2.4 Facilities and Equipment Plan

2.4.1 Design Policies

(1) Design Conditions

The natural and social environmental characteristics and the existing conditions of the fisheries industry of the Rompo model and Bima market sites as explained in sections 1.1 to 1.4 and 2.3 of this report are summarized in the table shown below.

Design Conditions

Model Sites	Design Conditions
Rompo: Fish collection center (integration of neighboring fishing villages)	• The fisheries facilities and the fishing villages will be developed on reclaimed land due to the lack of land area. • The facilities will be built near the existing TPI since it is currently the center of fisheries activities in the area. • The stone jetty constructed by the Japanese Army in 1943 will be extended offshore. • Facilities capable of withstanding the wind/waves of the eastern and western monsoon winds to enable fisheries activities to be carried out throughout the year will be built. • Mooring facilities that are unaffected by the fluctuations in the tide level are needed since the fish landing times at each site varies throughout the year. • Facilities that will meet the demands of the fisheries activities and the needs of the fishing villages are planned since they are closely linked.
Bima retail market: consumer market	• Move the fresh fish retail section from the existing market facilities. • Move the fresh fish retail section to the government-designated lot located halfway between PTI Tanjung (Bima) that is currently under planning and the existing Bima market. • Separate the line of movement between the horse carts of visitors and the whole sale and retail market area to improve the sanitary environment. • Create a functional link with the PTI Tanjung (Bima) under planning and the existing general market.
Common items	• *Create a sanitary environment for the fish handling site.* • Construct facilities and provide equipment and materials that will enable independent and sustainable management and operations of the facility.

(2) Guidelines

1) Rompo site

The Rompo site, located in Waworada Bay, is not affected by waves from the open sea, and a large-scale breakwater is not needed to keep the waters calm. But an outer wall (revetment) will be constructed to alleviate the impact of the wind and waves that occur in the bay. An adequate water depth will be secured to provide a safe vessel maneuver area for the fishing boats navigating the bay. A mooring facility capable of withstanding the easterly and westerly wind and waves will be constructed. The landing wharf will be equipped with preparation functions to enable the fishing boats to refuel and replenish their water supplies. In order to control the facility scale and construction cost, motorized fishing boats will continue to anchor offshore and small non-motorized boats will moor near the coast or beach their boats. However, the revetment will be equipped with mooring facilities to enable to moor their boats during the high tide.

The landing and preparation wharf must cope with the tide level differences since the landing times of fishing boats will differ throughout the year according to the type of fishing operations that are conducted. Therefore, adequate water depth for mooring must be secured during the low tide.

The crown height of the landing wharf will be fixed according to the high tide level, but since the tidal difference is 3m and large, the facility must also be capable of supporting

landing activities during the low tide. Therefore, supplementary mooring functions will be added to the revetment to enable the facility cope with all tide levels since extending the landing wharf will increase the scope of the facilities and greatly raise construction costs. Guidelines for the mooring facilities are given in the table below.

Guidelines of the Mooring Facilities

Type of mooring facilities	Application	Improvement Guidelines
For landing	For landing vessels	Pier type structure to cope with tidal level differences To move to resting anchorage after landing and preparation has been completed.
	For transport by sampan For beach landing of small fishing vessels	Construct a revetment with mooring functions or sandy beach to cope with tide level differences.
For preparation	Fuel supply, water supply, loading and unloading of the fishing gear, etc	Use for both landing and preparation activities such as refueling and replenishing supplies. To control the scale of the facility, it will be combined with landing facility.
For resting	Model fishing boat	Fishing boats will continue to anchor offshore.
Others (special purpose)	For passengers embarking and disembarking from the marine ferry boats (only for Rompo)	Secure the safety of passengers.

When implementing the project by sector, the following facilities and equipment will be required in addition to the facilities and equipment listed above.

Other Facilities

Type of facility and equipment	Facility and equipment	Improvement Needs
Basic fishing port facilities	Existing road improvements	Alleviate traffic congestion of the arterial road that runs through the sub-village
	Facility road	Support fishing activity related vehicles.
	Parking lot	Support fishing activity related vehicles
	Revetment	Land reclamation works are needed to construct the revetment proposed in the project. Support daily fishing activity by providing public access along the coastline occupied by private residential land. Protect the sub-village from waves and splash.
Functional fishing port facilities	Administration office	Enable the facilities and activities to be effectively managed.
	Electricity supply facility	Support the operation of the facilities proposed in project plan
	Simple drainage facility	Maintain minimum sanitary standards that are acceptable for a fresh fish handling facility
	Waste-collection area	Maintain minimum sanitary standards that are acceptable for a fresh fish handling facility
Facilities to support daily life activities in neighboring fishing villages	Sunday market site	The Sunday market is presently held along the road that runs through the sub-village, which has impeded the activities of the neighboring villages.

2) Bima market site

In order to ensure a minimum standard of sanitation that is required for a food and fresh fish retail market, the retail market, and unloading and loading yards, and wholesale activities will be placed in a shaded area, and adequate space will be provided to allow the floors to be washed, water for washing activities, trash collection, and simplified wastewater treatment facility will be provided. When implementing the project by sector, the following facilities and equipment will be required in addition to the facilities and equipment listed above.

Other Facilities

Type of facility and equipment	Facility and equipment	Improvement Needs
Basic market facility	Facility road	Support fishing activity related vehicles
	Parking lot	Support fishing activity related vehicles
Administrative and functional supplementary facilities	Administration office	Enable the facilities and activities to be effectively managed.
	Electricity supply facility	Support the operation of the facilities proposed in project plan
	Simplified drainage facility	Maintain minimum sanitary standards that are acceptable for a fresh fish handling facility
	Waste-collection point	Maintain minimum sanitary standards that are acceptable for a fresh fish handling facility

2.4.2 Layout Plan

(1) Functional Integration and Division of Roles

Based on the linkage between each function, and their division of roles, the layout of the planned facilities is explained below.

(a) Landing, Handling, and Shipping Functions

To support the fish landing and fish handling improvement project and the project to improve fresh fish transport, it is important that the landing support functions and the fish catch handling and shipping functions are integrated. Thus, these functions will be concentrated around the fish handling shed so that operations can flow seamlessly from landing to handling to packing to shipment. Ice supply facilities and insulated box storage space will be located nearby to facilitate these functions. To enable fishing boats that have landed their fish catch to prepare for the next day's fishing trip, preparation functions for refueling and loading fishing gear will also be concentrated in this area. To support the shipment and transport of fish from the fish handling shed, an access road linking the fish handling shed to the arterial road will be constructed. This road will be used by transport vehicles and by the fishermen and traders who use these facilities.

Functions and Facilities Located Behind the Landing Facility

Facility	Function
Landing wharf	To double as a preparation wharf
Fish handling shed	Will include a fish handling shed, insulated box temporary storage area, insulated box storage area, preliminary processing area, loading/unloading workspace for fish shipment, and supplementary facilities.
Ice-making and storage facility	Ice-making facility room, temporary storage room, ice storage room, machine/electricity room, and transport area.
Fuel supply facility	Will supply fuel to fishing boats.
Water supply facility	Will supply water to fishing boats and handling shed.
Roads	For transporting the fish catch.

(b) Fisheries Support Functions

The simple workshop, fishing gear repair area, fishing gear storage area, and other facilities will be located in a separate area from the fish landing, handling, and shipping areas. But they will be located near the revetment with mooring facilities to assist the loading and unloading of fishing gear and materials on the boat.

(c) Supplementary Facilities

The floors of the fish handling shed will be washed using seawater, and the seawater intake point and the wastewater discharge point will be located in separate areas.

(d) Others

The transport ferry facility and support facilities for the Sunday market and other activities of the neighboring fishing communities will be located so as not to impede fisheries activities.

(2) Zoning and Line of Movement Plan of the Rompo Site

The layout of the facilities has been planned as shown in the table below based on the topographical characteristics and conditions of the site, major line of movement and linkage with each area, and for each separate line of movement (of fishing boats, fish catch, people, clean water, wastewater, vehicles, etc.)

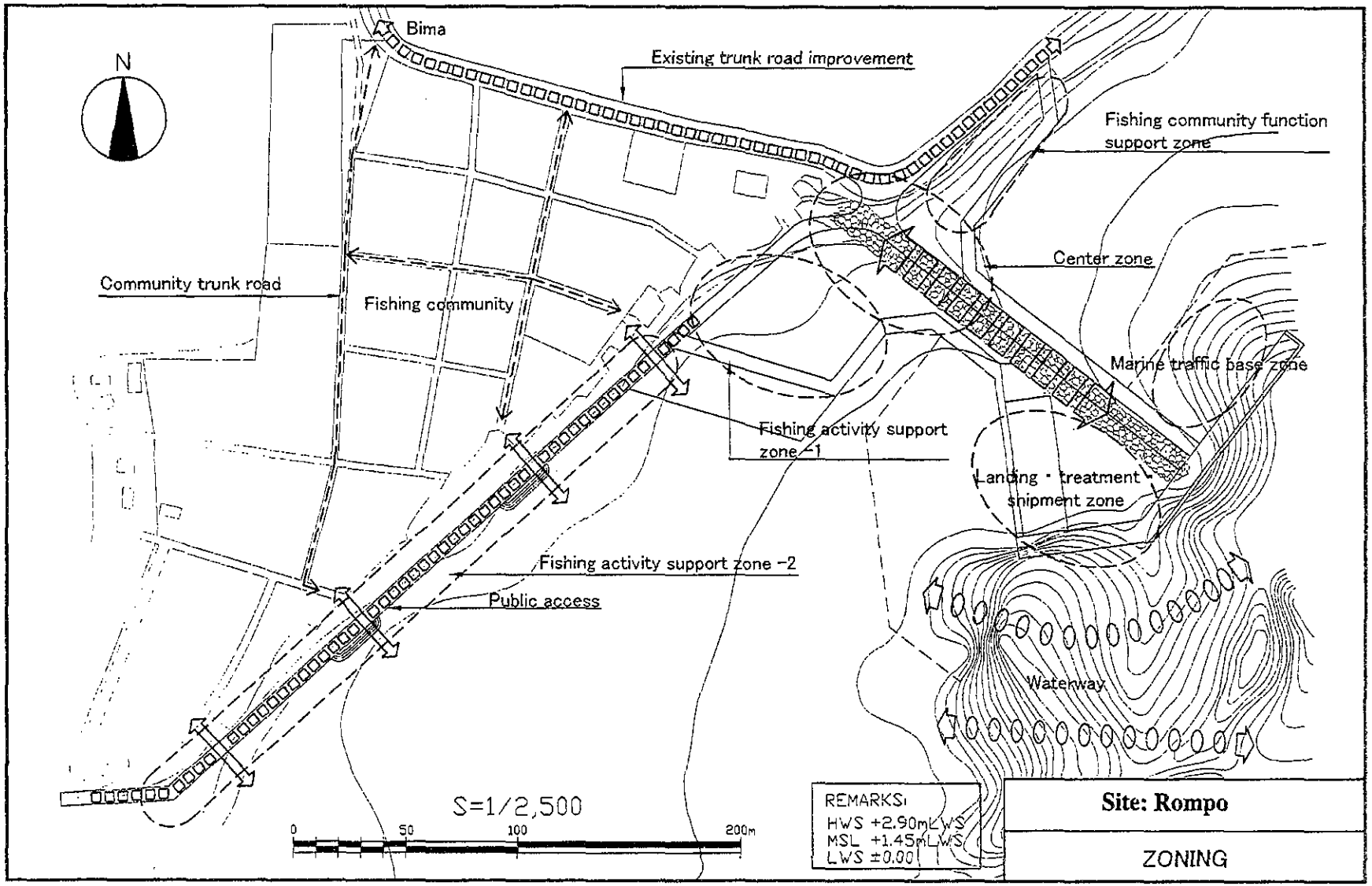
Presently, fishing activities are centered around both sides of the stone piled jetty constructed by the former Japanese Army, therefore, this jetty will continue to be utilized. In view of seabed topography (water depth) around the jetty, the landing functions will be concentrated at the tip of jetty and the other functions will be concentrated around the existing TPI. Since the area between the tip of the jetty and the coral shoals is presently used as a passageway by the fishing boats, it will be continue to be kept as a navigational waterway.

The revetment will be built in front of the fishing village and public access or space will be created for fishing and village activities.

Of the existing arterial roads, the road running through the sub-village will be renovated as a major line of movement. It will serve as the line of movement for the entire district and in addition to fishing activities; it will be used for general traffic. Therefore, an intersection will be created between this arterial road and the line of movement of the facility at the curved area of the district road (near the existing TPI). The following table and the figure show the co-relation of the zoning and planned facilities.

Zoning and Planned Functions and Facilities

Zoning	Planned Functions	Planned Facilities
Landing, handling, shipping zone	Fish landing, preparation activities for fishing boats	Landing and preparation wharf
	Handling, packing, shipping	Fish handling shed
	Preliminary fish processing	Next to the fish handling shed
	Fresh fish storage	Next to the fish handling shed, ice-making and storage facility
	Fishing trip preparations	Fuel and water supply facilities
Fishing activity support zone -1	Fishing gear and equipment repair area	Simple workshop
	Fishing gear repair, temporary storage	Fishing gear drying area, open yard
	Processing improvement, development, extension	Model processing area
Fishing activity support zone -2	Ensuring public access along seashore Support fishing gear repair, small fishing boat operations, repair and preparation work, mooring of small fishing vessels	Revetment
Ferry transport zone	Coming and going of transport ferry boat in Waworada Bay (Support for landing fish catch during westerly winds and preparation function for fishing boats).	Embarking and disembarking facility for transport ferry boat
Fishing community function support zone	As center of traffic and fishing communities	Sunday market site, waiting area for ferry boat
Center Zone	Management of facilities and activities	Administration office
	Traffic, secure line of movement for fishermen, traders, residents, etc. Support fishing activities.	Facility road, arterial road

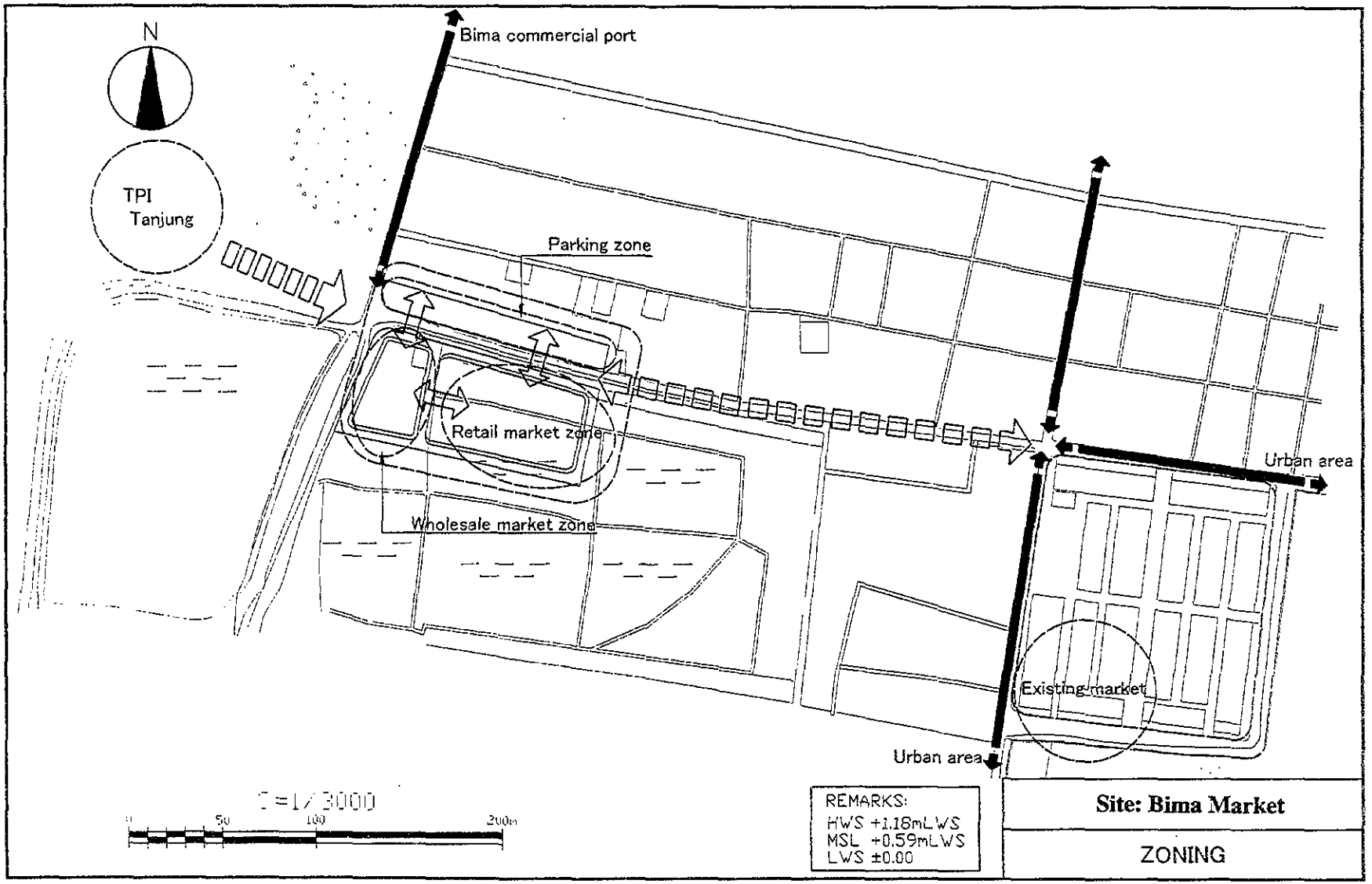

N
Bima
Existing trunk road improvement
Fishing community function support zone
Center zone
Community trunk road
Fishing community
Marine traffic base zone
Fishing activity support zone -1
Landing・treatment・shipment zone
Fishing activity support zone -2
Public access
Waterway
S=1/2,500
0
50
100
200m
REMARKS:
HWS +2.90mLWS
MSL +1.45mLWS
LWS ±0.00
Site: Rompo
ZONING

(3) Zoning and Line of Movement at the Bima Market Site

Based on the linkage and roles of each function, the layout of the planned facilities is as follows. To integrate the functions of the existing markets and PPI Tanjung (Bima), the facilities will be located between the market and the PPI. The line of movement of the horse carts of the visitors and will be separated from the fresh fish retail area. The parking lot for transport vehicles and for visitor horse carts will also be separate. The following table and the figure show the co-relation of the zoning and planned facilities.

