

1. Background of the Eastern Flores Priority Zone

1.1 Situation of Priority Zone

1.1.1 Natural Conditions

(1) Conditions Surrounding the Location

The model sites are located in the East Flores and Lembata districts in the eastern region of the Flores Islands. Both districts are comprised of many outlying islands. Lembata district became an independent district from East Flores district in 1999. Since it is an outlying island, it is connected to the other islands by ferry transport.

Larantuka is the center of the zone's economy and transportation network. The Larantuka model site is located 8km south of Larantuka town. The other model sites in the district are located on outlying islands and are isolated. Lamahala Jaya model site is located on the south coast of Adonara island, which is east of Larantuka and the Larantuka Strait. The Sagu model site is located on the north coast of Adonara Island. Both sites are located in the East Adonara district.

Lembata district is located on Lombien Island, which is on the east side of Adonara Island. The Lewoleba model site is the center of Lembata district's economy and transportation network and it is located in the coastal area of Lewoleba city. The Balauring model site is located in Balauring village in the Omesuri sub-district of Lembata district on the northern coast of Lombien Island. The Lamalera model site is comprised of two villages (A and B), located on the south coast of the island in the Urandoni sub-district, in the south side of the district. Balauring and Lamalera are located 40km to 50km from Lewoleba city. Although the arterial road is under construction, they are separated by the mountains and Lamalera in particular is isolated.

(2) Weather Conditions

The weather in East Flores district is largely divided between the wet and dry seasons in one year. The dry season is from May to September and wet season is from October to April. During the wet season, the average number of rainy days per month exceeds 20 days. In contrast, there is hardly any rainfall during the dry season and the average number of rainy days ranges from 0 to 3 days. The monthly average rainfall volume is 200mm to 300mm during the wet season, and the average annual rainfall volume is about 1,500mm. The average numbers of rainy days in Larantuka and East Adonara districts where Lamahala Jaya and Sagu are located are nearly equal, but the average annual rainfall volume in Larantuka is about 2,000mm and high.

The climate in Lembata district is also largely divided between the dry season from May to September and the wet season from October to April, but the number of rainy days and the rainfall volume during the wet season is relatively low in comparison to other districts. The average number of rainy days in one month is about 10 days and the average monthly rainfall volume is about 100mm to 200mm. The average annual rainfall volume is 1,000mm, which is only about 60 percent of the average for East Flores district. The rainfall volume for the sub-districts of Nubachikan (Lewoleba model site), Omesusri (Balauring model site), and Urandoni (Lamalera model site) is the same as the district average (see Tables 7-3-1 to 7-3-4, Appendix 7).

(3) Topographical and Geological Conditions

Lewoleba city, the region is mountainous with very little flatlands and the mountains border. The entire zone is comprised of outlying volcanic islands. Excluding the urban area

of coastline, the inland sea that is surrounded by the main island of Flores in East Flores district, Adonara Island, Solor Island and Lombien Island where Lembata district is located, has an average water depth of 100m to 200m. It is the fishing grounds for the region's coastal fisheries. In contrast, the continental shelf in Flores Sea on the north side and the south side of Sawu Sea is narrow and the water depth is deep.

The Larantuka model site in East Flores district is located on the inner coast of Oka Bay which is about 8km south from Larantuka city. It is a sandy beach with a mangrove forest, and coconut trees and grasslands dot the flatland that lies between the arterial road and the beach. The remnants of the former fisheries company, PT. Bali Raya, are adjacent to the beach and the 1ha lot remains abandoned. Lamahala Jaya is located in an inclined beach area on the southern coast of Adonara Island. The sub-village is built on a slope extending more than 1km along the coast. The coastal area of the sub-village is a reef and the west side is a sandy beach. The reef on the ocean side of the sub-village runs from the seabed to the beach line, and continues on to the land area (sub-village). Sagu is located in the Sagu Bay on the north side of Adonara Island and the sub-villages are scattered along the coastline to the inland areas. The coastal area is a shallow sandy beach and a simple rock revetment was built along the coastline where a rustic sub-village exists. The sub-village built behind it has been built on flat land.

Lewoleba in Lembata district is located on the north side of the central coast of Lembata Island. The site is comprised of a shallow beach; and about 700m of sandbar (Pulau shipet) becomes exposed during the low tide. The coastline is dotted with houses built on a simple stone revetment. Balauring is located on the north-eastern coast of Adonara Island and faces the southeast. Lamalera is located on the southern coast of Lombien Island. The mountains in the back form a sloping land area that extends down to the coastline. The sub-villages are located on this sloping land area or in the very limited flatlands running along the coast. Much of the coast is comprised of reefs and the few sandy harbors that are found between these reefs have become the focal centers for fishing activities.

(4) Ocean Conditions

The waters of the inland sea and bay are calm, and the wave height is small even during strong winds, due to the western and eastern winds (north-west monsoon and south-east monsoon, respectively). In contrast, the southern coastal regions are hit by swells that come in from the Sabu Sea and the Indian Ocean. The differences in tide levels are large (two to three meters) at the sites located in the inland sea and the southern coastal region, in contrast to the difference in tidal levels at the Sagu and Balauring sites.

The water areas of Larantuka are calm because it fronts the southern inner area of Larantuka Bay and the ocean conditions are optimum. Lamahala Jaya faces the inland sea. Its waters are prone to swells that are generated by the open sea in Malakera Strait, located between Solor and Lombien islands. Even in the calm offshore waters about 100m from the coast, the waves become swells at the shallow shoreline and become turbulent near the reef. This affects the fishing activities of small non-motorized fishing boats (sampan) and impedes fish transport activities. During the north-west monsoon and south-east monsoon, the impact on the wind waves in the inland sea are minimal, but 20-second cycle swells are created near the shoreline during the south-west monsoon (southeast winds). But the waves are large during the south wind season. The Sagu site is located on the northern coast bordering the Flores Sea. Its beach is located on the northern side of the inner bay, and its waters are relatively calm and remain unaffected by the strong winds that are generated during north-west monsoon and south-east monsoon since it is enclosed on both sides by a cape.

