

4.4 Plan for Improvement of Fisheries Infrastructure

4.4.1 Development Concept

(1) Condition for development

All fish landing places in the planned area are categorized in Type D fishing port (PPI) and are used for small-scale fishing activities except in Labuhan Lombok (NTB) and Kupang (NTT) which are categorized in Type-C fishing port. Accordingly the objective fish landing places in this plan are also planned to support the fishing activity in limited area. The functions, scale, correlation among related area are considered in the planning for the role of core center for the area, and independent center in the area.

(2) Development Policy

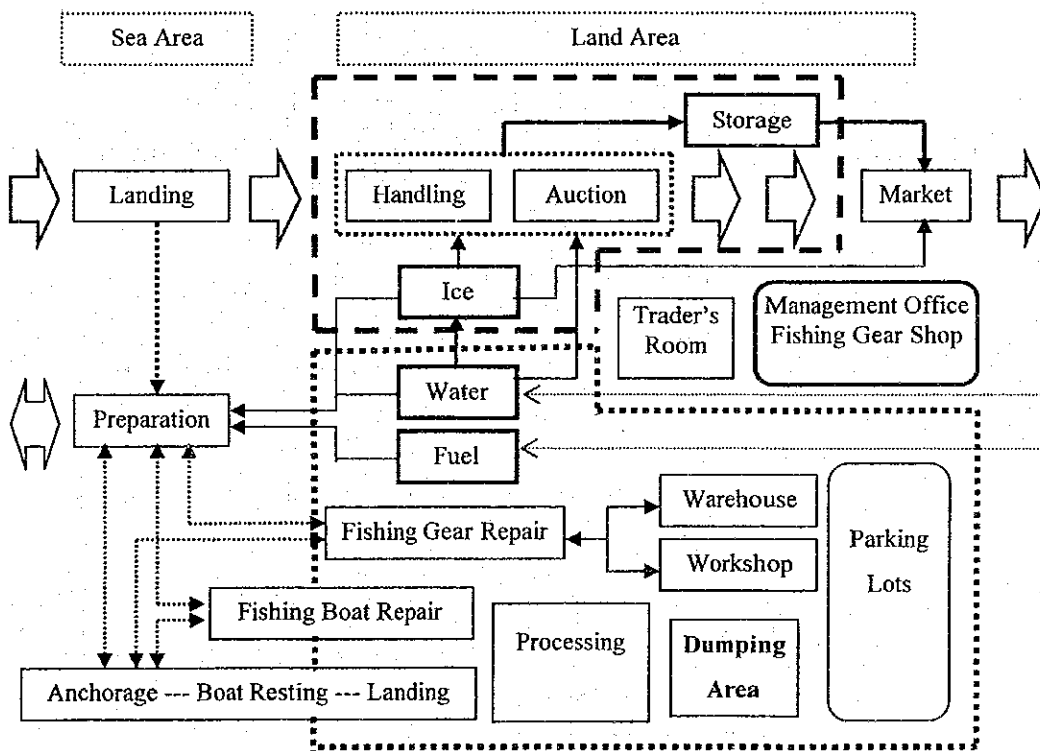
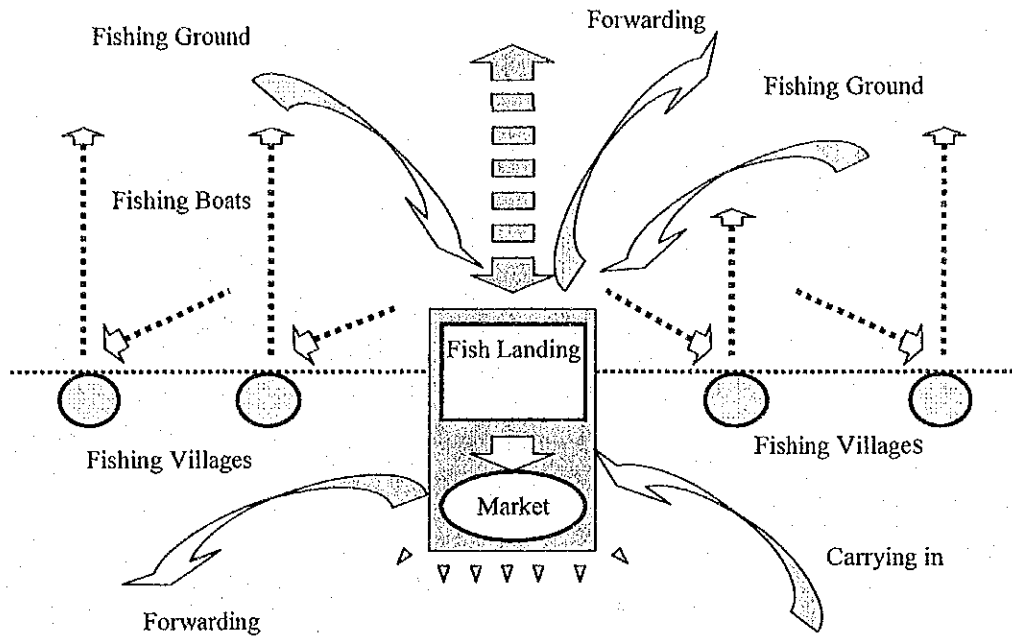
The main role of fisheries infrastructure is support fishery activities. The fisheries infrastructure development is aimed to create the regional fishery bases focusing on marketing and other fishery activities, not only the working environment by upgrading of safety, efficiency and convenience, but also to strengthen the functions as the core base for various activities of the community.

The fish landing places in the study area are to be classified by a) roles and functions in consideration of the correlation with the surrounding area, b) types and scales of fishing activities, and to formulate the improvement plan by each type. This approach would lead to the appropriate development of fishery infrastructure along with the coastal village community.

1) Classification by roles and functions

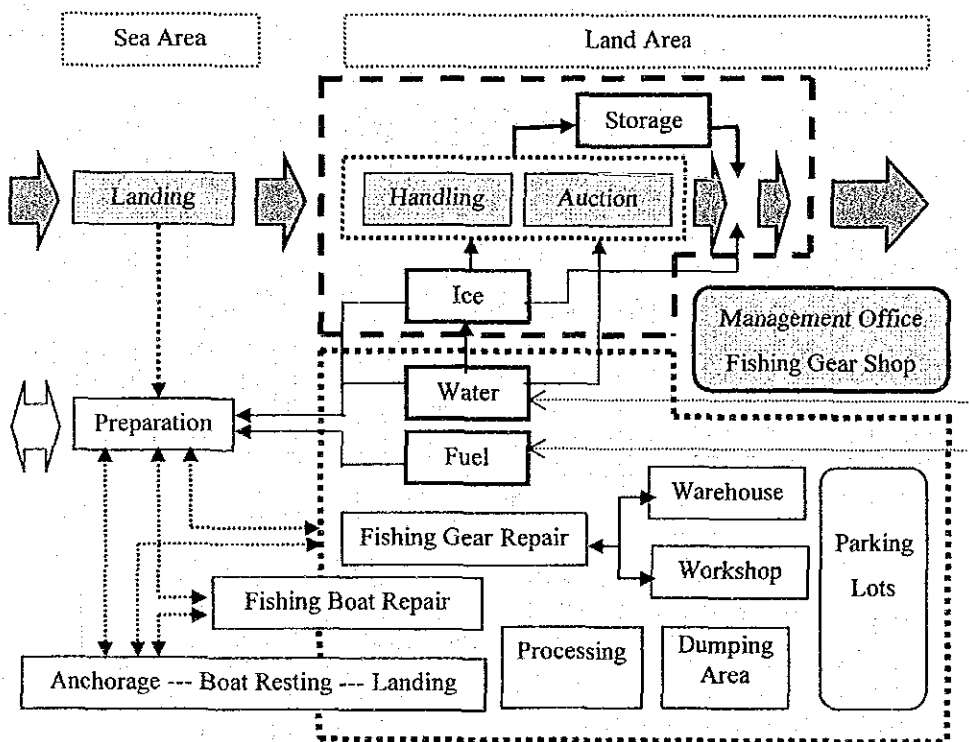
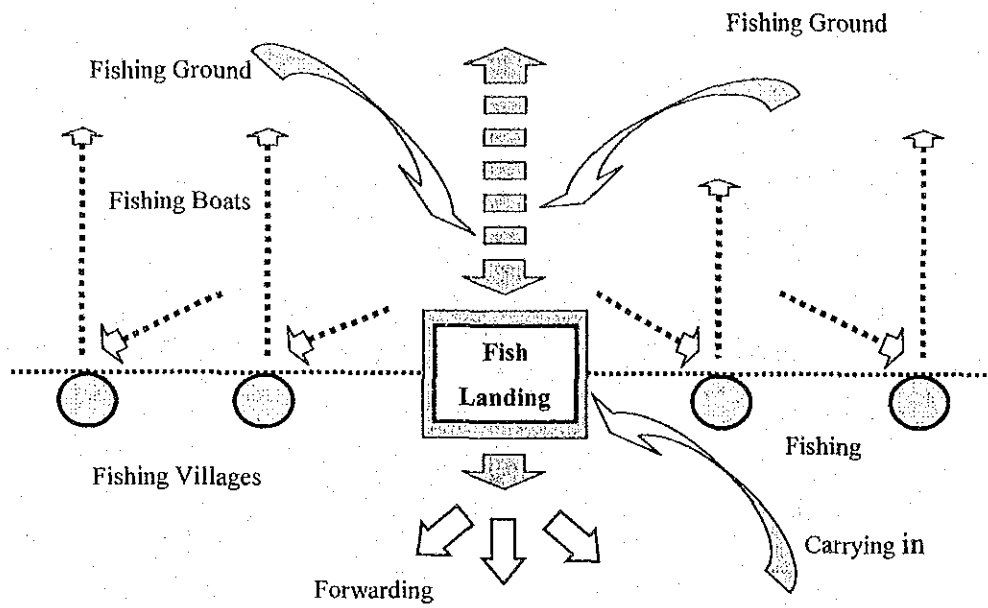
Type	Characteristics
Type-I Urban Fish Landing Base & Marketing Center	Attached to market and big landing volume (more than 1,500 tons/year), located in urban area. Improvement of landing and preparing facilities to be able to use simultaneously for plural fishing boats. Improvement of supporting facilities for marketing and forwarding.
Type-II Fish Landing Base and Forwarding Center	Major production base and big landing volume (more than 1,500 tons/year), located in rural area. Improvement of landing, preparing and resting facilities for local fishing boats. Improvement of supporting facilities for forwarding.
Type-III Rural Fish Landing Base	Village type and small landing volume (less than 1,500 tons/year), mainly located in rural area. Supplementary type, landed at Types-I & II. Improvement of landing, preparing and resting facilities for local fishing boats.

Conceptual charts of functions and facilities for each type are shown in the following pages.

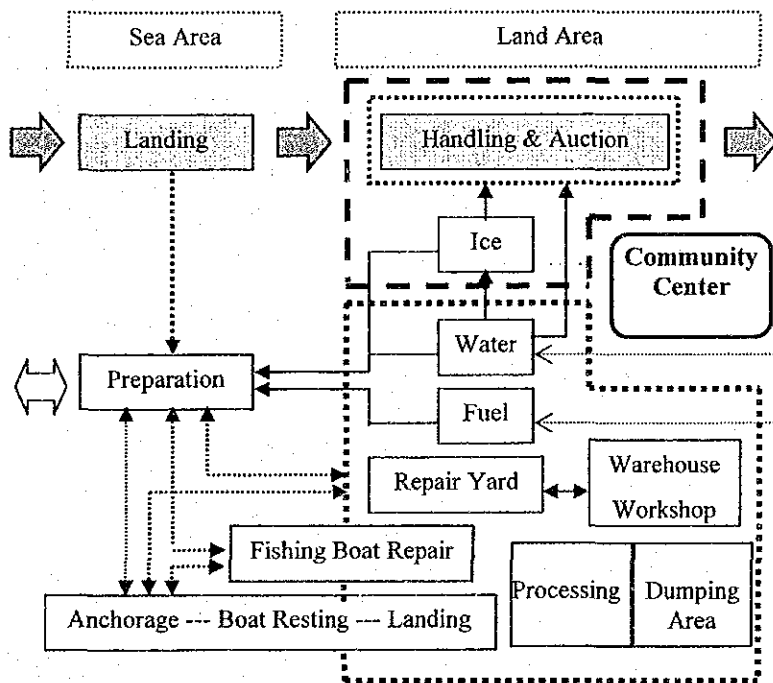
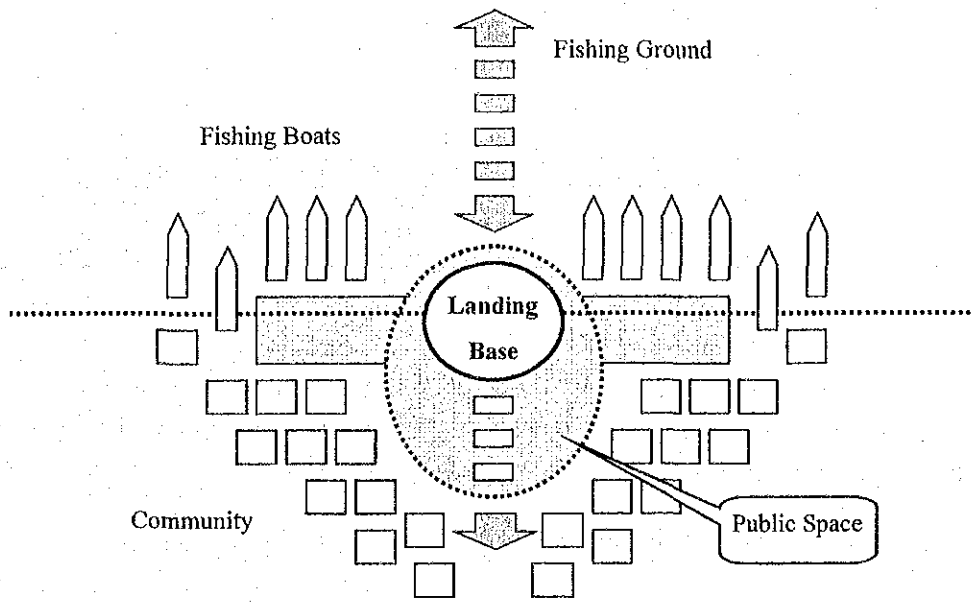


■■■Type-I (Urban Fish Landing and Marketing Center) ■■■

Conceptual Charts of Roles and Functions for Each Type (1/3)



■■■ Type-II (Fish Landing and Forwarding Center) ■■■
 Conceptual Charts of Roles and Functions for Each Type (2/3)



■■■ Type-III (Rural Fish Landing Base) ■■■

Conceptual Charts of Roles and Functions for Each Type (3/3)

2) Classification by type of fishing activities

Fish landing places will be classified by fishing activities, and improved in accordance with fishing scale at each site.

Type	Type of fishing activities	Present level of Fishing activities
1	Large Scale Fishing Activities	More than 100 motorized boats except Bagan-type
2	Middle Scale Fishing Activities	50-100 motorized boats except Bagan-type
3	Small Scale Fishing Activities	Less than 50 motorized boats except Bagan-type

3) Network of fishery infrastructure

Fish landing places in study area will be classified by roles, functions and type of fishing activities mentioned above. Coastal community development will be advanced by zoning and networking in study area based on these circumstances.

Zoning and networking in study area are shown in the following page.