Zoning and Planned Functions and Facilities

Zoning	Planned Functions	Planned Facilities
Wholesale market zone	Delivery of fish catch from outside areas and wholesale activities	Loading -unloading yard, and wholesale market
Retail market zone	Retail market for residents	Retail market
	Market administration	Administration office
	Supplementary functions	Water supply, electricity supply Simple wastewater facility, Waste collection point
Parking zone	Parking space for drivers	Parking lot for staff member and visitors


N
TPI
Tanjung
Bima commercial port
Parking zone
Retail market zone
Wholesale market zone
Urban area
Existing market
Urban area
1:3000
0
50
100
200m
REMARKS:
HWS +1.18mLWS
MSL +0.59mLWS
LWS ±0.00
Site: Bima Market
ZONING

2.4.3 Facilities Plan

(1) Rompo Site Development

1) Basic Fishing Port Facilities

(a) Outer Structure

To protect the landing activities from the wind waves generated by the east wind, a revetment that will act, as a breakwater will be constructed. The west side of revetment tip will have mooring facilities to supplement the landing and preparation functions of this structure. Fishing boats will be able to moor on the shallow side of the revetment near the land side during MWL~HWL; and its base will be B=6m.

The revetment in front of the fishing communities will serve as a public access way, community space, and provide protection against the east wind. Stairs will be built in front of the road in the fishing village to support the operations and repair of fishing gear and small fishing vessels.

(b) Mooring facilities

Wind waves are generated by the east and west winds that blow from July to September and November to February, respectively, and greatly impact the bay waters. To secure calm waters for the mooring facility and anchorage, the jetty built by the former Japanese army will be utilized and a breakwater will be constructed at the end of this jetty. To enable the jetty to be used during the season of the east and west winds, mooring facilities will be constructed on both sides. During low waves, the revetment near the fish handling shed will also be used to moor fishing boats. The landing wharf will be built on the west side to avoid the strong impact of the wind waves generated by the easterly winds. But since the entire length can not be effectively used due to the corner end (80m + 20m), mooring facilities will be constructed at the revetment near the fish handling shed, which will serve as supplementary landing facility. Mooring facilities specifically for the model fishing boat will be constructed at the front side of the fish handling shed.

A disembarkation and embarkation area for passengers of the transport ferry will be created on the east side of the jetty. This facility will also serve as a supplementary landing facility for fishing boats during the westerly winds. A seawall (revetment) will be located on the offshore side of the jetty in order to keep the mooring and anchorage areas calm; and the inner side of the revetment will have mooring functions. An adequate water depth is required for the landing wharf during the low tide. During the high tide (MWL HWL), mooring is feasible in the shallow water area. Hence, mooring functions will be constructed at the shallow area of the revetment that will also function as a supplementary preparation area for the loading and unloading of fishing gear. In addition, mooring facility for the transport ferry boat will also be a step type, for passenger embarkation and disembarkation purposes during the high tide. At the west side of reclaimed site, the construction of a slipway (L=75m) will be reviewed for the repair, maintenance, and building of fishing vessels.

Reference: Countermeasures against tide levels

The difference between the sea surface and crown height of the mooring facility will be limited to2.0m for ease of work.
If the tide levels are divided into three levels due to HWL +2.90m, the feasible crown height for utilization is as follows.
Tide level ±0.0m~+1.0m: Crown height is approx. +1.5m
Tide level +1.0m~+2.0m: Crown height is +2.5m
Tide level +2.0m~+2.9m: Crown height is+3.5m

(c) Mooring Facilities

Dredging (-2m) is required to secure the required water depth in front of the mooring facility and vessel maneuver area, and the soil will be used in the land reclamation area. Since the sea area between the stone piled jetty constructed by former Japanese Army and the scattered coral reef shoal offshore is used as a passageway, the normal line of the outlying facilities (revetment and landing wharf) will be inclined. In general, the width of both sides of the navigation passageway in rough waters is (5~8 times the boat width), and the vessel maneuver area is the total of the mooring area plus turning area of the fishing vessels (3~5×vessel length). For instance, in case of purse seiners with high navigation frequency, the width of the navigation passageway and vessel maneuver area is estimated to be 12.5m~20m and 40m~65m, respectively. Therefore, the dredging area is 60m from the normal line of the mooring facility.

(d) Transport facilities

Since the fishing activities are presently focused in the curved area of the district road, the entrance to the facilities will be located at this curved area (near the existing TPI). The width of the entrance area will be expanded to alleviate the traffic congestion of fishing related vehicles and passing vehicles. To facilitate the traffic of fishing activity vehicles and to increase the convenience for the fishing communities, the unpaved district road where the borders are not clearly marked will be renovated to clearly demarcate the traffic lane, road side and private land borders.

The width of the facility road that runs from the district road entrance to the central jetty area will be adequately expanded to accommodate fisheries related vehicle, visitors, traders, passengers of the ferry boat, and others. The parking lot for fishing vehicles will be located within the facility.

2) Functional Fishing Port Facilities

(a) Fish Catch Handling and Storage Facility

The fish marketing support facilities related to landing, handling, and shipping will be concentrated in one area for efficiency. Therefore, the fish handling shed will be located behind the end of the mooring facility. The cargo loading area for fish transport vehicles will be located in the fish handling shed, therefore, the transport vehicle waiting area for will be located on the road next to the fish handling shed.

In order to protect the facility from splash caused by waves during the eastern and western winds, the outside apron width will be 10m. The ice-making facility will be installed next to the fish handling shed to support the ice packing work.

(b) Management Facility

An administrative office, waiting room for fish traders, training and meeting room, public restrooms, electricity/machine room, and others will be located near the intersection of the facility road and the access road that connects to the arterial road.

(c) Processing Facility

A model processing plant will be built to support the activities planned under the project to improve fish processing. The model processing plant will have an iron pot, an improved drying area, and an indoor processing facility. The improved drying area will consist of only a roof and floor.

(d) Fishing Gear Drying Yards

A fishing gear drying area will be created for washing, drying, and repairing fishing gear and nets. A multipurpose open yard will also be provided to facilitate fisheries activities. The fishing gear drying area and open yard will be an open area for multipurpose use. The simple workshop will consist of only a structure to enable the fishermen to utilize the space freely. These facilities will be conveniently located next on the right side of the reclaimed land.

(e) Supply facilities

The fuel supply facilities will consist of a storage tank rather than drum cans due to the high demand. They will be located near the landing wharf to enable fishermen to refuel their fishing boats during the preparation activities. But due to their dangerous content, adequate space will be secured around the fuel tank.

The water pipes (PDAM) from the existing arterial road will be extended, and a water supply facility for fisheries activities will be constructed to supply water for fish processing, replenishing water on boats, ice-making, and for sanitation purposes, including the water supply for the village. To reduce the costs involved in constructing the water supply facility, seawater will be used for washing the catch and for cleaning the facilities and equipment. The standards set forth in the Technical Guidelines on Constructing Fisher Housing, Director General of Cipta Karya, Public Works Ministry, No.43/KPTD/CK/1999 (henceforth referred to as Ministry of Public Works guidelines), will be used to build the water supply facility for fisheries activities, including drinking water in the facility.

A wire will be laid from the existing PLN network to the planned site. An electricity control, machine room that will power the ice-making machine and other facilities will be located in the management facility.

(f) Waste Disposal Facilities

To ensure a minimum level of sanitation in the locations where fresh fish is handled, facilities will be provided for supplying cleaning, collecting garbage, and simple wastewater treatment. The construction standards for each facility can be found in the Ministry of Public Works guidelines.

(g) Others

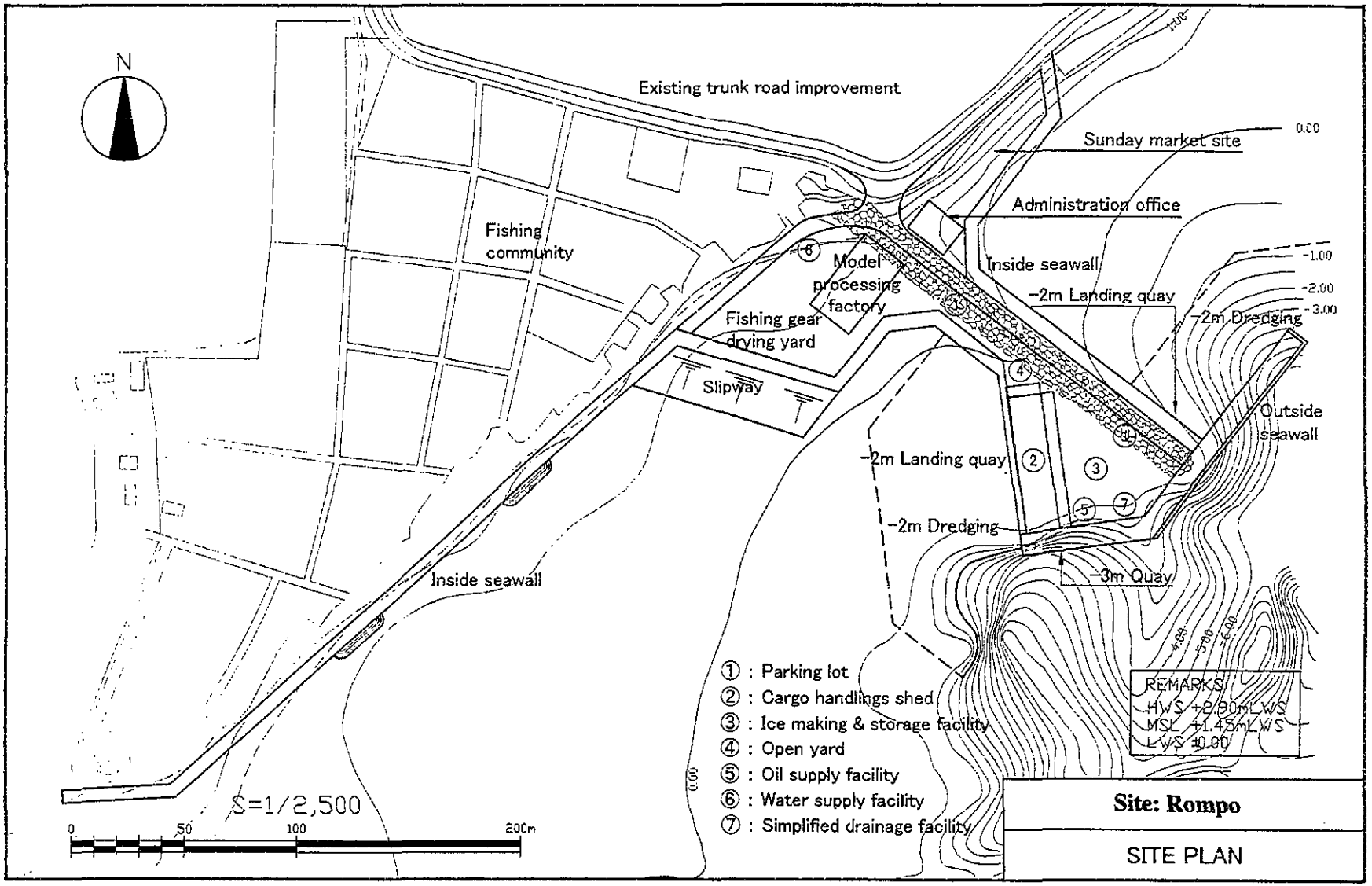
The Sunday market site will be located on the left side of the reclaimed land in order to keep the line of movement separate from the fisheries activities. As the existing coastline is rather complex, a public area for the sub-village will be created between the existing coastline and revetment.

3) Facilities to Improve the Fishing Community Environment

A general water supply system will be provided to ensure minimum domestic water demand in conjunction the water supply facility for the fisheries activities as explained above. The water supply facility will comply with the Public Work Ministry Standard and PDAM (Perusahaan Daerah Air Minum). In the regional fishery center, a model toilet facility (kamar mandi type) will be provided. Construction materials to improve the main roads in the community will be provided. Trash boxes will also to be provided to support the garbage collection system that will be introduced in the project. An outline of the improvement works in Rompo is summarized in table below. The following table and the figure show the co-relation of the zoning and planned facilities.

List of Planned Developments

Facility Category	Name	Facility Scale	Remarks
BASIC FACILITIES			
Outer Facilities	Seawall –1	L=60m	East side of jetty tip, inner side will be fishing boat mooring type
	Seawall -2	L=50m	End of the land site
	Revetment - 1	L=305m	For land site, for mooring during MWL – HWL (for preparation and resting)
	Revetment -2	L=350m	In front of community, public space for sea wall base, partial step type, mooring for small fishing vessel (preparation and resting)
Mooring Facilities	-2m Landing quay	L=100m	For fishing vessel (landing, fuel supply, replenish supplies) Step type to cope with tide level differences.
	-3m Quay	L=20m	For model fishing vessel, step type to cope with tide level differences
	-2m Landing wharf	L=40m	For transport ferry (embarking, disembarking passengers), step type
	Slipway	W=75m	-
Water Facilities	-2m Dredging	V=14,000m3	Water depth –2m in front of mooring facility, 2 places on both sides of jetty, A=8,700m2
Transport Facilities	Road for fishing port	L=290m	Traffic lane (B=6m), with side ditches on both sides
	Existing road improvement	L=350m	Traffic lane (B=6m), with side ditches, establish border between private and public area and separation of lane, road side
	Parking lot	A=1,000m2	-
Others	Site development	A=10,400m2	Excluding facility road
FUNCTIONAL FACILITIES			
Fish handling and storage facility	Fish handling shed	Area 960m2	Fish handling shed, insulation box temporary storage area, packing area, insulation box storage area, preliminary processing area, shipping/loading area, includes supplementary facilities
	Ice-making, storage facility	Area 350m2 Production 6ton/day Storage 12ton	Ice-making room, temporary storage room, ice storage room, machine room (includes electricity room), includes task of carrying out the ice
Management Facility	Administration office	Area 300m2	Administrative office, waiting room for fish traders, training and meeting room, public restrooms, electricity/machine room, and others
Processing facility	Model processing plant	Area 870m2	An iron pot, an improved drying area, and an indoor processing facility
Fishing gear storage, repair facility	Simple workshop	Area 150m2	Boat engine repair, constructing insulated fish boxes, repair, mending tasks, technical guidance, extension, etc.
	Open yard	Area 270m2	Multipurpose area for fisheries related activities
	Fish gear drying area	Area 2,790m2	Fishing gear drying area for gill nets, purse seines, mending area
Supplementary facilities	Fuel facility	Storage tank 5kl	Fuel tank, supplied through dispenser
	Water supply facility	Water tank 20m3	Water tank, joint work with community water supply system
	Power facility	One lot	Electric cable extension from the PLN cable, used jointly with the electricity/machine room in the management facility
Waste collection facility	Simplified drainage facility	Discharge 21m3/day	Simple treatment of wastewater generated by the facilities (screen + sedimentation basin)
	Trash collection point	Area 90m2	Collection area of trash generated in the facilities
Others	Sunday market site	Area 1,000m2	Removal of existing Sunday market, procurement of site only.
FISHING COMMUNITY ENVIRONMENT IMPROVEMENT			
Water supply, model lavatory facilities	Water supply facility	40.7m3/day	Provided with fishery water supply system or facility
	Model lavatory facility	2 sets	Kamar mandi type
Community roads	Community roads	L=600m	B=3m with side ditch, supply of materials only
Waste collection	Trash box	31units	1m*0.5m with cover