Lewoleba is an open coast on the north side of the inland sea area. The nearby water body is shallow and the wind waves remain unaffected during the Musim Barat. Balauring faces the southeast, but the peninsula on the west side protects the site from the effects of the Musim Barat. In contrast, Lamalera borders Sabu Sea on the southern coast, and it is directly hit by the wind waves from the open sea, which are particularly high from the end of December to February and long at 10-second cycles. As in the case of Lamahala Jaya, swells are found even during the season for calm waters and the turbulence near the reefs and the wave breaking along the shoreline hamper the fishing activities and ocean transport services. Based on the field survey and interview survey findings, it was found that developing mooring facilities for fish landing, handling, wholesale activities, and passenger use is unfeasible due to the violent pitching of fishing and collection boats.

The data on measurements taken on the tidal levels at each model site are shown in the table below.

Site	Fluctuations in Tidal Levels			Source
	LWL	MWL	HWL	
Larantuka (Oka)	±0.00	+1.40	+2.80	District FO data
Lamahala Jaya	±0.00	+1.38	+2.76	Field survey data
Sagu	±0.00	+0.82	+1.64	Field survey data
Lewoleba	±0.00	+1.22	+2.44	Field survey data
Balauring	±0.00	+0.54	+1.08	Field survey data
Lamalera	±0.00	+1.01	+2.02	Field survey data

(5) Land Usage

Larantuka model site in East Flores District is a government owned lot that lies between the arterial road and a natural coast. It is on flat land with coconut trees and grasslands. The remnants of the former fisheries company, PT. Bali Raya, are adjacent to the beach and the 1ha lot remains abandoned. The fishing villages are mainly scattered throughout the urban areas of Larantuka, and there is no collection of sub-villages near the model site.

Lamahala Jaya is comprised of a concentration of sub-villages that has been built on 1km of inclined land, and an arterial road runs through the center. The houses have been built in step formation; and the land in the village, including the beach, belong to the residents. Thus, there is no surplus land space to carry out fishing activities.

The sub-village at the Sagu site is built on a simple stone revetment along the coastline, but fishermen's houses are built on the flat land area in the sub-village, and there is no open land area.

The Lewoleba model site is located in the coastal area of Lewoleba city in Lembata district. An arterial road runs along the coastline and a simple stone revetment has been built on the ocean side of the coast, where a row of fishermen houses has been built. There is no open land space in the sub-village for fisheries activities.

The Balauring site is comprised of sub-villages built on the flatland that lies between the coast and the mountains. There are many public facilities in the sub-villages and there is land area to develop fisheries facilities.

In Lamalera, the mountains closely border the coastline and the entire area is inclined. The sub-villages are located behind the few sandy beaches that are found in the middle of this land area. At the back of the sandy beach, there are about 30 houses of whalers, and it is a focal center of fisheries activities. There is surplus land usage area in the entire region.

1.1.2 Social Infrastructure

(I) Road Traffic Conditions

The major means of transportation that links the model sites in the zone is ocean transport. The base of operations of this ocean transportation network is located in the bays of Larantuka, Waiwerang (Adonara Island), Lewoleba, and Balauring. A passenger/cargo transport boat operates daily between Larantuka and Waiwerang (Adonara Island) (about two hours) and between Waiwerang and Lewoleba (about two hours). Ferry transport also operates between Kalabahi on Alor Island in east Lembata district to Balauring, and from Lewoleba to Larantuka three times a week. A small port exists in Larantuka and Lewoleba and ferry service operates once a week between NTT province and its capital Kupang. But due to the limited service, Maumere port in Sikka district, which is about a three-hour drive from Larantuka, functions as the major port.

The Larantuka model site is located along the national highway that runs between Maumere and Larantuka. Lamahala Jaya is adjacent to Waiwerang and Sagu is about a 40-minute drive from Waiwerang. Both sites are linked to Waiwerang by a paved road.

Lembata district is an outlying island and is dependent on ferry transport for its linkage to other islands. Although the paved arterial roads are under construction in the island, the majority of the roads in Lembata city are unpaved and the road conditions in the district are poor. The arterial road that runs between Lewoleba and Balauring located 53km east is paved, but Lamalera located 43km south of Lewoleba remains isolated. The road connecting these two sites is paved only until the mountain villages and the road is unpaved from that point on. The road conditions in the mountainous regions are poor. The public bus service that operates between Balauring and Lewoleba takes 2 hours and 30 minute. In contrast, the bus service between Lamalera and Lewoleba takes about 4 hours.

Public Transportation in Lembata District

Model Site	Transport Means	Destination and Travel Time	Frequency	Cost
Balauring	Bus	Lewoleba (2.5 hours)	3 round trips daily	Rp7,500/person
	Ferry	Kalabahi -(8hr)- Balauring -(5hr)- Lewoleba-(4hr)- Larantuka	3 trips per week (Mon, Tues, Sat)	
Lamalera	Truck	Sun : Lewoleba → Lamalera (4 hours)		Rp15,000/person
		Mon : Lamalera → Lewoleba (Same as above)		
		Tues : Lewoleba → Lamalera → Lewoleba (one way 4 hours)		
		Sat : Lewoleba → Lamalera → Lewoleba (one way 4 hours)		
Cargo boat	Mon : Lamalera (8:00) → Lewoleba (14:30)	6.5 hours	Rp10,000/person	
	Tues : Lewoleba → Lamalera		Rp12,000/person	
	Wed : Lamalera (8:00) → Larantuka (15:00)	7 hours		
	Fri : Larantuka → Lamalera			

The ferry service that operates between Lamalera, Lewoleba, and Larantuka is managed by a private company that owns two 50-passenger ferry boats, the Kurnia Ilahi. As there are no mooring facilities at Lamalera, the ferry boats anchor in offshore waters and the passengers are moved to the port in Urandoni district. Although large wind waves occur at the end of December to February, ferry services are not suspended.