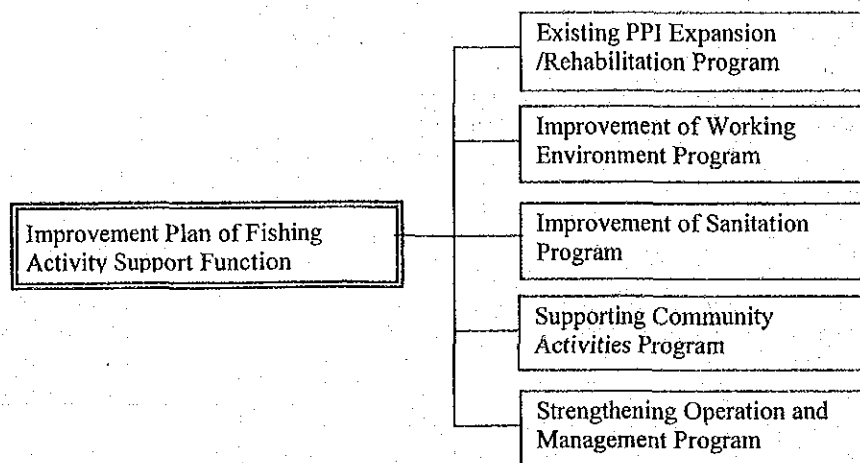
Zoning and networking of fishery infrastructure

Zone	View of networking	Base port	Note
Lombok - Sumbawa	Fish landing places are located facing Alas straight. Labuhan Lombok will be a base port of wide area. Tanjung Luar and Labuhan Lalar will be base port for fishing activities in the zone, and cooperate with the other fish landing places (Type-III). Teluk Santong will be a base port for surrounding area. Sumbawa Besar will be independent port.	Labuhan Lombok, Tanjung Luar, Labuhan Lalar Teluk Santong	
Dompu	Soro (Kempo) will be a base port for Teluk Saleh. Hu'u will be a landing base for south coast of Sumbawa island, and forward to Dompu cooperating with other landing places (Type-III) in Teluk Cempi,	Solo (Kempo), Hu'u	Soloadu (PPI) will be a supplementary port in consideration of fishing activity and insufficient marketing function.
Bima	Rompo (Waworada) and Sape will be base port for Tel. Waworada and Tel. Sape respectively, and forward to Bima cooperating with other landing places (Type-III) in the each area. Bima will have mainly marketing function, landing place (Tanjung) will be as Type-III.	Rompo (Waworada), Sape	
Manggarai - Ngada	Labuan Bajo will be a base port for surrounding area and cooperate with other landing places (Type-III). Kotajoko will be a forwarding base to Bajawa. Fish landing places (Type-III), except Labuan Bajo will be improved compactly as independent landing places.	Labuan Bajo, Kotajoko	
Ende-Sikka	Paupanda and Maumere (Kalimati) will be base port for south coast and north coast respectively and forward to marketing area on hinterland cooperating with other landing places (Category-C) in each area.	Ende, Maumere	Maumere (PPI) will be a supplementary port in consideration of location and marketing function.
Flores Timur -Lembata	Oka (Laratunka) will be a center for surrounding islands, and forward to marketing area cooperating with other landing places (Type-III) in each area. Lamahala Jaya will be a landing base for inland sea fishing.	Oka (Larantuka), Lamahala Jaya	
Alor	Kalabahi will be a base port for fishing activities in the zone, and forward to marketing area on hinterland cooperating with the other fish landing places (Type-III).	Kalabahi	
Sumba	Waingapu and Waikero will be a base port for fishing activities in the zone, and forward to marketing area in Sumba Island.	Waingapu, Waikero	
Kupang	Kupang will be a base for wide area. Sabu and Baa will be landing base for small-scale fishing in island.	Kupang	

The network of fishery infrastructure is shown in Figure 4.4.1

4.4.2 Development Plan

The development plan of fisheries infrastructure is composed as follows.



(1) Improvement Plan of Fishing Activity Support Function

1) Objective

The objectives are to effectively utilize fish landing places and to activate fishing activities of each area, by providing the support facilities having the appropriate roles and functions.

2) Contents

Each fish landing sites would be classified into the following 3 types by roles and functions, and the network in consideration of linkages with the adjacent villages would be established in each zone.

The necessity of functions and facilities of each type of fish landing site would be determined. Then, the scale of facilities shall be designed according to type and scale of fishing activities at the site.

Urban Fish Landing and Marketing Center (Large Scale)

Function	Necessity	View Points of Necessity	Application of Necessity	Improvement of Facilities	
				Basic Facilities	Functional Facilities
Landing and Handling	High	Landing & handling are main function. To be able to land limited time	In case of large number of small fishing boats, necessity of simple mooring facilities for small boats shall be high.	Breakwater*, Mooring Facilities, Revetment,	Fish handling shed, Marketing hall, Ice plant, Ice/Fish storage,
Preparation	High	Target are both local fishing boats and from other areas.	If fishing boats from other area are prepared their own site, necessity shall be medium.	Slipway, Simple mooring facilities for small boats	Fuel depot, Water tank, Warehouse, Open pile yards, Fishing gear repair & drying yards, Boats repair yards, Parking lots
Resting	Low	Target is only local fishing boats, mainly anchored or landed on beach.	In case of resting fishing boats from other area and difficult anchoring or landing on beach, necessity shall be medium.		
Repair	Medium	Target is only local fishing boats.	In case of repair fishing boats from other area and large number of net fishing, necessity shall be high.		
Marketing and Forwarding	High	Marketing & Forwarding are core functions.			
Storage	High	To control forwarding	If fish will be forwarded immediately after landing by type of fishing activities, necessity shall be low.		

Note: 1) Bold-faced letters are higher necessity (importance).

2) Storage function shall be changed by type of fishing activities (type of fishing method, fish pieces, relation to market, etc.) at each site.

Fish Landing and Forwarding Center (Large Scale, Medium Scale, Small Scale)

Function	Necessity	View Points of Necessity	Application of Necessity	Improvement of Facilities	
				Basic Facilities	Functional Facilities
Landing & Handling	High	Landing and handling are main function. To be able to land in limited time	In case of large number of small fishing boats, necessity of simple mooring facilities for small boats shall be high.	Breakwater, Mooring Facilities , Revetment , Slipway , Simple mooring facilities for small boats	Fish handling shed , Marketing hall, Ice plant , Ice/Fish storage , Fuel depot , Water tank, Warehouse , Open pile yards , Fishing gear repair & drying yards , Boats repair yards , Parking lots
Preparation	High	Target are both local fishing boats and from other areas.	If fishing boats from other area are prepared their own site, necessity shall be medium.		
Resting	Medium	Target is only local fishing boats. In case of fishing boats mainly anchored or landed on beach, necessity shall be low.	In case of resting fishing boats from other area and difficult anchoring or landing on beach, necessity shall be high.		
Repair	High	Target is only local fishing boats.	In case of repair fishing boats from other area and large number of net fishing, necessity shall be high irrespective of scale.		
Forwarding	High	Forwarding is core function	-		
Marketing	Low	For local consumption	In case of large local consumption site, necessity shall be medium. To be use handling hall at small local consumption site.		
Storage	High	To control forwarding	If fish will be forwarded immediately after landing by type of fishing activities, necessity shall be medium		

- Note: 1) Bold-faced letters are higher necessity (importance).
 2) Storage function shall be changed by type of fishing activities (type of fishing method, fish pieces, relation to market, etc.) at each site.
 3) In case of large number of fishing boats from other areas, the necessity and scale shall be reconsidered based on the total number of fishing boats.

Rural Fish Landing Base (Large Scale, Medium Scale, Small Scale)

Function	Necessity	View Points of Necessity	Application of Necessity	Improvement of Facilities	
				Basic Facilities	Functional Facilities
Landing and Handling	High	Landing and handling are main function. To be able to land in limited time	In case of large number of small fishing boats and landing mainly on beach, necessity shall be medium. Simple mooring facilities for small boats shall be necessary.	Breakwater*, Mooring Facilities, Revetment, Slipway, Simple mooring facilities for small boats	Fish handling shed, Marketing hall, Ice plant, Ice/Fish storage, Fuel depot, Water tank, Warehouse, Open pile yards, Fishing gear repair and drying yards, Boats repair yards, Parking lots
Preparation	High	Target is only local fishing boats.	Necessity shall be medium at mainly 1 day fishing sites, because of unnecessary of ice supply.		
Resting	Medium	Target is only local fishing boats, mainly anchored or landed on beach.	In case of resting fishing boats anchoring or landing on beach, necessity shall be low.		
Repair	High	Target is only local fishing boats.	Necessity shall be high irrespective of scale at large number of net fishing sites.		
Marketing	Low	For local consumption	In case of large local consumption site, necessity shall be medium. To be use handling hall at small local consumption site.		
Storage	-	No necessity for only local consumption			
Forwarding	Low		Unnecessary at mainly local consumption. Necessity shall be low in case of forwarding to outside.		
Supporting Daily Life	High	Site as isolated village where sea transportation is needed.	Simple multi-purpose mooring facility is necessary in case of no mooring facilities for landing as small fishing scale site		

Note: 1) Bold-faced letters are higher necessity (importance).
2) Storage function shall be changed by type of fishing activities (type of fishing method, fish pieces, relation to market, etc.) at each site.

The concept and policy of improvement at each type are as follows.

- Bold-faced letters on the above tables are higher necessity (importance).
- Necessities of each function mentioned above are standard criteria, subject to the change by condition of each site.
- Breakwater will need high cost under severe natural condition. Breakwater shall be improved in case of low improvement cost (high benefit/cost ratio).
- Type and structure of basic facilities to be applied based on the natural conditions are classified as given in Section (3) "Improvement of Working Environment Program".

Improvement cost for basic facilities shall be differed by natural conditions of each site. Basic facilities shall be improved step-by-step according to the B/C ratio. In case of same B/C ratio, higher priority shall be given to the facilities yielding higher benefits.

- In case of Bagan-type fishing boats, landing method shall be kept transportation by dugout boats and canoe. Landing facility for Bagan-type fishing boats shall not be improved.
- In case of large number of small fishing boats and landing mainly on beach, landing facilities shall be lower necessity.
- In case of large number of motorized boats and net fishing such as purse-seine, gill-net, etc., the repair facilities for fishing gear and boat shall be highly necessary.
- Slipway for boat repair shall be low necessity at sandy beach.

(2) Improvement Plan of Effective Use of Existing PPI

1) Objective

The objective is to improve the functional facilities for effective use as fishery base for landing and marketing in existing PPI.

2) Contents

Existing facilities, which are old ramshackle, broken and/or difficult to use, would be improved and rehabilitated up to the required level. Functional facilities would be installed to activate fish handling and marketing activities. Landing facilities, such as simple jetty, revetment, stairs, etc., would be attached to enable small fishing boats to moor in consideration of the natural conditions.

(3) Improvement Plan of Working Environment

1) Objective

The objective is to create suitable working environment for the fishery activities at the sites where fishermen are compelled to do heavy work by the effect of natural condition.

2) Contents

Topographic Condition	Policy of Improvement
Littoral sand drift	Gravity-type structures are unsuitable for sandy beach, since coast line would be deformed by littoral sand drift. Piled pier is suitable for mooring facility in order to keep littoral current.
Shallow and tidal flat	Mooring facilities are combined with jetty and piled pier to secure required water depth. However, short length of pier is high utilization than longer in working efficiency. Pier length is restricted by protruding land facilities in order to be over length.

Sea Condition	Policy of Improvement
Big tidal height	Mooring facilities (pier, jetty, quay wall, etc.) are to be improved to meet requirements for water depth and crown height for maximum use of boats.
Swells & long period waves	Large scale with high cost would be necessary to improve basic facilities, such as big breakwater, to meet long period wave & swell.
Location	Policy of Improvement
Stilt houses close on coastline	Public space shall be created to use for all village people on coastline. Stone-type revetment is improved along coastline to secure accessibility between sea and main community road, and to secure mooring for small fishing boats. A part of public space is provided as slipway for small fishing boats to use under stilt houses floor as warehouses.
Houses behind beach	Present fishing activities shall be maintained since the small fishing boats are currently lifted on to the beach.

(4) Improvement Plan of Sanitary Environment

1) Objective

The objective is to improve the sanitary environment to upgrade fish quality/freshness and sanitation at fish landing sites.

2) Contents

Line of flow shall be divided for fish, people and vehicles in PPI. To improve in quality/freshness of fish and sanitary condition, the facilities such as handling hall (including floor and roof), drainage, water and ice supply facilities, dumping area, etc., would be improved in the course of activities from landing to forwarding of fish.

(5) Improvement Plan of Support Function for Community Supporting Community

1) Objective

The objective is to support community activities by improvement of facilities and creation of common space in fish landing sites as community center.

2) Contents

Public space would be created to use for all village people. Community road and drainage system would be improved at the landing place closed to village. Fresh water would be supplied to the site as needed. Stone-type revetment would be improved along coastline to secure accessibility between sea and main community road, and to secure mooring for small fishing boats. A part of public space would be used as slipway for small fishing boats and warehouses.

(6) Improvement Plan of Operation and Management System

1) Objective

The objective is to operate and manage the fisheries complex on self-sufficient level, and to accelerate the strengthening of fisheries organization.

2) Contents

Basic facilities, such as jetty, revetment, land, etc., would be managed by

district fisheries office.

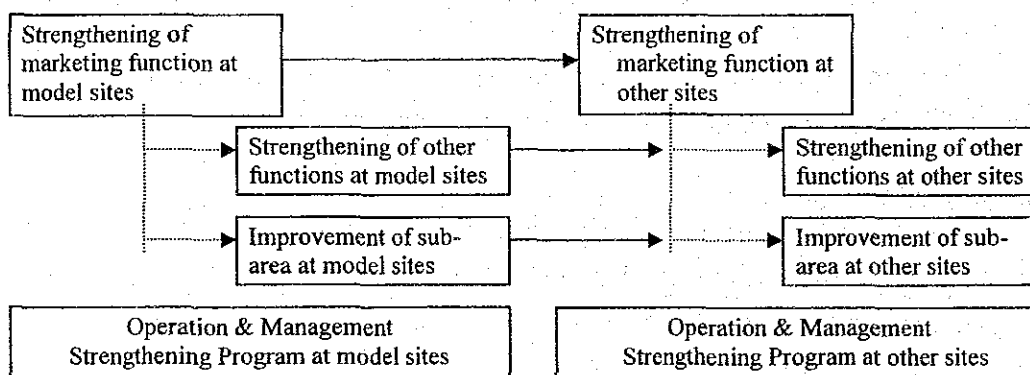
Operation, management and maintenance of functional facilities, such as water/ice/oil supply facilities, storage, etc., would be entrusted to fisheries cooperatives based on community.

Collection of fish landing data would be carried out by community under the guidance of District Fisheries Office. Collected data would be effectively used for monitoring and evaluation of activities so as to lead to the sustainable utilization of facilities. Charge for water/ice/oil supply and use of facilities would be revolved with the facilities for operation on self-sufficient basis.

(7) Development Procedure

Improvement of infrastructure would be executed at each model site but depends on the existence of well-organized cooperatives. Other sites would be improved by applying the results at the model sites.

At each model site, the priority would be given to the strengthening of marketing function according to the roles of fish landing sites. Then, other functions shall be improved based on the combined sub-program at each model site.



4.5 Plan for Improvement of Fishing Village Environment

4.5.1 Basic Policy

Fishing villages are classified according to two types of location and village effectiveness. Villages where fishermen's houses are specifically concentrated in one specific area either in a rural or urban setting will be targeted, whereas fishermen households scattered within a city such as Paupanda (Ende), Kalimati (Sikka-Maumere) will not be

targeted. Targeted fishing villages will be classified according to the three types as shown below.

- Type-A: Coastline of village is covered private simple stone-revetment to protect stilt houses. Low accessibility to coastline from main community road because of covered with private space.
- Type-B: Space of coastline is used for fishing activities.
- Type-C: Low accessibility to coastline from main community road.

4.5.2 Fishing Village Environment Improvement Plan

(1) Working Environment Improvement Plan

1) Objective

Almost all fishing villages in the Study Area are involved in coastal fishery activities using the village-front beach as fish landing site, so that the coastline plays an important role in their fishing activities. Working environment would be improved to support fishing activities in consideration of locations. Furthermore, fish landing sites play an important role as center of community gathering of people, information and many things.

Improvement of fishing village environment corresponding to location will support fishing activities in the village.

2) Contents

Type of Fishing Village	Level of Improvement
Stilt houses build on coastal line	Creation of public space along coastline for fishing activities such as securing high accessibility and mooring fishing boats. Improvement of stone-revetment road on coastline to secure high accessibility between coastline and main community road. Stone-revetment would be improved so as to have mooring function for small fishing boats (out-rigger and dug-out boats). Slipway for small fishing boats would be improved on part of stone-revetment.
Houses build behind coastline	To secure public space for fishery and community activities, such as shipbuilding and repairing, on sandy coastline.
Houses build on slope along coastal line	Improvement of road and stairway to secure high accessibility between coastline and main community road.
Isolated village	Improvement of transportation network in wide area to support of fishing activities. The isolated village where fishing activities are depended on sea transportation would be improved with simple multi-purpose jetty.