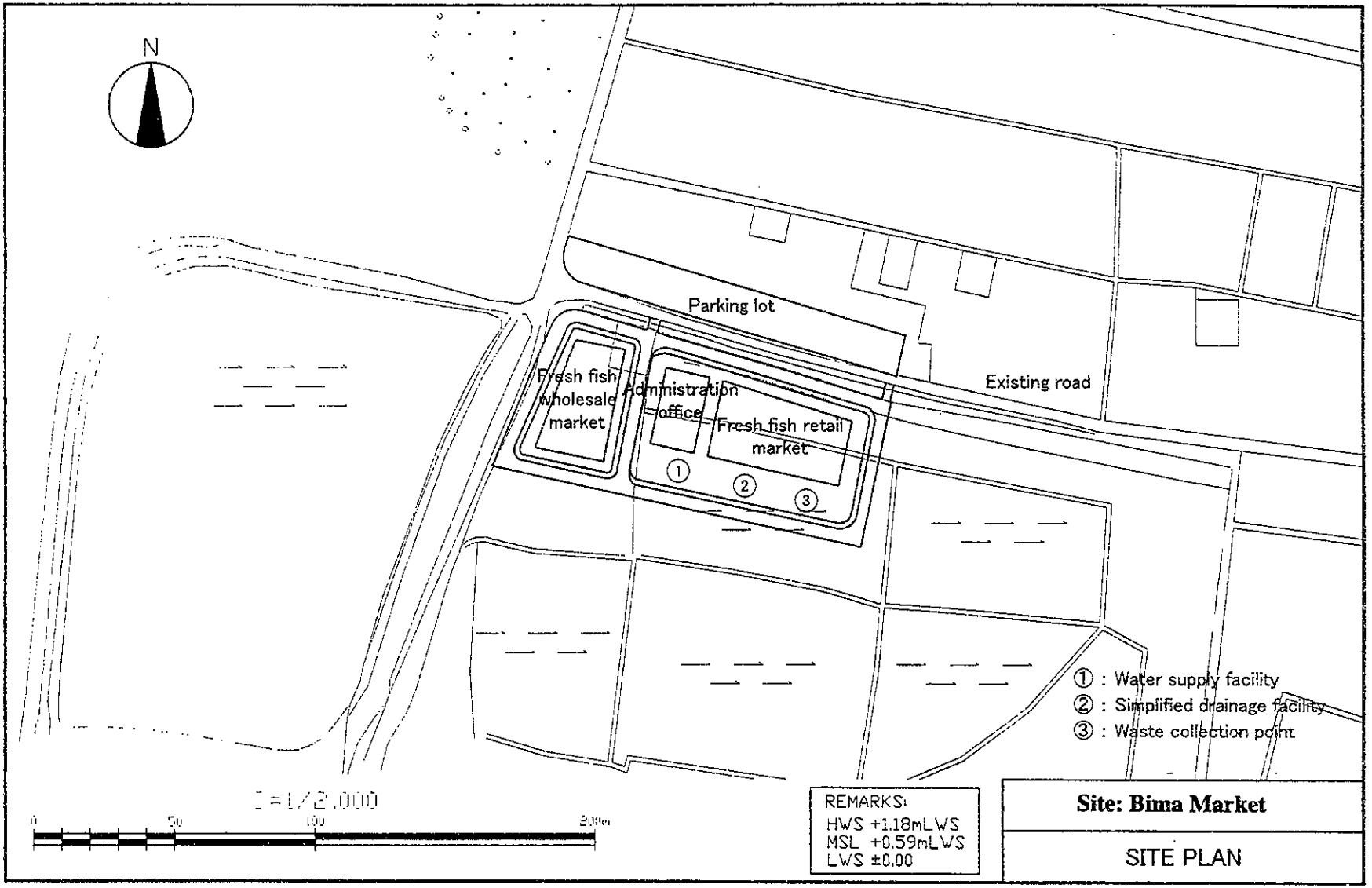

N
Existing trunk road improvement
Sunday market site
0.00
Administration office
Fishing community
Model processing factory
Inside seawall
-1.00
-2.00
-3.00
-2m Landing quay
-2m Dredging
Fishing gear drying yard
Slipway
Outside seawall
-2m Landing quay
-2m Dredging
3m Quay
Inside seawall
① : Parking lot
② : Cargo handlings shed
③ : Ice making & storage facility
④ : Open yard
⑤ : Oil supply facility
⑥ : Water supply facility
⑦ : Simplified drainage facility
REMARKS
HWS +2.90mLWS
MSL +1.45mLWS
LWS ±0.00
S=1/2,500
0
50
100
200m
Site: Rompo
SITE PLAN

(2) Outline of improvement works at Bima market site

The administration office will be located on the south side of the existing road. A fresh fish wholesale area (delivery, unloading and auction of fresh fish) will be constructed next to the retail market. The parking lot will be located on the north side of the road to keep the line of movement between the horse carts and market area separate. An access entrance road will be constructed because an irrigation canal runs between the existing road and facility site. The following table and the figure show the co-relation of the zoning and planned facilities.

List of Other Planned Developments

Facility Category	Name	Facility Scale	Remarks
Basic market facilities	Access road	4 places	Construct over the irrigation canal
	Facility road	L=400m	Width 4m, with one side ditch
	Parking lot	A=1,400m2	-
	Land site preparation	A=5,100m2	Excluding the facility road
Functional market facilities	Fresh fish retail market	Area 1,280m2	Retail market, Kiosk
	Fresh fish wholesale market	Area 900m2	Unloading place with sales and loading areas
Administration, supplementary facilities	Administration office	Area 460m3	Administrative office, waiting room for fish traders, training and meeting room, public restrooms, electricity/machine room, and others
	Water supply facility	Water tank 9m3	Connection to pipe line along existing road (PDAM)
	Electricity supply facility	One lot	Connection to PLN network
	Simple drainage facility	Discharge 9m3/day	Simplified treatment, screen + sedimentation tank
	Waste collection point	Area 270m2	Collection point in facility


N
Parking lot
Existing road
Fresh fish wholesale market
Administration office
Fresh fish retail market
①
②
③
① : Water supply facility
② : Simplified drainage facility
③ : Waste collection point
1=1/2,000
0
50
100
200m
REMARKS:
HWS +1.18mLWS
MSL +0.59mLWS
LWS ±0.00
Site: Bima Market
SITE PLAN

2.4.4 Equipment Plan

(1) Basic Guidelines

Machinery will be selected that is used in Indonesia and that is made by manufacturers who can offer after services in order to facilitate the sustained maintenance of the machinery at the site.

(2) Machinery for the Coastal Resources Management Plan

Type	Machine name	Major specifications	Quantity
To improve the data collection system and to expand the fishing licensing system	Logbook	Loose-leaf notebook, for fishermen's log, with fishing license	150
	Calculator	Solar-powered, 8-column	150 units
	Computer	To be installed in each facility, with printer	1 set
	Fishing boat marking tool	Flag, paint, etc. (for 130 boats, 35 boats, 60 boats each)	1 set
To expand fishing grounds and to improve the surveillance system of coastal fishing grounds	FAD	500-1,000m depth model	3 units
	VHF wireless	For land office (25W, table-top)	1 unit
		For coastal surveillance (25W, simple antenna, with batteries)	3 units
		Inland water area (25W, portable, rechargeable)	2
	Model fishing boat	Made by FRP, about 13m long x 3.7m wide 1.4m deep. On-board diesel engine: about 90 horsepower. Crew: about 10 people. Insulated fish hold: about $7m^3$. Fishing equipment: hydraulic roller, ring wire block, fishing lamp Navigation equipment: VHF wireless, GPS, sonar, magnetic compass Fishing gear: purse seine (about 350m x 60m), gill net, long lines	1 boat
	High-speed boat	Total length: 7-8m. Made by FRP, capable of beach landing. Engine: about 40 horsepower. Cruising speed: 20 knots plus. Crew: 5 people. Voyage area limited to within 4 miles of the coast. Equipped with VHF wireless, GPS, sonar, compass.	1 boat

(3) Plan for Improving Landing, Handling, Shipping, and Processing

Type	Machine name	Major specifications	Quantity
To improve landing and handling	Plastic containers	Internal capacity 60L, mesh, stackable	43 units
	Platform scale	Scale capacity 0-100kg, mechanical, kg display	3 units
To improve fresh fish shipping	Ice-making machine	Daily production: 6 tons (block ice 25kg/block 120blocs/operation 2 operations/day), compression function capability about 54kw, air cooling, brine tank: made of insulating concrete, with a chain block and ice crushing device	1 unit
	Ice storage	Insulating concrete structure with a capacity of $36m^3$ (about 12 tons of ice storage Insulation material thickness of 60mm or more, with an insulated door	1 ($18m^3$)
	Insulated fish box	Styrene foam box (capacity: 45L)	78 units
		Styrene foam box (capacity: 80L)	27 units
		Made by FRP (capacity: 150L)	28 units
		Made by FRP (capacity: 300L)	19 units
	Catch transport vehicle	3-ton trucks, with bench in the cargo area	2
	SSB wireless	150W, for communication between Rompo and Bima model sites	2 sets
To extend	Fish box	Wood, tacks, tape	1 set

fresh fish handling technology	reinforcement materials	(105 pieces for the styrene foam boxes mentioned above)	
To improve fish processing	Materials for making improved drying racks	Wooden rack (size: about 60cm x 400cm, 3-layers) + wooden frame net panel (120cm x 80cm x 24 panels)	10 sets
	Machines for processing development	1 processing table, 2 manual meat grinders, 1 manual press, 1 vacuum packager, 1 freezer (capacity of 500L, -20C), 1 hanging scale, 10 sets of cooking equipment.	1 set
Materials to support fisheries activities	Repair tools	General hand tools for woodworking, general and specialized tools for diesel engine repair	1 set

2.5 Operation and Maintenance Plan

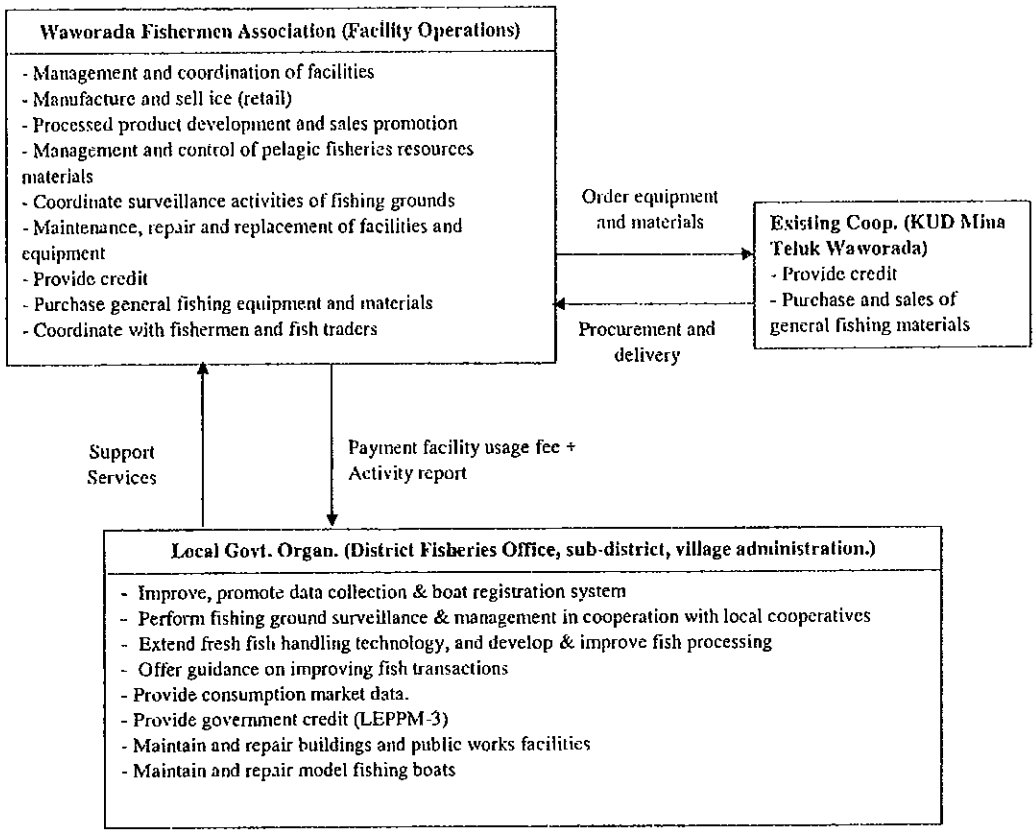
2.5.1 Organization for Operation and Management

The existing village based association, KUD Mina Teluk, is located in Waworada and conducts small credit activities and sells daily commodities and simple fishing gear. There were 231 registered members as of January 2002, and it was created under the "one village, one cooperative policy" that was implemented by the Suharto administration. Subsequently, its members consist of both fishermen (about 75 percent of the total membership) and farmers. The chairman of the cooperative is not selected from among the members, but is appointed from outside the organization. As a result its operations do not reflect the views of the local users.

The Bima district government in conjunction with the local fisheries personnel is planning to establish a new local fisheries organization (provisional name, Waworada Bay Local Fisheries Association) that will be operated based on the decisions made by local residents. It will be placed under the jurisdiction and supported by the provincial government. The new organization will tentatively begin its operations in August 2002. Presently, the District Fisheries Office has begun explaining the cooperative to local fisheries related personnel and cooperating with other local district and village groups.

(1) Linkages with Related Organizations

The facilities that have been planned will fulfill three functions pertaining to (1) fish landing, handling, processing, and shipping, (2) coastal resource management, and (3) fishing community living environment. Coordination with locally managed organizations, government organizations, and existing associations is essential to ensure that the facilities are effectively operated and their functions are fulfilled as planned. The functions and role divisions of each organization and the overall system of coordination are shown in the figure below.



(2) Facility Management Organization

Membership in the Waworada Bay Local Fisheries Association is open to fishermen, fish traders, retailers, and anyone employed in the Waworada coastal fisheries industry. The objective of the cooperative is to develop comprehensive regional fisheries by providing sustainable services with the understanding and cooperation of its members.

The development of fisher, trader, and retailer groups has lagged in this region. Subsequently, fishermen, traders, retailers, and village women will be accepted as individual members rather than as group members. Each member will be expected to pay Rp.5,000 for the cost of an identification card (with photograph) and an annual membership fee of Rp.20,000 to pay for the cost of general meetings. In addition, to secure the initial operating costs of the facilities from the region, Rp.10,000 will be collected from each member. Members will be paid a dividend on this amount when the facilities begin to generate profits. This money will be returned when the member quits the cooperative. Each member will also have equal voting rights at the general meetings.

Although both members and nonmembers will be able to use the facilities, members will be given priority and their user fees will be lower. Members will also be given priority access to existing government credit schemes such as LEPPM-3 and others and to a variety of technical extension services that are planned under this project. In addition, in areas where the formation of groups has progressed, group members will be given priority status and measures to create user groups within the organization will be pursued.

(3) Decision-making Mechanism Regarding Facility Operations

The following management and coordination mechanism will be created within the organization to ensure that the various aspects of the facility operations will reflect the general consensus of its members. The decisions will be adopted at the annual general meetings attended by members.

1) Board of directors

The board of directors will be comprised of the representatives from each district and user group who will serve as directors. They will be responsible for making decisions about facility operations or related activities. Discussions, confirmations, deliberations on countermeasures, drafting bylaws on facility operations, coordinating with other related organizations, discussion of personnel matters, and others will be handled by the board of directors. In principle, a board meeting will be held once a month with the participation of an advisory committee.

At the initial start of its creation, the board of directors will be composed of the chairperson, secretary, auditor, and 11 other directors for a total of 14 board members, who will be responsible for discussing all decisions.

Ketua: 1 person
Secretariat: 1 person
Auditor: 1 person
Directors: 11 persons

The first board of directors will be comprised of district representatives, who will be selected in proportion to the number of fishermen households per village, since the development of fishermen, fish trader and retailer groups have lagged in this district. In this specific region, there are three village governments, six fishing villages, and a RT comprised of 14 fishermen households. Hence, one district representative (director) will be selected from each relevant RT, and one ketua, one secretariat, and one auditor will be elected from among this group.

Government Village (Desa)	Fishing Village Dusun	Number of Fishermen Household RT (Number of District Representatives)	Number of Fishermen Households	Number of Fishermen Households Per Representative
Waworada	Rompo	5	311	62
Karumbu	Rimba / Bugis	2	114	57
	Soro Afu	4	232	58
Karanpi	Karanpi / Siro	3	125	42
Total	6 villages	14	782	Average 56

The directors are representatives of fisherman households in each district. They will be responsible for coordinating the different views in the district about resource management and facility operations, holding board meetings once a month, and discussing organizational decisions. The content of the final discussions will be constantly fed back to each district, and re-discussed there. They will be formally adopted as bylaws or standards based on the clarifications that are given and the majority consensus achieved at the regular annual general meeting. An emergency general meeting will be called to decide urgent matters.

Each representative (director) will be from a fisher household and elected according

to peer popularity. They will not be the village head or other public officeholder. These representatives will play a central role in promoting fishermen, trader, and retailer groups in their district. In future, they will help the board to evolve into a body comprised of user groups elected from each district.

2) Advisory committee

An advisory committee composed of representatives from the district fisheries office and relevant kecamatam, desa, and kelurahan. The members will consist of one district head (from Langgule), three village chiefs (from Waworada, Karumbu, and Karanpi) and two government officers from the district fisheries office for a total of six members. The advisory committee will have absolutely no decision-making powers with regard to the operations of the facilities. It will serve strictly in an advisory capacity on technical issues and offer support and advice on management issues. In addition, the function of the advisory committee will be gradually decreased as the capabilities of the board of directors improve and are strengthened. A secretary will be employed as needed and the region's self-reliance will be targeted.

3) General meeting

The board of directors will present and explain the fiscal year report on activities and accounts; the activities and accounting plan for the following year, field questions from members, and obtain the final approval on decisions at the annual general meeting. If revisions and reforms of the bylaws on operations are required, the directors will explain and discuss these revisions at the meeting, and the attending members will approve the changes. The changes will become effective following this approval. The general meeting will be held regularly once a year and attended by all members. Emergency meetings will be held to discuss urgent matters.

(4) Management Structure of Activities

The activities of the cooperative will be implemented according to the operations policy, bylaws, and standards that were passed at the annual general meeting, and the management group will be responsible for the operations and maintenance of the facilities. The management group will be headed by a manager and assistant manager, who will be responsible for overseeing five groups--an on-site operations group, ice-making and retail group, technical group, administrative and accounting group, and resources group. Each group member will be under the direct management and coordination of the manager and assistant manager. The manager and assistant manager will submit a monthly facility operations report to the board of directors. Existing problems will be discussed and solutions will be proposed by the operations side.

