment and educational activities to strengthen the village residents' motivation will be pursued.
- 5) An extension section to be set up within district fisheries office to strengthen the capability of staff and to disseminate extension activities to other areas in the district based on the achievement of the project.
- 6) To construct a fish retail market adjacent to the existing Bima Market in Tanjung Bima .

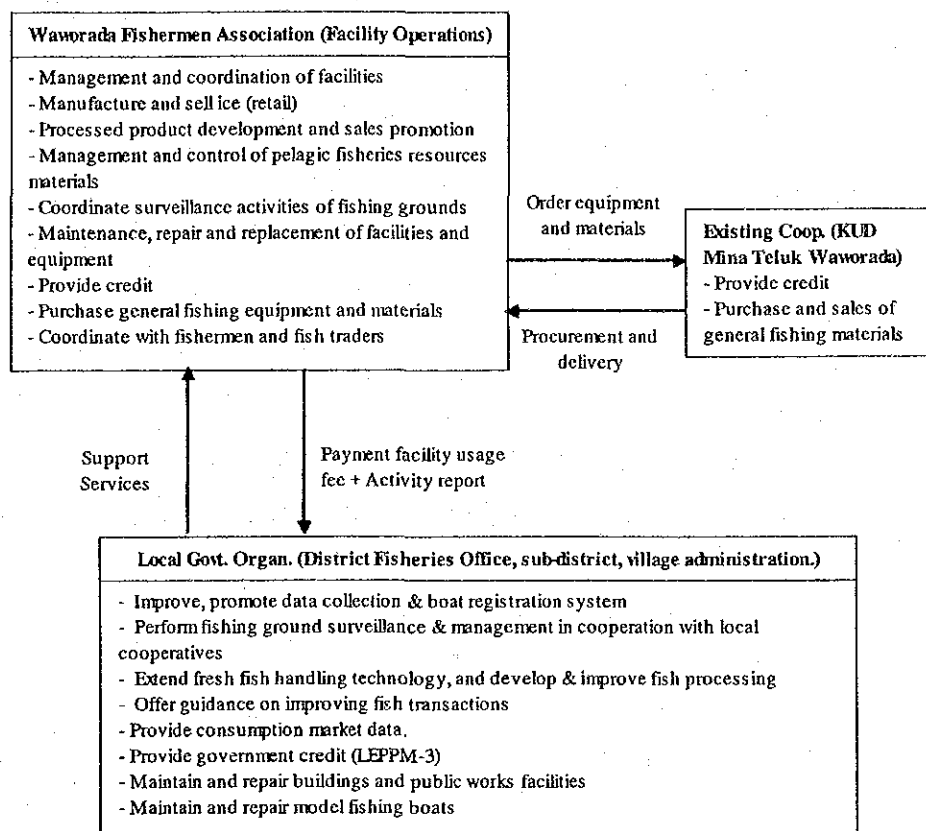
## 5.1.4 Development Projects

The development projects implemented in Rompo based on the concepts and approach mentioned above are shown on following table.

<p>1 Coastal Resources Management Plan</p> <p>1) Improve fish landing data collection system.</p> <p>2) Expand and improve existing fishing permit system.</p> <p>3) Diversify fishing grounds.</p> <p>4) Establish a coastal fishing ground monitoring system.</p>	<ul style="list-style-type: none"> <li>• Record fish landing data by fishermen and data collection / analyses.</li> <li>• Provide guidance to improve fishery management.</li> <li>• Formulate fishing license system and fishing boat construction permit system.</li> <li>• Issue fishing license and collect license fees</li> <li>• Issue fishing boat markers.</li> <li>• Legally establish this system and its extension to the district level.</li> <li>• Create offshore fishing grounds using floating Fish Aggregating Device (FAD).</li> <li>• Exploit offshore pelagic resources by introducing a model boat.</li> <li>• Establish monitoring and communication system to discourage operations by illegal fishing boats.</li> <li>• Establish a system of controls against illegal fishing boats.</li> </ul>
<p>2 Fish landing/Handling/Shipping/Processing Plan</p> <p>1) Improve fish landing and handling system.</p> <p>2) Improve fresh fish shipping system.</p> <p>3) Conduct extension activities to introduce fresh fish handling technology.</p> <p>4) Improve processing technology.</p> <p>5) Create a Bima Fish Market.</p>	<ul style="list-style-type: none"> <li>• Provide appropriate fish landing facilities.</li> <li>• Provide fish handling facilities.</li> <li>• Provide ice plant and ice storage.</li> <li>• Provide cool boxes and their keeping place.</li> <li>• Provide communication equipment.</li> <li>• Popularize the use of cool boxes.</li> <li>• Provide model processing facilities.</li> <li>• Conduct extension activities to improve existing processing practices.</li> <li>• Conduct extension activities to introduce new processed products.</li> <li>• Provide wholesale and retail markets.</li> </ul>
<p>3 Fishery Activities Support Plan</p> <p>1) Improve incidental facilities for fish landing/handling/shipping/processing plans</p>	<ul style="list-style-type: none"> <li>• Provide facilities for fuel / water supply, small workshop, fish net repair space, etc.</li> </ul>
<p>4 Fishery Community Environment Improvement Plan</p> <p>1) Improve community infrastructure.</p> <p>2) Upgrade the community's motivation to improve the social environment.</p>	<ul style="list-style-type: none"> <li>• Provide model facilities for water supply and toilet.</li> <li>• Provide trash collection system.</li> <li>• Provide roads and drains in the villages.</li> <li>• Provide trash boxes and extension of trash collection system.</li> </ul>
<p>5 Fishermen Organization / Fishery Extension Improvement Plan</p> <p>1) Establish a fishermen organization.</p> <p>2) Conduct extension activities to enable the fishermen organization carry out viable and self-reliant project management.</p>	<ul style="list-style-type: none"> <li>• Establish fishermen organizations to operate and manage the planned facilities.</li> <li>• Introduce a participatory monitoring and evaluation system.</li> </ul>
<p>6 Education / Training Plan</p> <p>1) Establish a fishery extension unit in the district fisheries office.</p> <p>2) Provide training to build the capacity of the extension staff and enhance the economic activities of the fishermen organization.</p>	<ul style="list-style-type: none"> <li>• Provide training for the leaders of the fishermen organization and extension staff of the fishery office by external institutes</li> </ul>

### 5.1.5 Operation and Maintenance Plan

A new local fishermen organization that will be operated based on the decisions made by local residents is to be established. The organization will be placed under the jurisdiction and supported by the provincial government and will operate the planned facilities in conjunction with existing organizations. The functions and role division of each organization and the overall system of coordination are shown in the figure below.



### 5.1.6 Breakdown of Project Costs

A breakdown of the project costs for Waworada is shown in the table below.

(Unit: Rp. million)

Site	Center		Estimated Project Costs	Foreign Cost	Domestic cost
Waworada	Coastal resources management	Facility	-	-	-
		Equipment	1,772	1,772	-
		Activity costs*	578	-	578
	Landing, handling, shipping, processing fisheries	Facility	24,271	23,587	684
		Equipment	2,608	2,608	-
		Activity cost*	978	-	978
	Improvements to fishing village environment	Facility	393	-	393
		Equipment	-	-	-
		Activity cost*	-	-	5
Bima market	Fish landing, handling, shipment, processing	Facility	4,384	3,117	1,267
Total			34,984	31,084	3,905

Note: Asterisk mark denotes for the first two-year period

### **5.1.7 Project Evaluation**

The small-scale fisheries development project for this zone will not contribute directly to an increase in the fish catch volume. But it will increase the fresh fish supply and its value added through the transfer of marketing and processing technology, and subsequently help increase the local income through the marketing network.