(2) Condition of Public Facilities

Public facilities are concentrated in Larantuka city. The outlying ferry service terminal is located in the city's coastal area, and the bus terminal is located next to the public market. Waiwerang located near the East Adonara district administrative office Adonara Island is the community center of Adonara Island with public facilities such as schools, the public market, and the ferry service terminal. The public market handles all types of products and goods to meet the demand of the island residents. Lamahala Jaya is located adjacent to Waiwerang and its fisheries and community activities are closely integrated with dependent on Waiwerang. In contrast, with the exception of a village administrative office, primary school and small local market, there are no public facilities in Sagu.

Although public facilities exist in Lewoleba city, their scope and functions are inadequate in comparison to Larantuka. The main city road is the major market road for the local residents. Despite the small public fish market located on the coast, the road connecting this market to the city is in poor condition. There are no Pertamina fuel depots on the island and subsequently, five fuel transport boats from Larantuka transport the fuel to the island in drum cans. It is transported throughout the island by tank lorries.

The village administrative office, primary school, health clinic, city market, and other public facilities exist in Omesuri District where Balauring is located. A wharf has also been built as a terminal for the ferry services that connect the island to the other outlying islands.

There is a village administrative office, primary school, and health clinic in Lamalera. Daily commodities are sold at a kiosk in the village, but major goods and commodities must be purchased in Lewoleba or Larantuka. The ocean conditions at this model site are harsh. Subsequently, there is no ferry terminal for the regular ferry service.

The existing state of the water and power supply, and communications for each site is given in the table below.

Water and Power Supply and Communications			
Site	Power Supply	Water Supply	Communications
Larantuka	Power supplied by PLN (24hr)	PDAM water pipe has been installed along the arterial road.	Telephone communications available
Lamahala Jaya	Power supplied by PLN (17:00-6:00 a.m. only)	No PDAM facility. Residents depend on well water.	Telephone communications available
Sagu	No power supply Individual power generators, units, 45 households/unit, Rp5,000/10W/household	Village-managed water facility. Water is supplied to each household by pipe that is connected the water source 3km away. Water storage tank (3t), water carried to each house in plastic tanks, free.	Telephone communications unavailable
Lewoleba	Power supplied by PLN (17:00-14:00 only)	PDAM water pipe has been installed along the arterial road. Sub-village on east side use well water.	Telephone communications available, but poor.
Balauring	Power supplied by PLN (17:00-6:00 only)	Village managed water supply facility. Piped in from water source 3.5km in the mountains. 25 water stations in the village, each household carries water in 30kg tanks.	Telephone communications available, but poor.
Lamalera	No powers supply facility. Whale oil used for lighting purposes, privately owned power generators 3 units	Piped in water from 2001. Each household does not have a water supply. 3 water storage tanks/from the sub-village to each household, the diameter of the pipe is small.	Telephone communications unavailable

1.1.3 Fishery Related Facilities

Fresh fish is sold in the streets and a section of the public market in Larantuka city. Due to lack of a fish landing facility, the purse seiners land their fish catch in a section of the bay. There are two private foreign capital based fisheries companies in Larantuka district that mainly purchase bonito that is shipped out of the region. One company has their own fish landing, ice making, and freezer facilities and the other owns their own transport vessel. At the Lamahala Jaya site, there is a privately owned ice-making facility (capacity 1t/day), but the fish is landed on the coast more than 1km away and the traders are forced to make an added trip to purchase ice. Since it more convenient to purchase ice from the nearby retailer, the use of the ice-making facility is low.

There is a fish market at the Lewoleba site, but due to the poor road conditions in the neighbouring area, fish transport activities have been impeded. Public facilities for fisheries activities other than the facilities that have been described above do not exist in this zone.

1.2 Fisheries Conditions

1.2.1 Overview of Fishing Village

The total population of this zone, including Larantuka, is about 200,000 people, and the population is concentrated in Lembata Island (pop. 90,000) and Adonara Island (pop. 50,000). Excluding Larantuka (pop. 40,000) and the coastal town of Lewoleba, the majority of the population resides in the inland areas. Although the majority of the population is Catholic, the coastal fishermen are mainly Muslim. The traditional Catholic fishing communities are Mokantarak village in Larantuka and Lamalera village in Lembata Island. The remaining fishing communities are descendants of emigrants from Sulawesi Island who immigrated to the region in the 18th century.

Although the main economy of the region is agrarian, the fisheries industry comprised 10 percent of the GRDP and fishery products comprise 8 percent of the export value of this zone. The annual per capita income is Rp.702,000 in East Flores district and Rp. 356,000 in Lembata district. The per capita income in Lembata district is slightly lower than the average per capita income in NTT province (Rp 704,000).

This zone is comprised of six model sites (Larantuka, Lamahala Jaya, Sagu, Lewoleba, Balauring, and Lamalera. Larantuka, which is the marketing center of the zone, is connected to the five other outlying islands by ferry. The villages, RT number, number of households, number of fisheries households are shown in the table below (see Table 1-9, Appendix 1).

Model Site	Number of Villages	Number of Fishing Sub-villages	RT Number (Fisheries household RT)	Number of Households (Number of Fisheries Households)	Number of Fishermen Groups	Number of Women Groups	Fisheries Cooperatives (Number of Members)
Larantuka	16	16	189 (combined)	4,242 (1,019)	37	16	1 (163)
Lamahala Jaya	1	1	7 (7)	500 (365)	-	-	3 (220)
Sagu	1	2	8 (5)	440 (339)	-	-	1 (48)
Lewoleba	3	12	23 (13)	1,299 (246)	54	17	1 (126)
Balauring	1	3	9 (9)	107 (107)	3	4	-
Lamalera	2	7	17 (17)	284 (284)	7	4	-