To effectively operate the facilities, the management group will be comprised of the following staff members. Priority will be given to Langgulu residents during recruitment. But for the positions of manager, mechanic, and general affairs/accountant, the most qualified person will be hired irrespective of place of residence.

Position	No.	Duties	Hiring Policy
Manager	1	Overall management and coordination of the fish landing, marketing and processing facilities, preparing the monthly report to the board, negotiate/coordinate with related government institutions, check the daily operations records, supervise staff members	Honest and diligent candidate will be recruited irrespective of region or place of residence (initially a two-year contract, will be transferred to the local area as local staff members improve)
Assistant Manager	1	Assist the manager	Will be recruited from among Langgulu residents (future manager candidate)
Mechanic	1	Operations, repair, maintenance of ice-maker, freezer, pump, and other machinery, technical transfer to local mechanic	Will be hired from Sulawesi, Java (initially a two-year contract, will be transferred to the local area in conjunction as local staff members improve)
Assistant Mechanic	1	Assist the mechanic, manage the workshop	Will be recruited from among Langgulu residents (future mechanic candidate)
Facility Overseer	5	Oversee activities at the wharf, sorting area, processing facility, collect user fees, clean the facilities	Will be hired from among the Langgulu residents
General Affairs, Accountant	2	Collect fees for ice and facility usage, sell tickets, bookkeeping of expenses and revenues, other general office work	Will be recruited from Bima province
Workers	7	Ice-making, ice-selling (water supply, taking out the ice, throwing out old ice, crushing ice, sorting, storage, sales), cleaning the facility	Will be recruited from among Langgulu residents (will hire according to sub-district)
Security Guards	2	Patrolling the grounds, surveillance	Will be recruited from among Langgulu residents (shift change every 12 hours)
Driver	2	Driver of the fish transport vehicle and its maintenance	Will be recruited from among Langgulu residents

Note: The fueling facility will be operated by a private tenant based on a direct contract with Pertamina and the Waworada Bay Local Fisheries Association.

(5) Government Assistance Organizations and System

To provide the variety of assistance services explained in section (1) on "Linkages with Related Organizations", the following staff members from the provincial Fisheries Office will be assigned to the management office at the facilities to pursue their work as fisheries officers and to participate as members of the resources group.

Position	No.	Duties	Hiring Policy
Branch Director	1	Oversee resources management related activities, coordinate extension activities in fish marketing and processing, coordinate the navigation of the model fishing boat and small high-speed boat	Will be selected from the existing district fisheries officers
Data Collector	2	Collect the fisher's logbooks, analyze and report data, boat registration task, provide guidance on fish handling at the sorting area, implement improvements in fish transaction related activities	Will be recruited from the existing data collectors
Boat Captain	1	Navigate model boat, responsible for boat's maintenance, maintain logbook, file reports	Will be hired from Sulawesi, Java (initially a two-year contract)
Chief Engineer	1	Same as above.	Same as above.
Navigator	1	Responsible for the navigation and maintenance of the high-speed boat	Will be selected from the local fishermen

2.5.2 Operation and Management Plan

(1) Coastal Resources Management Plan

1) Project to improve the data collection system and expand the fishing license system

The project will be implemented with the cooperation of with the district fisheries office and other relevant government agencies, (district, sub-district, village administrative offices). One fisheries officer will be assigned to implement the project. He will be responsible for integrating and coordinating the various activities, hire and supervise temporary data collectors to conduct the field work (explain, supervise, tally and input data, distribute boat markings). The following inputs will be required to implement the project.

(a) Improve the data collection system

Cost	Breakdown	Cost (million Rp.)
Equipment and materials	Logbook Rp.100,000/1book x 150 books, calculator Rp.50,000/unit x 150 units, computer Rp.20 million x 1 unit	42.5
Consumables	Rp.100,000/month x 15 months	1.5
Village meeting costs	Rp.10,000/person x 5 days/meeting x 30 people/day x 6 meetings (1 seminar for fishermen, 1 social gathering, 4 training sessions)	9.0
Personnel costs	Data collectors Rp.300,000/man month x 2 people x 15 months	9.0
Travel cost	Fisheries officer Rp.50,000/man months x 1 person x 30 days	1.5
Total		62.0

(b) Expanding the fishing license system

Cost	Breakdown	Cost (million Rp.)
Equipment and materials	Registration card Rp.20,000/card x 150 cards Boat markings Rp.50,000/boat x 150 boats	10.5
Village meeting costs	Rp.10,000/person x 5 days/meeting x 30 people/day x 6 meetings (1 public hearing)	1.5
Personnel costs	Data collectors Rp.300,000/month x 2 people x 3 months	1.8
Travel cost	Fisheries officer Rp.50,000/man months x 1 person x 30 days	1.5
Total		15.3

The activities listed above are anticipated to be implemented in 1.5 years time at an estimated cost of Rp.773 million. The subsequent estimated yearly cost that this project will incur is Rp.11.9 million (personnel cost Rp.7.2 million, traveling costs Rp.2.0 million, and equipment maintenance cost of Rp.2.7 million). The annual budget of the District Fisheries Office for project activities is Rp.1,483 million (FY2001), of which Rp.158 million is allocated for fisheries management activities and Rp.65 million for resource management activities. Although there are three major fish landing sites in the district, the annual cost needed to continue the activities in Waworada (Rp.11.9 million) is well within the present budget of the Fisheries Office.

In addition, a budget of Rp.50 million has been allocated for fisheries development in Waworada in the FY2002 fiscal budget of the Bima district government. Of this amount, Rp.15 million will be spent to expand the fishing license system explained earlier (will be directly implemented by the Bima District Fisheries Office).

2) Project to expand fishing grounds and develop a surveillance system for the coastal fishing grounds

The coastal fisheries resource management activity will be placed under the supervision of the Fisheries Office, and the local organization, the Waworada Bay Local Fisheries Association, will manage the activity. The operations plan for the major facilities and equipment is as follows.

(a) Model fishing boat

The model fishing boat will not operate in Waworada Bay where the CPUE is highly concentrated, but will develop and utilize resources outside the bay by conducting trial fishing operations in new areas and developing fishing grounds. Based on these activities, fishermen will be given the opportunity to participate in new fishing operations, and to experience and acquire new fishing technology. The crew of the model fishing boat will be comprised of fishermen groups that want to exploit fishing grounds outside the bay, develop new fishing grounds, and experience and acquire new technical knowledge and skills.

(a-1) Operations plan

The model fishing boat will belong to the Bima District Fisheries Office which will be responsible for its operations and maintenance and for hiring a full-time captain and chief engineer. During the initial stages, a crew of fishermen experienced in fishing operations in the waters of South Sulawesi and Java will be recruited. The full-time captain and chief engineer will provide guidance on boat operations and maintenance, and technical supervision for the fishing crew trainees. Through these training activities, local fishermen who show potential aptitude to serve as a full-time captain and chief engineer will be selected and trained, and the model fishing boat will be completely manned by a local crew in a few years.

Fishermen groups that want to participate in the on-board training activities will be able to participate on a rotational basis, and the captain will supervise the training activities. Fisheries groups will be selected among the fishermen groups that want to participate in the model boat's activities to operate in fishing grounds outside the bay, develop fishing grounds, and experience and acquire new fishing technology. The boarding schedule will be adjusted and set accordingly.

One fishing group will be comprised of seven to eight members, and one training session will be for a one-month period. An estimated 11 groups will be able to participate in the practical training operations of the model boat in one year. Each fishing trip will last for three days and about eight trips will be carried out in one month.

The operations and maintenance costs of the model fishing boat will be paid out of the revenue generated from the sales of the fish catch. The salaries of the captain, chief engineer and the direct operating costs will be directly deducted from the sales revenue and the remainder (gross profit) will be divided equally between the boat owner (District Fisheries Office) and the fishing crew (fishermen group and the captain and chief engineer). The District Fisheries Office will save the profit revenue that it receives to pay for the maintenance costs of the model fishing boat.

(a-2) Revenues and expenditures

The period for one fishing trip is three days and eight fishing trips will be carried out in one month. Therefore, 88 fishing trips will be conducted in one year (11 months). The annual operating cost for the model boat is estimated at Rp.143 million (see Table 5-1-1, Appendix 5). This amount includes the salaries for the captain and chief engineer (Rp.21.6 million), who will be recruited from outside the district to operate the model fishing boat

during the initial stages. This cost is anticipated to be greatly curtailed in future when the local fishermen learn the technology and they are able to take over the operations and maintenance of the model boat.

One fishing trip of the model fishing boat is estimated to harvest 1,200kg of mainly frigate tuna, and the annual revenue generated from fish sales is estimated at Rp.193 million based on the inexpensive fish price at Rompo surveyed in this study. The gross annual profits that have been estimated after the operating costs have been deducted from the sales revenue are Rp.50 million.

The gross profits will be shared equally (50/50) between the District Fisheries Office and the fishing crew, which is a commonly accepted practice in the Waworada sub-district. The profits will be distributed to the fisher group (for the fishing crew) and the captain and chief engineer as commissions. Although the individual distribution ratio will be discussed and decided in separate negotiations, the annual average commission that will be distributed for each person is estimated at Rp.26 million.

(a-3) Maintenance plan

The captain and chief engineer will be responsible for the local maintenance and repair work of the model fishing boat at the site. The fisher groups will carry out the daily maintenance work and repairs under the supervision of the captain and chief engineer. Large major repairs will be carried out in Denpasar since a repair dock for fishing boats is nonexistent in both NTB and NTT provinces.

(b) Fish Aggregating Device (FAD)

The Waworada Bay Local Fisheries Association will be responsible for the operations and maintenance of the FAD. A 24-hour daily fishing ground surveillance system using the FAD will be created and association members (fishermen) will participate in the system on a 12-hour rotational shift. The fishermen will moor their boats at the FAD, and equipped with a wireless communications unit and binoculars, they will watch the fishing grounds. In addition, they will be responsible for collecting fishing fees (prepaid tickets) from the fishermen operating near the FAD and to report to the management office after their return to port. The surveillance activities will be conducted by the fishermen on a voluntary basis.

The durability of the FAD is one year and in order to sustain its continuous use, it must be reset once a year. The cost of this activity will be covered by the fishing fees that are collected. The fishing boats that are mainly targeted are the purse seiners and based on their pattern of fishing operations in the bay, the fishing fees per fishing operation and the number of boats that will be involved have been estimated as follows.

(b-1) Annual number of fishing boats

Near the mouth of the bay during high wave season, in the bay during the peak fishing season (April to August): 2 boats/day x 15 days/month x 5 months = 150 boats

Near the mouth of the bay during the season of normal waves, in the bay during the peak fishing season (September to December): 2 boats/day x 25 days/month x 4 months = 200 boats

Near the mouth of the bay during the season of normal waves, in the bay during the lean fishing season (January to March): 2 boats/day x 15 days/month x 3 months = 90 boats

Total number of fishing boats in operation: 400

(b-2) Fishing fees per fishing operation

FAD materials, construction, installation costs is Rp.15million/unit ÷ 440 boats/year = Rp.34,000/operation

Based on the findings obtained from a trial purse seine fishing operation conducted in April 2002, it was found that the fish catch volume outside the bay was 1.8 times greater than the fish catch volume harvested in the bay. Based on the assumption that the fishing efficiency will increase around the FAD, it is estimated that the potential fish catch volume will be twice the fish catch volume produced in the bay. Since the average fish catch volume of purse seiners operating inside the bay is about 250kg/day, the fish catch volume outside the bay is estimated to reach 500kg/day. Therefore, the difference in the fish landing volume is estimated to be Rp.500,000/day (Rp.2,000/kg x 250kg). Based on this estimation, it has been concluded that fishermen will be able to pay the fishing fee that will be charged for their use of the fishing grounds. However, since the actual system that will be adopted will not be based on the collection of fishing fees, but a payment system that is based on the maximum fish catch of the fishermen (30-40% percent of the profits generated from the maximum fish catch volume minus the costs), the fishermen will be able to pay the fees.

(c) High-speed boat

The high-speed boat will be used only in response to emergencies or illegal fishing activities reported by fishermen. The estimated annual operating and maintenance costs of this boat are shown in the table below.

Item	Calculated Expenditures	Annual Operating Cost (Rp million.)		
		First 2 years	3 to 5 years	After 6 years
Fuel	100 trips/year x 2 hours/trip x 24L/hour (80hp) x Rp.2,000/L	9.6	9.6	9.6
Maintenance, repair	1%, 2%, 4% of boat cost	1.6	3.2	6.4
Pay for the pilot	Rp.20,000/hour x 100 trips/year	2.0	2.0	2.0
		13.2	14.8	18.0

Based on the existing fisheries license fees that are charged in Bima district, the annual revenue generated from license fees in Waworada Bay has been roughly estimated at Rp.13 million (see table below).

Fishing Gear	Annual License Fee	Number of boats	Estimated revenue Rp. Million
Purse seine	Rp.200,000	44	8.8
Bagan (power generator)	Rp.150,000	22	3.3
Bagan (kerosene lamp)	Rp.100,000	18	1.8
Bottom long line	Rp.50,000-150,000	4	0.4
Hand line	Rp.20,000	50	1.0
Gill net (monofilament)	Rp.15,000-25,000	5	0.1
Gill net (multi)	Rp.35,000-75,000	5	0.25
Total		150	15.65

Source Bima District Fisheries Office

Based on the above, the annual operating and maintenance cost of the high speed boat has been estimated at Rp.13 to Rp.18 million, which is nearly equivalent to the annual revenue that will be collected from fishing licenses. It is possible to save the revenue generated from license fees as a reserve fund for the fishing grounds and to pay the annual operating and maintenance cost of the high speed boat from this fund. But the durability of the high-speed boat is about ten years and the government must take budgetary measures to meet the cost of replacing the boat (about Rp.160 million) in future.

(d) Model Project to Draft Rules on Coastal Fisheries Resources Management

The focal center of this project is an impartial outside party or consultant/NGO without vested interests in the fisheries that is conducted in this zone, who will be responsible for implementing a workshop and field survey with the cooperation of the fishermen based in Waworada Bay, the district FO, the administrative village, and others. The project will be divided into two stages. Stage 1 will be a six-month period during which time the consultant/NGO will study the inner coastal bay resources, and the natural hydraulic conditions of the inner bay waters. Stage 2 will be a four-month period during which three workshops will be held in each community in the bay as shown in the table below.

Cost	Details	Cost (Rp million)
Employment costs of the facilitator	*Salary: Rp.5,000,000/month x 10 months* = Rp 50,000, Allowance: Rp.100,000/day x 300 days=Rp 30,000,000 Land transportation cost: 4 roundtrips to Mataram x Rp.200,000 = Rp.800,000, 20 roundtrips to Bima x Rp.10,000 = Rp.200,000	81.0
Water survey cost	See separate table	26.1
Survey on characteristics of coastal resources	Boat rental Rp.500,000 x 30 days = Rp 15,000,000 Allowance for fishermen representative: Rp 300,000/month x 1 month = Rp.300,000	15.3
Study on traditional resource use	Ocean transport cost: Rp.10,000/person/day x 2 persons/trip x 24 trips = Rp.480,000 Allowance of district officer Rp.50,000/person/day x 1 person/day/trips x 24 trips = Rp 1,200,000	1.7
Special study on vested interest groups	Allowance of village officer: Rp.30,000/person/day x 3 person/day/village x 6 villages = Rp 540,000	0.6
Workshop costs	Meals Rp.10,000/person/day x 20 people/day x 1 day/workshop x 18 workshops = Rp 3,600,000 Sea transport cost: Rp.10,000/person/day x 2 person/trip x 18 trips = Rp360,000 Allowance of district officer: Rp.50,000/person/day 1 Person/day/trip 1 person/day/trip 1 person/day/trip x 18 trips = Rp 900,000 Allowance for village officer Rp.30,000/person/day 1 Person/day/trip x 18 trips = Rp 540,000	5.4
Cost of consumables	Office supplies, copying costs, etc.: Rp.30,000/village x 3 workshops/village x 6 villages = Rp,180,000	0.2
Cost to draft coastal resources usage plan	Ocean transport cost: Rp.10,000/person/day x 1 person/trip x 18 trips = Rp 360,000 Allowance of district officer: Rp.50,000/ person/day x 1 person/day/trip x 18 trips = Rp 900,000 *Allowance for village officer: Rp 30,000/person/day x 1 person/day/trip x 18* trips = Rp 540,000	1.8
Total		132.1

Breakdown of Hydraulic Survey Costs Unit: Rupiah

Study on the Current Drift of the Inner Bay	Unit	Subtotal
Man day of surveyor/trip	17	-
Number of surveys	3	-
Technician cost/month	9,000,000	15,300,000
Worker cost/month	2,000,000	3,000,000
Car rental	300,000	1,800,000
Boat rental/day	300,000	4,500,000
Rental cost of tachometer/survey	500,000	1,500,000
Total		26,100,000

(2) Approach to Improving Fish Landing, Handling, Shipping, and Processing and Cost

The fish landing, handling, shipping, and processing facilities and the fishermen activity support facility will be supervised by the Bima district government and operated by the Waworada Bay Local Fisheries Association.