The average per capita income of the Lombok fishermen in FY2001 was Rp.1.76 million and it exceeds the per capita income of Rp.1.63 million targeted in the MP. The implementation of this project is anticipated to produce an annual benefit of Rp.2.165 billion for the entire site. Consequently, the average income of the 782 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.539,000/person.

The EIRR of the development project in the targeted zone was 10 percent. This figure was lower than the estimated interest rate of the Central Bank (14 percent) when the Indonesian government formulated its FY2002 budget. But it is a much higher figure than the real interest rate minus the inflation rate of 8 percent. Moreover, this figure is also higher than the real discount rate of 8.5 percent that is generally used by the World Bank. The FIRR only on the portion of planned facilities/equipment is 4 percent. However, it is not possible to calculate the overall FIRR that included the financial burden of the district government. Therefore, financial assistance for facility repair costs and grant to cover a large portion of the fiscal year investments required by the central and district governments are needed.

In terms of a long-term perspective, the development plan is significant since it improves the protein intake of the populace and establishes a coastal resources management system. It also improves fish marketing, processing facilities, the fishing village environment, generates employment opportunities for fishing village women, and promotes social participation. It is especially significant in terms of gender promotion. Since major environmental issues do not exist, it has been concluded that the overall implementation of the plan is highly feasible.

## **5.2 Dompu Priority Zone**

### **5.2.1 Current Conditions and Issues**

#### **(1) Soro**

- 1) Soro is also categorized as an independent fishing community located near a consumption center.
- 2) There are 1,100 fishermen households, and the majorities are permanent fishermen.
- 3) The fish catch volume is fairly high from March to September, and the peak season is from May to July.



- 4) Soro is located at the end of Saleh Bay. There are 33 motorized Bagan boats, 10 purse seiners and 14 gill net / hand line boats in Soro. The Bagan boats are more than 20m in length, and the purse seiners range from 12 to 15m in length.
- 5) Most of the fish catch by Bagan or purse seiners are sold to fish collectors at sea, and the relationship between the two parties is one of mutual support.
- 6) The fish catch of Saleh Bay is believed to have reached its level of TAC. Although pelagic fish resources of the Flores Sea outside the Saleh Bay have not been exploited, these waters are too far from Soro (about 100km).
- 7) The fish catch harvested by Bagan is a major fish supply source for the local consumption market. Because the fish catch volume decreases during the full moon period, the fresh fish supply to the market is largely influenced by the moon phases. Consequently, the price of the fish catch affects the supply volume to the Dompu market.
- 8) About 75 percent of the fish catch landed in Soro is comprised of small pelagic fish. The ratio of demersal fish is also comparatively high at about 20 percent.
- 9) There are 144 local fish traders (including 108 of women). The traders handle about 9 tons/day during the peak season. The 90 percent are small-scale traders that handle less than 100kg/day.
- 10) About 2.1 tons of fresh fish is often remains unsold during the peak season.
- 11) The fish landing site is located at a shallow and flat beach area, where the seabed becomes exposed for about 300 to 400m from the shore during the low tide. The containers of fish are landed and manually transported to the shore during this time.
- 12) A PPI exists in Soro, but it is not utilized because of the lack of functional facilities.
- 13) A KUD has been organized that conducts small scale credit and fuel sales. However, it is not trusted by the fishermen due to the lack of transparency its accounting activities and past bad performance.
- 14) Due to the shortage of fresh well water, the water supply for household and drinking purposes is insufficient.
- 15) Community motivation to improve the living environment is low in terms of water supply and waste disposal improvements, and others.

**(2) Hu'u**

- 1) Hu'u is categorized as an independent fishing community located near a consumption center.

- 2) Hu'u is located at near the mouth of Cempi Bay, and fishery resources along the southern coast of Sumbawa district adjacent to Dompu district remains undeveloped.
- 3) There are 546 fishermen households in Hu'u; and the majority are part-time fishermen.
- 4) The major form of fishing is purse seine. Gill net and hand line operations are also carried out. There are 14 purse seiners and 9 gill net boats in Hu'u.
- 5) The fish catch volume is fairly high from March to September, and the peak season is from May to July.
- 6) The purse seiners shift their fishing grounds to the Alas or the Sape channels during the lean season of January to February. During the peak fishing season in Cempi Bay, about 50 purse seiners will arrive from other regions to fish in the bay.
- 7) The wives of boat owners control the sales of landed fish. The fish is sold near this village when the catch is small, but it is transported and sold at the Dompu market when the catch is large.
- 8) There are 27 local fish traders (including 11 women). The fish traders handle about 1.3 tons/day in the peak season. The daily handling volume by each trader is below 100kg.
- 9) About 65 percent of the landed volume is comprised of large pelagic fish such as frigate tuna, marlines, skipjack, tuna, etc.
- 10) The fish catch price largely fluctuates according to season and the phases of the moon, and affects the supply volume to the Dompu market.
- 11) Salted / baked (Pindang Selepi) frigate tuna and skipjack are a specialty product food of this area, and its unit price is higher than fresh fish.
- 12) A fishermen cooperative was newly established in 2002, but its activities have not started as yet.
- 13) Community motivation to improve the living environment of the village is low.

### **5.2.2 Development Concept**

- 1) An initial coastal resource management system that can be implemented by the fishermen and the local government will be established, in conjunction with measures to improve the knowledge of fishermen about coastal resources management and to improve the local government's fishing licensing system. In particular, trial operations in mariculture and establishing boundaries for fisheries and marine culture zones to effectively utilize the resources within Saleh Bay are recommended.
- 2) Fishery facilities connected with landing, shipping, distribution, and processing should be provided, and fishermen and fishermen's wives should be given technical training and advice from extension officers, with the aim of raising their incomes. Note, however,

that because of the limitations of Hu'u's natural conditions, landing facilities for that village have not been included.

- 3) Based on the degree of maturity of the activities of the existing sub-village fishermen cooperatives (Soro) and fishing cooperatives (Hu'u), the project administration system will be centered on these organizations in a way that is beneficial for the fishermen. In addition, until the fishermen's organizations become mature and self-sufficient, the regional government and the regional cooperatives should set up mechanisms to assist them.
- 4) Programmes that strengthen the motivation of the fishing village residents to take the initiative to improve village infrastructure and the social and living environment will be created.
- 5) Extension and training programs to extend the activities described above to other areas in the district will be implemented.

### 5.2.3 Approach

- 1) Although fishermen training activities will be conducted and offshore fishing grounds will be developed in Hu'u, developing offshore fishing grounds in Kempo is difficult. Therefore, trial activities aimed at developing propagation aquaculture in the coastal areas and activities to draft boundaries for culture and fishing operations based on scientific data will be implemented. In addition, a coastal resources management system will be established that includes fishing ground surveillance activities by fishermen and substantiating the fishing licensing and fishing boat construction permit system.
- 2) Fish landing, marketing, processing, and other fisheries related facilities and equipment will be provided in Soro and Hu'u (a fish landing facility will not be provided for Hu'u) to raise fishermen income through improved fishing activities by the community.
- 3) Based on the measures described in section 2), in order to enable the future operations of the facilities to be carried out by the fishermen organization as they become self-reliant, a joint government and private operations system will be established. For the facilities at Hu'u, a shared system based on the participation of the existing KUD, the district Fisheries Office, and the Hu'u fishermen's association will be set up.
- 4) A model project to develop infrastructure and educational activities to strengthen the motivation of the village community will be implemented to help the fishing village achieve a self-reliant living environment.
- 5) An extension section to be set up within district fisheries office to strengthen the capability of staff and to disseminate extension activities to other areas in the district based on the achievement of the project.