1.2.2 Fishing Activities

(1) Major Fishing Methods and Fishing Boats

The fishing waters in this zone are comprised of three areas—the strait that runs from Larantuka to Lewoleba and the inner bay waters, the northern coastal waters (on the side of the Flores Sea), and the southern coastal waters (on the side of Savu Sea). Of these three fishing areas, the production volume is the largest in the strait and inner bay waters. Bagan fishing is carried out in Larantuka (26 fishing boats) and Lewoleba (47 fishing boats). Purse seine is the major fishing method used in Lamahala Jaya (82 purse seiners) where small pelagic fish are harvested. In addition, bonito is caught by fishing boats engaged in pole and line fishing (43 boats) near the FAD installed 10 to 20 miles (water depth of 2,000m to 3,000m) in the northern and southern offshore waters. The bonito boats sell their fish catch directly to three fisheries companies that freeze and transport or process the fish in the district. Gill nets, pole and line fishing, and trawling are carried out in the northern coastal waters by small fishing boats that harvest large pelagic fish. The major fishing villages are Sagu (Adonara Island) and Balauring (Lembata Island). There are very few fishing villages bordering the southern coastal waters and road access to this area is extremely limited due to the steep topography. Despite these difficult conditions, Lamalera village which is located in the southern area of Lembata Island, is known as a traditional whaling village, and its fishing boats, including the whaling boats, are non-motorized. All of the boats engage in one-day fishing trips and the quality (fish freshness) of the fish catch is good.

In recent years, the use the FAD in shallow waters has become popular. These FAD are privately owned and fishing boats pay a users fee to the owner in order to operate in nearby waters (40 to 50 percent of the fish catch sales). The use of the FAD is particularly prevalent in Balauring (22 units), Lamahala Jaya (10 units), Lewoleba (5 units), and several in Sagu, and the coastal waters of Larantuka.

The number of motorized fishing boat according to fishing method at the six model sites in this zone are shown in the table below.

	Number of Fishing Boats According to Fishing Method				
	Bagan	Purse Seine	Gill Net	Pole and line fishing, Trolling	Others
Larantuka	26	10		30	Pole & line fishing 43
Lamahala Jaya	2	82	10	-	-
Sagu	2	6	10	11	-
Lewoleba	47	3	10	2	-
Balauring	-	2	7	Motorized 14, non-motorized about 80	-
Lamalera	-	-	Outboard engine 11, non-motorized about 40		Whaling 20

(2) Fishing Patterns of Fishing Boats

The fishing season in this zone differs according to the water area. The peak fishing season in Lamahala Jaya and Larantuka is from March to December (optimum peak season is from April to May and September to November). Due to the heavy and frequent wind and rains from January to February, the fish landing volume drops drastically. In contrast, the peak fishing season in Sagu and Balauring bordering the Flores Sea is from September to March (during the northwest monsoon season). The fish landing volume in Lewoleba Bay is relatively uniform throughout the year due to the year around fishing that is possible. The fish catch volume is large during the months from January to March when the fish landing volume is nearly nonexistent in Larantuka (see Fig. 1-2, Appendix 1).

The fish landing volume is the largest in Adonara Island where the inland sea, enclosed by Lembata and Solor islands, provides good fishing grounds for purse seiners. The

population of Adonara Island is large and the fish consumption volume on the island is substantial, but the fish catch volume during the peak fishing season exceeds the island's demand. Hence, about 30 purse seiners move their fishing operations to the neighboring waters of TI Konga and Tg. Bunga from March to October (about 20 boats), the western water areas of Adonara Island (about 5 boats), and the water area of Lembata (about 5 boats). They return to Lamahala Jaya once every three weeks. In addition, fish collection boats known as "sinjai" (about 40 to 50 boats) from Ende and Bima collect the fish catch directly at sea during the peak fishing season. The fish are mainly salted and sold in the Ende and Bima markets (see Appendix 1, Fishing Patterns of Boats According to Model Sites in the Zone).

(3) Fish Species

The major fish species that are harvested in this zone are bonito (about 30% of the total fish catch volume), frigate tuna (24%), round scads (11%), fusiliers (6%), anchovy (5%), and sardine species are scarce. The ratio of demersal fish is relatively high in Lewoleba, and they are mainly harvested near Ili Api. Other major fish catch is landed in Terbang, excluding whales landed in Lamalera. Whaling is prohibited from May to October, and fishing operations are conducted 20 days a month during this period. Thus, the number of fishing days is very limited.

(4) Fishing Equipment Supply and Maintenance

The spare parts for fishing gear can only be purchased in Larantuka or Waiwerang in Adonara Island. Simple fishing gear such as ropes, hooks, and fishing lines can be purchased at other fishing villages, but the variety and stock are limited. Fuel is sold at the official rates set by the Pertamina fuel depot in Larantuka. In the outlying islands, private fuel retailers transport and sell the fuel from Larantuka or Kalabahi (Alor Island) at prices that are 30 to 80 percent higher than the official rates. Due to the limited number of gasoline stands in the urban areas of Larantuka, many of the fishermen will purchase the higher-priced fuel sold near their homes.

1.2.3 Fish Marketing, Processing, and Shipping

(1) General Conditions

There are three major fish landing/consumption sites in the East Flores district, which are in Larantuka, Waiwerang (Adonara Island), and Lewoleba (Lembata Island). The volume of fish that is transported from these sites to the inland areas is relatively large, but due to the limited consumption demand in the inland areas, the entire beach is used to dry the fish catch during the peak fishing season. Fish that is transported outside the district are salted and dried as processed products, with the exception of frozen bonito that is handled and transacted by companies, because of the lack of marketing infrastructure. Several fish traders in Larantuka, which has land access to other district city markets, are restricted in the volume of fresh fish that they transport to Maumere and Ende during the peak fishing season due to the shortage of ice.

(2) Fish Transactions

The fishing households are scattered in the urban district of Larantuka, and the fish catch is landed at 16 sites along the coast. Of these sites, the central site is the beach flanking the public quay wall. Fishing boats of more than 3 GT (mainly purse seiners) land their fish catch at the site where the majority of the fish traders and retailers gather. But the smaller boats that engage in gill net fishing and pole and line fishing use the beach sites near the residential areas. Generally, the fishermen wives process and sell the fish. In the outlying

islands, the fish is landed on the beach in front of the fishing village and the local village women sell the fish in various areas of the island. Fish traders and retailers gather at each site when the fishing boats return, and the fish catch is unloaded after it has been transacted. In the case of Bagan and gill net fishing, the wives of the boat owners or the chief fishermen have the fish marketing rights; and generally the fish catch is sold at wholesale prices to the village women gathered at the beach.