(2) Plan to Improve Living Environment

1) Objectives

The objectives are to improve the living environment of the fishing villages in terms of convenience, safety and sanitation and to reduce the time spent by fishermen on manual labour and enable fishermen to engage in fishing activities. The improvement plan is comprised of measures to improve sanitation, safety and convenience.

2) Content of the Plan

Measures to prevent flooding in the village during the wet season, to develop a drainage system to prevent household wastewater from accumulating in the village (the community will be responsible for improving the drainage along narrow paths and around the wells), and a garbage incinerator in conjunction with the fish landing sites is planned.

In terms of improved safety and convenience, a revetment will be constructed to provide access along the coast and to act as a breakwater against the wave erosion of residential land, wind waves and flooding of the village. Access between the arterial road and the fishery activity site (fish landing, coastline) will be created. For isolated villages, a multipurpose pier will be provided to improve the convenience and support for daily fishery activities.

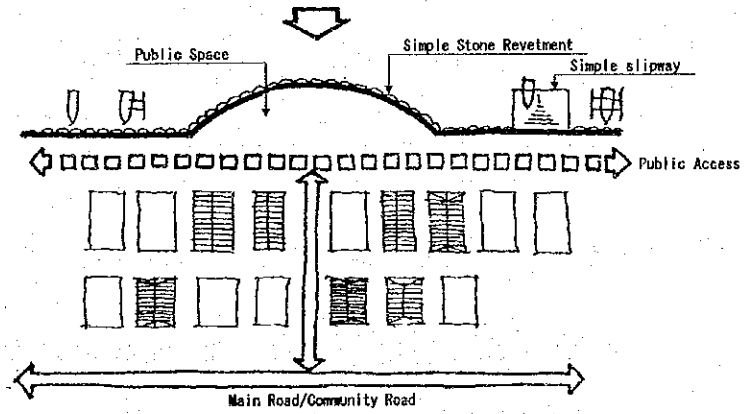
A water supply facility will be provided for areas with a shortage of drinking water and water for fishery activities and where inordinate labour of water transport is required. The community will be responsible for pumping water from wells and improving the efficiency of transporting water. In order to discourage the use of beach area as toilet, public toilets will be planned.

Improvements

The improvements include protective revetment for the sub-village (with mooring facilities for small fishing boats), public multipurpose area, village road (access road), arterial drainage ditch, water supply facility, garbage disposal, incineration area (land), and public toilet.

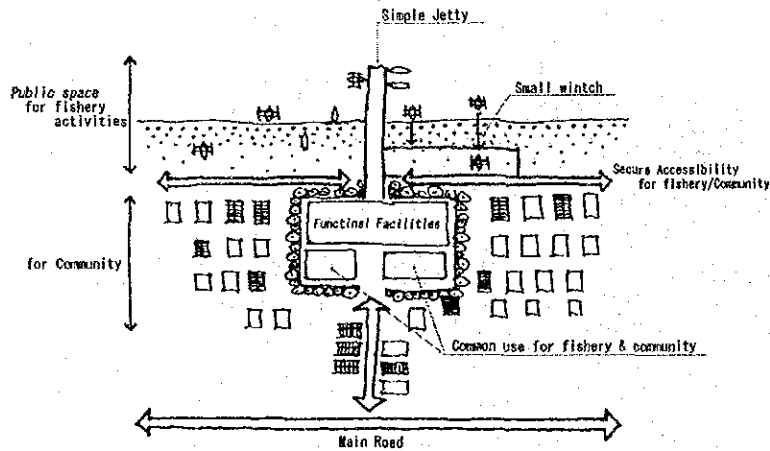
(a) Type-A: Houses are built up to the shoreline (the coastline is owned by individuals)

For villages facing the beach, a public space for use by the entire village will be created. A stone revetment will be built parallel to the beach and access between the arterial road in the village and the beach will be created. A general diagram showing the stone revetment for mooring by small fishing boats and the access road is given below.



(b) Type-B: A sub-village is located on level land behind the shoreline (the beach is public land).

The sandy beach will be secured as public space for fishery and daily life activities. A general outline of the improvements is shown below.



(c) Type-C: The sub-village is located on inclined land behind the shoreline (the beach is public land).

Access will be created between the beach, sub-village, and arterial road.

Type of Village	Content of the Plan
Houses are built up to the shoreline (the coastline is owned by individuals)	The access to the shoreline will be improved, protective revetment for the village (against the erosion of land, wind waves and flooding of the village), prevent flooding of the village during the rainy season, construct drainage ditches along the arterial roads to improve sanitary conditions (drainage along small roads and for individual houses will be the community's responsibility), garbage disposal site combined with landing facilities
A sub-village is located on level land behind the shoreline (beach is public land).	Prevent flooding of sub-village during rainy season, construct drainage ditches along the arterial roads to improve sanitary conditions (drainage along small roads and for individual houses will be the community's responsibility), garbage disposal site combined with landing facilities
The sub-village is located on inclined land behind the shoreline (the beach is public land).	Access will be created between the beach, sub-village, and arterial road.
Isolated sub-village	A multipurpose pier will be constructed.
Other	A water supply facility will be provided for areas with a shortage of drinking water and water for fishery activities and where inordinate labour of water transport is required.

(3) Promote Community Activities and Extension Plan to Improve Fishermen Awareness

1) Objectives

To effectively utilize the improved basic infrastructure (hardware), the awareness of the importance of joint activities by the local community is essential (institutional aspects). Therefore, measures will be implemented to foster the community's awareness of the need to implement joint community activities to improve and maintain the village and living environment. The educational activities will target the entire village. Kolo (Bima district, NTB province) and Mokantara (East Flores Island, NTT province) have been selected as priority model areas for this plan.

2) Content

Measures to improve the village road, the village drainage network, greenery in the village, separations between the road and the houses, hedges, and other joint community activities to improve the environment will be implemented. These community activities will help to faster the residents' awareness about shared activities.

The following measures will be implemented to improve the sanitation environment, convenience and comfort of the living environment.

- Conduct educational activities needed to improve the daily living environment as a regional community.
- Promote sub-village improvements through community activities.
- Promote regular cleaning of village roads and drainage ditches.
- Conduct activities to educate the residents about improving their sanitation environment by setting up garbage disposal sites and improving the practice of living with livestock.

4.6 Plan for Improvement of Fishermen Organization and Fisheries Extension

4.6.1 Development Issues and Policy

(1) Development Issues

The government took keen interest to form and establish organizations through various decrees in order to assist fishermen, and to enable them to undertake the required functions of a cooperative, such as procurement of fishing needs, fishermen household needs, and credit for fishermen, fish marketing, etc. However, the fishermen organizations could fulfil only some of the needs of the stakeholders, as the organizations are generally ill-managed and inefficient in their activities. This situation is due to several weakness and issues, as summarized below, facing the fishermen organizations. In addition, the government has also neglected its role to facilitate, extend technical support and to monitor their activities.

- Organizations are not well managed and inefficient in organizational structure, lack or none in community spirit and not self-reliant and depend on the government to resolve their issues.
- Low membership and lack of support from fishermen themselves due to lack of awareness and understanding of the function and benefits of cooperatives.
- Lack of leadership capability and lack of management skill to administer and organize activities.
- Fisheries cooperatives have weak financial base (for operation and investment) due to lack of economic activities and low saving ability.
- Generally fishermen and fisheries cooperatives have no creditability with private finance sources for credit and loans.
- Lack of experience and skill to manage and operate facilities and infrastructure on the part of fisheries officers.
- Minimum or non-existent of technical support from extension services
- Lack of skill manpower for fisheries extension as the extension workers are mainly trained for agriculture extension.

(2) Development Policy

The fishermen and their organizations are to play an active role in the proposed programs, and therefore, it is of utmost importance that they are strengthened to function as a self-reliant and autonomous body. The development policies that are needed to counter the above weaknesses and issues and to foster an independent and self-reliant fisheries organization are as follows.

- Organize and strengthen the organizations for an effective and efficient administration and management with appropriate representation of the stakeholders
- Raise awareness among fishermen on the role of mutual assistance, its benefits and opportunities
- Impart training and education to increase skill and knowledge of members and provide management and leadership training to leaders.
- Employment of a capable and competent person (not a fisherman) as a “facilitator and mover” by the organization for day-to-day operation and management of activities.
- Establishment of independence and self-reliance in operation and management of common-use facilities and infrastructure.
- Strengthening financial base by mobilizing membership fee collection, mutual savings, and generating revenue (collection of users’ fee) through economic activities.
- Set up an extension service unit within district fisheries office to conduct extension, monitor and evaluate the activities.

4.6.2 Development Plan

The development plans to resolve the weaknesses and issues facing the fishermen organizations and fisheries extension are listed below. The objectives are to strengthen the organizations to function as an independent and self-reliant body and to get the stakeholders fully and actively involve at every stage of planning, implementation and operation.

Development Plan	Purpose of the Plan	Required Tasks	Implementing Body
Strengthening of Fisheries Organization	<ul style="list-style-type: none"> - Organize and strengthen the organization for an effective and sustainable administration and management system - Educate and strengthen the need for mutual assistance and the benefits 	<ul style="list-style-type: none"> - Mobilize and identify problems and needs of the identified group or community - Raise awareness among members on the role of mutual assistance and its benefits & opportunities - Raise the understanding of constraints & issues in fisheries sector and government's role - Educate on the benefits of resource management and conservation - Strengthen administrative and managerial capacity 	District Fisheries Office District Cooperative Office
Activation / Expansion of Economic Activities	<ul style="list-style-type: none"> - Promote economic activities such as fish marketing, sales of fuel & ice, etc. - Form users groups that will be responsible for facilities and equipment to promote sense of ownership and responsibility 	<ul style="list-style-type: none"> - Educate members of business skills and/or employ able manager to initiate and guide - Share the cost of facility (equity) - Formulate O/M system of facilities & equipment - Educate on management (bookkeeping, accounting) 	District Fisheries Office District Cooperative Office
Improvement of Financial Base and Establishment of Credit (Revolving Fund)	<ul style="list-style-type: none"> - Promote and encourage mutual savings/credit to offset the shortage of fund for operation and investment as well as to gain creditworthiness or trust from formal fund sources 	<ul style="list-style-type: none"> - Awareness of the need for own savings and its benefits - Educate the concept & benefit of revolving credit - Formulate steps to mobilize savings/deposits of members 	District Fisheries Office District Cooperative Office Local Development Bank
Improvement of Extension Services in Fisheries	<ul style="list-style-type: none"> - Institutional strengthening of the fisheries extension services and capacity of extension staff in planning, formulating and implementing extension services and training 	<ul style="list-style-type: none"> - Establish a well-equipped extension sections within Dinas (at district level) - Provide training in extension methods and approach oriented to fisheries - Provide in-house and in-country training 	District Fisheries Office DIKLAT BIPP IPPTP

4.6.3 Collaborative Management System for Self-Reliance of Fishermen Organization

Under the current situation for the weaknesses and issues indicated above, the fishermen organizations can not utilize efficiently and effectively the facilities and equipment, and function independently without assistance and guidance. Therefore, a concerted effort of relevant institutions is essential to assist in the collaborative management of the organization in order to strengthen and achieve self-reliance. A system for collaborative

management is shown in Fig. 4.6.1, and the strengthening approach and achievement target is summarized in Table 4.6.1. The expected roles of relevant institutions for strengthening fishermen organizations are schematically shown in Fig. 4.6.2 and are summarized in Table 4.6.2.

4.6.4 Implementation Plan

The plans will be implemented at the initial stage in the selected model area and then it will be extended to the other model areas at later stage. At the initial phase of the implementation, the pre-requisite is to implement the strengthening of the organization in order to raise awareness and understanding of the cooperatives roles and benefits prior to commencing the other relevant activities. In the overall implementation of the plans, the various roles of respective institutions as indicated in Table 4.6.2 must be coordinated and conducted on timely manner.

4.7 Educational and Training Plan

4.7.1 Development Policy

On the basis of the sector review and the issues and constraints that have been identified, one of the development needs is the educational and training in different sectors. Lack of adequate, appropriate and timely education and training for fishermen have hindered the development of small scale fisheries and the progress of the fishermen organizations. Educational and training of target beneficiaries is very essential to achieve the anticipated results. The basic policies are:

- to develop human resources with adequate skills and know-how to ensure a sustainable development and management of the project,
- to foster and strengthen the core members of fishermen organization and fisheries officers with a wide vision in economic activities,
- to change the mindset of the members to be self-reliant and independent in their activities and to resolve their problems and not to be entirely dependent on the government agencies.

4.7.2 Development Plan

The proposed educational and training plan is in line with the strategy and policy outlined in the national and provincial development plans. The development approach is as follows

- to utilize fishing communities and fisheries officers self-help potential to improve their living standard and income while participating in the proposed sector activities,
- to utilize the courses and programmes available in relevant institutions and agencies

(District/Provincial Fisheries Offices, Provincial/District cooperative offices, DIKLAT, IPPTP, training centres, etc.).

- To solicit services and assistance of NGOs for informal education and training on basis of needs and requirements for illiteracy eradication, welfare activities, micro-credit, etc.

The proposed educational and training plans are shown in the Table 4.7.1, and a summary of it is shown in the following page.

Development Plan	Contents of Education/Training	Method	Target Groups
Improvement Plan of Fishermen Organization and Fisheries Extension	<ul style="list-style-type: none"> - Leadership, managerial and administrative skill - Record keeping, and accounting - Concept and benefit of savings and revolving fund - Subject matters related to fisheries (data collection, resource management, marketing, processing, sanitary, etc.) 	<ul style="list-style-type: none"> - On-Job-Training (OJT) - Prepared materials for distribution - Audio-visuals - Observation trips (field visits) 	Members of Fisheries cooperative, District fisheries staff members Leaders of community
Improvement of Fishing Technology and Coastal Resources Management	<ul style="list-style-type: none"> - Modernization of fishing boats and fishing gears (for diversification of fishing grounds (to offshore and under exploited coastal waters) - Coastal resources management and conservation - Fisheries data collection method 	<ul style="list-style-type: none"> - On-Job-Training (OJT) - Prepared materials for distribution - Audio-visuals - Study tour and exposure to on-going projects in resource management 	Fishermen and District fisheries staff
Improvement of Fish Marketing and Processing	<ul style="list-style-type: none"> - Fish handling and marketing (on board, landing & transport), preservation and use of ice - Sanitary and hygiene standards - Fish processing (new products) 	<ul style="list-style-type: none"> - On-Job-Training (OJT) - Prepared materials for distribution - Short training courses - Audio-visuals 	Fishermen, traders, District fisheries staff
Improvement of Fisheries Infrastructure	<ul style="list-style-type: none"> - Operation and maintenance of facilities and equipment - Efficient and effective use of facilities and equipment - Sanitation and cleanliness of the area 	<ul style="list-style-type: none"> - On-Job-Training (OJT) - Prepared materials for distribution - Audio-visuals 	Fishermen, traders, district fisheries officers
Improvement of Fishing Village Environment	<ul style="list-style-type: none"> - Instill responsibility for periodical cleaning and maintenance of community facilities - Fostering awareness for community oriented self-reliance and independency - Raise awareness on sanitation and hygiene 	<ul style="list-style-type: none"> - Prepared materials for distribution - Audio-visuals 	Whole community
Improvement of Aquaculture Technology	<ul style="list-style-type: none"> - Pond ecosystem, breeding, nursing and rearing of selected species - Establish extension system for aquaculture techniques - Fish disease identification and prevention system 	<ul style="list-style-type: none"> - Short-term training at established farms or research centres - Prepared materials for distribution - Audio-visuals 	Extension workers, district fisheries officers, fish farmers, leaders of kelompok

5. Outline of Project Design by Districts in Sumbawa and Flores Islands

5.1 Objective Districts

Of the study area targeted in the M/P, a model project design will be formulated according to district in Sumbawa and Flores Islands in the Nusa Tenggara region for small-scale fishing communities for the following reasons.

- (1) Lombok Island is located next to Bali Island and is relatively abundant in fishery resources and fish shipments. In addition, Mataram, the provincial capital of NTB, is also located on the island, making it more of a consumption market rather than a fisheries production site.
- (2) Flores Island is the eastern most region of the study area and the development potential of its fishery resources is high. However, it is distantly located from the consumption markets in Java and Bali islands, and due to its small population, its regional markets are limited. Hence, based on its favorable conditions and the district's potential shipment of fish to the western region in future, its development was given priority and it was selected for project formulation. In addition, Timor Island is also another potential destination for fish shipments due to its geographical proximity (Kupang city, NTT province), but it is not included in the M/P study area.
- (3) The scope of the fisheries industry in Sumbawa Island is extremely small-scale, and despite its expansive coastal waters, the number of fishermen is small. Subsequently, its fish supply and demand in 2012 are estimated to be supplied by Flores Island.