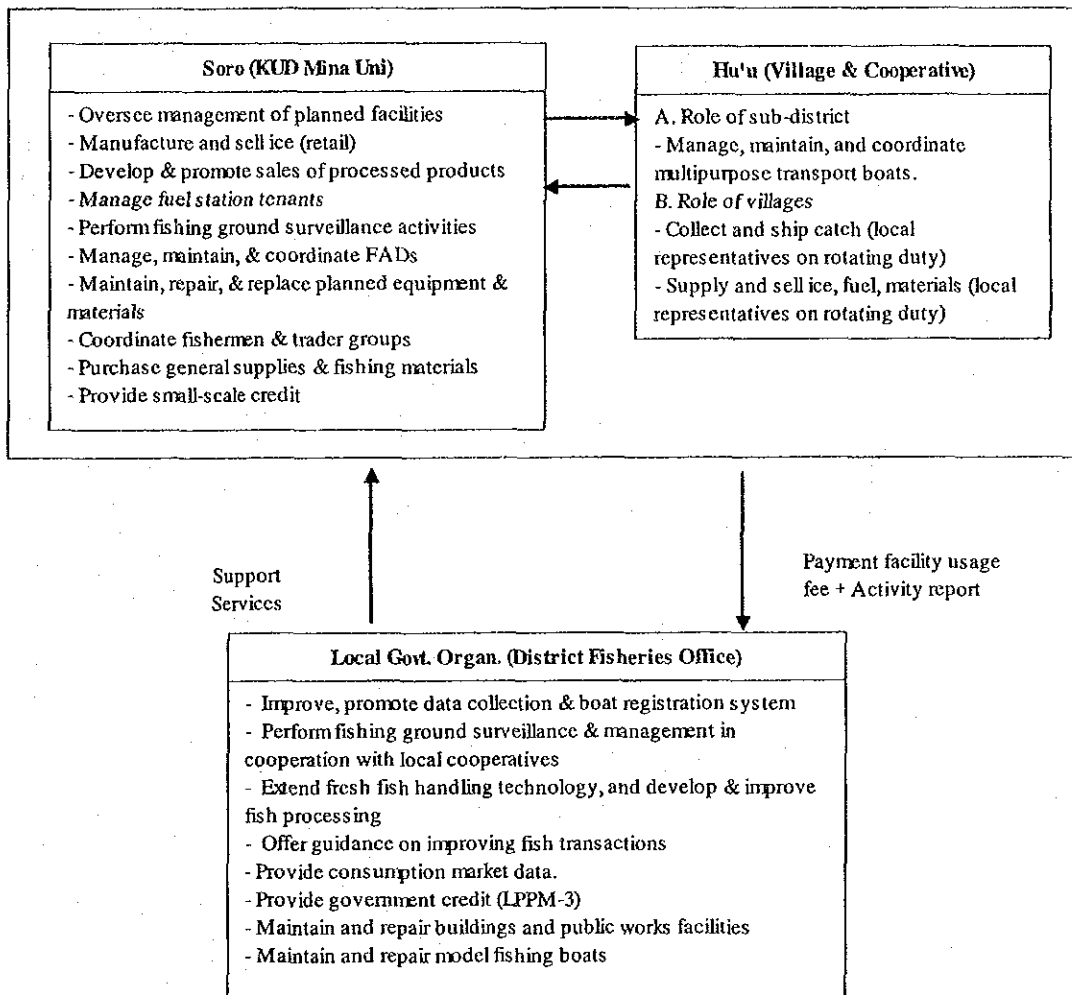
## 5.2.4 Development Projects

The development projects that will be implemented in Soro and Hu'u based on the concepts and approach mentioned above are shown in following table.

1	Coastal Resources management Plan	
1)	Improve fish landing data collection system.	<ul style="list-style-type: none"> <li>Record fish landing data by fishermen and data collection / analyses.</li> <li>Provide guidance to improve fishery management.</li> </ul>
2)	Expand and improve existing fishing permit system.	<ul style="list-style-type: none"> <li>Formulate fishing license system and fishing boat construction permit system.</li> <li>Issue fishing license and collect license fees</li> <li>Issue fishing boat markers.</li> </ul>
3)	Diversify fishing grounds.	<ul style="list-style-type: none"> <li>Legally establish this system and its extension to the district level.</li> <li>Conduct trial exploitation of sea grass bed as a nursery ground for fishery resources (Soro).</li> <li>Exploit potential resources along the southern coastal area in Sumbawa District. (Hu'u)</li> <li>Exploit offshore pelagic resources by introducing a model fishing boat.</li> </ul>
4)	Establish a coastal fishing ground monitoring system.	<ul style="list-style-type: none"> <li>Establish monitoring and communication system against illegal fishing boats.</li> <li>Establish a system of controls for illegal fishing boats</li> </ul>
2	Fish landing/Handling/Shipping/Processing Plan	
1)	Improve fish landing and handling system.	<ul style="list-style-type: none"> <li>Provide appropriate fish landing facilities (Soro).</li> <li>Provide fish handling facilities.</li> </ul>
2)	Improve fresh fish shipping system.	<ul style="list-style-type: none"> <li>Provide ice plant and ice storage.</li> <li>Provide cool boxes and their keeping place.</li> <li>Provide communication equipment.</li> </ul>
3)	Conduct extension activities in fresh fish handling technology.	<ul style="list-style-type: none"> <li>Popularization of cool boxes.</li> </ul>
4)	Improve processing technology.	<ul style="list-style-type: none"> <li>Provide model processing facilities.</li> <li>Conduct extension activities to improve existing processing practices.</li> <li>Conduct extension activities to introduce a new processing product.</li> </ul>
3	Fishery Activities Support Plan	
1)	Improve incidental facilities for Fish landing/Handling/Shipping/Processing Plan	<ul style="list-style-type: none"> <li>Provide facilities for fuel / water supply, small workshop, fish net repair space, etc.</li> </ul>
4	Marine Aquaculture Plan	
1)	Formulate a draft spatial plan for marine aquaculture development in Saleh Bay (Soro).	<ul style="list-style-type: none"> <li>Survey existing fishing grounds (Soro)</li> <li>Survey hydrological conditions (Soro).</li> </ul>
2)	Establish cage culture technology applicable to Saleh Bay water (using seedlings from hatchery) (Soro).	<ul style="list-style-type: none"> <li>Clarify content of the contract for participants (Soro).</li> <li>Transfer proper farming / management technology (Soro).</li> <li>Establish an appropriate cage culture model Soro).</li> </ul>
5	Fishery Community Environment Improvement Plan	
1)	Improve community infrastructure (Soro).	<ul style="list-style-type: none"> <li>Provide model facilities for water supply and toilet (Soro).</li> <li>Provide trash collection system (Soro).</li> </ul>
2)	Upgrade the community's motivation to improve the social environment.	<ul style="list-style-type: none"> <li>Provide trash boxes and extension of trash collection system.</li> </ul>
6	Fishermen Organization / Fishery Extension Improvement Plan	
1)	Establish a fishermen organization	<ul style="list-style-type: none"> <li>Establish a fishermen organization to operate and manage the planned facilities.</li> </ul>
2)	Provide extension activities to enable the fishermen organization to conduct viable and self reliant project management	<ul style="list-style-type: none"> <li>Introduce a participatory monitoring and evaluation system.</li> </ul>
7	Education / Training Plan	
1)	Establish a fishery extension unit in the district fisheries office.	
2)	Provide training to build the capacity of the extension staff and enhance economic activities of fishermen organization.	<ul style="list-style-type: none"> <li>Provide training for leaders of the fishermen organization and extension staff of fisheries office by external institutes</li> </ul>

### 5.2.5 Operation and Maintenance Plan

A new local fishermen organization that will be operated based on the decisions made by local fishermen will be established. The organization will be placed under the jurisdiction and supported by the provincial government, and will operate the planned facilities in conjunction with existing organizations. The functions and role divisions of each organization and the overall system of coordination are shown in the figure below.



## 5.2.6 Breakdown of Project Costs

A breakdown of the project costs for Dompu is shown in the table below.