Although the transaction unit by which the fish catch is sold at each beach differs according to fish species and type of fishing boat, it is mainly sold according to catch in number (5 to 10 small fish) at the villages where the landing volume is small (mainly harvested by gill nets, pole and line fishing). In fishing villages where the fish landing volume is large (mainly Bagan and purse seine fishing), fish is sold in container/tub units (30kg) or in bamboo baskets (25kg to 50kg). The transaction unit will also differ according to fish species—round scads and sardine species are sold in tubs or bamboo baskets and other species are sold according to catch in number. The only fish that is transacted in kilogram units is bonito, tuna, and dried fish that are sold by fisheries companies to fish distributors.

(3) Fish Distributors

Based on the findings obtained from the count survey conducted in this study from February to March 2002, the average number of retailers and traders per day during the peak fishing season at each model site and the fresh fish handling volume was estimated. The data is given in the table below (see Table 1-5, Appendix 1).

	Larantuka	Lamahala Jaya	Sagu	Lewoleba	Balauring
Number of people	89	73	39	147	15
Handling volume (kg/day)	6,327	4,068	1,478	10,689	688
Average (kg/person/day)	71	56	38	73	46

Note: There is no data on Lamalera (it is surmised that 284 village women are involved in fish retail activities)
The estimated value for Larantuka is based on the number of fresh fish retailers at the public market.

Excluding Sagu, more than 90 percent of the distributors at each site are women, and the distributors in Lamahala Jaya, Lewoleba, and Lamalera are all women. The distributors who handled more than 100kg of fresh fish per day were only a small number in Larantuka and Lewoleba. Although their ratio of the total handling volume is large at 35 to 50 percent, their overall number comprises only about 15 percent of the women distributors. Hence, it is surmised that village women who handle less than 100kg per day market fish.

Demersal fish distributors do not operate in this district and distributors from other regions are traders who purchase salted and dried fish during the peak fishing season from March to November (the volume transacted and number of traders is unknown), the Sinjai collection boats from Ende and Bima districts (40 to 50 boats, estimated collection volume is about 1,400 tons/year), and the local fisheries companies that purchase bonito and tuna (three companies, 2,000 to 2,500 tons/year).

(4) Fish Processing

Much of the small pelagic fish such as round scads and sardines species are sold and shipped as processed salted and dried or salted and soaked fish products. Generally, the peak-processing season is the dry season, but in Lewoleba and Sagu, the fish is landed during the wet season and cannot be processed into salted and dried fish or the quality is inferior. Subsequently, traders and retailers do not purchase the product and the price drops. During the peak fishing season, family labor and work area are limited, and processing is not be adequately carried out. Hence, dried and salted fish in Java is often sold as livestock feed (the volume of fish that can be sold as food by the local market is limited).

The estimated ratio of both processed and fresh fish volume is shown in the table below. Approximately 11 percent of the fish landing volume (about 19 percent of the fresh fish distribution volume) is not sold as fresh fish due to the daily fluctuations in fish landing volume; this becomes an economic loss (see Table 1-11, Appendix 1).

Site	Landing volume ton/year	Fresh fish distribution (%)		Processed (%)	Remarks
		Sold	Unsold		
Larantuka	2,593	56%	14%	30%	Excluding bonito pole and line fishing
Lamahala Jaya	2,164	46%	7%	47%	Excluding collection by Sinjai at sea
Sagu	551	44%	13%	43%	
Subtotal for East Flores district	5,308	51%	11%	38%	
Lewoleba	1,767	43%	11%	46%	
Balauring	361	47%	41%	12%	
Lamalera	498	17%	4%	79%	Including whales (total volume is processed)
Subtotal for Lembata district	2,626	38%	11%	51%	
District Total	7,938	47%	11%	42%	

(5) Fish Price

The beach price of the fish catch will differ according to the fishing season and the fish landing volume of that day. The fish price rises before and after the full moon when the fish catch volume is small, especially in Larantuka, Lewoleba, and Lamahala Jaya where purse seiners operating at night and Bagan fishing predominate. As a result, fish landed in Balauring, which is usually transported to the neighbouring mountain villages (especially during the once or twice a week market days), is shipped to Lewoleba during this period. Seasonally, the fish price is cheap during the peak fishing season from April to November and it rises during the months of December to March when the shipment volume drops. The fish catch volume is large in Lewoleba from December to March when it decreases in other areas. The fish price falls at this time because the traders for dried fish processing do not appear. The fluctuation patterns of the fish price differ from the other sites in the zone. The general fish price of major fish species according to landing site is shown in the table below.

Fish species	Larantuka	Lamahala Jaya	Sagu	Lewoleba	Balauring	Lamalera
Halfbeaks	2,500-4,000		1,000-7,500			
Fusiliers		4,500-7,500		4,500-9,000		
Round scads		1,500-3,000		700-3,000	1,000-4,500	
Sardines		1,500-3,000		200-1,000	1,000-2,000	
Frigate tuna		1,000-2,000			1,000-3,000	
Flying fish			2,500-5,000			1,000
Anchovy				1,000-2,500		
Big-eye scad					1,500-3,000	
Eastern little tuna					2,000	
Low fish price period	Mar.-May Sep.-Dec.	Apr.-Nov.	Mar.-Apr.	Nov.-Apr.	Oct.-Apr.	No fluctuations
High fish price period	Jan.-Feb. June-Aug.	Dec.-Mar.	May-Feb.	May-Oct.	May-Sept.	

Source: Field interview survey conducted in March 2002 (see Table 1-8, Appendix 1)

1.2.4 Mariculture

As of March 2002, the District Fisheries Office started two cage culture projects of groupers in the villages of Mokantank and Kelurahan Waibalun in East Flores district. Several months prior to the start of these two projects, a fisheries company began cage culture activities, but it terminated the endeavour by May 2002. However, this is first time that the culture of groupers has been implemented in the East Flores district

The District Fisheries Office is planning to begin similar projects in the four sub-districts of Larantuka, Ille Mandiri, Tanjung Bunga, and Wutanggitang in FY2002. The FY2002 budget for these projects is given in the table below.