1) Fish landing improvement project and project to improve fresh fish shipments

(a) Fixing and collecting the user fees of the facilities

The facility user fees at the existing fish landing site is based on a fixed percentage of the sales transactions conducted at the landing site. This collection system was set according to Ministerial Ordinance No. 142/2000, "revenue tariff for tax exempt persons in the fisheries sector", enacted by the central government. But following the regional decentralization policy that has been enacted since that time, each district government has established its own regulations. According to Bima district government regulation no. 56/2001, an uniform usage fee of 5 percent of the fish sales amount transacted at the fish landing site is collected (2 percent from fishermen, 3 percent from buyers). Of this amount collected, 60 percent is paid to the district government. The district government, in turn, uses the revenue to pay for the facility's maintenance costs, the cost of administrative services, and others. The remaining 40 percent is used to pay the salaries of the facility's staff members, and the compound interest of the fishermen's social welfare costs. However, the following problems have surfaced that are related to the facility fee collection system enacted under the regulation mentioned above.

- The sales transactions are negotiated between the fishermen and buyers and the catch is transacted according to catch in number or in container units containing a variety of sizes and species. The fish catch is not transacted in kilogram units. There are also no receipts and it will take years to establish a system of user fees based on fish transactions.
- User fees cannot be collected because some fishermen do not use the landing facility and deliver and sell their fish directly to the market. Additionally, it is difficult to keep transaction records for raw fish that has been sold for processing.
- Both the fishermen and buyers run small-scale operations, and the scope of the individual transactions is small. As a result, a large number of receipts must be issued and the administrative work of recording and collecting the money would incur an enormous cost.
- If the user fees are too expensive and both the fishermen and buyers do not feel that the facilities are beneficial, there is the strong possibility that the facilities will not be used.
- The criteria that are used to establish user fees are vague.

The planned facilities must be designated as public facilities that have been built to develop regional fisheries. Generating profits is not the objective. Thus, minimum user fees will be reviewed for each site and fixed within a range that will enable the maintenance and operations cost of the facility to be paid out of revenue that is generated. The regulations that presently exist in Bima district will be reviewed and revised in accordance with the approach that is proposed in this project.

Therefore, based on the above explanation, the user fees will be fixed within a minimum range that will pay for the operations and maintenance cost of the facilities and enhance the merits of the facilities for the fishermen, fish traders, retailers, and other users. In addition, each type of user fee should be adjusted according to the yearly changes that occur

in the operating conditions of the facility. Specific user fees for the initial period have been set according to the following approach.

(b) Source of revenue of the facility

The major source of revenue for the facilities that have been planned is ice sales and three types of facility user fees (the jetty, the handling/auction hall, and the lease of specific facilities and equipment that are available for users).

(b-1) Jetty fees

The jetty fees (includes the user fees for the water supply) for one motorized fishing boat will be uniformly set at Rp.1,000 and the maximum mooring time will be about one hour. The jetty will function strictly as a support facility for fish landing activities and its scope has been set accordingly. It will not have berthing functions. The jetty fees will enable boats to land their fish catch, refuel, and restock their water supply to alleviate the congestion of fishing boats. In addition to restocking their water supply, fishermen will be able to use the toilets and showers, and the jetty fees will also include the water utility cost. The jetty fee will be reviewed and adjusted as the number of fishing boats and crew members utilizing the facility increases in future. Non-motorized boats that do not use the jetty will not be charged.

(b-2) Handling/auction hall user fee

The user fee for the handling/auction hall will be collected from those who used the facility for fish handling purposes (washing, packing in ice, and loading activities). The user fee will initially be based on the types and size of the fish boxes that are used to transport the fish as shown in the table below.

Type of box, size, rates		Large Rp.1,500/box	Medium Rp.1,000/box	Small Rp.500/box
Fresh fish for transport	Plastic fish box, bamboo basket	40-50kg/box average 45kg	25-35kg/box average 30kg	10-20kg/box average 15kg
	Insulated fish box	150L/box average fish volume 80kg	80L/box average fish volume 50kg	45L/box average fish volume 30kg
Handling before processing	For all types	Rp.500/day per person (estimated that an average of 50kg will be processed by one person)		

Note 1: Rp.500/person will be collected for fish that is not transported in boxes.
Note 2: A discounted rate will be charged for fish transported in insulated fish boxes to promote and spread their use.

Initially, the fees will be collected according to the breakdown shown in the table above. However, with the gradual spread of the use of uniform containers, the growing awareness and use of kilogram units, the introduction of an auction system for a segment of the fish catch, a fee collection system based on sales vouchers will be introduced about five years from the start of the project (however, this will be instituted gradually in conjunction with the users growing awareness and consensus).

(b-3) Rental fees for special facilities and equipment

The rental fees of the overnight insulated fresh fish boxes (300L) will be Rp.1,000/box per day based on the boxes' durable number of years. The use of the model processing facility (the use of the iron pot only) will be Rp.500 per person. However, rental charges will not be charged for the use of the model processing facility for the trial development of new processed fish products since this will be a part of the development and extension activities of the Fisheries Office. Charging rental fees for specific processing groups will be reviewed when these groups are able to begin processing activities independently of the Fisheries Office.

(b-4) Effectiveness of collecting fees

The rental fees described above will be set at 50 percent of the handling volume that has been estimated for the first year of operations. It will be increased by 10 percent annually from the second year of operations until it reaches 100 percent in its the sixth year.

(c) Price of ice

The volume of ice that will be sold has been estimated at 80 percent of the production volume due to losses and fluctuations in demand. After calculating the anticipated ice sales revenue and the maintenance and operations cost of the facility, the unit price of ice was set to prevent a deficit in the overall revenues and expenditures of the facilities. Ice will be sold in 25kg blocks at Rp.300/kg and in 5kg units in plastic bags Rp.320/kg for retailers and small fish traders. The unit price of ice sold in plastic bags reflects the cost of the plastic bags and the labor cost of crushing and packing the ice. The retail price of ice sold in plastic bags in Bima district is Rp.330/kg. Although the difference between this price and the price of ice at the facilities will not be a large gain for users, the volume of ice that will be sold is expected to meet the estimated volume in view of the absolute shortage of ice in Rompo.

(d) Non-member user fees

The user fees that have been explained above are the fees that will be collected from the members of the Waworada Local Fisheries Association. Nonmembers will be charged twice the amount collected from members. In addition, the price of ice for nonmembers will be Rp.20/kilogram higher than member prices.

(e) Revenues and expenditures generated from facility operations

If the fees explained above for each facility are collected, the average annual revenue generated by the facilities is estimated at Rp.483 million. Expenditures in the form of equipment depreciation costs have been estimated to average Rp.453 million annually. This is adequately sufficient for the facilities to sustain their maintenance and operations. (see Table 5-2-1, Calculations of the Operations Revenues and Expenditures, Appendix 5).

However, these figures are strictly estimations, and it is anticipated that the balance in the revenues and expenditures will fluctuate if the facilities are not utilized as expected. Therefore, the board of directors of the association in charge of the facilities will draft a revision of the user fees for each facility, irrespective of the annual revenues and expenditures generated and the conditions of the activities, and submit it to the annual general meeting for all members where it will be debated and adjusted according to general consensus.

In addition, although revenue to cover equipment depreciation costs will be generated as part of the annual profits, it must be saved to enable the association to replace the equipment in future.

The district government will be responsible for the public works related to the facilities, for maintaining the structures and facilities, in addition to providing the needed technical development and extension services. Although the district government is able to fulfill these responsibilities under its present budget, it will not be able to provide added services. Thus, in view of the stringent budget of the district government, there is concern that financing for the activities will not be available in future. For each project to become financially self-supporting in each district there is a need for a segment of the profits generated from the facilities to be paid to the district government.

(f) Fish transport vehicle

The Waworada Bay Local Fisheries Association will be responsible for employing a full-time driver for the fish transport vehicle that will be provided by this project and for all

vehicles related maintenance and repairs. This vehicle will be leased to traders and retailer groups to transport fish and passengers (small traders and retailers) between Waworada and the district market. Since fish is transported daily, excluding the lean fishing months of January to February, the annual number of transport trips has been estimated at 300. The annual operating and maintenance cost per vehicle has been estimated at about Rp.70 million. Therefore, the leasing costs will be Rp.240,000/day to transport fish cargo and Rp.16,000/person for passengers (maximum capacity of 15 people). The average volume of that fish that will be transported, round-trip, is 110kg/person (see Table 5-3-1, Appendix 5).

The current one-way transport fare from Waworada to Bima is Rp.5,000/person and Rp.5,000/fish box. The introduction of transport services by the facility's transport vehicles will enable small traders and retailers to transport twice the current volume of fish for the same cost. There is the added benefit of being able to accompany the fish cargo. For retailer and trader groups that will lease the vehicles, there is the added advantage of being able to transport a large volume of fish at one time.

2) Project to extend fresh fish handling technology and project to improve fish processing

The district government with the cooperation of the facility management body will conduct the extension activities. During the first year, one fisheries officer will be assigned to prepare and implement the workshops for the trial processing activities, and carry out technical guidance and evaluation activities. The following input will be needed to implement these activities.

(a) Improve and disseminate fresh fish handling technology

Item	Details	Cost (Rp. million)
Cost of materials	Reinforcement materials: Rp.10,000/box 105 boxes	1.1
Cost of workshops	Meals Rp.10,000/person, day x 2 days/person x 82 people Transportation cost Rp.10,000/person x 82 people	2.5
Personnel costs	Supervisor Rp.50,000/person, day x 1 person x 2 days/workshop x 6 workshops Carpenter Rp. 30,000/ person, day x 2 people x 6 people	1.0
Traveling cost	Supervisor Rp.50,000/person//workshop x 1 person x 6 workshops	0.3
Total		4.9

(b) Improve and disseminate fish processing technology

Item	Details	Cost (Rp. million)
Cost of materials	Raw fish for processing Rp.2,500/kg x 150kg/operation x 40 operations/year Other ingredients Rp.100,000/operation x 40 operations/year	19.0
Cost of workshop	Meals Rp.10,000/person/day x 10 people/workshop x 3 days/workshop x 40 workshops/year Transportation cost Rp.10,000/person/day x people/workshops x 40 workshops/year	16.0
Personnel costs	Supervisor Rp.50,000/person/day x 1 person x 3 days/workshop x 40 workshops/year	12.0
Cost of consumables	Office supplies, coffee, etc. Rp. 30,000/workshop x 40 workshops/year	1.2
Total		48.2

Note: Due to cooperation of the facility operations body, the model processing facility and equipment will be provided under grant aid cooperation, and the cost of the electricity, water, and ice will be free.

It will be feasible to implement the activities described above in one year at the estimated cost of Rp.53.1 million and there are no activity costs to be maintained after this

period. Following the second year, processing groups will begin actual operations based on the knowledge and experience gained from their one-year study period and trial processing activities. Financially self-supporting processing operations are anticipated to develop. Funds to cover the costs of fish handling and processing related activities have not been allocated in the district government's annual budget for project activities. Therefore, new budgetary measures must be adopted to implement extension activities, but if the district government is unable to enact new budgetary measures, the construction of the model processing plant will be shelved.

(3) Operations and Cost of the Project to Improve the Fishing Village Environment

The project to improve the villages is comprised of the Project to Improve the Fishing Village Infrastructure and Project to Improve the Social Environment of the Fishing Village. The operations and cost of this project are described below.

1) Project to Improve the Fishing Village Infrastructure

(a) Developing a water supply and model toilets

Kamar mandi style toilets (with washing area) will be installed as a model facility in the compound of the fish handling facility in the project to improve the fish landing facilities. Therefore, the construction costs will be included in that project. This toilet will be comprised of a water supply and septic tank. The village residents will be responsible for disposing the accumulated sludge in the septic tank on a voluntary basis, thereby reducing maintenance costs.

In addition a water supply facility will be installed next to the model site for use by the village residents. Usage fees will be collected from the village residents to cover the maintenance costs.

Item	Details	Cost (Rp million)
Water supply facility	41m^3/day, Rp.2,630,000/m^3=Rp.107,830,000	108.0
Maintenance cost	0.5% of the construction cost/year=108,000,000 x 0.005=Rp.540,000/year	0.54
Total		108.54

(b) Improving the village road and drainage ditch

The village residents will build a road (with drainage ditches) in the sub-village and the project will pay only for the cost of the construction materials. The cost of the construction materials will be included as part of the facility construction costs in the project to improve the fish landing facilities. An officer from the district construction works office will supervise the village residents that will build the road. The estimated cost is shown in the table below.

Item	Details	Cost (Rp.million)
Cost of materials	Total length 600m, 600m x Rp.465,000/m=Rp.273,600,000	274.0
Personnel costs	Salary of supervisor: Rp.50,000/man day x 1 person 3times/month x 10 months Rp.1,500,000 Transportation cost: Rp.10,000/man day x 30 people/trip = Rp.300,000	1.8
Total		275.8

c) Improving the garbage disposal system

Each village women's group unit (1 unit comprised of 10 households) will be provided with a garbage container made of concrete and therefore, maintenance costs will not be incurred. The garbage collected by the assigned group for that day will be taken to the garbage dumpsite by hired Benhur (horse cart). These village activities will be decided at the village meeting under the leadership of the village head and the district fisheries officer will coordinate them until the activities become fully established. The fisheries officer will also be responsible for monitoring and recording the progress of these activities.

Item	Details	Cost (Rp million)
Garbage container	All 310 households, 31 units x Rp.350,000=Rp.10,850,000	10.9
Personnel costs	Salary of DFO: Rp.50,000/man day x 1 person x 1 time/month x 12 months=Rp.600,000 Transportation cost: Rp.10,000/man day x 12 people/trip=Rp.120,000	0.8
Total		11.1

2) Project to improve awareness about the social environment of the village

(a) Supplementary educational materials for educational awareness activities to improve the social environment

The NTB provincial Fisheries Office will be responsible for providing the supplementary educational materials and to supervise and develop the content of the educational activities. These will be audiovisual materials that will be shown at a video showing for the village residents. The materials will be prepared in Indonesia or by a foreign expert who will work with the NTB provincial fisheries office extension section. A period of 12 months will be allocated to collecting information (including filming for the video) and 12 months to develop the educational materials.

The provincial fisheries office will coordinate and assist in producing educational materials with the district fisheries office in this zone, Sumbawa Island and Flores Island. An expert will be recruited to assist the survey conducted in the zone during the information collection stage by the district fisheries office. The materials that will be needed for these activities will be supplied by the provincial and district fisheries office as shown in the tables below.

NTB Provincial Fisheries Office

Item	Details	Cost (Rp million)
Materials	Video recorder 1 unit, 1 editing unit 1 computer set	80.0
Cost to collect information	6-month information collection survey on Sumbawa Island: Rp.40,200,000 6-month information collection survey on Sumbawa Island and Flores Island: Rp.57,400,000 Cost of expert: Rp.5,000,000/month x 12 months=Rp.60,000,000	157.6
Production, supervision of materials	Video production on Mataram, Lombok Island: Rp 10,800,000 Cost of expert: RP.5,000,000/months x 12 months=Rp 60,000,000	70.8
Total		308.4

District Fisheries Office

Item	Details	Cost (Rp million)
Information collection cost	Salary of district officer: Rp.50,000/man day x 1 person 8 days/month x Transport cost: Rp.10,000/man day x 6 man days = Rp.160,000	1.0
Total		1.0

(b) Materials to support educational activities to improve the community

The NTB provincial Fisheries Office will be responsible for providing one 4WH motor vehicle that will be used in the educational activities and one video recorder set. This equipment and the package of educational materials will be kept at the NTB provincial FO office and they will be lent to each of the nine districts fisheries office on Sumbawa and Flores islands for a 10-day period. They will be used for a two-year period.

NTB Provincial Fisheries Office

Item	Details	Cost (Rp million)
Equipment, materials	One 4WD motor vehicle (1), 1 video player	230.0
Total		230.0

District Fisheries Office

Item	Details	Cost (Rp million)
Travel costs for extension activities	Fuel cost: Rp50,000/day x 20days= Rp1,000,000 Extension allowance: Rp.50,000/man day x 2 people x 20 days = Rp.2,000,000	3.0
Total		3.0

(4) Operation Cost of Improvement of Fishermen Organization and Fisheries Extension

Fishermen organization will be responsible for the project management in the model site of Rompo. Therefore, it is mandatory that the participating members of the fishing communities in the model site are mobilized, organized, and provided with appropriate education/training prior to their participation in the planned programmes. This has to be conducted during the preparation stage or construction period of the project at each model site. The steps that must be taken during the preparation stage, followed by steps to be taken during the management and operation of the planned programmes, and the estimated cost are described below.

1) Preparation stage

During the preparation stage the fishing community must be mobilized, fishermen organizations must be created to manage the project, and preliminary extension/training activities must be conducted. The estimated cost is only for the first year.

a) Mobilization of fishing community for awareness building

The participating members of the fishing and village communities in Rompo model site will be mobilized two times (two days each time) during the construction period of the planned programmes. Initially, a two-day motivation workshop will be conducted to raise awareness and understanding of the planned programmes, the role of the provincial and district Fisheries Office and village administration. In the second step, after several weeks of giving sufficient time for the communities, another two-day workshop will be conducted to collect their opinions, ideas, and expectations. These workshops and meetings will be organized and facilitated by three staff members of the Fisheries Office and two staff members from the cooperative office. The estimated cost of mobilizing the community, transport and allowance for staff members is about Rp2.8 million as shown below.

Items	*Details*	*Cost (Rp million)*
Organizing cost	Rental of hall, materials (stationery), refreshments and transport of fishing community x 4 days (Rp300,000/day)	1.2
Per diem	Rp30,000/person x 5 persons x 4 days	0.6
Allowance	Rp50,000/person x 5 person x 4 days	1.0
Total		2.8

b) Selection of members and formation of management organization

Following the mobilization of participating members and based on their opinions and expectations, further explanations on forming fishermen organizations to manage the project, organizational setup, membership qualifications, the rights of members, the recruiting procedures, the working conditions of the hired staff members, and others relevant matters will be provided. This workshop will also be conducted two times (two days each time) and it will be facilitated by five staff members of the Fisheries Office and cooperative office. The estimated cost is about Rp 2.8 million as shown below.