Unit: Rp. million

Site	Center		Estimated Project Costs	Foreign Cost	Domestic cost
Kempo	Coastal resources management	Facility	-	-	-
		Equipment	480	480	-
		Activity costs*	126	-	126
	Landing, handling, shipping, processing fisheries	Facility	17,083	15,015	2,068
		Equipment	1,419	1,419	-
		Activity cost*	1,156	-	1,156
	Improvements to fishing village environment	Facility	246	-	246
		Equipment	-	-	-
		Activity cost*	5	-	5
Hu'u	Fish landing, handling, shipment, processing	Facility	-	-	-
		Equipment	1,539	1,539	-
		Activity cost*	579	-	579
	Coastal resources management	Facility	4,213	3,051	1,162
		Equipment	342	342	-
		Activity costs*	191	-	191
	Total		27,379	21,846	5,533

Note: Asterisk mark denotes for the first two-year period

## 5.2.7 Project Evaluation

The small-scale fisheries development project for this zone will not contribute directly to an increase in the fish catch volume. But it will increase the fresh fish supply and its value added through the transfer of marketing and processing technology, and subsequently help increase the local income through the marketing network.

The average per capita income of the Solo fishermen in FY2001 was Rp.1.88 million and it exceeds the per capita income of Rp.1.63 million targeted in the MP. The implementation of this project is anticipated to produce an annual benefit of Rp.1.463 billion for the entire site. Consequently, the average income of the 1,101 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.26,600/person.

In contrast, the average per capita income of the Hu'u fishermen in FY2001 was Rp.1.20 million/person and it is lower than the per capita income targeted in the MP. The implementation of this project is anticipated to produce an annual benefit of Rp.5.768 billion for the entire site. Consequently, the average income of the 546 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.26,400/person. However, the per capita average income with this increase is only Rp.1.46 million and falls short of the targeted figure.

The EIRR of the project to develop fisheries facilities and equipment for this zone is 8 percent and it is the lowest among the four priority zones. In addition, the FIRR is -3 percent for the fisheries facilities and equipment. It was not possible to calculate the overall

FIRR that included the financial burden of the district government. Therefore, financial assistance for facility repair costs and grant to cover a large portion of the fiscal year investments required by the central and district governments are needed.

However, in terms of long-term goals, the creation of a resources management system is important not only for Indonesia, but for the global community as well. It is also an important source of protein for the Indonesian people. A project that strengthens the capabilities of the small-scale fishermen is a vital first step to improving the coastal fishing communities. Furthermore, activities to improve marketing, the facilities located at the river mouth, and to improve the fishing village environment will generate employment opportunities for the village women, increase their participation in village society, and positively affect the gender issue.

Improvements implemented simultaneously at the Solo and Hu'u sites will place a financial strain on the district government, but shifting the timing of the improvements will alleviate this burden.

Implementation of the project raises no major environmental issues. Therefore, it is concluded that overall, there is a high potential to implement the project.

### **5.3 Eastern Flores Priority Zone**

#### **5.3.1 Current Conditions and Issues**

- 1) Eastern Flores is categorized as core fishery community among the fishery communities in the remote islands.
- 2) The model sites consist of Oka, Lamahala Jaya and Sagu in East Flores and Lewoleba, Balauring and Lamalera in Lembata. There are 2,360 fishermen households and 77 Bagan boats, 103 purse seine boats, 248 gill net / hand line / trawling boats at these sites. It is estimated that only 9 percent of these boats are motorized.
- 3) About 80 percent of the export volume from this zone is generated by fishery products.
- 4) The average annual per capita income of Lembata district (Rp.356,000) is quite low in comparison to East Flores district (Rp.702,000).
- 5) Bagan and purse seiners operate in the island channels and bay areas which have the largest fish landing volume. Large migratory pelagic fish is caught by small boats operating in the northern coastal waters, and whales and small pelagic fish are harvested in the southern coastal waters.
- 6) From the Larantuka base, skipjack pole and line boats operate in the offshore waters where FADs have been installed. The catch is sold to three local companies.

- 7) The good fishing season for Larantuka and Lamahala Jaya is from March to December (the peak season is from April to May and from September to November), and it is from September to March for Sagu and Balauring. The fish landing volume of Lewoleba Bay does not fluctuate throughout the year, while the fish landing of Larantuka decreases from January to March.
- 8) The major fish catch species are skipjack (30 percent of the total landed volume), frigate tuna, etc. A comparatively higher percentage of demersal fish is landed in Lewoleba.
- 9) Recently, many privately owned FADs have been installed in water areas which are occupied by specific fishing boats.
- 10) The fishermen communities are scattered in Larantuka, and the fish catch is landed in 16 places. Most of the fishing boats (more than 3 GT) land their fish catch on the beach adjacent to the public wharf where many fish traders and retailers gather. In the island areas, fishermen land their fish catch on the beach in front of their village, which is marketed to inland areas by local community women.
- 11) There are 363 fish traders and retailers in the model sites, who handle an average of 23.4 tons/day. More than 90 percent of these traders and retailers are women. Buyers who handle more than 100kg daily operate only in Larantuka and Lewoleba.
- 12) Fish that is marketed outside of this zone is carried out by fish processors who visit from March to November, fish collection boats from Ende and Bima, and local fishery companies.
- 13) The annual volume of unsold fresh fish is about 800 tons in this zone, which becomes an economic loss for fishermen.
- 14) In Larantuka, a fishermen group started grouper cage culture supported by the district Fisheries Office since 2000, but face various management problems.
- 15) The water supply is insufficient at the Larantuka site. In addition, the landing beach is also used a site for human wastes and garbage disposal by the community residents, which has affected fish landing conditions.

### **5.3.2 Development Concept**

In view of the current situation where fish landed by small fishing villages in the outlying islands of this zone is marketed to West Flores via Larantuka, the following measures will be implemented to comprehensively improve the prevailing conditions explained above, including those of the five major fishing villages in Adonara and Lembata islands.



- 1) An initial coastal resource management system that can be implemented by the fishermen and the local government will be established, in conjunction with measures to improve the knowledge of fishermen about coastal resources management and to improve the local government's fishing licensing system.
- 2) Develop the facilities and equipment needed to transport fresh fish to the West Flores Islands from Larantuka as well as the flow of commodities between Larantuka and the outlying islands, the fishing villages, and to support fishing activities such as fish landing, shipping, marketing, and processing. Conduct technical training for fishermen and fishing village women and extension activities to improve fishermen income.
- 3) A project management body centered on the existing fishing village cooperative, fisheries cooperative, and fishermen groups will be created based on the maturity and experience of these groups, in order to help fishermen access the benefits produced by the project. The local government and other local organizations will assist this management body until it has developed sufficiently to operate independently.
- 4) Activities to improve mariculture technology will be implemented. In Larantuka, technical guidance will be provided to improve the propagation culture technology for groupers. In order to reduce the rearing period, natural fry will be used to develop the technology, which will be transferred to the local fishermen.
- 5) As in the case of the Bima priority zone, a programme to strengthen the self-motivation of the fishermen to improve their living environment and village infrastructure will be developed.
- 6) A training and extension programme to disseminate the activities described above to other areas in the district will be implemented.

### **5.3.3 Approach**

- 1) In addition to developing offshore fishing grounds and implementing fishermen training activities, a fishing surveillance system by fishermen and measures to substantiate the fisheries licensing system and a boat construction permit system will be implemented.
- 2) Facilities will be constructed in Larantuka to enable fish shipments from the outlying islands to the western Flores region. In addition, facilities with fish collection functions will be constructed in Lewoleba, where the fish landing volume is high throughout the year, and small multipurpose facilities (fish handling, cold storage, processing, etc.) will be constructed at the other sites, in lieu of a fish landing facility with the objective of reducing the economic loss and raising fishermen income.