	Unit: Rp.
AP	7,000,000
Cage culture construction and cost of fry	125,000,000
Culture training activities (60 persons)	30,000,000
Total	162,000,000

There are no other mariculture projects in the East Flores district other than the culture of groupers started by the District Fisheries Office.

(1) Characteristics of the Grouper Cage Culture Project

The operating method that will be adopted for the culture projects in Mokantank and Kelurahan Waibalun villages will be identical. In addition, the same method will also be used in the four projects that will be implemented in FY2002. This operating method is characterized by the following components.

Small-scale Culture Facility

The facility consists of one cage surface utilizing a 3 x 3 x 3m four-sided net and a small work shed (1m²). Ten people from one Kelompok conduct the cage culture project, but in actuality, there is not that much volume of work generated. A total of three people are sufficient, in view of the net changing work that is required.

(a) Inch Plasma method

The culture projects are managed by a kelompok at each site. The needed equipment and materials the operating capital is provided by the District Fisheries Office. But a private company (Inch) that is contracted by the Fisheries Office will be responsible for providing the operating capital, equipment and materials, and the management of the projects. This company will receive the capital for the projects from the District Fisheries Office and in accordance with the terms of the contract, it will provide the kelompok with the equipment and materials and the revenue needed to regularly purchase the feed. The kelompok will purchase the feed, feed the fry, and carry out the daily tasks. However, both the private company and the kelompok will not have earned any revenue this time. Although the kelompok members will be paid to work the night shift to guard the project, no allowance will be paid for the activities implemented during the day. The profits generated from the fish sales generated by the project will be distributed between the private company, kelompok, and the local government. However, the distribution ratio remains undecided.

(b) Mariculture using natural fry

The grouper culture projects conducted in East Flores district harvest grouper fry using pole and line fishing and cages. The kelompoks are provided with an outboard engine and cages to harvest grouper fry. In addition, fry that are longer than 15cm are purchased from other fishermen at the price of Rp.10,000 to 15,000/kg. The majority of the species that are harvested are tiger grouper (kerapu macan), coral trout (kerapu sonoh) and humback grouper (kerapu bebek).

There were 510 fish that were being culture in Mokantank village as of May 2002. However, data such as the number of fish according to species, weight, and other statistics were not recorded

(2) Starting Up the Project

The District Fisheries Office started up the projects according to the following

procedure.

(a) Select the project site

The project site was selected according to the following criteria.

- The area was already used to harvest groupers.
- There were fishermen who would supply the fry
- The water area was unaffected by the wind and waves in the bay.

(b) Establish kelompoks (fishermen groups)

Select fishermen interested in participating in the project, and formally establish and register the kelompok.

- The participants must be fishermen and must be capable of harvesting grouper fry that will be cultured.
- The members of the kelompok must participate in a six-day study on cage culture given by the District Fisheries Office. In addition, they must receive training in learning how to build the cages.

(c) Provide equipment and materials needed for culturing

The kelompoks will be provided with the equipment and materials needed to construct cages. As explained earlier, a private company that is contracted by the District Fisheries Office to oversee the projects will provide the equipment and materials. The kelompoks will be paid the estimated daily feed cost of Rp.100,000 by the private company. The culture period for groupers is estimated at six months.

(3) Issues

The issues that the culture projects face are as follows.

(a) Late payment of operating costs and vague contract terms

The District Fisheries Office has contracted a private company to manage the operating funds of these projects. However, the late payments by the private company to the kelompoks have become conspicuous, and the kelompoks are unable to purchase feed. In addition, the kelompoks do not have information about the project budget or the terms of the contract of the private company (its obligations to the kelompoks). Although the profits generated from fish sales is supposed to be distributed between the three parties concerned—the local government, the private company, and the kelompoks, the distribution ratio has not been established.

(b) Immature rearing technology

Four fisheries officers from the District Fisheries Office in East Flores attended a one-month training session in mariculture at the Situbondo Culture Center in 2001. The fisheries officers, in turn, supervised the members of the culture projects prior to their start. However, the technical knowledge of the officers is not sufficiently adequate to address many issues about the rearing methods used by the kelompoks. The major technical issues that have been identified are as follows.

- The rearing environment is poor because the cage nets have not been changed.
- The participants and workers do not know about freshwater fish disease prevention, and other technical information.
- Rearing data such as feed amount and the growth of the cultured fish is not recorded.
- The 10m water depth of the area where the cages have been set is too shallow.

(c) Project activities have not generated income

The kelompok members presently work for free. They will be paid a segment of the sales profit that is generated from the sale of the cultured fish. However, the rearing period is a lengthy six months during which time the kelompok members have no earnings. In addition, the ratio of the profits that will be paid remains unclear.

The majority of the kelompok members are full-time fishermen who also engage in farming activities. Since they do not earn a regular income from the project, their main occupation remains fishing and farming, and they dedicate their free time to the project. Thus, the low motivation of the kelompok members is one factor underlying the technical issues listed above.

1.3 Fishermen Organization, Fisheries Credit, Fisheries Extension, Education/Training and Community Living Environment

1.3.1 Fishermen Organization and Fisheries Credit

(1) Fishermen Organizations

Zone 3 covers a wider area with six model sites in the districts Flores Timur and Lembata. The six model sites have three KUD Minas (village-level fisheries cooperatives) and three Koperasi Nelayan (fishermen cooperatives), and several fishing and women groups (kelompok).

In Larantuka (Oka) there is one KUD Mina Gonsalu Raya, which was established in 1995, and has 161 members. It had initially received government grant of Rp 32 million as a fund for credit operation. Savings/credit is its main activity, and other activities include operating a small kiosk (selling rice, tea, cigarettes, etc.). In 2001, it generated Rp 400,000 in profits and Rp 1.4 million in savings. In addition to this cooperative, there are 37 fishing groups and 16 women groups in Larantuka.