Items	Details	Cost (Rp million)
Organizing cost	Rental of hall, materials (stationery), refreshments and transport of fishing community x 4 days (Rp300,000/day)	1.2
Per diem	Rp30,000/person x 5 persons x 4 days	0.6
Allowance	Rp50,000/person x 5 person x 4 days	1.0
Total		2.8

c) Preliminary extension/training

A preliminary extension/training workshop will be conducted on leadership and management skills, accounting and bookkeeping procedures, mobilization of savings, and others for the fishermen, elected board members and others. This will assist in the preparation and efficient management and operation of the planned programmes at the model site. This extension/training workshop will be conducted for five days. The assistance of Diklat for leadership and management training, local development bank for accounting, bookkeeping, savings and others, and Fisheries Office will be solicited. The estimated cost will be about Rp 4.1 million as shown below.

Items	Details	Cost (Rp million)
Organizing cost	Rental of hall, materials (stationery), refreshments and transport of fishing community x 5 days (Rp 300,000/day)	1.5
Per diem	Rp50,000/person x 2 persons x 5 days (Staff from outside district)	0.5
	Rp30,000/person x 4 persons x 5 days	0.6
Allowance	Rp50,000/person x 6 person x 5 days	1.5
Total		4.1

2) Management/Operation Stage

The planned activities are participatory monitoring and evaluation and periodic extension and training,. The estimated cost for these activities will recur every year.

a) Participatory monitoring and evaluation

During the management and operations of the project by the fishermen organizations, participatory monitoring and evaluation will be implemented in order to measure the objectives, to evaluate the activities and performance, and to identify and resolve the prevailing problems and issues. Basically, the fishermen organization will be directly involved in all phases of the monitoring and evaluation process. The Fisheries Office will provide introductory training on the procedures (type of data and collection method, work plan/recordkeeping, etc.) for five days, and subsequently, the resident fisheries staff member will provide guidance for the fishermen organization. The introductory training will be given to core members of fishermen organization only once in the beginning by two fisheries officers. A monthly evaluation for three days will be conducted by a visiting fisheries officer to identify problems and issues and to formulate measures in extension/training needs. The estimated cost for the introductory 5-day training workshop for three persons is Rp 1.3 million and the subsequent annually recurring cost is Rp 2.88 million.

Items	Details	Cost (Rp million)
Organizing cost of M&E	Step – 1: Organizing to explain the introduction of M&E and developing tools; materials (stationery) and others Rp 100,000 x 5 days (First time) Step – 2: Conduct monthly evaluation; 3 days/month x 12 months	05
Per diem	Step-1: Rp30,000/person x 2 persons x 5 days	0.3
	Step-2: Rp30,000/person x 1 person x 3 days/month x 12 months	1.08
Allowance	Step-1: Rp50,000/person x 2 person x 5 days	0.5
	Step-2: Rp50,000/person x 1 person x 3days/month x 12 months	1.8
Total		4.18

b) Periodic extension/training

Extension and training will be provided periodically according to the needs as identified by the resident fisheries officers and the results of the monitoring and evaluation. Therefore, based on these results, appropriate extension/training must be designed and conducted for at least three days a month by two staff of fisheries offices. The annual estimated cost is about Rp 5.76 million.

Items	Details	Cost (Rp million)
Organizing cost	- To implement extension/training depending on the needs proposed by the resident fisheries staff and members, and also the results of M & E. - Three days a month for one site by 2 persons	
Per diem	Rp30,000/person x 2 persons x 3 days/month x 12 times	2.16
Allowance	Rp50,000/person x 2 person x 3days/month x 12 months	3.6
Total		5.76

(5) Cost for Fisheries Education and Training

Education and training will be imparted to fishermen and fisheries staff members with the aim to sustain the development of the project on a long-term basis as well as to broaden their vision to embark on more economic activities. Definite plans will be identified based on the impact and the results that are achieved through on-job-training/extension and the participatory monitoring and evaluation. However, taking into consideration the existing condition and issues facing the coastal fisheries, appropriate education and training are proposed and the cost is estimated accordingly as described below.

1) Fishing technology and coastal resources management

Selected fishermen and fisheries staff will be given supplementary education/training to increase their knowledge and skills through lectures and study tours to projects implemented outside the priority zone. The selected members are expected to disseminate the knowledge and experience gained to other fishermen. The education/training is to be conducted three times during the project implementation, and each time it will for 6 days. The annual estimated cost is about Rp 4.2 million as shown below.

Items	Details	Cost (Rp Million)
Travel to Lombok	Rp 100,000/trip/person x 6 persons	0.6
Per diem (Lombok)	Rp 50,000/person/day x 6 persons x 6 days	1.8
Allowance (Lombok)	Rp 50,000/person/day x 6 persons x 6 days	1.8
Total		4.2

2) Fish marketing and processing

Supplementary education and training on sanitation, hygiene, handling, preservation and others will be imparted to fishermen, traders and staff engaged in the management and operation of the facilities and equipment. This will be short training courses using charts,

hand-outs, etc. and to be conducted at the model sites once a year (5 days each time) by two fisheries officers from the sixth year onwards. The annual estimated cost is about Rp 1.65 million as shown below.

Items	Details	Cost (Rp Million)
Organizing expense	Rp 150,000/time/model site	0.15
Per diem	Rp 50,000/person/day x 2 pers x 5 days	0.5
Allowance (Lombok)	Rp 50,000/person/day x 2 pers x 5 days	0.5
Other expenses (material, etc.)	Preparation of charts, hand-outs, etc.	0.5
Total		1.65

3) Strengthening of fishermen organization

An intensive short-training course is planned for the core staff of the fishermen management organization in order keep abreast with administrative and management skills and to enhance entrepreneur skills. The education and training will be conducted at the model site using programmes formulated by Diklat Koperasi and Dinas Koperasi. It will be conducted two times; in the fourth year and eighth year, and each course will be 5 days. The annual estimated cost is about Rp 5.25 million in the third year and Rp 5.25 from the as shown below.

Items	Details	Cost (Rp Million)
Organizing expense	Rp100,000/day x 5 days	0.5
Per diem	Rp50,000/pers/day x 3 pers x 5 days	0.75
Allowance	Rp 100,000/pers/day x 3 pers x 5 days	1.5
Training Fee to Diklat	Rp 2.5 million per course	2.5
Total		5.25

4) Fisheries extension unit (within district fisheries office)

The set up of a fisheries extension unit within the fisheries office is mandatory in order to provide periodic and consistent extension and training to fishermen, and to transfer the success or results achieved in the models sites to other development zones. This unit will assist to foster skilled manpower in planning, formulating and implementing extensions services. However, it is also necessary to build the capability of the fisheries staff in relevant fisheries subjects. Education and training courses offered in training institutions such as Diklat, BIPP and Semarang Fisheries Training Center will be considered. It will be conducted twice during the implementation stage; once in the second year and the second time in the sixth year. The fisheries officers who have been trained are expected to disseminate the knowledge and skills to fishermen and others. The annual estimated cost is about Rp 16.95 million.

Items	Details	Cost (Rp Million)
Travel to Semarang	Rp 250,000/trip/person x 3 persons	0.75
Travel to Lombok	Rp 100,000/trip/person x 3 persons	0.3
Per diem	Rp 50,000/person/day x 3 persons x 35 days	5.25
Allowance	Rp 50,000/person/day x 3 persons x 35 days	5.25
Training Fee to Semarang Training Center	Rp 60,000/trainee/day x 30 days x 3 persons	5.4
Total		16.95

2.5.3 Maintenance Plan

The maintenance activities of the jetty, the embankment, road, and other public works and structures (wastewater, water supply, and electricity) will be divided between the regular

annual inspection and repairs and the periodically implemented large-scale repairs (includes renovation of the facilities). As explained earlier, the Bima district government will be responsible for the maintenance of the facilities. The construction costs of the structures and public works facilities are enormous and if they are not adequately maintained and inspected on a daily basis, the repair and renovation work may become very costly. Therefore, the facility management body, the Waworada Bay Local Fisheries Association, will be responsible for conducting the daily inspections and maintenance work of the facilities that are planned in this project. The maintenance work and cost of each facility are shown in the table below.

The cost of major renovation and repair work (including the replacement of facilities) within the overall maintenance cost has been calculated as follows. The renovation cost based on the number of durable years of the facility was calculated, and the daily maintenance cost was calculated on a yearly basis using a percentage of the direct construction costs (see Table 5-2, Appendix 5).

Maintenance Work and Cost of the Facilities

Type		Facility	Maintenance and Cost
Basic Facilities	Outside facilities	Embankment, jetty	Partial repairs will be carried out once every 10 years. 1% of the direct construction cost for 10 years will be added as renovation cost. O.1% per year of this direct construction cost will be saved and used to pay for this cost.
	Mooring facility	Mooring pier, fishing landing site	Same as above
	Transport Facility	Road	The road is widely used by the district residents as well as fisheries related personnel. The facility will be maintained by the management body, but small repairs will be carried out as a joint activity by the village community. 30% of the road will be paved every 10 years. 3% of the paving cost (direct public works cost) will be saved yearly and used to pay for this cost.
		Parking area	The cost of repaving the parking area is less than the repaving cost of the road due to less traffic. Therefore, 1% of the paving cost (direct public works cost) will be saved and used to pay for the repaving cost.
Functional facilities	Roof	Handling/auction hall, office, model fish processing facility, mini-workshop, fuel depot	The structure will be re-roofed once every 10 years. 0.5% of the construction cost (direct public works cost) will be saved annually and used for repairs and to replace parts, and pay for daily maintenance costs.
	Water supply and wastewater sanitation facility	Main facility	0.5% of the main facility construction cost (direct public works cost) will be added as repair costs for the water supply facility, fuel depot.
		Mechanical facilities	The mechanical facilities will be replaced once every 10 years. 10% of the mechanical facility cost (direct public works cost) will be saved yearly for 10 years.
	Electrical lighting facility		The indoor and electrical lighting fixtures on the premises will be replaced once every 10 years. 10% of the electrical lighting fixture cost (direct public works cost) will be saved yearly for 10 years to pay for this cost. 0.5% of the annual construction cost (excluding the cost of the electrical lighting fixtures) will be used to pay for the daily repair costs.

2.6 Environmental Impact Evaluation and Mitigation

2.6.1 Impact during Construction Stage for Rompo (Waworada) Site

Activity	Potential Impact	Classification	Evaluation of Impact	Mitigation/ Comments	Responsible Institution
Site clearing / preparation	- There are no trees, mangrove or vegetation on site that need clearing.	-	No impact as there are no vegetation on the site.	None	-
Excavation of sea bed and jetty construction	- Excavation of sea bed at end of jetty to –2m depth. - Importing of soil & rock to use as fill of jetty and shore area. The existing rock jetty will not be removed and will be filled to the required design level.	L, D, Lc, A	Impact not significant. The excavation of sea bed is in a limited area and not expected to affect significantly the existing local current or shore processes. Impact of the fill to the jetty will not be significant as the existing rock jetty has been in place since the 1940s with no significant changes to the shore characteristics.	Unwanted or unsuitable excavated soil should be disposed off in proper place.	• Implementing body • Contractor
Demolition	- Demolition of temporary market stalls along the main road might be necessary during construction stage.	S, D, Lc, A	The impact will be moderate as the structures are of temporary nature. Also, the impact will be temporary for the duration of the construction stage. After completion of construction, the stalls will be allocated space in the complex for their operation.	Stall owners' consent and understanding should be obtained before start of construction activities regarding the need to demolish structure and relocation to alternative location in village especially the market on Sunday (Pasar Minggu).	• Implementing body
Relocation	- Existing beach front activities such as boat building and repairs will be affected by the building of the sea wall along village sea front.	S, D, Lc, A, I	Impact will be significant for the duration of the construction.	Alternative sea front location in the village which will not be enclosed by the sea wall, should be allocated for these beach front activities for the duration of the construction stage.	• Head of Village • Implementing body
Construction activities	- Construction activities on site will create noise, dust, and increase construction traffic on road	S, D, Lc, A, R	Impact will be significant but temporary only for the duration of the construction.	Construction activities to be restricted to working hours and constructional plant traffic should be cautioned to travel at low speed especially passing through populated areas.	• Implementing body • Contractor

Legend: S = Short Term impact L = Long Term impact D = Direct impact I = Indirect impact
Lc = Local impact St = Strategic impact A = Adverse impact B = Beneficial impact R = Reversible I = Irreversible

Notes:

Impact that is Significant will be further classified into Reversible or Irreversible impacts.

Implementing body will consist of Dinas Perikanan. Management organization will consist of Fishermen groups (Kelompok)/ KUD Mina/ Village representatives (for details please refer to Section 2.5.1)

2.6.1 Impact during Construction Stage for Rompo (Waworada) Site....(continue)

Activity	Potential Impacts	Classification	Evaluation	Mitigation / Comments	
Temporary services (water, electricity)	- Construction activities will make use of water & electricity supply on the site	S, D, Lc, A	Impact will not be significant and temporary only for the duration of the construction. There is no pipe water supply in the village to meet the constructional needs.	Water requirement for the constructional needs should be procured from the nearby Waworada village.	• Contractor
Construction labour force	- labour force from outside Waworada district will create demand for housing, services (transport, restaurant, etc.)	S, D, Lc, B & A	Impact will not be significant as most of the unskilled labourers are available from local communities. The impact will be temporary only for the duration of the construction. The beneficial benefits will be from the injection of cash into the local community and increase in economic activities of the outside workers (such as house rental, meals at local restaurants, use of transport). Adverse impact is not expected to be significant as the number of outside workers are expected to be small.	Encourage the contractor to hire local labourers from the community or nearby villages to reduce social tension from outside workers.	• Contractor • Implementing body
Construction of shore facilities on fill land behind sea wall protection	- the filling of the beach to construct the shore facilities will impact the access to the sea, parking of boats, bathing and washing in the sea of the households located west of the beginning of the jetty.	L, D, Lc, A	The impact on the access to the beach will affect the household most notably on the beaching of the boat and boat repairs activities. The distance to the sea will be increase to about 80 m. These impacts will be moderate as access to the sea will still be freely available although a bit further.	Steps and slopes will be designed into the sea wall protection in order to facilitate easy access to the beach for the households/ fishermen to conduct their activities. Boat repair activities will be accommodated in the newly fill area for the shore facilities.	• Implementing body
	- the sea wall will protect the houses located on the beach from the threat of inundation during high tides and provide year round dry ground in the community.	L, D, Lc, B, A, I	The impact will be significant as the community living along the beach will now enjoy the protection from being flooded during high tides. However, the flushing action (removal of rubbish, debris, etc.) of the high tides into the area of the houses located on the beach will be stopped by the sea wall.	The benefits of non-inundation by the high tides will require a habit change of throwing rubbish indiscriminately with the expectation of the tide flushing to disperse the rubbish/ debris out to the sea. An awareness campaign must be initiated to affect this habit change and to promote a rubbish collection system in the community.	• Management organization • Fishing community

Operation / Maintenance Stage					
• Coastal Resource Management Sector Plan					
Improve data collection system	- collection of data will provide the necessary information to formulate resource management plans and policies.	L, D, Lc, B, R	Impact will be significant & beneficial in the long *term to ensure future sustainable use of resources.*	Accurate long-term data collection is essential for information exchange with fishers to raise their awareness for the need for resource management and policy making.	• Management organization • Implementing body
Introduce fishing licence system	- this licensing system will not only generate revenue for the fisheries public sector but also as a tool to manage the number & type of fishing vessels.	L, D, Lc, B, R	Impact will be significant & beneficial for management and control of the level and type of fisheries exploitation.	The need for to introduce this licensing system should be properly explained to the fishing community to get *their understanding and* consensus to avoid non-compliance and resentment.	• Management organization • Implementing body
	- fishing community may resent/resist this system.	S, D, Lc, A, R	Impact may be significant if the system is seen as unfair and if the introduction is not carefully explained and carried out with prior consultations/ meetings with the fishing communities that will be affected.	Fishers' understanding and consensus of the licensing system is essential to avoid conflict *and resentment of this system.*	• Implementing body
Fishing ground diversification					
- Offshore fishing ground (FAD introduction)	- *will reduce the pressure on the near* shore resources	L, D, Lc, B, R	Impact will be significant & beneficial by diversification of fishing ground and fish catch composition thus reducing the pressure on near shore fisheries resources.	Fair and equitable access to the FAD is essential to avoid conflict and resentment amongst the fishers.	• Management organization • Implementing body
- Modernization/ increase of fishing boat	- the training on the model boat will broaden the skills of the fishers. - motorization of existing boats will enable fishing in areas further a field.	L, D, Lc, B, R	The beneficial impact will only become significant as more fishers get trained and proceed to modernize their fishing technique/ equipment.	Opportunity for training and upgrading their *fishing boat/ motorization should be availed to* all fishers that wish to partake in this scheme.	• Management organization • Implementing body
- Monitoring, control § surveillance system	- surveillance and communication will help to reduce illegal fishing practices. - will ensure the long term sustainability of the fisheries industry by control of illegal and/or unacceptable fishing practices.	L, D, Lc, B, R	Impact will be significant & beneficial. In the long term, future sustainability will be in doubt if these activities are not implemented.	Long term and sustained implementation of this system is essential for resource management and sustainable fisheries.	• Management organization • Implementing body