- 3) Technology transfer will be conducted to improve grouper cage technology in Larantuka. In order to shorten the culture period, culture technology will be developed using slightly bigger size of natural fingerlings.
- 4) A joint management and operations system by the government and fishing community will be established that will enable the fishermen organization to operate the facilities and equipment independently in future.
- 5) Infrastructure related model projects that promote the fishing community's motivation to implement improvements in their living environment and educational activities to strengthen the village residents' motivation will be pursued.
- 6) An extension section to be set up within district fisheries office to strengthen the capability of staff and to disseminate extension activities to other areas in the district based on the achievement of the project.

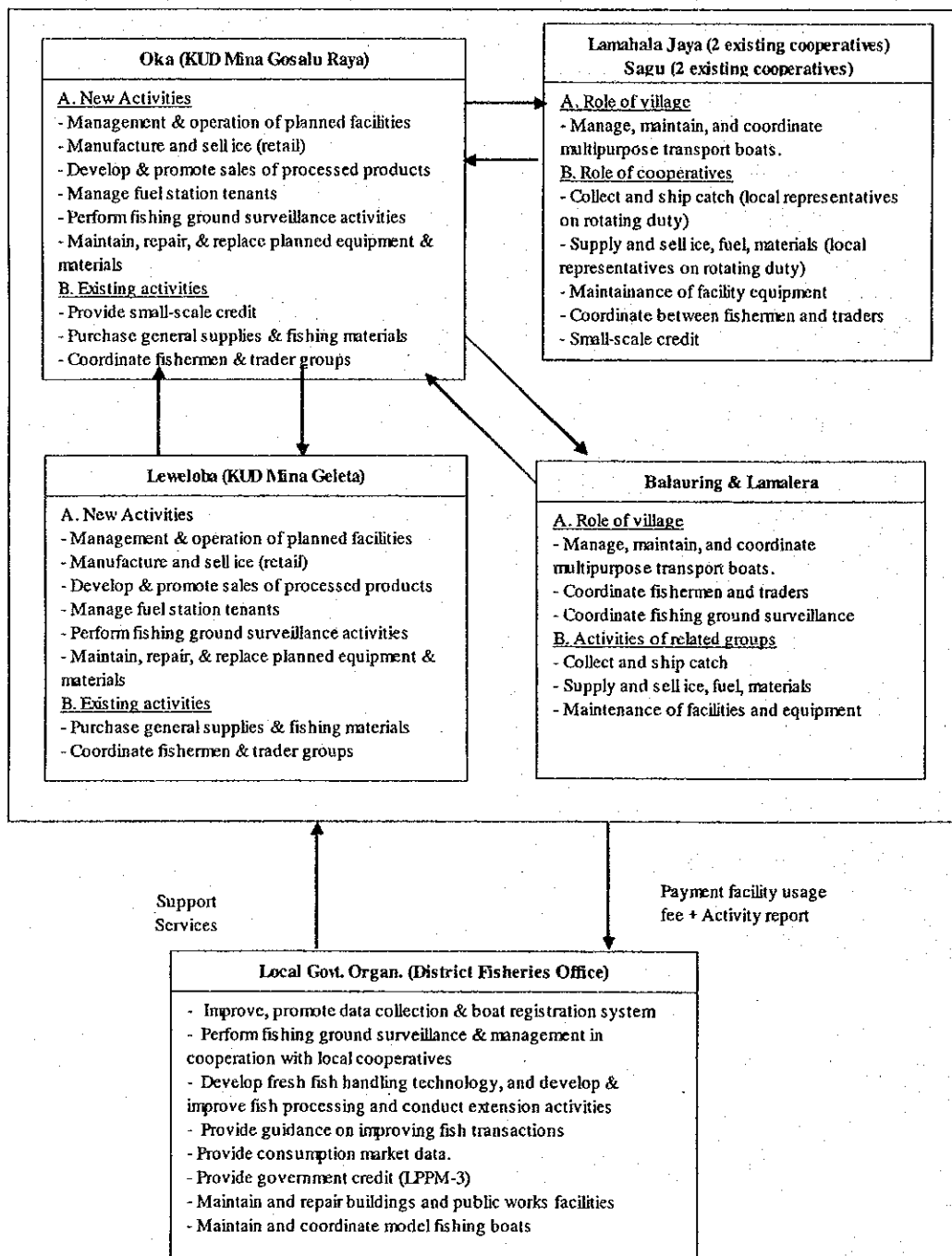
#### **5.3.4 Development Projects**

The development projects implemented in East Flores based on the concepts and approach mentioned above are shown in following table.

1 Coastal Resources Management Plan	<ul style="list-style-type: none"> <li>• Record fish landing data by fishermen and data collection / analyses.</li> <li>• Provide guidance to improve fishery management.</li> <li>• Formulate fishing license system and fishing boat construction permit system.</li> <li>• Issue fishing license and collect license fees</li> <li>• Issue fishing boat markers.</li> <li>• Legally establish this system and its extension to the district level.</li> <li>• Create offshore fishing grounds using floating Fish Aggregating Device (FAD).</li> <li>• Exploit offshore pelagic resources by introducing a model boat.</li> <li>• Motorize artisanal fishing boats in Sagu, Balauring and Lamalera.</li> <li>• Establish monitoring and communication system against illegal fishing boats.</li> <li>• Establish a system of controls against illegal fishing boats.</li> </ul>
2 Fish landing/Handling/Shipping/Processing Plan	<ul style="list-style-type: none"> <li>• Provide fish landing/handling facilities in Oka.</li> <li>• Provide fish landing/handling facilities in Lewoleba.</li> <li>• Provide ice plant and ice storage (Oka, Lewoleba).</li> <li>• Provide cool boxes and their keeping place.</li> <li>• Provide insulated trucks (Oka, Lamahala Jaya, Lewoleba, and Balauring).</li> <li>• Provide transport truck (Larantuka and Balauring)</li> <li>• Provide multi-purpose transport boat (except Larantuka).</li> <li>• Provide communication equipment.</li> <li>• Popularize cool boxes.</li> <li>• Provide model processing facilities (Oka, Lewoleba).</li> <li>• Conduct extension activities to improve existing processing practices.</li> <li>• Conduct extension activities to introduce new processed products.</li> </ul>
3 Fishery Activities Support Plan	<ul style="list-style-type: none"> <li>• Provide facilities for fuel / water supply, small workshop, fish net repair space, etc.</li> </ul>
4 Marine Aquaculture Plan	<ul style="list-style-type: none"> <li>• Clarify content of the contract for participants.</li> <li>• Transfer proper farming / management technology.</li> <li>• Establish an appropriate cage culture model.</li> </ul>
5 Fishery Community Environment Improvement Plan	<ul style="list-style-type: none"> <li>• Provide model facilities for water supply and toilet.</li> <li>• Provide trash collection system.</li> <li>• Provide trash boxes and disseminate the trash collection system.</li> </ul>
6 Fishermen Organization / Fishery Extension Improvement Plan	<ul style="list-style-type: none"> <li>• Establish fishermen organization to operate and manage the planned facilities.</li> <li>• Introduce a participatory monitoring and evaluation system.</li> </ul>
7 Education / Training Plan	<ul style="list-style-type: none"> <li>• Provide training for the leaders of fishermen organizations and extension staff members of the Fisheries Office by external institutes.</li> </ul>

### 5.3.5 Operation and Maintenance Plan

A new local fishermen organization that will be operated according to the decisions made by local residents will be established. The organization will be placed under the jurisdiction and supported by the provincial government. It will operate the planned facilities in conjunction with existing organizations. The functions and role division of each organization and the overall system of coordination are shown in the figure below.



### 5.3.6 Breakdown of Project Costs

A breakdown of the project costs for Eastern Flores zone is shown in the table below.