Lamahala Jaya, located in the southern region of Adonara Island, has two cooperatives. The Koperasi Nelayan Insan Madani (established in 2000) with about 50 members (had 111 members when established) had received an initial fund of Rp 70 million from the District Cooperative Office. Its main activities are savings/credit and purchase/sales of fishing needs. The Koperasi Nelayan Sari Utama, established in 2001, has about 100 members. It received Rp 25 million from the District Cooperative Office to launch its credit operation. Provision of small credit is the only activity now and it plans to conduct purchase and sales of fishing gears in future.

Sagu, also located on the northern coasts of Adonara Island, has two cooperatives namely Koperasi Nelayan Batu Maja and Koperasi Nelayan Sagu. Koperasi Nelayan Batu Maja, established in 1977, has only about 38 members. It was quite active in fish marketing from 1977 to 1984, but the average age of its members is high and it is no longer as active as it was in the past. In contrast, the Koperasi Nelayan Sagu is a newly organized (three fishing groups) in 2002 with 25 members. Presently, it is waiting for official registration from the District Cooperative Office, but it has received boat engines and fishing equipment from the District Fisheries Office.

Lewoleba located in the central western region of Lembata Island, has one cooperative, namely KUD Mina Gelekat Lewotana. This cooperative was established in 1997 and has 126 members. It has been provided Rp 40 million in operating funds from the District Cooperative Office. This fund must be returned within one year at a monthly rate of 1 percent. According to the 2000 annual report, its activities generated a profit of Rp 2.8

million, a membership deposit of Rp 2.7 million, and savings (voluntary and compulsory) of about Rp 2.1 million. Presently, its activities include providing small loans and operating a kiosk. In addition, there are also 54 fishing groups and 17 women groups in Lewoleba.

In Balauring, there are no cooperatives, but there are three fishermen and four women kelompok. Similarly, there are no cooperatives in Lamalera, but there are 6 fishermen and 4 women kelompok. These kelompok are engaged in their own separate economic activities and does not conduct joint activities. Fishing groups (kelompok) are self-help groups in an embryonic stage and are to be nurtured to a cooperative later. However, as a whole, many of the kelompok are stagnated in their activity and seldom exhibit incentives or none for self-improvement on a sprit of cooperation. The weakness is attributed to their unawareness of roles and benefits in mutual cooperation, inadequate monitoring to understand their conditions and issues, limited extension services to resolve their issues, etc. The practical approach in the priority areas is to mobilize and organize the fisherfolks, irrespective of their groups to raise awareness of the benefits of mutual and organized activities, understanding of issues in fisheries sector and their expected role, etc.

A workshop was conducted in Larantuka with about 30 people (representatives of cooperative, fishermen, fish traders and processors, fisheries officers) including from Lamahala Jaya and Sagu. The general view of the majority of the participants was that the existing cooperatives and fishermen kelompok did not adequately promote the cooperative spirit; and its activities did not provide many benefits for fishermen. The consensus was that fishermen did not have the management capabilities to adequately function in a supervisory role. They recognized the importance of self-reliant management and actively supported the project implementation plan and their participation in the project. They also understood that the project would stabilize fish prices, create a stable market and improve fish quality, and they were not adverse to paying service and user fees for the facilities. They acknowledged the need to participate in training activities to acquire the technical knowledge needed to manage the project. They also approved of the idea to recruit an expert to supervise the maintenance of the facilities.

(2) Fisheries Credit

Cooperative-based credit is available for member fishermen in Larantuka, Lamahala Jaya and Lewoleba. The credit activity of the fisheries cooperatives is one of the financial sources available to member fishermen to cover the immediate needs such as fishing operation. However, KUD Mina in Lewoleba provides credit to non-members with guarantee. These cooperatives extend credit amounts from Rp 200,000 to Rp 3.0 million and the conditions differ; for example KUD Mina in Lewoleba charges monthly interest of 8 percent, which is very high, amounting to 96 percent a year, while a cooperative in Lamahala Jaya charges 2 percent a month. Likewise in other zones, the cooperatives do not have any reserve funds (capital) to extend to fishermen for investments, as they do not generate revenue through economic activities; its credit fund is mainly from the interest and savings (regular membership and voluntary savings). Therefore, fishermen have to resort to informal sources to meet their credit and investment needs.

Lembata district received PEMP fund of Rp 461 million in 2001 and it has been distributed to 20 women groups and 11 fishermen groups. Three fishing groups in Balauring (model site) are recipients of PEMP credit fund. Fishing group (Kelompok Tanjung Pasir) with 11 members has received Rp. 40 million (Rp 3.6 million a person) with condition of annual interest of 8 percent and repayment period of two years. Similarly, a women group of 6 members has received Rp 10 million with annual interest of 8 percent and payback period is one year. However, Flores Timur has not been allocated this fund in 2001.

1.3.2 Fisheries Extension, Education/Training

Likewise in the priority development areas (Bima and Dompu Priority Zones) in NTB, the extension activities in NTT is administered and conducted by the agriculture department and the provincial and district fisheries offices are not formally charged with the responsibility of extension activities. The district fisheries office of Flores Timur has 15 technical staff members who are engaged in fisheries extension activities. In 2001, Flores Timur had a budget of Rp 28 million for training of 90 fishermen, Rp 4.5 million for business training of 40 fishermen and Rp 21 million for OJT in mariculture for four fishermen in East Java. Lembata is a newly established district and the fisheries office is still lagging behind in terms of physical resources and capable manpower to conduct extension and training. In FY2000, it had received Rp 292 million as general development budget to renovate and improve its office and about Rp 65 million for development, which includes extension/training of fishermen.

1.3.3 Community Living Environment

(1) Larantuka Site

The fishing communities are located along the coast running from north to south in the center of the urban region of Larantuka. There are 16 sub-villages and none of them constitute a formal administrative unit known as a village. Of the 4,242 households that comprise these sub-villages, about 24 percent (1,019 households) are engaged in fisheries.

The following living environment related issues were pinpointed in the workshop that was conducted at the model site to improve the fishing village living environment.