Based on the reasons explained above and in view of the balance in the fish supply and demand of the region, nine districts in Sumbawa and Flores Islands (including Lembata district, that gained independence from Flores district in October 1999) were selected as model sites most suited for widespread marketing of fish to Java and Bali islands. Both the Indonesian and Japanese governments agreed to the summary of the project design of the targeted region and signed the S/W on January 25, 2001.

5.2 Characteristics of Fisheries and Development Issues

(1) Sumbawa District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds of Sumbawa Island are largely divided into three areas—the inland waters of Saleh Bay, the north coast (the Flores Sea), and the west coast (Alor Strait). Of these three fishing grounds, the fish catch volume of Saleh Bay comprises three-quarters of the district's total fish catch. It is the district's largest production site and supplies fish to the city market in Sumbawa Besar, the district capital. Much of the fisheries conducted in

Saleh Bay is Bagan fishing, and the bay is an abundant source of valuable fry and shellfish. But due to large harvests of juvenile fish, the fish catch volume has stagnated in recent years and overfishing is suspected.

In addition, the district is also a good source of live fish shipments to Bali Island, as well as the origin of exported demersal fish and prawns. But due to illegal fishing such as blast fishing and cyanide fishing, the coastal ecosystem is on the verge of decimation. Although the inland waters of Saleh Bay and the northern coastal waters have a high potential for brackish water aquaculture, development in this area has lagged.

The motorization ratio of fishing boats in this district is 34.8 percent and comparatively high, but the fishing pressure in the inland waters of the bay and the shallow coastal waters is extremely high and an increase in the fish catch volume of existing fishing grounds is not expected. In addition, the per capita fish consumption volume is 62.4kg, which is the highest in northwest Nusa Tenggara province. In view of this fact, the need to increase the fish supply to the inland markets is low. In contrast, many unexploited fishing grounds exist and district's access to outside markets in Bali, Java, Lombok, and other areas is favorable. Hence the district is seen as a good fish production and supply base for outside markets if its unexploited fishery resources and aquaculture potential are developed.

2) Development Issues

- a. Distribute fishing activities that are presently concentrated in shallow coastal waters to water areas with abundant resources and achieve a sustainable and stable increase in fish production volume (northern coastal waters: develop offshore reef fisheries, western coastal waters: develop the unexploited resources of the southern coast).
- b. Promote the development of mariculture as a supplementary source of income for small-scale fishermen and establish a sustainable fisheries resources management system for the inland waters (Saleh Bay).
- c. In addition to the export of live fish, produce good quality processed fishery products, and increase export volume to outside markets in Java, Bali, and Lombok.

(2) Dompu District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds of Dompu district are largely divided into the three areas--the northern coast (Flores Sea), central Saleh Bay, and the southern coast (Cempi Bay, Savu Sea side). Of these three fishery areas, about 90 percent of the total fish catch is landed in Saleh Bay and Cempi Bay—pelagic fish is harvested in the former and demersal fish is harvested in the latter water areas. The fishing pressure in Saleh Bay is extremely high due to Bagan fishing, and subsequently, an increase in the fish catch volume is not expected. Excluding exported demersal fish and prawns, the majority of the fish catch is shipped to Dompu city

and the neighboring Bima market. Both production sites are located near Dompu city and their access to collection markets is good. In addition, brackish water prawn culture is rapidly developing in the inland waters of Cempi Bay and the product is quickly becoming a major export commodity (via Bali Island).

As in the case of Sumbawa district, the motorization ratio of fishing boats is comparatively high (39.8 percent); and the fish catch volume has stagnated in the fishing grounds of Saleh Bay. In contrast, many unexploited fishing grounds exist in the southern coastal waters outside Cempi Bay and in the northern coastal waters on the Flores Sea side; and future development of these waters is anticipated. The per capita annual fish consumption volume is 38.8kg and comparatively high. Hence, measures to achieve a stable fish supply for the existing markets in the district, as well as production and supply activities of prawns and value added, good quality processed fish products to Java, Bali, and Lombok will be pursued in this plan.

2) Development Issues

- a. Distribute fishing activities that are presently concentrated in shallow coastal waters to water areas with abundant resources in order to cope with the increased local and export demand and to achieve a sustainable and stable increase in fish production volume (southern and northern coastal waters).
- b. Promote the development of mariculture as a supplementary source of income for small-scale fishermen and establish a sustainable fisheries resources management system for the inland waters (Saleh Bay).
- c. Diversify and improve the quality of processed fishery products and increase the export volume to the outside regions of Java, Bali, and Lombok.

(3) Bima District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds of Bima district are largely divided into the three areas of the northern coast (Bima Bay), Sape Straits, and the southern coast (inner and outer Waworada Bay). Bagan fishing is the major form of fishing conducted in the inland bay and the shallow coastal waters. Much of the fish catch supplies the surrounding Bima city and Bima market, but processed dried fish is shipped to Sape (cuttlefish, anchovies, etc.), as well as the export of fresh demersal fish to outside regions. The estimated resource volume is being fished in both the bay and the other fishing grounds and there is a need to extend the fishing grounds to outside areas and to manage the inland bay resources in future.

The motorization ratio of fishing boats is the highest in the study area (83.4 percent) and its annual productivity is 10.5 tons per fishermen household or Rp.17.5 million and the scope of the average fishing operations is the largest. The per capita fish consumption volume

is 43.5kg and is similarly high as in the two districts in Sumbawa Island. Therefore, the objective of the plan is to establish a stable fish supply to the district market, as well as to establish the district's position as a production and supply base for good quality processed products for Java and Bali.

2) Development Issues

- a. To cope with the increasing local and the export demand, the fishing activities that are concentrated in the inland waters must be disseminated to resource abundant water areas outside the bay, in order to stabilize an increased, sustainable production volume (for all water areas)
- b. Measures to strengthen the educational and training activities for young fishermen, especially the shift from Bagan fishing to alternative fishing methods will be targeted; the development of mariculture as a supplementary source of income for small-scale fishermen will be promoted; and a sustainable fisheries resources management system in the bay will be created (for all water areas).
- c. Diversify and improve the quality of processed fishery products and increase the export volume to the outside regions of Java, Bali, and Lombok.

(4) Manggarai District

1) *Characteristics and Position of the Fisheries Industry*

The fishing grounds of Manggarai district are largely divided into the three areas of the northern coast, southern coast, and Komoda/Rinca islands. About two-thirds of the total fish catch volume is landed in the Komodo and Rinca islands by Bagan fishing. However a stringent fisheries management system is enforced in the water areas of the Komodo national Park and the fish catch volume has stagnated in recent years due to the impact of the increasingly restricted fishing grounds. In addition, the fishing areas in inland bay and shallow waters of the northern and southern coasts are also extremely limited and fishing activities are not active and only small fishing communities exist in these areas.

The major consumption market in the district is Ruteng city, but it is located about three hours overland from the fish landing area. The fish is mainly supplied to Labuhan Bajo on the Komodo island side and the fish landed in the northern and southern coasts is marketed and consumed in the areas surrounding the production sites. In addition, Labuhan Bajo is a shipping base for exported fresh demersal fish.

The fishermen ratio is high in comparison to other districts (77 percent of all fishermen households) and the scope of the fishing operations are also limited (946 fishing boats, motorization rate 9.6 percent). Although it has abundant fisheries resources, their development will require an excessive amount of time and cost. In contrast, although the district has the largest population in the region, its per capita fish consumption volume is the

lowest (7.4kg). By increasing the import of fish from other districts, it will be able to meet its fish consumption demand. In this plan, the district will also be defined as a production and supply base for mainly export demersal fish produced through aquaculture development.

2) Development Issues

- a. To improve the fish distribution network within the district, measures to stabilize and increase fish supply to the inland areas, especially the Ruteng market will be targeted. In particular, a marketing network between the inland city, Ruteng and the fishing communities will be developed and Labuhan Bajo will play an important role as a fishing landing site in the outside marketing network.
- b. The per capita productivity in fisheries production and the sustained increase in the production volume in the district will be achieved through educational and training activities for fishermen and an expanded fisheries credit system.
- c. The development of mariculture will be promoted as a source of supplementary income for fishermen; and a sustainable fisheries resources management system for shallow coastal waters will be established (the Komodo/Rinca water areas). In addition, brackish water aquaculture will be promoted and an effective and abundant resource of natural milkfish seedlings will be used to increase the fish supply to the district market (northern coast).

(5) Ngada District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds in this district are largely divided into two areas—the northern and southern coastal waters. Both water areas border directly on the open sea and the scope of fisheries production is limited (752 fishing boats, 6.6 percent motorization rate, 1,130 fishermen households, make it the lowest among the targeted districts). However, due to the small population of the district, the per capita fish consumption volume (21.0kg) is within the range of the national average. Its contribution to the fisheries GRDP is low (about 3 percent), but fish is an important source of protein for the district inhabitants. This district is also the designated site in the development programme, KAPET, and fisheries development under this programme has been given important focus.

As in the case of neighboring Manggarai district, the major market for the fish catch is Bajawa, the inland district capital. Presently, the fish catch from the northern coast is shipped via Ende, the adjacent district capital. But this is expected to change as the fisheries and marketing system of East Flores district is developed, at which time, the fish catch will be mainly marketed within the district.

Although the district per capita fish consumption level is relatively stable, there is a shortage of fish in the inland areas. Since rapid development aimed at increasing the scope of

fisheries will require an excessive amount of time and cost, it has been positioned in this plan as a production base that will mainly meet district consumption demands by importing fish from other districts.

2) Development Issues

- a. The fresh fish marketing network in the district will be developed to provide a stable and increased fish supply to the inland areas, especially the Bajawa market. In particular, developing such a network, that is centered on the inland city of Bajawa as a base, is an important development issue.
- b. The per capita productivity level will be improved by expanding educational and training activities for fishermen and the fisheries credit system, in order to achieve a sustained increase in the production volume of the district.
- c. Brackish water aquaculture will be promoted and an effective and abundant resource of natural milkfish seedlings will be used to increase the fish supply to the district market (northern coast).

(6) Ende District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds in this district are largely divided into two areas—the northern and southern coastal waters; and about three-fourths of the fish catch volume is landed in the southern coast near Ende city. The major forms of fishing in these waters are lampara nets, and purse seines. Due to the abundant pelagic fish resources of the coastal waters, the scope of the fisheries activities is comparatively large in comparison to the western Flores region. The motorization ratio of fishing boats is the largest in the Flores region at 15.7 percent, and there is ample potential to develop the resources in the northern and southern coastal waters.

Ende city is both a major fish production and consumption center. The per capita fish consumption volume is 36.0kg, which is the highest in the island. It is also a commodity supply point in the navigational route between Sumba and Timor islands off the southern coast of Flores Island.

Under this plan, the district will serve as fish production and intermediate supply point between the resource rich, active fisheries of East Flores and west Flores, where there is a shortage of fish.

2) Development Issues

- a. Increase fish production volume by effectively utilizing the abundant fishery resources in the district, in particular 1) appropriate management of coastal resources through countermeasures to prevent destructive fishing operations, and 2)

improvements that provide an alternative source of income for fishermen engaged in blast fishing.

- b. Achieve stable and increased fish supply to the inland areas and west Flores region (Bajawa, Ruteng markets) by improving fish landing, marketing, and processing technology. In particular, improving fresh fish storage and shipment methods to Ende and improving the quality of processed products during the peak fishing season are important issues.

(7) Sikka District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds in this district are largely divided into two areas—the northern and southern coastal waters; and about 90 percent of the fish catch volume is landed in the northern coast near Maumere city. Pole and line fishing for tuna by commercial fisheries exists in the northern area of the district, in addition to comparatively active purse seine fishing activities. However, adequate fisheries facilities do not exist, given its focal position as a district fisheries center in Flores Island. The southern coastal waters have abundant pelagic resources, but development lags. Subsequently, the motorization ratio of fishing boats for the entire district is 11.9 percent and low.

The per capita consumption volume (23.4kg) exceeds the national average, but due to the inadequate marketing infrastructure, the economic losses are relatively high. The district is also positioned as a major production and supply point that is capable of meeting the fish consumption demand of west Flores as well as the demands of the district consumption market.

2) Development Issues

- a. Increase fish production volume by effectively utilizing the abundant fishery resources in the district, in particular 1) improve the fish landing and marketing facilities at Maumere as a major regional production and marketing base, 2) develop large pelagic fisheries in the southern coastal waters, 3) develop a fishing ground management and surveillance system.
- b. Reduce the economic losses after the fish catch has been landed and establish a stable and increased fish supply to the inland areas and west Flores (Bajawa, Ruteng markets). In particular, an important development issue is to improve fresh fish storage and shipping methods of Maumere as a supply point and to improve the quality of processed products during the peak fishing season.

(8) East Flores District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds in this district are largely divided into three areas—the waters surrounding Larantuka, the northern coastal waters (on the Flores Sea side) and the southern coastal waters (on the inland sea side). Much of the fish is landed by purse seine fishing activities operating in the straits and the inland sea area, that are not affected by the open sea, and semi-commercial based pole and line tuna fisheries conducted in the open sea. The northern and southern coastal waters are an abundant source of large migratory pelagic fish, which is accessible by local fishermen as well. Larantuka is a district city, which is the marketing point in the navigational route from the eastern outlying islands (Adonara Island, Solor Island, Lembata Island, Alor Island).

Fishery products are the district's large export commodity, and fisheries comprises a high ratio of the GRDP (10.9 percent). In contrast, the per capita consumption volume is relatively low for a fish production site (21.5kg) and this is due to the relatively large economic losses stemming from the inadequate marketing infrastructure of the outlying islands, where the majority of the population resides, and the impact of open sea fish retail activities conducted by collection boats from other areas.

In this plan, the East Flores district will be designated as a fish production and shipping point that will meet outside demand from central and west Flores, in addition to providing a stable fish supply to the district and inland markets.

2) Development Issues

- 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.

(9) Lembata District

1) Characteristics and Position of the Fisheries Industry

The fishing grounds in this district are largely divided into three areas—the waters surrounding Lewoleba, the northern coastal waters (on the Flores Sea side) and the southern coastal waters (on the inland sea side). The northern and southern coastal waters are an abundant source of large migratory pelagic fish, which is accessible by local fishermen, but due to the lagging motorization rate of fishing boats, the small scope of the fisheries activities,

the resources have not been fully developed. In addition, due to its remote location, the transport costs are high, which has restricted fish shipment and supply activities. Lamalera village, which is world renown as a traditional whaling village, is also located in the district.

The per capita income level of Lembata district is the lowest in the Flores region, but the GRDP ratio of fisheries is high. In contrast, the per capita fish consumption volume is lower than the national average (13.1kg) for the same reasons as East Flores district.

To achieve a stable fish supply for the inland and district market, Larantuka, which is the marketing point for the outlying islands, will be designated as a fish production, collection, and shipment point in this plan.

2) Development Issues

- 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.

5.3 Development Policy

According to the project design summary, the direction of fisheries development for the nine districts located in Sumbawa and Flores islands will be formulated based on the currently available data. However, in order to formulate a realistic operations and organizational system and project content, a F/S study must be implemented. Therefore, one to three development zones will be created as a production and marketing base in the districts. In addition, development measures will be implemented for focal model sites in each zone.

5.4 Set up of Development Zones and Model Sites

5.4.1 Development Zones

As explained below, water areas will be defined based on topographical location and district borders, as well as the regional characteristics of the fisheries and marketing activities; and two to three development zones will be created in each district (see Fig. 5.4.1).