Unit: Rp. million

Model Site	Center		Estimated Project Costs	Foreign Cost	Domestic cost
Oka	Coastal resources management	Facility	-	-	-
		Equipment	1,549	1,549	-
		Activity cost*	631	-	631
	Landing, handling, shipping, processing fisheries	Facility	12,130	10,707	1,423
		Equipment	2,702	2,702	-
		Activity cost*	1,609	-	1,609
	Improvements to fishing village environment	Facility	-	-	-
		Equipment	-	-	-
		Activity cost*	4	-	4
Lamahala Jaya	Coastal resources management	Facility	-	-	-
		Equipment	398	398	-
		Activity cost*	26	-	26
	Landing, handling, shipping, processing fisheries	Facility	1,238	1,195	43
		Equipment	1,092	1,092	-
		Activity cost*	221	-	221
Sagu	Coastal resources management	Facility	-	-	-
		Equipment	476	476	-
		Activity cost*	26	-	26
	Landing, handling, shipping, processing fisheries	Facility	433	383	50
		Equipment	93	93	-
		Activity cost*	114	-	114
	Improvements to fishing village environment	Facility	39	-	39
		Equipment	-	-	-
		Activity cost*	-	-	-
Lewoleba	Coastal resources management	Facility	-	-	-
		Equipment	1,548	1,548	-
		Activity cost*	590	-	590
	Landing, handling, shipping, processing fisheries	Facility	6,733	5,959	774
		Equipment	1,316	1,316	-
		Activity cost*	767	-	767
Balauring	Coastal resources management	Facility	-	-	-
		Equipment	1,548	1,548	-
		Activity cost*	590	-	590
	Landing, handling, shipping, processing fisheries	Facility	6,734	6,679	55
		Equipment	2,434	2,434	-
		Activity cost*	767	-	767
Lamalera	Coastal resources management	Facility	-	-	-
		Equipment	276	276	-
		Activity cost*	-	-	-
	Landing, handling, shipping, processing fisheries	Facility	418	370	48
		Equipment	878	878	-
		Activity cost*	2,031	-	2,031
	Improvements to fishing village environment	Facility	10	10	-
		Equipment	-	-	-
		Activity cost*	1	-	1
<b>Total</b>			<b>49,422</b>	<b>39,613</b>	<b>9,809</b>

Note: Asterisk denotes for the first 2-year period.

### 5.3.7 Project Evaluation

A widespread fisheries marketing network will be established and measures to increase fishermen income will be implemented in this zone. Projections on fishermen income in the zone have been evaluated for both East Flores and Lembata districts which comprise this zone.

The average per capita income of East Flores District (Larantuka, Lamahala Jaya, and Sagu) in FY2001 was Rp.1.61 million, which is slightly below the per capita income of Rp.1.63 million targeted in the MP. The implementation of this project is anticipated to produce an annual benefit of Rp.2.468 billion for the entire site. Consequently, the average income of the 1,723 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.330,000/person; and the average per capita income of fishermen will rise to Rp.1.93 million. This exceeds the per capita income targeted in the master plan.

The average fishermen income in Lembata district (Lewoleba, Balauring, and Lamalera) is Rp.1.56 million/person, which is below the per capita income targeted in the MP. The implementation of this project is estimated to produce an annual benefit of Rp.1.2943 billion for the entire site. Consequently, the average income of the 637 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.535,000/person; and the average per capita income of fishermen will rise to Rp.2.10 million. This exceeds the per capita income targeted in the master plan.

Moreover, the implementation of the project will enable the 275 tons of the 629 tons of surplus fresh fish in the East Flores region to be shipped to Central Flores, and 354 tons of fresh fish to be shipped to western Flores via Central Flores. With an increase in surplus fresh fish stemming from extended fishing grounds in future, increased shipments of fresh fish to this region can be expected.

The EIRR of the development project in the targeted zone was a high 17 percent, which is indicative of a high need for the project. The FIRR was low for all five sites, excluding Lamahala Jaya (7 percent). In particular, the financial responsibility of the district government for the entire project could not be calculated because the internal profit ratio of the management organizations in Sagu and Lamalera showed a deficit. Therefore, financial assistance for facility repair costs and grant to cover a large portion of the fiscal year investments required by the central and district governments are needed.

However, in terms of long-term goals, the creation of a resources management system is important not only for Indonesia, but for the global community as well. It is also an important source of protein for the Indonesian people. A project that strengthens the capabilities of the small-scale fishermen is important for this region since it will serve as a

fish supply base for the other regions, as well as functioning as a vital first step to improving the coastal fishing communities of this zone.

Furthermore, the project will contribute greatly to generating employment opportunities and promoting social participation of village women in the fishing villages through improvements in the marketing system and processing facilities.

Implementation of the project raises no major environmental issues. Therefore, it is concluded that overall, there is a high potential to implement the project.

## **5.4 Central Flores Priority Zone**

### **5.4.1 Current Conditions and Issues**

- 1) Central Flores is the economic center of Flores Island, and Maumere is the largest distribution base.
- 2) Central Flores (Kalimati/Wuring, Paga and Paupanda) is categorized as a fishery community adjacent to an urban area.
- 3) PPI in Kalimati is in close vicinity to the consumption area of Maumere, but there are no fishermen households at the site. The fishermen in neighboring villages (mainly fishermen in the Wuring sub-village) land their catch at the PPI in Kalimati.
- 4) There are 4,406 households in Wuring, and all the households are engaged in fishery activities. The village is known as a traditional fishing village and it is a tourist spot. In Paga, 400 households out of a total of 1,460 households are engaged in fisheries. All the households in Paupanda are also engaged in fisheries. The motorized fishing boats consist of 108 purse seiners, 91 gill net / hand line / trawling boats and 31 other types of fishing boats. The existing purse seiners are rather small and the non-motorized boats do not have enough space to install fish holds.
- 5) The motorization ratio of fishing boats is about 12 and 16 percent in Sikka and Ende districts, respectively.
- 6) The fishing grounds are roughly divided into the northern area (Flores Sea side) and the southern area (Sabu Sea/ Indian ocean side). In the northern area, some fishery companies and live fish buyers collect fish for outside markets, but there are no fishery companies and live fish buyers in the southern area.
- 7) The exploitation rate of fishery resources is estimated at below 50 percent, and there is still scope for resources to be exploited. The fishery resource of the southern area is considered to be richer than the northern area.

- 8) Good fish catch season for both areas is from March to December; and the landing volume of the northern area is comparatively stable throughout the year, while the fish catch volume in the southern area is decreases greatly from December to February.
- 9) The landing percentage of large migratory fish such as skipjack and tuna is comparatively high--especially in Maumere where 70 percent of the total landed volume is comprised of large migratory fish.
- 10) Fishing boats in Kalimati and Paupanda anchor at a distant site from the beach and land their fish catch by sampans. Consequently, the landing beach is congested and time is wasted.
- 11) In Paupanda, traders buy the entire fish catch from fishing boats and sell fish at the beach to retailers by mutual agreement. In contrast, in Kalimati, both small and large traders and retailers gather at the landing site and buy fish directly from the fishing boats.
- 12) There are 223 fish traders and retailers who handle an average of 17 tons of landed fish daily. The majority of these buyers are male. The percentage of small traders whose daily handling volume is below 100kg is 39 percent in Kalimati, 67 percent in Paupanda and 98 percent in Paga.
- 13) A large volume of unsold fish is generated during the peak fishing season that is used as raw material for processed fishery products. In particular, the fish price plummets in Lamalera during the season when large frigate tuna is harvested and the unsold fish is abandoned.
- 14) The community residents dispose human wastes and garbage at the fish landing beach and these conditions must be rectified. Although limited community activities are conducted in Ende, such activities are nonexistent at the other sites and the motivation of the community residents to improve their village environment is low.
- 15) The Sikka district Fisheries Office have secured land (2,300m<sup>2</sup>) for fisheries development and is scheduled to construct a landing jetty, fish market and office in 2002. But this plan must resolve various issues, because the design does not reflect the actual needs of the fisheries activities. Likewise, a PPI exists in Ende, but it is not utilized by local fishermen since they do not meet the current needs of the fisheries activities.