Issues	Existing Conditions
1) Water supply shortage	Although tap water is supplied to some areas of the district, the water supply is frequently cut off occasionally for three days. Households that do not have access to tap water rely on well water, but the water supply is inadequate and there is an overall shortage of drinking water.
2) Lack of roads and drainage facilities in the sub-villages	The roads in the villages are unpaved and without side ditches. Subsequently, the roads turn to mud and become impassable during the wet season. Due to the lack of drainage facilities, wastewater from each household overflows into the surrounding area.
3) Toilets	The dissemination rate of toilets is about 70% and they are osmosis system toilets. Households without toilets use the beach. Problems related to water pollution were not raised.
4) Disorderly garbage disposal	Although the residents clean the area around their houses, they dispose their garbage in the nearby ocean or mountains since rules on garbage disposal do not exist. As a result, the beach is littered with garbage.
5) Electricity	About 80% of the households are supplied with electricity 24 hours of the day, but there are frequent planned black outs.
6) High primary school dropout rate	Parent awareness about the importance of formal education is limited and the ratio of children who dropout of primary school is high (specific statistics are unavailable). The parents state that the education that is provided is inadequate due to the shortage of desks, chairs, textbooks and other equipment and materials.
7) Lack of leadership qualities	There are no recreational area or sports facilities. Although sports equipment are affordable and accessible, there is no one is willing to step forward to organize and take the lead in establishing recreational activities. In addition, there is a high ratio of unemployed youth who are the cause of drinking, fighting, and other social problems. This indicates the lack of community mobilization.
8) Excessive burden of fishing village women	The belief that housekeeping and child-rearing activities are the responsibility of women is strongly rooted and fishing village women who are engaged in fish selling activities (at the city market, in the mountain villages) are not exempted from these tasks. They are doubly burdened and want their husbands to share in the child-rearing tasks.

(2) Model Sites in the Outlying Islands (Lamahala Jaya, Sagu, Balauring, Lamalera)

Issues	Lamahala Jaya (73% of 500 households in the district are fishing households)	Sagu (77% of 440 households are fishing households)	Lewoleha (19% of 1,289 households are fishing households)	Balauring (100% of 107 households are fishing households)	Lamalera (100% of all households are fishing households)
Water Supply	Rely on well water (40-50 households/wells). Abundant water volume. Inflow of polluted water from upstream. Drinking water is purchased (Rp.20,000/month). Deep well construction cost: About Rp.1 million	Drinking water is piped into storage tank from water source. Each household fills their own plastic container for private use. Water is free. Abundant water volume. Well water is used for bathing and laundry.	About 30% of households have tap water, 60% use well water, 10% use river water.	Water is piped into 25 water tanks from the water source. Each household fills their own plastic container for private use. Water cost: Rp.500/household/month	Water is piped into 3 water tanks from water source. Each household fills their own plastic container for private use. Water cost: Rp.10,000/household/month
Road / drainage	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.
Toilets	About 50% of the households use the beach at the fish landing site.	About 40% of the households use the beach at the fish landing site.	About 60% of the households use the beach at the fish landing site.	About 60% of the households use the beach at the fish landing site.	All the households have toilets.
Garbage disposal	No garbage disposal rules in the village. Dispose garbage at the fish-landing beach. NGO activities have begun to improve the situation.	No garbage disposal rules in the village. Dispose garbage at the fish landing beach.	No garbage disposal rules in the village. Dispose garbage at the fish landing beach.	No garbage disposal rules in the village. Dispose garbage at the fish landing beach.	No garbage disposal rules in the village. Dispose garbage at the fish landing beach.
Electricity	90% of the households use electricity. Electricity is supplied 12-14 hours/day.	There is no electricity.	85% of the households use electricity. Electricity is supplied 20 hours/day.	85% of the households use electricity. Electricity is supplied 14 hours/day.	There is no electricity.
Primary education	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.
Self-help awareness	Community cleaning of public facilities, shared cost of deep well construction is possible, but no leaders to mobilize community.	Community cleaning of public facilities, shared cost of deep well construction is possible, but no leaders to mobilize community.	Community cleaning of public facilities, shared cost of deep well construction is possible, but no leaders to mobilize community.	Community cleaning of public facilities, shared cost of deep well construction is possible, but no leaders to mobilize community.	Community cleaning of public facilities, shared cost of deep well construction is possible, but no leaders to mobilize community.
Gender issues	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.	Problems were not raised.

Based on the above, the infrastructure conditions of the outlying islands are comparatively similar. The issues that have the most negative impact on fisheries activities at

each site, is the use of the fish landing beaches for garbage disposal and toilet use by the village residents. In addition, the lack of motivation by residents to improve conditions in the village is a social environmental problem that appears to be a shared characteristic of the model sites. Although primary education and gender related issues were not raised by the workshop participants, it is assumed that these problems exist since these sites are the most poverty-stricken areas in the district. It is surmised that they were not raised at the workshop because livelihood related issues tended to take precedence over other issues.

1.4 Development Issues

(1) Development Issues (East Flores District)

- a) Increase fish production volume by effectively utilizing the abundant fishery resources in the district, in particular 1) fisheries development based on coordination between fishery companies and fishermen associations, 2) development of large pelagic fisheries in the northern and southern coastal waters, and 3) develop a surveillance and management system for the coastal fishing grounds.
- b) Reduce the economic losses after the fish catch has been landed and establish a stable and increased fish supply to the district market and central and west Flores region. In particular, an important development issue is to improve fresh fish storage and shipping methods of Larantuka as a supply point and to improve the quality of processed products during the peak fishing season.

(2) Development Issues (Lembata District)

- a) Increase fish production volume by effectively utilizing the abundant fishery resources in the district, in particular 1) develop fisheries with the cooperation of the fisheries companies and the fishermen association, 2) develop large pelagic fisheries in the northern and southern coastal waters, and 3) establish a management and surveillance system for the coastal fishing grounds.
- b) Reduce the economic losses after the fish catch has been landed and establish a stable and increased fish supply to the inland area and central and western Flores region. In particular, an important development issue is to improve the fish transport network that is linked to Larantuka and to improve fish storage and processing methods that meet local demand.