(1) Designation of Water Areas Based on the Characteristics of the Fisheries Conducted

Type I: Gill net and angling fisheries

Type II: Bagan and purse seine fisheries

(2) Designation of Water Areas According to Marketing Characteristics

Type A: Demersal fresh fish, frozen fish for export to outside regions (districts where activities by fisheries companies and fish collectors are active)

Type B: Fish shipment and marketing activities centered on the markets in the region (districts where activities by fishing village women, local traders are predominant)

District	No	Development Zone	Fish Catch in Whole Zone (ton/year)	Main fishing gear	Main Species	Main Market (Destination)	Major Type of Buyers	Characteristic Division	
								Fishing	Marketing
Sumbawa	1	West coast	587	GN/HL/PY	D	Taliwang	VW	I	B
	2	North coast	4,679	GN/HL/PY/BG	SP+D	S.Besar, Utan, Alas, Bali*	VW+BT+CL	I	A
	3	Tl. Saleh	17,489	BG/GN/HL	SP	S.Besar and towns on the way	VW+CL	II	A
Dompu	4	North coast	503	GN/HL	SP+D	Dompu	VW	I	B
	5	Tl. Saleh	2,599	BG/PS/HL	SP	Dompu	VW+BT	II	B
	6	Tl. Cempi	3,009	HL/PS/PY/TN	LP+D+C	Dompu	VW	II	B
Bima	7	Tl. Bima	509	BG/HL/GN	SP+D	Bima	VW	II	B
	8	Tl. Sape	11,799	BG/PS/GN/HL	SP+D	Bima, Sape, Bali*, Java*	VW+CL	II	A
	9	Tl. Waworada	7,074	BG/PS/GN/HL	SP+LP+D	Bima, Interior village/town	VW+BT	II	B
Manggarai	10	Komodo/Rinca	4,346	BG/GN/HL	SP+D+M	Ruteng, Labuan Bajo, Bali*	VW+BT	II	A
	11	North coast	1,284	HL/GN/BG	D	Ruteng	VW+BT	I	B
	12	South Coast	1,221	HL/GN/PS	SP+D	Local market	VW	II	B
Ngada	13	North coast	1,553	PS/HL/BG	SP+D	Bajawa, Ende	VW+BT	II	B
	14	South Coast	1,726	PS/LM/HL/GN	SP	Bajawa, Ruteng	VW	II	B
Ende	15	North coast	1,957	GN/LM/BG	SP	Local market	VW+BT	II	B
	16	South Coast	6,199	PS/LM/GN/HL	SP+LP	Ende	BT	II	B
Sikka	17	North coast	6,083	PS/GN/HL/PL	SP+LP+D	Maumere, Ende, Java*	BT+FE	II	A
	18	South Coast	479	PS/HL/GN	SP+LP	Interior Villages	BT	II	B
Flores Timur	19	Flores Mainland	4,039	BG/PS/GN/PL	SP+LP	Larantuka, Maumere, Java*	VW+BT+FE	II	A
	20	North coast	2,472	HL/GN/TR	LP	Waiwerang, Larantuka	VW	I	B
	21	Solor		PS	SP+M	Waiwerang, Larantuka	VW	II	B
Lembata	22	North coast	562	HL/GN/TR	LP+SP	Lewoleba, Larantuka	VW	I	B
	23	Tl. Lewoleba	306	BG/GN/HL	SP+D	Lewoleba, Larantuka	VW+BT	II	B
	24	South Coast	319	HR/HL/GN	Whale	Interior villages, Larantuka	VW	I	B

1) Fishing Gear: HL:Hand-line (Pancing), GN:Gill-net (Jaring Insang), BG:Lift-net (Bagan), PS:Push-seine (Pukat Cincin), PY: Payang, LM:Lampara, TR:Trolling (Pancing Tonda), PL:Pole & Line, HR:Harpoon (for whale)

2) Fish Species: SP: Small pelagic fish, LP:Large pelagic fish, D:Demersal fish, C:Crustacean, M: Mollusc (squid)

3) Major markets: *mark: Inter-Island and export markets

4) Fish dealers: VW: Village women, BT: Beach traders, CL: Fish collectors, FE: Fishing Company

Based on these findings, a total of 24 development zones was selected from these special regions (Sumbawa and the outlying islands of Flores) (see Table below). Of these development zones, a total of 21 zones, excluding the two zones that were not included in the field survey study (the northern coasts of both Ende and Dompu districts) and one zone where the fisheries activities were extremely limited in the field survey study (the southern coast of Manggarai district), were selected for project design summary formulation.

5.4.2 Model Sites

In each development zone, one model site was selected that illustrated the characteristics of the zone and best represented the zone as a regional centre. The selected area is shown as a model site in the table below. The areas outside these model areas and three development zones that are not targeted for project designs will be developed in the future through the extension of activities implemented at respective model sites under close collaboration with the relevant fisheries cooperatives.

District	No	Development Zone	Model Site (Sub-district)	Effectuated Area of Model Site (Model Area)	Future Extended Areas
Sumbawa	1	West Coast	Lab.Lalar (Taliwang)	Kec. Taliwang coast	South coast (camp fishing base)
	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)	Tl. Cempi & its vicinity	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)	-	Entire north coast (after realization fishermen transfer)
	14	South Coast	Aimere (Aimere)	Kec. Aimere coast	Maumbawa & Nangaroro areas, and south coast of Manggarai
Ende	15	North Coast	Maurelo (Maurelo)	Maurelo coast	(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/Wuring (Maumere)	Kec.Maumere & Kec. Alo coast	Gelitung area
	18	South Coast	Paga (Paga)	Kec. Pag coast	Leta & Bola areas
Flores	19	Mainland	Oka (Larantuka)	Larantuka & its vicinity	Waiklibang & Waiteba areas
	20	North Coast	Sagu (Adonara T.)	North coast of Adonara	-
Timur	21	Sel. Solor	Lamahala (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)

5.4.3 Classification of Model Site

Each model site is categorized by following viewpoints to formulate the outline of project design.

(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.

(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

(4) Findings on Model Site Classification

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

Classification of Model Site

District	No	Development Zone	Model Site	Functions		
				Fish Production	Fish Landing & Shipment	O/M organization
Sumbawa	1	West Coast	Lab.Lalar	A	b-2	y
	2	North Coast	Lab.Sumbawa	A	a	z
	3	Teluk Saleh	Santong	B	b-1	x-2
Dompu	4	North Coast	Kilo	A	c	y
	5	Teluk Saleh	Soro	B	b-1	x-1
	6	Teluk Cempi	Hu'u	A	b-2	y
Bima	7	Teluk Bima	Bima	B	a	x-2
	8	Teluk Sape	Bugis	B	b-1	x-2
	9	Teluk Waworada	Waworada	A	b-1	x-2
Manggarai	10	Komodo/Rinca	Lab.Bajo	B	b-1	x-2

	11	North Coast	Reo	A	c	y
	12	South Coast	Mborong	A	c	y
Ngada	13	North Coast	Kotajoko	A	b-2	x-2
	14	South Coast	Aimere	A	c	y
Ende	15	North Coast	Maurelo	A	b-2	y
	16	South Coast	Paupanda	A	b-2	x-1
Sikka	17	North Coast	Kalimati	A	a	z
	18	South Coast	Paga	A	b-2	y
Flores	19	Mainland	Oka	A	a	x-1
Timur	20	North Coast	Sagu	A	c	x-1
	21	Sel. Solor	Lamahala Jaya	A	c	x-1
Lembata	22	North Coast	Balauring	A	c	y
	23	Teluk Lewoleba	Lewoleba	A	b-1	x-1
	24	South Coast	Lamalera	A	c	y

5.5 Basic Concept for Project Design of Development Zone by Districts

5.5.1 Items to be prepared by Indonesian side for Project Implementation

In order to implement the project successfully the following actions or measures by the Indonesian side will enhance the effect of the project implementation.

(1) Organisational Arrangement in the Project Area

As one of the essential pre-conditions for execution of any component of the project, the fisheries cooperatives have to be established with active credit, purchase, selling, and other activities. In addition, the following incentives should be made to promote the participation of fishermen and fishery-related persons in the cooperatives and to strengthen their activities.

- 1) Credit and training will have to be provided through cooperatives, but not directly to nonmembers.
- 2) The members of cooperatives will be given preferential treatment in the use of the project facilities (discount of facility user fees, etc.).
- 3) Fishing licenses will be issued only to the members of cooperatives.

(2) Raising the Motivation of Fishermen Households

The project will be executed based on the self-reliant efforts of fishing villages and fishermen households to increase their production. One indispensable method is to teach fishermen households to keep daily records of their activities (log books and account books) for submission to the district fisheries officer once a month. These records will not only ensure the sound management of each fishermen household, but will also be used as important basic data for future planning by the district Fisheries Office. Hence, the project will be implemented in areas where fishermen are willing to participate in such a system, and who will be given preferential treatment with regard to credit activities.

(3) Securing Revolving Funds

In principle, all the required operational funds in the project will be based on an independent accounting by each district.

- 1) Fishery cooperatives will have to effectively utilize the income obtained through project facility operations (sales of ice, facilities charge, profit from purchase and selling activities, etc.) to cover operation and maintenance expenditures on a sustainable level. For this purpose, cooperatives will have to prepare and execute the appropriate regulations on facility usage according to the consensus of its members.
- 2) The district Fisheries Office must deposit the fees and charges collected from cooperatives (facility user fees, fishing license fee, etc.) as a special fund to be effectively used for various project activities (fishing grounds management, maintenance of basic project facilities, training and extension services for fishermen and local staff, etc.).

(4) Training for Fisheries Officers Appointed to Project

One fishery official from each district will undergo an intensive training programme in Jakarta in various related fields (fishing activities and resources management, quality control and post-harvest technique of fishery products, fisheries cooperatives, etc.). After the training, the officer will be stationed at each model site on a full-time basis. His duties will be to effectively carry out the routine work as a government staff member, and also to guide and audit the cooperative activities from a technical and management perspective. As incentive for his active participation and residence at the project site, he will be paid an advisory fee from cooperatives in accordance with his performance (profit level of cooperatives), in addition to his government salary.

5.5.2 Basic Concept

(1) Basic concept by types

Based on the model site classifications explained in section 5.4.3, the basic structure of each model site according to type is explained below.

1) Increase Fish Production

Type A: Expansion/Diversification of Fishing Grounds

Development policy: The policy is to decrease the concentration of fishing activities in the existing fishing grounds and to lessen the stress on fisheries resources through fishermen training and developing unexploited coastal fishing grounds.

Content of the Development Measures

Items	Conditions
i) Development of fishing grounds (installation of FAD)	<ul style="list-style-type: none"> • Location to be within accessible range of existing boats (not much influenced by waves and current within 20 nm from fishing villages) • Within the provincial and district administrative waters (12 nm) • c) FADs to be renewed and maintained using only fishing fee collected from local fishing boats.
ii) Shift to larger fishing boats (model boat)	Mainly for net fishing (purse seine and Lampara net)
iii) Motorization of existing boats (small engines)	Mainly gill net and hand line - low motorization rate and low number of motorized boats.

Type B: (Promotion of Aquaculture and Propagation)

Development policy: Develop and promote aquaculture propagation to increase the supplementary income of fishermen households and to sustain the fisheries resources of existing fishing grounds.

Content of the Development Measures

Items	Contents	Conditions
i) Improve and develop living environs	Reforestation of mangroves, sea grass bed, coral reef recovery	Confirmed existence of mangroves, sea grass and coral reefs
ii) Develop aquaculture using existing resources	Stocking of juvenile bottom fish Shell fish culture	By-catch of small bottom fish mainly from Bagan Confirmed existence of shell fish in low tidal area

2) Fish Production and Shipment

Type A: Fish Production and Marketing Center

Development policy: Development of fish landing, shipment and processing in this area as well as development of fish collection and marketing in other areas. Further, the policy is to develop a wider range of marketing in future.

Content of the Development Measures

Items	Contents
i) Improvement of fish landing and handling	<ul style="list-style-type: none"> • Fish landing efficiency (landing quaywall) • Sanitary handling and transaction of fish catch (fish handling shed)
ii) Improvement of fresh fish shipment	<ul style="list-style-type: none"> • Supply and sales of ice to surrounding area (ice making and storage) • Fresh fish storage (insulated boxes) • Long distant shipment of fish to deficit areas (insulated vehicle) • Fish marketing information (communication equipment) • Supply of clean and fresh fish to consumers (retail market)
iii) Technical extension on fresh fish handling	<ul style="list-style-type: none"> • Training related to method on durable use of boxes and effect of icing fish • Sales promotion of insulated boxes (rental or credit)
iv) Improvement of fish processing	<ul style="list-style-type: none"> • Improvement of existing fish products (processing facilities for dry fish & salted/boiled fish) • Sales promotion and development of new fish products (model processing room) • Test and training for processing technology extension (dissemination)
v) Fishing activity support	<ul style="list-style-type: none"> • Conditions for repair of engines and fishing gears (workshop) • Supply of fuel and fresh water (fuel and water supply facilities) • Procure and sales of fishing and general materials (kiosk)

Type a: Fish Landing and Shipment Center

Development policy: As a main fish production center to develop as center of fish landing, fish collection and fish processing of fish from surrounding villages.

Content of the Development Measures

Items	Contents	Type b-1	Type b-2
i) Improvement of fish landing and handling	<ul style="list-style-type: none"> • Fish landing efficiency (landing quaywall) • Sanitary handling and transaction of fish catch (fish handling shed) 	<p>○</p> <p>○</p>	<p>—</p> <p>○</p>
ii) Improvement of fresh fish shipment	<ul style="list-style-type: none"> • Supply and sales of ice to surrounding area (ice making and storage) • Fresh fish storage (insulated boxes) • Long distant shipment of fish to deficit areas (insulated vehicle) • Fish marketing information (communication equipment) • Supply of clean and fresh fish to consumers (retail market) 	<p>○</p> <p>○</p> <p>○</p> <p>○</p>	<p>○</p> <p>○</p> <p>○</p> <p>○</p>
iii) Technical extension on fresh fish handling	<ul style="list-style-type: none"> • Training related to method on durable use of boxes & effect of icing fish • Sales promotion of insulated boxes (rental or credit) 	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>
iv) Improvement of fish processing	<ul style="list-style-type: none"> • Improvement of existing fish products (processing facilities for dry fish and salted/boiled fish) • Sales promotion and development of new fish products (model processing room) • Test and training for processing technology extension (dissemination) 	<p>○</p> <p>○</p> <p>○</p>	<p>○</p> <p>—</p> <p>—</p>
v) Fishing activity support	<ul style="list-style-type: none"> • Conditions for repair of engines and fishing gears (workshop) • Supply of fuel and fresh water (fuel and water supply facilities) • Procure and sales of fishing and general materials (kiosk) 	<p>○</p> <p>○</p> <p>○</p>	<p>○</p> <p>—</p> <p>○</p>

Type c: Fishing Village Center

Development policy: To link the nearest fish landing and consumption areas by improving transport means.

Content of the Development Measures

Items	Content
i) Improvement of fish landing and handling	<ul style="list-style-type: none"> • Sanitary handling of fresh fish (multipurpose facility)
ii) Improvement of fresh fish shipment	<ul style="list-style-type: none"> • Procurement and sales of ice (transport vessel and vehicle + insulated box) • Fresh fish storage (insulated boxes) • Improvement of fresh fish shipment (multipurpose vessel and vehicle) • Fish marketing information (communication equipment)
iii) Technical extension on fresh fish handling	<ul style="list-style-type: none"> • Training related to method on durable use of boxes and effect of icing fish • Sales promotion of insulated boxes (rental or credit)
iv) Improvement of fish processing	<ul style="list-style-type: none"> • Training related to method on durable use of boxes and effect of icing fish
v) Fishing activity support	<ul style="list-style-type: none"> • Repair of engines and fishing gears (workshop) • Supply of fuel and fresh water (fuel and water supply facilities)

3) Management Organization According to Structure

Type	Development policy
Type x-1: Strengthening of existing cooperative	To expand the scale of existing organization and expand the activity contents through providing advice on operation and technical support from district government
x-1: Strengthening of existing cooperative	
x-2: Establish new fishermen cooperative	To strengthen the fishermen organization through operation and management of facilities through providing advice on operation and technical support from district government
Type y: Operated by village administration and community	Initial stage operation will be done by village administration and later to promote the organization and integration of kelompokks gradually and transfer to Type-x operation
Type z: Operated by district government	Initial stage operation will be done by district government and later to promote the organization and integration of kelompokks gradually and transfer to Type-x operation

(2) Project Component According to Site

The proposed project components in M/P for each sector are shown in following table.