#### **5.4.2 Development Concept**

This plan aims to qualitatively improve the fisheries industry in fishing villages located near urban areas and to promote appropriate resources management while ensuring a stable supply of fish to the cities. It will deal with distribution issues by linking Maumere and Ende, as well as production issues in Paga, thereby enabling the region to supply fish to the



western areas of Flores Island and to serve as a mid-way point for fish transported from eastern Flores. The following measures will be implemented to comprehensively improve all of the prevailing conditions explained above.

- 1) An initial coastal resource management system that can be implemented by the fishermen and the local government will be established, in conjunction with measures to improve the knowledge of fishermen about coastal resources management and to improve the local government's fishing licensing system.
- 2) The plan will develop the facilities for fish landing, shipping, marketing, and processing, and provide tools for shipping fresh fish from Maumere and Ende to western Flores. Technical training will be conducted for fishermen and fishing village women and extension activities will be implemented to improve fishermen income.
- 3) In view of the development level of the fishing village cooperatives, fishing cooperatives, and fishermen groups already organized at each model site, a project management system will be created around these organizations that will produce benefits for the fishermen. The local government and other local organizations will assist these organizations until they have developed sufficiently to operate independently.
- 4) As in the case of the Bima priority zone, a program to strengthen the self-motivation of the fishermen to improve their living environment and village infrastructure will be developed.
- 5) A training and extension program to disseminate the activities described above to other districts and sub-districts will be developed.

#### **5.4.3 Approach**

- 1) In addition to developing offshore fishing grounds and implementing fishermen training activities, a fishing surveillance system by fishermen and measures to substantiate the fisheries licensing system and a boat construction permit system will be implemented.
- 2) Facilities that meet the existing fish landing needs will be constructed in Kalimati district in Maumere as supplementary facilities for the fish landing facility that is under construction there. In addition, facilities that will provide qualitative improvements in Wuring village, where fish catch for Kalimati is landed and processing and fishing gear repair activities are presently carried out, will be provided under this plan. A multipurpose facility will be provided for Paga since the existing fish landing method will be kept due to the strong impact of the long-interval swells that are generated at this fish landing site. In Ende, an ice-making facility will be provided for the PPI (public fish landing site) to strengthen the fisheries activities there. In addition, a fresh fish transport

vehicles will be provided for Maumere (Kalimati) and Ende to transport and mobilize fresh fish marketing activities to the western region of Flores. The aim of these measures is to reduce the economic loss of fishermen and to raise their income.

- 3) A joint management and operations system by the government and fishing community will be established that will enable the fishermen organization to operate the facilities and equipment independently in future.
- 4) Infrastructure related model projects that promote the fishing community's motivation to implement improvements in their living environment and educational activities to strengthen the village residents' motivation will be pursued.
- 5) An extension section to be set up within district fisheries office to strengthen the capability of staff and to disseminate extension activities to other areas in the district based on the achievement of the project.

#### 5.4.4 Development Projects

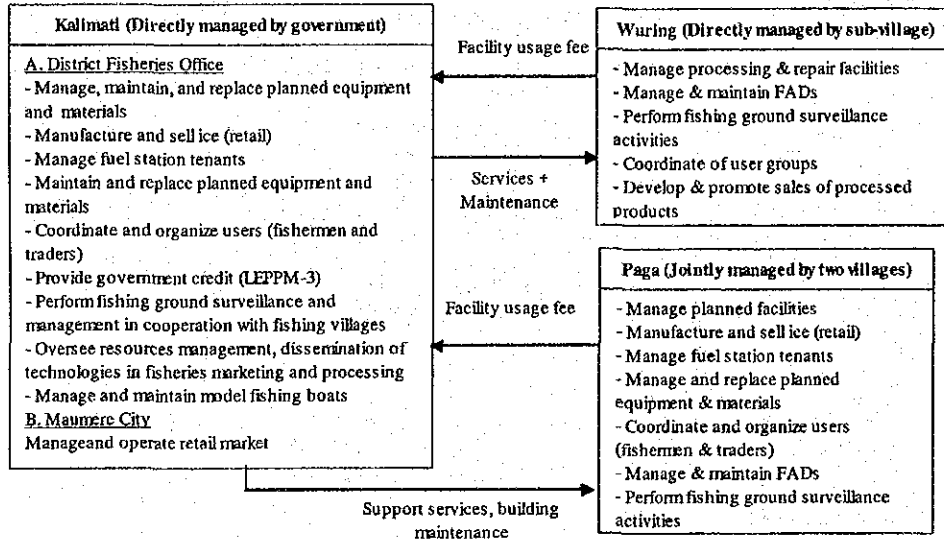
The development projects implemented in Central Flores based on the concepts and approach mentioned above are shown in the following table.

1	Coastal Resources management Plan	
1)	Improve fish landing data collection system.	<ul style="list-style-type: none"> <li>Record fish landing data by fishermen and data collection / analyses.</li> </ul>
2)	Expand and improve existing fishing permit system.	<ul style="list-style-type: none"> <li>Provide guidance to improve fishery management.</li> <li>Formulate fishing license system and fishing boat construction permit system.</li> <li>Issue fishing license and collect license fees</li> <li>Issue fishing boat markers.</li> <li>Legally establish this system and its extension to the district level.</li> </ul>
3)	Diversify fishing grounds.	<ul style="list-style-type: none"> <li>Control the number of purse seiners in the northern water area, and introduce appropriate fishing ground management.</li> <li>Exploit large pelagic fish in the southern waters by small-scale gill net boats and trawlers.</li> <li>Exploit offshore pelagic resources by introducing a model fishing boat.</li> <li>Promote the motorization of small fishing boats.</li> </ul>
4)	Establish a coastal fishing ground monitoring system.	<ul style="list-style-type: none"> <li>Establish a monitoring and communication system for illegal fishing boats.</li> <li>Establish a system of controls against illegal fishing boats.</li> </ul>
2	Fish landing/Handling/Shipping/Processing Plan	
1)	Improvement of fish landing and handling system	<ul style="list-style-type: none"> <li>Provide appropriate fish landing facilities in Kalimati.</li> <li>Rehabilitate PPI in Paupanda.</li> </ul>
2)	Improvement of fresh fish shipping system	<ul style="list-style-type: none"> <li>Provide fish handling /auction facilities in Paga.</li> <li>Provide ice plant and ice storage for 3 sites.</li> <li>Provide cool boxes and their keeping place.</li> <li>Provide insulated truck in Kalimati and Paupanda for fresh fish transportation.</li> <li>Provide multipurpose transport boat in Ende Island.</li> <li>Provide communication equipment.</li> </ul>
3)	Extension of fresh fish handling technology	<ul style="list-style-type: none"> <li>Popularize cool boxes.</li> </ul>
4)	Improvement of processing technology	<ul style="list-style-type: none"> <li>Provide model processing facilities.</li> <li>Conduct extension activities to improve existing processing practices.</li> <li>Conduct extension activities introduce new processed products.</li> </ul>
3	Fishery Activities Support Plan	
1)	Improve incidental facilities for Fish landing/Handling/Shipping/Processing Plan	
4	Fishery Community Environment Improvement Plan	
1)	Improve community infrastructure.	<ul style="list-style-type: none"> <li>Provide model facilities for water supply and toilet.</li> <li>Provide trash collection system.</li> </ul>
2)	Upgrade community motivation to improve the social environment	<ul style="list-style-type: none"> <li>Provide trash boxes and disseminate trash collection system.</li> </ul>
5	Fishermen Organization / Fishery Extension Improvement Plan	
1)	Establish a fishermen organization	<ul style="list-style-type: none"> <li>Establish a fishermen organization to operate and manage the planned facilities.</li> </ul>
2)	Provide extension activities to enable the fishermen organization to conduct viable and self reliant project management	<ul style="list-style-type: none"> <li>Introduce a participatory monitoring and evaluation system.</li> </ul>
6	Education / Training Plan	
1)	Establish a fishery extension unit in the district fishery office (DPK).	
2)	Provide training to build the capacity of the extension staff and enhance economic activities of fishermen organization.	<ul style="list-style-type: none"> <li>Provide training for leaders of the fishermen organization and extension staff of fisheries office by external institutes</li> </ul>