Community base collaborative resource management	- regulate the resource management & exploitation to a level agreeable to all the communities sharing the resource in the area.	L, D, Lc, B, R	Impact will be significant as the management & regulation become established and with effective enforcement from the above surveillance activity.	Common consensus of all stakeholders in the area that share the resources is prerequisite to establishing the rules and practices to govern resource management.	• Management organization • Implementing body
• Landing, Handling, Marketing & Processing Sector Plan					
Improve landing.	- will improve the ease and efficiency of landing of fish.	L, D, Lc, B, I	Impact will be significant and effect immediate. The benefit will be substantial as the fishers are now able to land their fish easily especially during low tide.	Fair and equitable access to the landing facilities is essential to avoid conflict and resentment amongst the fishers and other users.	• Management organization • Implementing body
Fish cleaning, sorting, packing activities	- These activities will increase waste water and waste discharge from these activities.	L, D, Lc, A, R	Impact will be significant as the waste could lead to pollution of the ground water and surrounding environment if not properly handled and treated.	Project design will provide adequate water supply and incorporate waste handling/ disposal facilities, and septic tank. Proper maintenance and discharge of waste water must be done to keep the facilities running in good order and avoid polluting the environment.	• Implementing body • Management organization
On-land preparation for fishing activities	- Contamination of the environment from fuel supply activities	L, D, Lc, A, R	Impact will be significant if the fuel supply yard is not designed to handle fuel spillage.	Project design will incorporate fuel trap and separators to minimize spillage discharge. Proper fuel handling/ supply procedure to be followed to minimize risk of spillage.	• Implementing body • Management organization
Fish marketing activities - buying / selling - distribution / traffic	- These activities will mean an increased people and vehicle movement, impacting on noise and exhaust emission.	L, D, Lc, A, R	Impact will be significant within the complex due to the concentration of people and traffic to conduct these activities. Impact of exhaust emission is not expected to be significant due to the open nature of the complex design and no inhabitants living within the complex.	Project design will cater to the volume of people and traffic. Adequate truck access & parking will be provided to handle the vehicle traffic.	• Implementing body • Management organization
Ice plant / cold storage - Water usage & waste water discharge	- These operation impact on the water supply and generate waste water.	L, D, Lc, A, R	Impact will be significant as the existing pipe water supply in Rompo is not available and waste water discharge will pollute the environment.	The project will incorporate its own water supply system so as not to impact on Rompo's village acute water supply problem. Waste water generated will be adequately handled by the project's waste handling/ disposal facilities.	• Implementing body • Management organization
- Ice supply, cool box and storage	- The ice and storage will impact on increased fish quality and maintaining freshness.	L, D, St, B, R	Impact will be significant as existing ice supply cannot meet local demand and storage facilities are not adequate.	Equity of access to be ensured by user group and autonomous body.	

Demonstration fish processing facilities & activities	- These facilities and activities will generate waste water and solid waste discharge.	L, D, Lc, A	Impact will not be significant as the scale of the operation is small and serve as model processing facilities used for teaching and extension function.	Waste water and solid waste discharge will be adequately handled by the project's waste handling/ disposal facilities.	• Implementing body • Management organization
Fishery Activities Support Sector Plan					
Workshop/ Repair / maintenance activities	- Waste from net, boat, gear repairs. - Contamination of environment from waste oil / fuel discharge from repair activities.	L, D, Lc, A, R	Impact will be significant if the waste disposal is not managed and appropriate facilities to handle the waste discharge.	Waste disposal facilities and its management & control will be implemented in the project.	• Implementing body • Management organization
Water supply/ consumption	- Water supply developed for the project will provide water supply not only for the project activities but also for the community.	L, D, Lc, B, R	Impact will be significant as the new water supply to the complex will alleviate the water supply problems of the community and fishing activities.	The charges for the use of water by fishermen and the community of the project's water supply facilities must be fixed at a reasonable low cost and equity of access to be assured.	• Implementing body • Management organization
Fuel supply activities	- Impact from accidental fuel spillage leading to contamination of soil and ground water. - Possible fire hazard.	S, D, Lc, A, R	Impact will be significant as existing site does not have fuel supply activities and is not contaminated. Impact will be significant as damage from fire will be drastic and may affect the whole operation of the complex.	Project will provide adequate fuel handling/ disposal facilities to cope with any accidental spillage. Fuel depot will be located away from complex to minimise fire hazard. Project to incorporate fire safety & fighting equipment.	• Implementing body • Management organization
• Community Environment Improvement Sector Plan					
Community infrastructure improvement					
- Model water supply/ toilet	- This model facility will serve to show the community the concept of communal bath/ toilet facilities and how the facilities should be managed and operated to maintain its sanitary condition for the benefit for all users.	L, D, Lc, B	The impact of this model facility will be slight in the short term but if the community decides to adopt the concept and develop/ built more of these facilities, the impact will become significant as sanitation will be much improved as these facilities become easily available in the community.	Socializing of this concept is required to build up awareness in the community on the proper usage, maintenance and benefits of this model facility.	• Management organization • Community leaders
- Road construction	- Building of community roads will improve the access to all houses and with proper drainage ditches, risk of flooding will be reduced leading to a improved living environment.	L, D, Lc, B	Impact will be moderate and dependent on the proper maintenance of the road & drainage ditches.	Willingness of the community to undertake the road construction & maintenance will need to be assessed before implementing this component.	• Community leaders

- Garbage collection system	- The overall sanitation of the living environment of the community will improve with this rubbish collection system.	L, D, Lc, B	Impact will be moderate but will be significant when the sea protection wall surrounding the village is complete with subsequent exclusion of the flushing action of the high tides.	A rubbish collection system will become critical with the construction of the sea protection wall resulting in the low lying areas of the community being cordoned off from the effects of the high tides which flushes out the rubbish/ debris to the sea.	• Community leaders
- Upgrading motivation for social environment improvement	- These educational provisions will impact on the general level of awareness of the community regarding ways to improve their social environment and self reliance.	L, D, Lc, B, R	Impact will be significant as the existing education opportunities/ awareness levels in the community are minimal.	The community should be encouraged to avail themselves of this opportunity to raise their awareness and their self reliance to improve their social environment.	• Community leaders • Community
• Fishermen Organization & Fisheries Extension Sector Plan					
- Formation of new management organization	- The new management organization will encourage/ mobilize the existing fishermen groups and cooperative (KUD Mina Teluk Waworada) to participate in a cohesive organization for the benefit of the fishing community.	L, D, Lc, B	Impact will be moderate in the short term but in the long term with better management and greater participation, the impact will become significant as the individual groups, cooperatives and the new management organization undertake more collective activities for its members.	An awareness campaign on the merits & necessity of the new organization should be done in the community to seek their agreement in the formation of and participation in this new organization.	• Implementing body • Management organization • Fishermen groups • KUD Mina Teluk Waworada
- Extension programs	- The impact of these extension programs will be to revitalize the existing groups and cooperative by addressing their weakness and promotion of their self reliance attitude.	L, D, Lc, B	Impact will be moderate in the short to medium term but in the long term the impact will become significant as the groups/ cooperative become more active, more self-reliant, operate with more transparency and accountability.	The extension programs should be developed and modified over time to address the needs of the groups/ cooperative and to consider the changing nature of their activities and financial situation.	• Implementing body • Management organization • Fishermen groups • KUD Mina Teluk Waworada

• Education and Training Sector Plan					
Training of fishermen & processors - fishing techniques, safety, resource management - processing techniques - quality & sanitation	- Knowledge empowerment will impact on behavioural changes that may lead to improved quality of life fisheries practices.	L, I, St, B, R	Impact will be indirect and significant for the improvement of the fisheries activities and life of the beneficiaries and community	Equity of access to these training opportunities to be assured by the implementing body and management organization.	• Implementing body • Management organization
Training for institutional & management strengthening	- Training will improve the knowledge and facilitate sustainable fisheries management of the fisheries center's operation.	L, D, St, B, R	Impact will be significant as training of the upper level beneficiaries will be necessary for the continued operation of the center.	Equity of access to these training opportunities to be assured by the implementing body and management organization.	• Implementing body • Management organization

2.6.2 Bima Fish Market Site

Activity	Potential Impact	Classification	Evaluation of Impact	Mitigation/ Comments	Responsible Institution
Site Preparation / Construction Stage					
Site clearing / preparation	- The site of the new market is an existing fish pond which will have to be filled in.	L, D, Lc, A	The impact is not significant as the area for the market is small and will not adversely affect the physical environment.	No compensation for the lost of the fish pond is necessary as it belongs to Dinas Perikanan.	• Implementing body • Contractor
Temporary services (water, electricity)	- Construction activities will make use of water & electricity supply on the site	S, D, Lc, A	Impact will not be significant and temporary only for the duration of the construction.	Water requirement for the constructional needs should be adequately met by the town's water supply network.	• Contractor
Construction labour force	- labour force for the market construction will increase economic activities in the area.	S, D, Lc, B & A	Impact will not be significant as most of the unskilled labourers are available from Bima town itself therefore adverse influence from outside workers will be minimal. The impact will be temporary only for the duration of the construction. The beneficial benefits will be from the injection of cash into the local community and increase in economic activities of the outside workers (such as house rental, meals at local restaurants, use of transport). Adverse impact is not expected to be significant as the number of outside workers are expected to be small.	Encourage the contractor to hire local labourers to reduce social tension from outside workers.	• Contractor • Implementing body
Construction activities	- Construction activities on site will create noise, dust, and increase construction traffic on road	S, D, Lc, A, R	Impact will be significant but temporary only for the duration of the construction.	Construction activities to be restricted to working hours and constructional plant traffic should be cautioned to travel at low speed especially passing through populated areas.	• Implementing body • Contractor

Construction and operation of the new market facilities	- the construction and operation of the new market facilities will have impact on the existing nearby retail market activities.	L, D, Lc, B, A	Impact will be moderate on the nearby market in terms of existing retail activities there. With the new fish market, all fish retail activities are envisaged to be conducted at the new market. The relocation of the fish retail will be beneficial as the new market will improve the sanitary condition for the fish sellers and buyers. Adverse impact may be expected on the consumers as they will not be able to buy all their groceries (including fish) at one market but will need to visit both the new market (for fish) and the existing market (for other food items).	The slight inconvenience for consumers of having to walk another 100m to buy fish will be more than made up by the more sanitary and orderly condition of the new fish market. Fish sellers' should be informed in advance of the objectives of the new fish market construction and their views on the stall allocation & market operation taken into account as far as possible when formulating the market operation plans.	• Implementing body • Management body

Legend: S = Short Term impact L = Long Term impact D = Direct impact I = Indirect impact
Lc = Local impact St = Strategic impact A = Adverse impact B = Beneficial impact R = Reversible I = Irreversible

Notes:

Impact that is significant will be further classified into Reversible or Irreversible impacts.

Implementing body will consist of District Fisheries Office. Management body will consist of Bima Municipality.

3. Project Costs

3.1 Condition for Cost Estimation

(1) Basic conditions of Design Selection Process

The basic three conditions of design selection process are listed below.

- Many facilities, including fish landing facilities are under construction in Indonesia. Therefore, the design method that was adopted for the model sites has been based on the construction method and costs that are the least problematic.
- The equipment and materials that will be used will be manufactured, assembled and supplied in Indonesia and past costs will be used as reference.
- Good quality supplies that meet the design standards and can be supplied locally without any inventory problems will be given priority.

2) Basic condition of cost estimation

Using the price list issued by the Ministry of Public Works, the calculated unit price was fixed based on an interview survey, calculation requests from contractors, contract fees, and calculation documents on similar projects implemented by other ministries in the eastern region of Indonesia. The basic conditions pertaining to the calculations are listed below.

- The fixed standards for the calculated unit cost are based for the year 2002 and the cost of a living increase ratio has not been included in the calculations.
- The calculated price includes the entire package of construction works--the temporary and direct construction works, labor costs, supplies, and installation, etc.
- The cost of building access roads to the model site was included based on past local road construction works.
- The direct construction costs alone have been added where the community's cooperation can be recruited in the project to improve the fishing village environment.
- The consultant fees will be 10 percent of the construction, equipment, and materials cost.

3.2 Breakdown of Project Costs

A breakdown of the project costs for Rompo and Bima Market is shown in the table below.

Unit: Rp. million

Site	Center		Estimated Project Costs	Foreign Cost	Domestic cost
Rompo	Coastal resources management	Facility			
		Equipment	1,772	1,772	
		Activity costs*	578		578
	Landing, handling, shipping, processing fisheries	Facility	24,271	23,587	684
		Equipment	2,608	2,608	
		Activity cost*	978		978
	Improvements to fishing village environment	Facility	393		393
		Equipment			
		Activity cost*			
Bima market	Fish landing, handling, shipment, processing	Facility	4,384	3,117	1,267
Total			34,984	31,084	3,900

Note: Asterisk denotes for the first 2-year period. The evaluation period is set at 15 years as explained in section 4.1.2 (3).

4. Project Evaluation

4.1 Economic and Financial Evaluation

4.1.1 Economic Evaluation

The model site of this zone includes the Rompo and Bima market. However, the economic evaluation of the retail market will be part of the economic evaluation of the Rompo site.

The basic inputs are facility improvements, the purchase of equipment and materials, and activity costs. In the economic evaluation, these costs will be converted into economic prices.

The benefits are 1) reduced working hours due to improved basic fishing port facilities, 2) increased value added of fresh fish supply due to improved processing and marketing facilities, 3) reduced costs due to efficient and improved transport and loading activities, 4) increased consumption of ice due to lower ice price, and 5) new technology and resource management by fishermen due to the provision of a model fishing boat. In addition, trial activities to reduce suspended business operations and health costs by improving the fishing village environment will also be implemented.

The evaluation period will be 15 years and basic inputs will be implemented in FY0. In addition, the required renovation inputs in conjunction with the physical lifespan years of the facility have been added, and the cost of the terminal value in FY16 has been added.

(1) Benefits

Added Benefits	Without Project	With Project
Fish landing volume	Remains the same.	Remains the same
Reduced working hours	Unable to secure time for fishing activities Excessive burden on fishing village women	By reducing the landing time, the time for fishery activities is secured, sustainable resources management becomes possible (opportunity cost in terms of fish catch has been added)
Increased value added fresh fish supply	Ratio of fresh fish: 47% Ratio of unsold fish: 10%	Ratio of fresh fish: 53% Ratio of unsold fish: Improve to 0% Increased processed fish price by 50%.
Reduced transport costs	*Transport fish catch to land:* Manual labor Transport: Dependent on bus (more than 2 hours)	*Transport fish catch to land: manual labor not needed* Transport: Truck (about 1 hour) A rise in will to pay.
Consumer surplus due to decrease in ice price	Current market price Rp.330/kg	5kg bags: Rp.340/kg 25kg ice blocks: Rp.320/kg
New technology and resource management by fishermen due to the provision of a model fishing boat	Overfishing of coastal resources	Improve infrastructure to extend fishing grounds in future
Fishing village improvements (garbage collection system)	Regular garbage collection activities	Garbage containers will be distributed and regular collection activities implemented.

(2) Calculating the Benefits

1) Reduced the working hours

The improvements in the basic fishing port facilities will reduce the fish landing time, the transport time during the low tide, the preparation time (refueling, restocking boat supplies), and the embarkation and disembarkation of the marine ferry boat (see Table 6-2-1, Appendix 6).

Although the revenue from fish catch according to time greatly differs depending on

fishing method and fishing period, Rp.2000/hour was used here. As a result, the benefits calculated are shown in the table below.

Unit: Rp. million

Task Time Reductions	Benefit
Fish landing	160.3
Transport	28.2
Refueling	15.7
Restocking water supply	15.7
Embarkation, disembarkation	56.1
Total	276.0

2) Increased supply of value added fresh fish

The breakdown of the annual handling volume, irrespective of whether the project is implemented or not, has been summarized in the table below.

Unit Ton/year

Fish Catch Marketing		With the Project	Without the Project
Fresh fish		2,265	2,573
Processed fish	In the zone	2,088	1,981
	Outside the zone		293
Unsold fish		494	0
Total		4,847	4,847

Although the retail price differs greatly according to fish species and fishing period, the average fresh fish price was set at Rp.2,000/kg, three-fourths of this price for processed fish, and one-half this price for unsold fish. In addition, the value added of processed products is anticipated to increase by 50 percent due to improved processing technology. The benefits have been summarized in the table below.

Unit: Rp. million/year

Fish Catch Marketing		With the Project	Without the Project	Benefits
Fresh fish		Fresh fish	5,146.0	616.0
Processed fish	In the zone	3,132	2,971.5	279.0
	Outside the zone		439.5	
	Increased value added	0	1,705.5*	1,705.5
Unsold fish		494	0.0	-494.0
Total		8,156	10,262.5	2,106.5

Note: Asterisk indicates assumption that processed products will be 100 percent..

3) Reduced transport costs

The transport and water costs are reduced due to the improved basic facilities (see Table 5.3, Appendix 5). In addition, due to the improved efficiency of fish transport activities to Bima district, an increased willingness on the part of the traders and retailers to pay the current costs is anticipated (one way fare Rp.4,000/person + Rp.5,000/fish box). Therefore, the project revenue has been included as simply a willingness to pay.

A willingness to pay = Rp.0.22 million/roundtrip x 300 roundtrips/year x 2 transport vehicles = Rp.132 million. Based on this formula, the benefits have been given in the table below.