Proposed Project Components by Model Sites

Model Site No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Type of Model Site		II	I	V	III	V	II	IV	V	II	V	III	III	II	III	II	I	I	II	I	III	III	III	II	III		
Coastal Resource Management Plan	Improvement of Data Collection System	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o		
	Fishing Licensing System	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Proper Use of Fishing ground	Off-shore fishing ground setup	o	o	-	o	-	o	-	-	o	-	o	o	o	o	o	o	o	o	-	o	o	o	-	o	
		Shift to larger fishing boats	-	o	-	-	-	o	-	-	o	-	-	o	o	o	o	o	o	o	o	-	o	-	o	-	
		Motorization of fishing boats	-	-	-	o	-	-	-	-	-	-	o	o	-	o	o	o	-	o	-	o	-	o	-	o	
	Coastal Surveillance	Aquaculture technology development	-	-	o	-	o	-	o	o	-	o	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Marine communication network	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
		Monitoring of FAD base system	o	o	-	o	-	o	-	-	o	-	o	o	o	o	o	o	o	o	-	o	o	o	-	o	
		Surveillance and enforcement	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Fish Landing/shipment/processing Plan	Fish Landing	Efficient fish landing operation	-	o	o	-	o	-	o	o	o	o	-	-	-	-	o	o	-	o	-	-	-	o	-	
Hygienic treatment of landed fish			Δ	o	o	Δ	o	o	o	o	o	o	Δ	Δ	o	Δ	o	o	o	o	o	Δ	Δ	Δ	o	Δ	
Improvement of fresh fish shipment		Ice making and supply	-	o	o	-	o	o	o	o	o	o	-	-	o	-	o	o	o	o	o	-	-	-	o	-	
		Fresh fish storage facilities	Fresh fish shipment Outside district	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Within district	-	-	-	o	-	-	-	-	o	-	o	o	o	o	o	-	-	-	-	-	-	o	o	-
			Marine transport	o	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o
		Fish market information provision	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Sales of clean & fresh fish to consumers		-	o	-	o	(Dompur Market)	o	-	-	-	-	-	-	-	-	-	o	o	-	o	-	-	-	-	-		
Ext. fresh fish handling		Fresh fish handling extension/lecture	Δ	o	o	Δ	o	o	o	o	o	o	Δ	Δ	o	Δ	o	o	o	o	o	Δ	Δ	Δ	o	Δ	
		Sales promotion of insulated boxes	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Ext. fish processing technology	Improvement of existing fish products	Δ	o	o	Δ	o	o	o	o	o	o	Δ	Δ	o	Δ	o	o	o	o	o	Δ	Δ	Δ	o	Δ		
	Dev. and sales of new fish products	-	o	o	-	o	o	o	o	o	o	-	-	o	-	o	o	o	-	o	-	-	-	o	-		
	Test/training for fish product (extension)	-	o	o	-	o	o	o	o	o	o	-	-	o	-	o	o	o	-	o	-	-	-	o	-		
Fishing activity support	Improve conditions for repairs	Δ	o	o	Δ	o	o	o	o	o	o	Δ	Δ	o	Δ	o	o	o	o	o	Δ	Δ	Δ	o	Δ		
	Procure/sales of fuel and water	Δ	o	o	Δ	o	o	o	o	o	o	Δ	Δ	o	Δ	o	o	o	o	o	Δ	Δ	Δ	o	Δ		
	Procure/sales of fishing gears & materials	o	-	o	o	-	o	-	-	-	-	o	o	o	o	o	-	-	o	o	o	o	o	o	o	o	

Note: o Facilities to be provided, Δ Space to be used jointly for the multipurpose facilities

Type of Model Site	Model Site No. and Site Name			
I: Fish ground expansion & landing/marketing Cent.	1.Sumbawa Dist. - Lab. Lalar	7.Bima Dist. - Bima	13. Ngada Dist. - Kotajoko	19. East Flores Dist. - Oka
II: Fish ground expansion & landing/shipment Center	2.Sumbawa Dist. - Lab. Sumbawa	8. Bima Dist. - Sape	14. Ngada Dist. - Aimere	20. East Flores Dist. - Sagu
III: Fish ground expansion & landing/village Center	3.Sumbawa Dist. - Lab. Santong	9. Bima Dist. - Waworada	15. Ende/Maurelo	21. East Flores Dist. - Lamahaia Jaya
IV: Aquaculture promotion & landing/marketing Cent.	4.Dompur Dist. - Kilo	10.Manggarai Dist - Lab.Bajo	16. Ende Dist. - Paupanda	22. Lembata Dist. - Balauring
V: Aquaculture promotion & landing/shipment Cent.	5.Dompur Dist. - Kempo	11.Manggarai Dist. - Reo	17.Sikka Dist. - Kalimati	23. Lembata Dist. - Lewoleba
	6.Dompur Dist. - Hu'u	12. Manggarai Dist. - Mbolong	18. Sikka Dist. - Paga	24. Lembata Dist. - Lamarela

5.6 Outline of Project Design

5.6.1 Design Policy with Regard to Hardware

- (1) The scope of the facilities and equipment that will be provided for each model site was decided according to the fish landing volume and the number of fishing boats in 1999. The fishing activities, management of fishing grounds, fish landing and marketing activities that are targeted in the plan will be expanded as the fishermen are able to achieve various stages of self-management.
- (2) The scope of the facilities and equipment that will be provided for each model site was decided according to the fish landing volume and the number of fishing boats in 1999. If the fishing communities in the model site are unable to be organized into one organization the scope of the facilities will be reduced.
- (3) The planned facilities and equipment that will be installed will fulfill the following minimum functions for each model site.
 - a. *Improve fish landing, marketing and processing activities.*
 - b. *Extend fishing grounds and diversify fishing activities.*
 - c. *Implement management of coastal fishing grounds.*
 - d. *Support fishing activities.*

5.6.2 Outline of Project Design by Model Site

See Appendix 1.

6. Selection of Priority Zones

6.1 Selection Criteria

The priority zones are areas that have been selected as a model sites for the development of coastal fishing communities in the study area. With the implementation of the Indonesian government's decentralization policy from January 2001, each district has been required to manage its administrative activities on a self-sufficient basis without waiting for budget allocations from the central government. Thus, the selection criteria for the priority areas were based on such factors as a high impact with low investments (both in terms of infrastructure and project management), the generation of quick benefits, and the smooth formation of self-sufficient fishermen organizations.

The objectives of this project are to increase the income of fishermen households and to ensure the stable supply of fish for the local communities. The former objective is linked to poverty alleviation (the equity factor), and the latter will be achieved by stabilizing fishing activities and improving the fish marketing/processing (the efficiency factor). Therefore, giving each criterion equal weight made the comparative analysis of the model sites.

The selection criteria for the priority areas were prepared as follows.

(1) Fishing Technology and Resources

(1)-1 Access to Potential Resources

(Priority will be given to areas where the earliest exploitation of resources can be achieved with minimal investment.)

- 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

(Priority will be given to areas with a history of promoting coastal resources management.)

- 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

(Priority will be given to areas where higher benefits are expected from the introduction 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

(Priority will be given to areas that will function as the regional fish landing and marketing center.)

- 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

(Priority will be given to 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

(Priority will be given to the areas where fisheries cooperatives are active to enable the project to be implemented with minimum training.)

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

(Priority will be given to the areas where electricity is available and water is easy to obtain.)

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

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

Point 0: Area where the PLN does not supply electricity.

(5)-2. Natural Conditions

(Priority will be given to areas where the natural conditions are suited to the construction of marine civil structures.)

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.

6.2 Priority Areas based on Selection Criteria

Based on the aforementioned selection criteria, two priority areas from both Sumbawa and Flores islands were selected based on a comparative analysis of 8 sites in Sumbawa Island and 13 sites in Flores Island.

6.2.1 Comparative Analysis of Each Area

(1) Fishing Technology and Resources Aspect

1) Sumbawa Island

District	Dev. Zone	Model Site	(1) Fishing Technology and Resources Aspect						Points given by Criteria (1)-2
			(1)-1 Access possibility to potential resources						
			Potential Ground	Resource Level	Fishing Methods to be applied	Existing Fishing Methods	Cost for Dev.	Dev. Potential	
Sumbawa	West coast	Lab.Lalar	South coast (20-30 miles off)	High (LP+D)	HL/TR/GN	Yes	Low (small engines + FAD)	12	3
	North coast	Lab. Sumbawa	North offshore (100 miles off)	High (D)	HL/BL/GN	Yes	High (enlargement of boats)	6	2
	Tl. Saleh	Santong	Tl. Saleh (central parts)	Medium (SP)	PS	No (training needed for PS)	High (construction of boats)	2	1
Dompu	Tl Saleh	Soro	Tl. Saleh (central parts)	Medium (SP+D)	HL/PS/GN	Yes	Low (use existing boats)	8	2
	Tl.Cempi	H'uu	South coast (20-30 miles)	High (LP+SP)	HL/PS/GN	Yes	Low (small engines + FAD)	12	3
Bima	Tl. Bima	Kel.Tanjung	Out of Tl.Bima (20-30 miles)	Medium (SP+D+LP)	HL/GN/PS	No (training needed for PS)	High (construction of boats)	2	1
	Tl. Sape	Bugis	Out of Tl.Sape (20-30 miles)	Medium (SP+D+LP)	HL/GN/PS	Yes	Low (use existing boats)	8	2
	Tl. Waworada	Rompo	Out of Tl. Waworada (20-30 miles)	High (SP+D+LP)	HL/GN/PS / BL/TR	Yes	Low (small engines + FAD)	12	3

District	Dev. Zone	Model Site	(1) Fishing Technology and Resources Aspect					Points given by Criteria (1)-2
			(1)-2 System for resource management					
			Implementation for the Plan	Village rules for resource management	Role of Fisheries Division			
				Data collection	Extension Officer	Other		
Sumbawa	West coast	Lab.Lalar	No	No	Once a week	Yes (Taliwang)	-	0
	North coast	Lab. Sumbawa	No	No	Once a week	Yes (Sumbawa Besar)	-	0
	Tl. Saleh	Santong	No	Yes (Sanonda)	Once a week	Yes (Plampang)	-	1
Dompu	Tl Saleh	Soro	No	Yes (Fishing regulation)	Once a week	Yes (Kempo)	-	1
	Tl. Cempi	H'uu	No	No	Once a week	Yes (Hu'u)	-	0
Bima	Tl. Bima	Kel.Tanjung	No	No	Once a month	Yes (Bima)	Collection of fee for fishing permission	0
	Tl. Sape	Bugis	No	Yes (Thanks- giving to sea)	Once a month	Yes (Sape)	Same as above	1
	Tl. Waworada	Rompo	No	Yes (Sea & coast conservation program)	Once a month	Yes (Waworada)	Same as above	1

2) Flores Island

District	Dev. Zone	Model Site	(1) Fishing Technology and Resources Aspect						Points given by criteria
			(1)-1 Access possibility to potential resources						
			Potential ground	Resource level	Fishing methods to be applied	Existing fishing methods	Cost for Dev.	Dev. Potential	(1)-1
Manggarai	Komodo/Rinca	Lab. Bajo	North of Komodo (20-30 miles off)	Medium (SP+LP)	HL/TR/GN	Yes	Low (small engines + FAD)	8	2
	North coast	Reo (Reo)	North coast (10-20 miles off)	Medium (SP+LP)	HL/TR/GN/PS	No (training needed for PS)	High (construction of boats)	2	1
Ngada	North coast	Kotajoko	North coast (10-20 miles off)	Medium (SP+LP)	PS/HL/TR/GN	Yes	High (construction of boats)	4	1
	South coast	Aimere	South coast (10-20 miles off)	Medium (SP+LP)	PS/HL/TR/GN	Yes	High (construction of boats)	4	1
Ende	South coast	Paupanda	South coast (20-30 miles off)	High (LP+SP)	HL/TR/GN/PS	Yes	Low (small engines + FAD)	12	3
Sikka	North coast	Kalimati / Wuring	North coast (20-30 miles off)	Medium (SP+LP)	HL/TR/GN/PS	Yes	Low (small generator sets)	8	2
	South coast	Paga	South coast (10-20 miles off)	High (SP+LP)	HL/TR/GN/PS	Yes	Low (small engines + FAD)	12	3
Flores Timur	North Coast	Sagu	North coast (10-20 miles off)	High (SP+LP)	HL/TR/GN/PS	Yes	Low (small engines + FAD)	12	3
	SeI.Solor	Lamahala Jaya	Out of sel.Solor (20-30 miles off)	Medium (SP+LP)	HL/TR/GN/PS	Yes	Low (small generator sets)	8	2
	Mainland Flores	Oka	North & south coasts (30 - 40 miles off)	High (LP)	HL/TR/PL	Yes	Low (small engines + FAD)	12	3
Lembata	North coast	Balauring	North coast (10-20 miles off)	High (LP+SP)	HL/TR/GN	Yes	Low (small engines + FAD)	12	3
	TI. Lewoleba	Lewoleba	In & out TI.Lewoleba (3-30 miles off)	Medium (SP+LP)	HL/TR/PS/GN	Yes	High (construction of boats)	4	1
	South coast	Lamalera	South coast (10-20 miles off)	High (LP+SP)	HL/TR/GN	Yes	Low (small engines + FAD)	12	3

Note: Points for potentials:

Resource Level: High-3, Medium-2, Low-1, Existing fishing methods: Yes-2, No-1, Cost for development: High-1, Low-2

Total potential = (resource Level) x (existing fishing methods) x (development cost)

Abbreviation: LP: large pelagic, SP: small pelagic, D: demersal, HL: hand-line, TR: trolling, GN: gill-net, BL: bottom long-line, PS: purse-seine

District	Dev. Zone	Model Site	(1) Access possibility to potential resources (1)-2 System for resource management					Points given by criteria (1)-2
			Implementation for the Plan	Village rules for resource management	Role of Fisheries Division			
					Data collection	Extension Officer	Other	
Manggarai	Komodo/Rinca	Lab.Bajo	Yes (Komodo National Park)	No	Once a week	Yes (Lab. Bajo)	-	1
	North coast	Reo	No	No	Once a week	Yes (Reo)	-	0
Ngada	North coast	Kotajoko	Yes (Riung Marine Park)	No	everyday (Marapokot) Once a week (Riung)	Yes (Marapokot & Riung)	-	2
	South coast	Aimere	No	No	everyday	Yes (Aimere)	-	1
Ende	South coast	Paupanda	No	No	everyday (Mbongawani)	Yes (Ende)	Training for dynamite fishermen	1
Sikka	North coast	Kalimati / Wuring	Yes (COREMAP)	No	Once a month	Yes (Maumere)	-	1
	South coast	Paga	No	No	Once a month	Yes (Paga)	-	0
Flores Timur	North Coast	Sagu	No	No	Once a month	No	-	0
	Sel.Solor	Lamahala Jaya	No	No	Once a month	Yes (Waiwerang)	-	0
	Mainland Flores	Oka	No	No	Once a month	Yes (Larantuka)	-	0
Lembhata	North coast	Balauring	No	No	Twice a year	No	-	0
	Tl. Lewoleba	Lewoleba	No	No	Twice a year	Yes (Lewoleba)	-	0
	South coast	Lamalera	No	Yes (Traditional Rule for Whaling)	Twice a year	No	-	1

(2) Fish Marketing Aspects

1) Sumbawa Island

District	Dev. Zone	Model Site	(2) Fish Marketing Aspect					Points given by criteria	
			(2)-1 Benefits from Ice			(2)-2 Scale and Covering Areas		(2)-1	(2)-2
			Type & Price of Ice (Rp/kg)	Ratio of Ice to local fish	Effect of Ice	Landing from other villages	Fishing landing (ton/yr)		
Sumbawa	West coast	Lab.Lalar	500 (Plastic bag)	25%	Price: 2.0 (Ratio:50%)	No	587	2	1
	North coast	Lab.Sumbawa	250-500 (Plastic bag)	50%	Price: 1.5 (Ratio:75%)	No	975	1	1
	Tl. Saleh	Santong	330 (Plastic bag)	50%	Price: 1.3 (Ratio:65%)	No	8,048	1	3
Dompu	Tl. Saleh	Soro	330 (Plastic bag)	30%	Price: 1.3 (Ratio:40%)	Yes (Kempo, Pulau Bajo)	2,599	1	3
	Tl.Cempi	H'uu	330 (Plastic bag)	30%	Price: 1.3 (Ratio:40%)	Yes (H'uu, Soroadu, etc.)	1,830	1	2
Bima	Tl. Bima	Kel.Tanjung	330 (Plastic bag)	55%	Price: 1.3 (Ratio:72%)	Yes (All village of Tl.Bima)	509	1	2
	Tl. Sape	Bugis	330 (Plastic bag)	50%	Price: 1.3 (Ratio:65%)	Yes (All village of Tl.Sape)	11,799	1	3
	Tl. Waworada	Rompo	330 (Plastic bag)	60%	Price: 1.3 (Ratio:80%)	Yes (All village of Tl.Waworada)	7,074	1	3