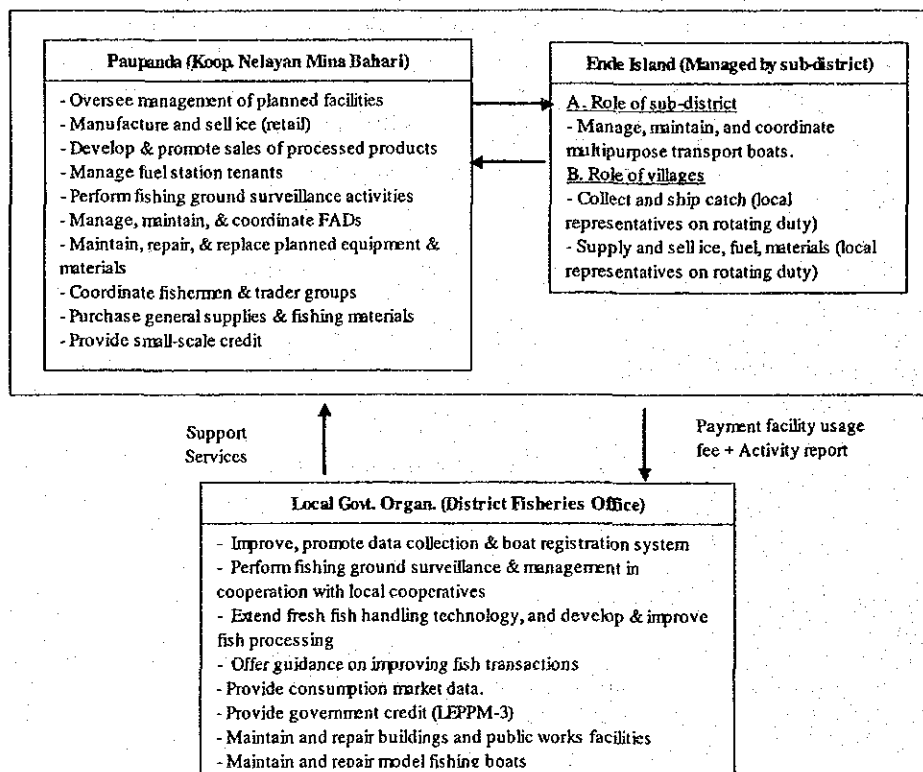
### 5.4.5 Operation and Maintenance Plan

A new local fishermen organization that will be operated according to the decisions of the local residents will be established. The organization will be placed under the jurisdiction and supported by the provincial government, and it will operate the planned facilities in conjunction with existing organizations. The function and role divisions of each organization and the overall system of coordination are shown in the figure below.

#### (a) Sikka district



#### b) Ende district



#### 5.4.6 Breakdown of Project Costs

A breakdown of the project costs for the Central Flores zone is shown in the table below.

Unit: Rp million

Site	Sector		Estimated Project Costs	Foreign Cost	Domestic cost
Kalimati	Coastal resources management	Facility	-	-	-
		Equipment	1,615	1,615	-
		Activity costs*	571	-	571
	Landing, handling, shipping, processing fisheries support activities	Facility	12,100	11,642	458
		Equipment	2,203	2,203	-
		Activity costs*	737	-	737
Wuring	Landing, handling, shipping, processing fisheries support activities	Facility	5,165	4,415	750
		Equipment	-	-	-
		Activity costs*	47	-	47
	Improvements to fishing village environment	Facility	14	-	14
		Equipment	-	-	-
		Activity costs*	4	-	4
Paga	Coastal resources management	Facility	-	-	-
		Equipment	537	537	-
		Activity costs*	26	-	26
	Landing, handling, shipping, processing fisheries support activities	Facility	417	234	183
		Equipment	1,180	1,180	-
		Activity costs*	271	-	271
	Improvements to fishing village environment	Facility	8	-	8
		Equipment	-	-	-
		Activity costs*	4	-	4
Paupanda & Ende Island	Coastal resources management	Facility	-	-	-
		Equipment	2,223	2,223	-
		Activity costs*	502	-	502
	Landing, handling, shipping, processing fisheries support activities	Facility	11,257	10,827	430
		Equipment	1,878	1,878	-
		Activity costs*	949	-	949
<b>Total</b>			<b>41,708</b>	<b>36,754</b>	<b>4,954</b>

Note: Asterisks denote for the first 2-year period

#### 5.4.7 Project Evaluation

A widespread fish marketing system will be established and fishermen incomes will be improved in this zone. The anticipated improvements in fishermen income was estimated according to the three regions that comprise this zone, Kalimati, Ende, and Paga.

The average per capita fisherman income in Kalimati in FY2001 was Rp.1.33 million, which is below the per capita income of Rp.1.63 million targeted in the master plan. The implementation of this project is anticipated to produce an annual benefit of Rp.6.20 billion for Kalimati. Consequently, the average income of the 1,046 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.138,000/person; and the average per capita income of fishermen will rise to Rp.1.47 million. This falls below the per capita income targeted in the master plan.

The average per capita fisherman income in Ende in FY2001 was Rp.430,000, which is greatly below the per capita income of Rp.1.63 million targeted in the master plan. The

implementation of this project is anticipated to produce an annual benefit of Rp.1.113 billion. Consequently, the average income of the 2,563 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.433,000/person. With this increase, the average per capita income of fishermen will rise to Rp.504,000, but as in the case of Kalimati, this figure falls below the per capita income targeted in the MP.

Likewise, the average per capita fisherman income in Paga in FY2001 was Rp.1.58 million, which is below the per capita income of Rp.1.63 million targeted in the MP. The implementation of this project is anticipated to produce an annual benefit of Rp.476.5 million. Consequently, the average income of the 397 fishermen households, who are the beneficiaries of this project, is estimated to rise by Rp.343,000/person. With this increase, the average per capita income of fishermen will rise to Rp.1.92 million, which exceeds the per capita income targeted in the MP.

With the implementation of this project, about 656 tons of surplus fresh fish from Central Flores will be shipped to the western Flores. In combination with fresh fish shipments from East Flores to western Flores, the total volume of fresh fish shipments is estimated at 1,010 tons. With an increase in surplus fresh fish stemming from extended fishing grounds in future, increased shipments of fresh fish to this region can be expected. In addition, increased fish landing volume will contribute greatly to augmenting incomes in this region. The multipurpose boat that will be provided in this project is especially anticipated to contribute to the economic activities of Ende Island.

The EIRR of the development project in the targeted zone was a high 17 percent, which is indicative of a high need for the project. However, the FIRR including the financial responsibility of the district government for the entire project could not be calculated. A large portion of the investments for the first fiscal year must be covered by grant aid and financial assistance from a public institution to cover the repair costs is needed.

However, in terms of long-term goals, the creation of a resources management system is important not only for Indonesia, but for the global community as well. It is also an important source of protein for the Indonesian people. A project that strengthens the capabilities of the small-scale fishermen is important as a vital first step to improving the coastal fishing communities in the eastern region.

Implementation of the project raises no major environmental issues. Therefore, it is concluded that overall, there is a high potential to implement the project.