2) Flores Island

District	Dev. Zone	Model Site	(2) Fish Marketing Aspect					Points given by criteria	
			(2)-1 Benefits from Ice			(2)-2 Scale and Covering Areas		(2)-1	(2)-2
			Type & Price of Ice (Rp/kg)	Ratio of Ice to local fish	Effect of Ice	Landing from other village	Fish Landing (ton/yr)		
Manggarai	Komodo/Rinca	Lab.Bajo	330 (Plastic bag)	25%	Price: 1.3 (Ratio:33%)	Yes (Lab. Bajo, Pulau Mesa, etc)	3,806	1	3
	North coast	Reo	1,000 (Plastic bag)	20%	Price: 4.0 (Ratio:80%)	Yes (Reo, Rebek, etc.)	1,038	2	2
Ngada	North coast	Kotajoko	660-1,000 (Plastic bag)	25%	Price: 3.3 (Ratio:82%)	Yes (Riung, Marapokot)	1,553	3	3
	South coast	Aimere	1,000 (Plastic bag)	25%	Price: 4.0 (Ratio:100%)	No	464	3	0
Ende	South coast	Paupanda	750 (Plastic bag)	10%	Price: 3.0 (Ratio:30%)	Yes (Mbongawani, Pulau Ende, etc.)	4,159	2	3
Sikka	North coast	Kalimati / Wuring	500 (Plastic bag)	15%	Price: 2.0 (Ratio:30%)	Yes (Mauwere, Wuring, etc.)	5,098	2	3
	South coast	Paga	1,000 (Plastic bag)	10%	Price: 4.0 (Ratio:40%)	No	332	2	0
Flores Timur	North Coast	Sagu	750 (Plastic bag)	10%	Price: 3.0 (Ratio:30%)	No	2,331	2	0
	Sel.Solor	Lamahala Jaya	750 (Plastic bag)	10%	Price: 3.0 (Ratio:30%)	Yes (Lamahara, Pulau Solor)		2	2
	Mainland Flores	Oka	600-1,000 (Plastic bag)	10%	Price: 3.2 (Ratio:32%)	Yes (Oka, Posto, Mokantarak, etc)	2,886	2	3
Lembata	North coast	Balauring	1,000 (Plastic bag)	10%	Price: 4.0 (Ratio:40%)	Yes (Balauring, Wairiang)	295	2	1
	Tl.Lewoleba	Lewoleba	600-1,000 (Plastic bag)	10%	Price: 3.2 (Ratio:32%)	No	243	2	0
	South coast	Lamalera	Not available	0%	Not available	No	76	2	0

Note: 1) Impact of Ice: Present price of ice / Rp.250/kg (expected normal price with the project)

2) Ratio of ice usage with the project is expected to increase if the current cost of ice can be maintained.

(3) Social and Institutional Factors

1) Sumbawa Island

District	Dev. Zone	Model Site	(3) Social factor (No. of fish buyers/day)			(4) Institutional factor		Points given by criteria	
			Village women	Fish traders	Fish collectors/fish agents	Name of KUD	No. of members	(3)	(4)
Sumbawa	West coast	Lab.Lalar	20 – 30	-	Export: 1 (D)	-	(Kelompok only)	2	1
	North coast	Lab.Sumbawa	20 – 30	-	Export: 12 (D)	-	(Kelompok only)	1	1
	Tl. Saleh	Santong	50 – 60	10 – 20 (Men)	Export: 2 (D)	-	(Kelompok only)	1	1
Dompu	Tl. Saleh	Soro	20 – 30	50 – 60 (Women)	Export: 4 (D)	KUD Mina Uni	440 (Fishermen:100%)	1	3
	Tl.Cempi	H'uu	20 – 30	-	-	-	(Kelompok only)	3	1
Bima	Tl. Bima	Kel.Tanjung	20 – 30	-	Export: 3 (D)	Koperasi Perikanan	87 (Women: 70)	1	1
	Tl. Sape	Bugis	50 – 60	-	Export: 18 (D) Domestic: 4 (P)	-	(Kelompok only)	1	2
	Tl. Waworada	Rompo	20 – 30	20 – 30 (women)	Export: 3 (D)	KUD Mina Teluk	184 (Fishermen:75%)	1	3

2) Flores Island

District	Dev. Zone	Model Site	(3) Social factor (No. of fish buyers/day)			(4) Institutional factor		Points given by criteria	
			Village women	Fish traders	Fish collectors/fish agents	Name of KUD	No. of members	(3)	(4)
Manggarai	Komodo/Rinca	Lab.Bajo	20 – 30	10 – 20 (men)	Export: 5 (D)	-	(Kelompok only)	1	1
	North coast	Reo	10 – 20	5 – 10 (men)	-	-	(Kelompok only)	2	1
Ngada	North coast	Kotajoko	30 – 50	30 – 50 (Women)	Export: 1 (D)	-	(Kelompok only)	2	1
	South coast	Aimere	10 – 20	-	-	-	(Kelompok only)	3	1
Ende	South coast	Paupanda	-	80 – 100 (men)	Domestic: 20 (P)	KUD Nelayan Mina Bahari	150 (no activity) (Fishermen:100%)	0	1
Sikka	North coast	Kalimati/Wuring	30 – 50	30 – 50 (Men)	Export: 2 (D) Domestic/export: 2 (P/Inti)	-	(Kelompok only)	1	1
	South coast	Paga	-	50 – 60 (Men)	-	Koperasi Usaha Baru	70 – 80 (Fishermen:30%)	0	2
Flores Timur	North Coast	Sagu	10 – 20	-	Domestic/export: 1 (P/Inti)	Koperasi Nelayan Batu Maja	48 (Fishermen:100%)	2	2
	Sel.Solor	Lamahala Jaya	50 – 60	-	-	Koperasi Nelayan Insannadasu	170 (Fishermen:100%)	2	3
	Mainland Flores	Oka	50 – 60	30 – 50 (Women)	Domestic/export: 3 (P/Inti)	KUD Mina Gonsalu Raya	163 (142 fishing boats)	1	3
Lembata	North coast	Balauring	20 – 30	-	Domestic/export: 1 (P/Inti)	-	(Kelompok only)	2	1
	Tl.Lewoleba	Lewoleba	20 – 30	-	-	Koperasi Nelayan Mina Geleta	84 (Fishermen:100%)	3	2
	South coast	Lamalera	50 – 60	-	-	-	(Kelompok only)	3	1

Note: 1) Number of fish buyers during the lean fishing season is based on observation and interviews during the field survey (June – July 2001)

2) Number of fish traders and village women during the fishing season seems to be 2 to 3 times the figures given above.

Abb.: D: demersal fishes, P: pelagic fishes, P/Inti: tunas/skipjacks collected by fishing company (Inti-plasma system)

6.2.2 Result of the Priority Analysis

(1) Sumbawa Island

District	Dev. Zone	Model Site	Points given by criteria								Total	Priority
			(1)-1	(1)-2	(2)-1	(2)-2	(3)	(4)	(5)-1	(5)-2		
Sumbawa	West coast	Lab.Lalar	3	0	2	1	2	1	1	0	10	5
	North coast	Lab.Sumbawa	2	0	1	1	1	1	1	0	7	7
	Tl. Saleh	Santong	1	1	1	3	1	1	1	2	11	4
Dompu	Tl.Saleh	Soro	2	1	1	3	1	3	1	1	13	2
	Tl.Cempi	H'uu	3	0	1	3	3	1	1	1	13	2
Bima	Tl. Bima	Kel.Tanjung	1	0	1	2	1	1	2	0	8	6
	Tl. Sape	Bugis	2	1	1	3	1	2	2	0	12	3
	Tl. Waworada	Rompo	3	1	1	3	1	3	1	1	14	1

First Priority Site: Rompo (Waworada), Bima District

Second Priority Site: Soro (Kempo) and Hu'u (Hu'u), Dompu District

(2) Flores Island

District	Dev. Zone	Model Site	Points given by criteria								Total	Priority
			(1)-1	(1)-2	(2)-1	(2)-2	(3)	(4)	(5)-1	(5)-2		
Manggarai	Komodo/Rinca	Lab.Bajo	2	1	1	3	1	1	1	2	12	4
	North coast	Reo	1	0	2	2	2	1	1	1	10	6
Ngada	North coast	Kotajoko	1	2	3	3	2	1	0	0	12	4
	South coast	Aimere	1	1	3	0	3	1	1	1	11	5
Ende	South coast	Paupanda	3	1	2	3	0	1	2	2	14	2
Sikka	North coast	Kalimati/Wuring	2	1	2	3	1	1	2	2	14	2
	South coast	Paga	3	0	2	0	0	2	1	1	9	7
Flores Timur	North Coast	Sagu	3	0	2	0	2	2	0	2	11	5
	Sel.Solor	Lamahala Jaya	2	0	2	2	2	3	1	1	13	3
	Mainland Flores	Oka	3	0	2	3	1	3	2	2	16	1
Lembata	North coast	Balauring	3	0	2	1	2	1	1	2	12	4
	Tl.Lewoleba	Lewoleba	1	0	2	0	3	2	2	1	11	5
	South coast	Lamalera	3	1	2	0	3	1	0	0	10	6

First Priority Site: Oka (Laratunka), Flores Timur District

Second Priority Site: Kalimati (Mauwere), Sikka District

Paupanda (Ende), Ende District

6.2.3 Analysis of Linkage between Selected Site and Other Areas (Zoning Analysis)

(1) Sumbawa Island

1) Rompo (Waworada), Bima District (First Priority Site)

a. Characteristics

Role & Function	Major Indicators	
Fish Landing Center in the Teluk Waworada	Covering Areas	All villages along TI. Waworada (Desa: Waworada, Karombu, Karunbu, Karampi)
	Number of Boat	25 collecting cum hand-line fishing boats (collecting about 90% of catch of Bagan fishing boats (approx. 100 units) in TI. Waworada on sea), 13 bottom long-line boats, 35 purse seine boats, 30 small boats (bubu)
	Operating time	Collecting boats: 18:00-04:00, Bagan: 17:00-07:00, Purse-seine: 08:00-21:00, Hand-line/bottom long-line: 3days/trip
	Landing time	Night time (21:00 – 04:00) Note: Catch from last haul of Bagan brought back by Bagan boats
	Landing volume	7,074 tons/year (statistics), Bagan: 3 – 12 tons/day (by Hearing)
Fish Supply Base to Bima market	Number of fish buyers	3 local fish collectors (fresh grouper, snapper, etc. For exporting via Bima and Denpasar), 50 – 60 local fish trader/day (Women from Renda, Ngali, Tente and Waworada)

b. Linkage with other areas

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

c. Conditions of existing facilities

- (i) The existing market in Bima (Pasar Baru) appears to have exceeded its holding capacity. (Women are selling fish along the street outside the market.)
- (ii) Cool boxes are seldom used even for keeping fresh fish overnight.
- (iii) There is a depreciated fish handling shed at Rompo (Waworada), but there is no extra space or area surrounding it.

d. Conclusion

Fish landing and marketing Facilities will be established at Waworada, including expansion/improvement of the existing fish market in Bima.

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

a. Characteristics

Site	Roles & Functions	Major Indicators	
		Covering Areas	
Soro (Kempo)	Fish Landing Center in Teluk Saleh	Covering Areas	Soro (Kempo) and Pulau Bajo
		Number of Boats	80 collecting cum hand-line fishing boats (collecting about 90% of catch of 33 Bagan and 10 purse-seine boats), 200 gill-net/hand line boats (non-motorized)
		Operating time	Bagan: 17:00-07:00, Hand-line: Day and night (not fixed)
		Landing time	Collecting boats: early morning (02:00 – 07:00), Hand-line: on occasion Note: Catch from last haul of Bagan and purse-seine brought back by Bagan boats.
		Landing Volume	2,599 tons/year (total of Kec. Kempo, statistics)
	Fish Supply Base to Dompu	Number of fish buyers	4 local fish collectors (fresh grouper, snapper, etc. for export via. Denpasar) 50 – 100 fish traders/day (women including fishermen's wives and buyers from Dompu)
Hu'u (Hu'u)	Fish Landing Base for Offshore Fishery outside of Teluk Cempi	Covering Areas	Hu'u (south-end fishing village along Teluk Cempi). Ice possible to supply to Nanganæ/ Soroadu
		Number of Boats	10 purse-seine boats, 15 hand-line boats (of which 4 with outboard engine) 8 purse-seine boats in Soroadu possible to change landing site.
		Landing volume	1,830 tons (total of Kec. Hu'u, statistics)
	Fish Supply Base to Dompu	Number of fish buyers	20 – 30 buyers/day (all local fishermen's wives)

b. Linkage with other areas

- (i) Both sites are located in the same district (Kab. Dompu) and supply fresh fish to Dompu market.
- (ii) Kempo plays a main role supplying small pelagic fish (caught by Bagan and purse seine), while large pelagic fish is mainly supplied from Hu'u.

c. Conditions of existing facilities

- (i) The existing Dompu market does not have enough space to sell fish or suitable place to stock fresh fish.
- (ii) There is a depreciated PPI at Soro (Kempo) constructed in 1983 (jetty, fish handling shed, office space, small fishmeal plant, etc.). The renovation is under consideration by the district government (requested budget: Rp. 200 million).
- (iii) There is only one small fish handling shed (approx. 50 sq. m) in Hu'u.
High costs will be incurred to implement countermeasures to control the large swell in front of Hu'u (if a fish landing jetty is needed).

d. Conclusion

The project (construction of fish landing and marketing facilities at both Kempo and Hu'u, and improvements to Dompu market) will be implemented.

Proposed major component of the project:

- (i) Soro (Kempo): Extend landing jetty, install ice plant and cool boxes, renovate existing facilities.
- (ii) Hu'u (Hu'u): Construct small facilities (fish handling shed, ice plant, etc. (Condition that must be met to implement the project: Organization of cooperatives)
- (iii) Dompu: Expand the market shed and slabs for fish sales, construct storage for cool boxes.

(2) Flores Island

1) Oka (Laratunka), Flores Timur District (First Priority Site)

a. Characteristics

Roles & Functions	Major Indicators	
Fish Receiving Center from Eastern Islands (Including Lembata)	Covering Areas	Laratunka, Sagu, Lamahala Jaya, and Pulau Solor (Flores Timur District) Balauring, Lewoleba and Lamalera (Lembata District)
	Number of Boats	At least 142 fishing boats belonging to KUD Mina Gonsalu Raya (All motorized) (47 pole-and-line, 24 purse-seine, 20 lampara, and 51 hand-line fishing boats) Potentials after the project: 47 Bagan (Kec. Larantuka), 87 units of non-KUD member boats (3-4 GT, purse seine, lampara, gill-net/hand-line), and fish transportation from fishing bases in the remote islands.
	Operating time	Pole-and-line: 1 day fishing (18:00-anytime on next day), Purse-seine/Lampara: 14:00-06:00, Hand-line/gill-net: on occasion
	Landing time	Bagan/Purse-seine/Lampara (early morning), Pole-and-line (anytime)
	Landing Volume	2,886 tons/year (Kec. Larantuka only, statistics), 2,475 tons/year (Pulau Adonara), 1,340 tons/year (P. Solor) 1,246 tons/year (Lembata)
Fish Supply Base to Laratunka, Maumere and Ende	Number of fish buyers	50 – 100 fish retailers/day at Laratunka market (fishermen's wives) 30 – 50 local fish traders (women selling fishes to Maumere and Ende) 2 fishing companies (PT. Mitra Mas, PT.Okishin) for collecting, processing and export of frozen skipjack.

b. Linkage with other areas

- (i) Larantuka is the main gate to the eastern islands (Adonara, Solor and Lembata).
- (ii) About 50 percent of the fish caught by fishermen in Sagu, Lamahala Jaya and Solor Island are brought to Laratunka.
- (iii) Tuna and skipjack are collected by fishing companies from local fishermen in Sagu, Balauring, etc.
- (iv) Fresh and dried fish are usually marketed by local traders (women) in Maumere and Ende, as well as the local market in Laratunka.

c. Conditions of the existing facilities

There are no fisheries infrastructure facilities in Flores Timur and Lembata (except private fishing companies).

d. Conclusion

Implement project (fish landing and marketing center at Laratunka, with fish

collection network involving neighboring islands).

Proposed major component of the project:

- (i) Fish landing and marketing complex at Laratunka
 - (ii) Network between Sagu, Lamahala Jaya, Balauring, Lewoleba and Lamalera for supply of ice and fuel supply facilities.
- 2) Kalimati/Wuring (Maumere), Sikka District and Paupanda (Ende), Ende District (Second Priority Sites)

a. Characteristics

Site	Roles & Functions	Major Indicators	
Kalimati/Wuring (Maumere)	Urban Fish Landing & Marketing Center	Covering Areas	Mainly: Kalimati (Maumere), Wuring (Kec. Alok) Partly: Gelitung, Pulau Besar, Pulau Panama
		Number of Boats	About 400 motorized boats (Maumere and Alok districts) 85 purse seine, 78 bottom long-line, 200 hand line/gill net.
		Operating time	Night time (In case of daytime operation, fish are landed at each village and sold the following morning.)
		Landing time	04:00 – 08:00 (Opening time of fish market, 06:00 – 10:00)
		Landing Volume	5,098 tons/year (total of Kec. Maumere and Kec. Alok, based on statistics), volume of fish directly sold to consumers at site: 5-10 tons daily (estimate).
		Number of fish traders	30 – 60 fish traders/retailers (men) who directly buy fish from fishing boats at Kalimati. 30 – 60 village women mainly from nearby villages to sell fish.
Paupanda (Ende)	Urban Fish Landing & Marketing Center	Covering Areas	Mainly fishing boats from Pulau Ende. Some from Mbongawani and Kec. Ende Selatan.
		Number of Boats	More than 280 units of motorized boats in Pulau Ende.
		Landing volume	4,159 tons (Kec. Ende, Pulau Ende, and Ende Selatan, based on statistics) Volume of fish sold directly to consumers at Mbongawani beach: 8-12 tons daily (estimate).
		Number of fish buyers	80 – 200 fish traders (men), of which 20 traders are large-scale (fish agents).

b. Linkage with other areas

- (i) More than 1,000 tons of fish are supplied annually from Larantuka and Maumere, and all fish including locally landed fish are consumed in Ende at present. In view of the projected fish demand, it is expected that Ende will play a key role as a transition market to distribute fish from the eastern region (Larantuka and Maumere) to the western region of Flores (Bajawa and Ruteng).
- (ii) Paga (the 7th priority) located between Maumere and Ende will also play an important role to increase fish production not only to supply fish to the western region, but also to supply fish to other islands.

c. Conditions of the existing facilities

- (i) The existing PPI Paupanda that was constructed in 1994 has not been utilized because there is no ice plant and fish storage, additionally, the jetty is unsuitable for fishing boats, etc.
- (ii) The distance between PPI Paupanda and the current fish landing beach (Nbongawani) is only 500m.

d. Conclusion

The project will be implemented (fish landing and marketing center both at Maumere and Ende, including small facilities at Paga)

Proposed major component of the project:

- (i) Fish landing and marketing complex at Maumere (Condition that must be met to implement the project: Organization of fisheries cooperatives)
- (ii) Rehabilitation/Improvement of the existing PPI Paupanda (Condition that must be met to implement the project: Revival of KUD Mina Bahari)
- (iii) Land facilities (auction hall, ice plant and storage) at Paga (Sikka District).

6.3 Initial Environmental Evaluation (IEE)

From the initial field survey, interview survey, and assessment of available data, a screening checklist was prepared to identify the potential elements that may impact the model projects at the priority sites. The environmental resources in the checklist considered the physical resources, ecological resources, human use and quality of life values, which could be impacted or affected by the proposed project activities/ components. Also, the constraints or impact of environmental resources on the proposed activities/ components were also considered.

The results of the screening checklist shown in Table 6.3.1 were used for scoping the environmental issues in the study.

6.3.1 Environmental Conditions of Priority Sites

(1) Waworada-Bima District, NTB

1) General Description of Waworada

A nearby settlement located uphill of Rompo village consists of fishermen that were relocated to the higher elevations from their previous houses that were located at the waters edge. This relocation was prompted by safety concerns due to big waves. The community living here are mostly transmigrants. There is electricity, but water for drinking and bathing has to be bought from vendors that sell from horse drawn carts. A gallon container costs about Rp300~400. The vendors' water source is ground water at Waworada village, which is about 2 km away. Firewood is in scarce supply and the villagers have to buy firewood which costs about Rp3,000 ~ 5,000 for a bundle.

The houses of the fishing village at Rompo are built on the tidal flats and roads in the village that are inundated during high tides. The houses are built on stilts with some houses nearer the sea having their own individual raised platform surrounded by rocks.

There was a seaweed cultivation project by Program Economy Local 2000 which was

funded from APBN, DAU (Dana Allocasi Umum).

Blast fishing has damaged coral reefs in the bay. Fishermen are reluctant to report to the police due to fear of retribution as perpetrators are from their community and known to them.

The state of the mangrove forest in the area is degraded and only unwanted mangrove trees remain. The community gets their mangrove trees for construction and firewood from the uninhabited areas opposite the bay.

The community has "rukun tetangga" activities for cleaning the common areas in the village, which they perform once a week on Friday. There are no activities to clean the beach. Processing of smoked fish is done near the houses and burning of rubbish is conducted in common areas of the community.

2) Initial environmental issues observed in Waworada

- Lack of drinking water. Residents have to buy water from vendors that bring in water on horse drawn carts from about 2km away. Underground water that is available in the fishing village is saline and not suitable for drinking.
- Damage of coral reefs from blast fishing activities. Enforcement, patrol and better communications need to be improved to discourage this destructive activity.
- Loss of the mangrove forest around Waworada due to cutting for firewood and construction. Almost all of the mangrove forest is lost with only a few unwanted trees remaining. Supply of bakau for the community's needs is now from the outer side of the bay.
- Burning of rubbish in common areas (such as road access) as there is no proper area set aside for this. This obstructs walking, access of horse drawn carts, smoky and odorous conditions for people living near the fire pits.

The general hygiene of the community could be improved especially in the common areas.

(2) Hu'u-Dompu District, NTB

1) General Description of Hu'u

As the road runs very close along the beach, there is very limited land between the road and the sea. Most of the fishermen houses are located on the other side of the main road away from the sea and on a gentle sloping hill.

The village's pipe water supply is supposedly from a river up in a nearby hill about 5km away. The water supply network built about 2 years ago has only 2 public taps in the village. Each household pays Rp3,000 per month for this water supply. There are 7 wells in the village but the water is saline and not suitable for drinking.

According to fishermen, there is very little blast fishing activities and subsequently, the coral reefs are in good condition. The coral reefs are about 5 to 8 m from the surface and stretches across the bay.

There are no mangrove forests in the village as the coastline is quite rocky with a steep sloping beach.

Some fishermen fishing the "tongkol" fish migrate to other areas to fish during different times of the year. From January to February, they are in Waworada, and from March to April, they are in Sape.

There is a boat from Bali that catches turtles. It supposedly has a permit to catch 100 turtles over a 6 month period. It keeps the turtles it catches in a cage in the sea nearby Hu'u. When the catch is sufficiently large, a transport boat will come to pick up the turtles to transport it to Bali for consumption there.

2) Initial environmental issues observed in Hu'u

- Water supply network in the village is insufficient and groundwater is saline near the coast.
- Limited area between road and beach which may impose constraints on future development in this area.

(3) Kempo-Dompu District, NTB

1) General Description of Kempo

There are 3 villages in the Desa, i.e., Dusun Kerama (or Kampong Pali), Dusun Kajenje, and Dusun Nciu. There is about 4,000 people in these 3 villages which is founded on tidal flats. There is a river that runs through the villages which is used by some for dumping rubbish and the water flow is minimal in the dry season.

There are 4 public wells in the village, which is about 2 to 5m deep. The well for drinking water is furthest from the sea and near the main road and the river. This well is affected by dust from the main road and some people wash their horses at this well.

The beach is a tidal flat and there is a low gabion stone wall at the side of the river that flows through the village. This gabion wall also extends to the side of the river mouth where it meets the sea. The biggest waves are during the northwest monsoon months from December to March.

There is a wooden jetty and a building on land at the western end of the village, supposedly a village (desa) project. The land facility is unused, as soil has been eroded from the site due to a protection wall that is too low and damaged to prevent seawater intrusion.

Near the small island offshore from the village there is a cage to keep live fish.

The disused PPI facilities are about 1km away from the furthest western end of the village. The facilities were constructed in 1980 and operated until 1986. The beach here is sandy and rocky. There remains only a small clump of mangroves at the western end.

There are five houses on the other side of the main access road to the facilities. Three public wells provide these houses with water all the year round.

Eight fishermen were caught recently for blast fishing.

- 2) Initial environmental issues observed in Kempo
 - Hygienic water supply to the village needs to be located away from the road and river which are sources of pollution and contamination.
 - The river flowing through the village is polluted due to rubbish and the low flow especially in the dry season.
 - Some of the houses are built on the beach and are subject to flooding during very high tides and rough weather.

(4) Oka – Flores Timur District, NTT

1) General Description of Oka

There are 3 Desas, i.e. Lewoloba, Larmawalong, and Wailolong. At Lewoloba/ Oka, there are 5 fisher groups (kelompok), about 125 fisher houses with 700 people. There are wells in the village which is 5 to 7m deep. There was a German and AustAid project to provide water supply to the village. There is good ground water in this area that extends down to the coast line.

There are two prominent bays in the area, i.e. around Oka and Mokantara. There are corals around the cape / headland of the bays with some mangrove on the northwest end of the bay. There is a Pertamina complex located on the cape between these two villages.

The rough season waves are about 2m during the southeast monsoon months of July to September. During rough weather, the fishermen do not go fishing. There is seasonal movement of sand but the coast line has basically remained unchanged.

Some outside fishermen were caught for blast fishing around Larantuka.

At the nearby village of Mokantara with a population of about 600 people, water is from pipe supply but it is intermittent. There are 4 public taps in the village and about 20 houses have their own water supply with meters. The water source is about 5 to 6km away from the village. Firewood is plentiful from nearby hills and the villagers collect enough to sell to other areas. Most of the fishermen here are also farmers.

There is plan to built a PPI facility next to the damaged Bali Raya complex. Dinas

Perikanan has completed the preliminary survey report and expects funds to be allocated soon for the construction.

- 2) Initial environmental issues observed in Oka/ Mokantara
 - The risk of oil spill or leakage from the Pertamina complex will need to be investigated to find out the pollution risk to fisheries activities.
 - Enforcement and patrol to control blast fishing need to be improved to discourage this destructive activity.

(5) Mbongawani / Paupanda – Ende District, NTT

1) General Description of Mbongawani/ Paupanda

The fish market is located on the beach and operates from early morning, 6 am to 12 noon. There is shade from the trees on the beach. Most of the fish is sold from tables but some sellers sold fish from plastic sheets spread on the beach. There is no tap on the beach and the water used by the sellers to clean the fish and selling platform is brought in by buckets. There is pipe water supply to the houses nearby from where the sellers get their water. The majority of the fishermen that land here are from Pulau Ende. During rough weather especially in January and February of the North-west monsoon, the fishermen land on the opposite site of the cape at Ipi.

The sellers pay Rp500/day/table as tax to sell at this market. They also contribute Rp500 each to employ a sweeper that cleans the beach market from 5 to 7 pm everyday. There is no market regulation to control the number of sellers, liquid and solid waste management.

Even though the beach market is generally clean, the beach outside the market is littered with rubbish. There are drainage outlets/ drains that discharge into the beach around the market and these outlets are also choked with rubbish.

There is a public toilet and an unused market hall on the beach. The charge to use the toilet is Rp500 per time. The market hall's floor and concrete tables are damaged. It is presently being used to store boxes containing ice and fishes.

- 2) Initial environmental issues observed in Mbongawani / Paupanda
 - The solid waste management of the market needs to be improved. The hygiene of the beach and drainage outlets around the market also needs to be improved with the cooperation of the city authorities and local communities.
 - Management of the market should be improved to address potential development issues especially with regard to solid and liquid waste disposal and hygiene of the market and surrounding areas.

(6) Kalimati -- Sikka District, NTT

1) General Description of Kalimati

The site of the fish market is located at the sand bar that has built up at the river mouth of the dry river flowing through the city. During the wet season when the river is flowing, the fishermen land their catch near this site and the fish market is then located on the land side of the landing point.

The present location is conveniently located close to the town center with easy access for the consumers and retailers. However, the build-up of rubbish in the dry riverbed and the presence of drying/processing tables at the side of the river bank has created an unsanitary environment for the market. There is no easy road access to this market location and heavy loads can only be handled by wheelbarrows.

The temporary nature of the market means that some fish are landed from the boats onto the sand, and fish are sold on plastic sheets spread on the sand. There is a lack of water at this market with water being brought in by buckets.

2) Initial environmental issues observed in Kalimati

The temporary nature of the market at the river mouth does not provide for a more permanent solution to the problem of sanitation at this site.

6.3.2 Results of Screening Checklist

From the table of the screening checklist (Table 6.3.1), the list of activities that may have significant impacts on the environmental resources are summarized below.

Activities	Significant Impact on	Scoping Consideration
1. Improve fishing technique	<ul style="list-style-type: none">• Fisheries• Fisheries industry• Economic and Social organization	<p>The significant impact on fisheries resources from this activity could be positive or negative. The improved technique could alleviate pressure on fish size or species that are not targeted. However, pressure on targeted fish could increase. To ensure sustainability of the fisheries activity, resource monitoring and control should be done. The willingness and awareness of the community regarding resource management should be investigated in order to mitigate the negative impact from this activity. Production could be increase from this activity to supply to the consumers and industry. The supply and demand projection of the master plan period should be considered in light of the resources and resource management plans that could be implemented with the cooperation of the community and/ or capabilities of the concerned agencies.</p> <p>This activity could improve the economic welfare of the participating fishermen. Possible conflict could arise between the fishermen that benefit from this activity and those that do not participate. The number of fishermen willing to take part, reservations or reasons for non-participation should be investigated. Social structure and motivation of the community should also be understood with regards to the fisheries sector.</p>
2. Improve	<ul style="list-style-type: none">• Fisheries	<p>The reasons for the positive and/or negative significant impact are the</p>

Activities	Significant Impact on	Scoping Consideration
fishing net/ gear	<ul style="list-style-type: none"> • Fisheries industry • Economic and Social organization 	<p>same as that for activity 1 above. Scoping items are also the same as that for activity 1 above.</p> <p>- same as for activity 1 above -</p> <p>- same as for activity 1 above -</p>
3. Improve fish landing jetty	<ul style="list-style-type: none"> • Marine/ beach/ estuarine system 	The construction or improvement of fish landing jetty should be designed to take account of the physical characteristics of the beach or sea condition of the surrounding area. Scoping items should include physical land and sea surveys, current and sea conditions, type of boats, etc. Willingness and motivation of the targeted fishermen to use the facilities should also be investigated.
4. Improve sanitation of processing area	<ul style="list-style-type: none"> • Land quality: pollution • Fish processing 	<p>The location and state of existing processing area should be surveyed as baseline data.</p> <p>Physical, social and cultural constraints to improvement of the processing area should be clarified. Willingness and motivation of the processors to participate in the project should be clarified.</p>
5. Improve fish market	<ul style="list-style-type: none"> • Economic and Social organization 	The operation of an improved fish market may create conflict/ economic disparity between participating and non-participating retailers. Present condition of market retailers, their number, scale of operation, frequency of use, etc should be clarified in order for equitable operation of the improved fish market to reduce or mitigate possible conflict.
6. Improve processing quality	<ul style="list-style-type: none"> • Fish processing 	The willingness of processors to engage in this new activity/ techniques/ technology should be clarified. Their motivation, time, monetary and cultural constraints with regards to processing activities should be investigated.
7. Diversification of fisheries products	<ul style="list-style-type: none"> • Fisheries 	- Same as activity 6 above -
8. Improve water supply	<ul style="list-style-type: none"> • Ground water hydrology 	The impact on existing ground water hydrology if water is to be harvested for project activities should be clarified. The amount and quality of water that can or may be harvested should be investigated.