Unit: Rp. million/year

Items that Reduce the Transport Cost	Benefits
Reducing the transport cost during fish landing	380.3
Reducing water cost	56.1
Increased ice sales due to efficient transport	132.0
Total	568.4

4) Increased consumer ice sales due to lower ice price

The estimated ice sales volume is shown in the table below (see Table 5-2-1, Appendix 5 for details).

Unit: Rp. million/year

Retail unit of ice	Retail volume (ton/year)	Price difference (Rp/kg)	Benefit
5kg	467	-10	-4.67
25kg	991	10	9.91
Total	1,296		5.24

5) New technology and resource management by fishermen due to the provision of a model fishing boat

The aim of the model fishing boat is to promote capacity building in the development and future use of fisheries resources outside the bay in future and to avoid concentrating fishing activities within Waworada Bay. As explained in later sections, although there are limitations to direct increases in fish catch revenue, the opportunity for fishermen to acquire new experience, knowledge, and technology through the use of the model fishing boat is extremely significant (see section 2.5.2 (1) 2) (a-2) Revenues and Expenditures of the Model Fishing Boat). It is difficult to quantify its benefit in the report; it is assumed to be twice the fish catch of model fishing boat.

Benefit = Rp.202 million/year x 2 = Rp.404 million/year

The cost is counted for only 10 years, and after 10 years it is assumed that a similar model boat will be introduced by credit and the operation is maintained.

In addition, an annual amount of Rp.15.7 million was added as a benefit derived from coastal resources with the introduction of a high-speed boat for surveillance activities and the collection of licensing fees (see section [2.5.2 (1) 2] (c) High-speed Boat).

6) Improvements of the Fishing Village Environment

According to the field survey, it was found that the quality of the living environment was a major factor that affected the disease ratio. Therefore, a decrease in the number of sick leave days and health and transport costs were calculated into the benefits that would be derived from the project. According to the survey, an annual benefit of Rp.48,900 would be generated per household (refer Table 6.4.19, Appendix 6). In addition, in Rompo an improved garbage collection system will be implemented, an added benefit of Rp.15.1 million will be generated for 310 households.

In Rompo, other water supply and model toilet facilities are planned and the composite impact of these facilities is being large.

(3) Economic Costs of the Project

The following conversion factors were used as shown in the table below (refer Table 6.5.1, Appendix 6).

Conversion Factors Used	Breakdown of the Items	Conversion Factors
Basic Conversion Coefficient	Standard Conversion Coefficient	0.90
	Latent labor coefficient	0.50
	VAT	20%
Input Conversion Coefficient	Soil works	0.71
	Concrete works	0.86
	Construction	0.78
	Plant	0.90
Management and operations Conversion Coefficient	Personnel costs, management costs	0.90
	Utilities, fuel	0.86
	Transport	0.84

Note: Generally, the investment interest rate for (value added net national product – total wages)/(net investment amount) is used as the capital opportunity cost, but unfortunately it could not be calculated because data on total wages was unobtainable. Data on wage rates for the hotel sector alone according to region was obtained. However, Nusa Tenggara province was categorized as "other region" and the national average for ranking hotels was Rp.126,000 and Rp.46,600 (37 percent) with average weekly days off. The national average for non-ranking hotels was Rp.56,500 and Rp.35,600 (63 percent) with average weekly days off. It was concluded that calculating the wage rates based on these figures alone (December 2000) was risky, and the construction and maintenance costs were calculated based on general data and data obtained from the interview survey. The exchange rate did not differ in the regions; therefore, the nationwide figure was used. The shadow exchange rate is the above figure multiplied by the standard conversion factor USD$1=Rp. A summary of the economic cost calculated using the conversion factor is shown in the table in section (4) Evaluation Findings.

(4) Evaluation Results

1) Economic Internal Rate of Return (EIRR)

The ice making and processing facilities were evaluated as a large benefit. Subsequently, the overall EIRR is a fairly good 11 percent.

Unit: Rp. million/15 years

Evaluated Project	Benefit	Cost	EIRR (%)
Coastal resources management	6,307	4,718	8
Fish landing/handling, marketing, processing improvements, etc.	46,470	20,291	12
Improved living environment of fishing villages	78	472	N.A.
Total	53,003	25,481	10

2) Sensitivity analysis

In this evaluation analysis, there are several suppositions about the conversion of the economic price and calculations of the benefits. In this zone, the impact of the overall EIRR will be reviewed. If the benefits and costs are fluctuated at +10% and –10%, respectively, the results are shown as follows in the table below.

Fluctuation Range	Benefit+10%	Benefit±0%	Benefit-10%
Cost +10%	10	8	6
Cost ±0%	12	10	8
Cost -10%	14	14	10

The above indicates that the effects of decreased costs and increased benefit are the same. In case of construction of basic infrastructure is delayed for two years due to constraints in getting investment, the overall EIRR will increase slightly to 11% because the benefit is large. However, the assumption has no meaning because the functional facilities at this site are constructed on a reclaimed land for basic facilities.

3) Distribution of benefits

The largest benefit is the increase in the fresh fish supply and its value-added due to the use of ice and insulated boxes. This will lead to a direct increase in income not only for the traders and retailers, but also for the fishing village women who are engaged in fish processing activities. There are very few projects that lead to an immediate increase in production for fishermen, and the distribution of short-term benefits is difficult. But through stringent resources management, long-term benefits will be generated.

4.1.2 Financial Evaluation

(1) Basic Concept on Cost Distribution

In principle, the beneficiaries will bear the operating costs of the ice making, processing, and marketing facilities. The renovation and repair costs of the basic facilities, such as the landing facility, strengthening the cooperatives and surveillance activities (data collection for resources management, monitoring, and cost of controlling illegal fishing activities) will be borne by the district government. The general activity costs of the fishermen's association that will be in charge of the operations and maintenance of the facilities will be covered by membership dues or its deposits. The cost of the FADs will be covered by the fishing ground user fees.

Although depreciation costs should be included in this evaluation, the evaluation was limited to renewal inputs.

(2) Estimated Revenue

1) Revenues generated by the fisheries complex

(a) Ice-making, marketing, and processing facilities

The following sales revenues were estimated for the ice making, marketing, and processing facilities (see Table 5-2-1, Appendix 5).

Unit: Rp. million

Revenue Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
Sales revenue	528.22	552.00	571.03	561.51

Note: The facility user fees are included in the figures above.

(b) Transport truck

The rental fees were used as the estimated revenue (see Table 5-3-1, Appendix 5).

Unit: Rp. million/year

Revenue Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
1 roundtrip rental fee	0.21	0.22	0.23	0.22
Revenue generated from rental fees	126.0	132.0	138.0	135.2

2) Revenue of the district government

(a) *Model fishing boat*

A model fishing boat will be provided to promote the modernization and use of larger fishing boats. Sales revenue generated by the sales of fresh fish landed from 88 fishing trips/year was estimated at Rp. 202.0 million (see Table 5-1-1, Appendix 5). The benefit is calculated for 10 years as the life of the model fishing boat is about 10 years.

(b) Resources management

The current fisheries licensing fees were estimated at Rp.15.65 (see section 2.5.2 (1) 2) (C).

(c) Extension activities to introduce fresh fish handling technology and fish processing

The capital required to implement extension activities to introduce fresh fish handling

technology and fish processing will be provided by the district fisheries office. The operating cost for the first fiscal year was estimated at Rp. 53.1 million (see section 2.5.2 (2) 2)).

(d) Strengthening the cooperative

The capital required to strengthen the cooperatives will be provided by the district FO (see section 2.5.2 (5) 2)).

(3) Summary of Expenditures

1) Expenditures of the fisheries complex

(a) Ice-making, marketing, and processing facilities

The costs shown in Table 5-2-1, Appendix 5 were used as the estimated expenditures of the ice making, marketing, and processing facilities.

Unit: Rp. million/year

Expenditure Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
Operations, maintenance costs	410.5	419.5	437.4	430.3

Note: The figures include the repair costs for the basic facilities.

(b) Transport truck

The costs shown in Table 5-3-1, Appendix 5 were used as the estimated expenditures for the transport truck.

Unit: Rp. million/year

Expenditure Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
Operations, maintenance costs	15.2	18.4	24.8	22.2

2) Expenditures of the district government

(a) Conservation costs of resources management

The costs shown in Table 6-2-1, Appendix 6 were used as the conservation costs for coastal resources management.

(b) Model fishing boat

The costs shown in Table 5-1-1, Appendix 5 were used as the cost for the model fishing boat. A total of Rp.198.2 million, comprised of the operations cost (Rp.142.1 million), the profit distribution to the crew (Rp.30.1 million), and the maintenance and repair cost (Rp.26.0 million), was estimated. The benefit is calculated for 10 years as the life of the model fishing boat is about 10 years.

(c) High-speed boat

The costs given in section 2.5.2 (1) 2) (C) was used for the high-speed boat.

Unit: Rp. million/year

Expenditure Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
Operations, maintenance costs	15.2	18.4	24.8	22.2

(d) Other activity costs

The cost of other activities has been summarized and is listed below.

Unit: Rp. million/year

Expenditure Source	Initial 2 years	3 – 5 years	6 – 15 years	Annual Average
Guidance for fishing village environmental improvements	5.6	0.0	0.0	0.4
Education, training	51.9	91.5	57.3	13.4
Organizing cooperatives, operations	31.5	42.2	140.8	14.3
Total	89.0	133.7	198.1	28.1

(4) Revenue and Expenditure

Based on the estimations given above, the expenditures and revenues of the Rompo site were calculated and are shown below.

Unit: Rp. million/15year

Facility and Activities	Revenue (A)	Operations Cost (B)	Renewal Input (c)	Expenditures (A-B-c)
Functional facilities				
- Ice-making facility	7,747.7	6,453.9	216.8	1,077.0
- FAD	675.0	-	675.0	0.0
- Transport truck	2,028,0	333.4	639.1	1,055.5
Subtotal	10,450.7	6,787.3	1,530.9	2,132.5
Model fishing boat	2,024.0	1,982.6	0.0	41.4
Surveillance activities, etc.	954.8	2,301.4	360.6	-1,707.2
Basic facilities	-	-	1,733.5	-1,733.5
Total	13,429.5	11,071.3	3,625.0	-1,266.8

Based on the figures shown above, the ice-making, marketing, processing activities, and the transport truck are adequately able to handle replacement input, but the model fishing boat is unable to cover the initial input, much less replacement input. This is because the lifespan years for the model fishing boat are ten years. Moreover, the replacement input for the basic facilities is an even greater problem.

Although the costs of surveillance and other activities will be provided by the district government, it is necessary to allocate 55 percent for the first fiscal year of the management budget of the district fisheries office (Rp.389.1 million) and 29 percent after three years (including the maintenance costs of the Bima retail market). The district fisheries office must strive to secure a budget within the district government.

(5) Calculation of the FIRR

Based on the estimations given above, the FIRR of the fisheries complex is only 4 percent, and the overall FIRR cannot be calculated. If the discount ratio is 0%, the Revenue/Expenditure (R/E) becomes 0.84. If the Bima Fish Market is included, the R/E is 0.39. However, if 80 percent of the input amount for the first fiscal year is subsidized by government, the FIRR of the planned facilities and equipment will become 42%. The overall FIRR for Rompo site is 8%, and if Bima Fish Market is included, it is 3%.

(6) Sensitivity Analysis

If the revenue and expenditures of the fisheries complex were fluctuated at +10% and 10%, the results are as shown in the table below.

Fluctuation Range	Revenue+10%	Revenue±0%	Revenue-10%
Input amount +10%	6	2	- 2
Input amount ±0%	7	4	0
Input amount -10%	9	5	1

The effect of increased input is much greater than the effect of decreased input.

4.2 Environmental Evaluation

(1) Rompo (Waworada)

With regards to the impact of the rural fish landing and shipment center on the physical resources at Rompo village, the significant impacts identified during construction are of temporary nature such as the relocation of the weekly market and nuisance of the construction activities such as dust, noise and increase constructional traffic. The significant impact of the sea wall protection around the shore of the village on the flushing action of the tide to remove the rubbish will require an awareness campaign to change the habit of throwing rubbish indiscriminately.

Mitigation measures recommended to lessen or avoid these impacts should be implemented during implementation by the concerned organizations or authorities.

The other significant impact of the project identified is from project activities. To lessen or avoid negative impacts from these soft aspects, the community should be informed about these activities and their consensus should be sort to avoid misunderstanding. Equitable and fair access to these activities is to be assured by the management organization and implementation body to avoid possibility of social conflicts especially between the people of Rimba and Rompo. Also, spatial implementation of sea and coastal activities such as FAD, sea weed farming, etc., must consider factors such as traditional uses of the area by different fishing groups / methods, and the economic and social relationships of the stakeholders using these areas.

Consequently, considering the scale of the project, the legal requirement under AMDAL, and the resulting significant impacts, EIA is not required.

(2) Bima Fish Market

The construction of the fish market at Bima will have significant impact during construction but these are of temporary nature such as noise, dust and traffic from the construction activities. Mitigation measures to lessen these impacts should be implemented during construction stage by the relevant authorities. No compensation for the lost of the existing fish pond (the site of the new fish market) is necessary as it belongs to Dinas Perikanan.

Negative impacts such as the relocation of the fish retail activities from the existing market to the new fish market and the inconvenience for consumers to purchase fish are not expected to be significant as the distance to the new market is only about 200m and the more sanitary, orderly condition of the new fish market will more than make up for the negative impacts. The transition to the new fish market should be orderly and transparent with fair and equitable stall allocations to the fish sellers to avoid any social and economic conflict.

Consequently, considering the scale of the project, the legal requirement under AMDAL, and the resulting significant impacts, EIA is not required.

4.3 Social Evaluation

Each small-scale fisheries development project that will be implemented in the targeted zones will benefit not only fishermen, but also fishing village women and young people.

(1) Impact on the Local Society

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

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

Furthermore, the supplementary facilities that are planned in the fishery activity support plan will not only benefit the fishermen, but will stimulate communication among the residents and impact the entire community.

(2) Achieving Sustainability

One of the effects that are targeted is a rise in the motivation of the villagers through self-help activities to improve their living environment. Additionally, the provision of a model fishing boat to train young fishermen targets the sustained use of fishery resources through diversified fishing operations.

(3) Gender Evaluation

As shown in the table below, reduced hours in fishing landing and marketing related tasks will greatly improve the living environment of the fishing village women. Additionally, an improved shipping system for fresh fish and improvements in fish processing technology will increase the income of the village women and generate new employment opportunities. These factors underscore the need and appropriateness of the project's implementation in terms of the gender issue.

Beneficiaries and Scope of Benefits for Women Anticipated From the Project

	Name of Project	Beneficiary	Benefits for Women		Benefits
1	Plan of Coastal Resources Management				
1)	Project of Data Collection system Improvement	Fishermen	X	•	Guidance to improve the economic state of fishermen households based on the collected data
2)	Project of Fishery Licensing System Expansion	Fishermen	X	•	Due to the appropriate scope of fisheries, sustainable fisheries system will be created.
3)	Project of Fishing Ground Expansion Promotion	Fishermen	X	•	Training of young fishermen using the model fishing boat
				•	Unexploited resources will be effectively utilized.
4)	Project of Monitoring System of Coastal Fishing Ground	Fishermen **Fishing village residents**	O	•	Decreased illegal fishing activities
				•	**Guidance on appropriate use and protection of coastal resources, based on self-control**
2	Fish Landing/Handling/Shipping/ Processing Improvement Projects				
1)	Project of Fish Landing/Handling Improvement	Fishermen Fish traders	O	•	Landing time is reduced. The labor hours of village women engaged in fish sales is curtailed.
2)	Project of Fish Shipment Improvement	Fish traders	O	•	Improved maintenance and storage for fish freshness reduces economic marketing losses, and increases income of women engaged in fish retail activities
3)	Project of Fresh Fish Handling Extension	Fish traders	O	•	Transfer of technique to maintain fish freshness through use of insulated boxes to village women engaged in fish retail
4)	Project of Fish Processing Improvement	Processors	O	•	Improved income and new employment opportunities for women engaged in fish processing through improved processing technology
5)	**Improvements for Bima City Market**	**Fish traders**	O	•	Improved sanitation of retail areas reduces loss of fresh fish, improves work efficiency, and raises income of village women selling fish
3	Plan of Fishery Activities Support				
1)	Improve supplementary processing and landing facilities	Fishermen Processors Fish traders	O	•	Improve work efficiency through use of supplementary facilities.
4	Plan of Community Environmental Improvement				
1)	Project of Community Infrastructure Improvement	Fishing Villagers	O	•	**The installation of roadside drainage ditches for the road running through the village,** tap water and a model toilet will improve the sanitary conditions of the fishing landing beach sites and strengthen the motivation for self-reliant measures maintenance issues.
2)	Improvement of social environment	Fishing Villagers	O	•	Educational activities to promote the motivation of the villagers are conducted.
5	Project of Upgrading Motivation of Community People on Social Environment Improvement				
1)	Plan of Fishermen Organization/Fishery Extension Improvement	Fishermen organization	O	•	The participation of village women in fishermen organizations that will be in charge of project operations and management
2)	Guidance on Project Management Methods	Fishermen Organization	O	•	Project monitoring and guidance on evaluation techniques will be provided.

6	Education and Training Plan				
1)	Establish an extension section within the District Fisheries Office	Fisheries Office	Δ	•	Strengthening the extension section of the District Fisheries Office will enable technical guidance to be provided for the fisheries activities of the village women.
2)	Education and training for District Fisheries extension officers and the leaders of fishermen organizations	Fisheries Office Fishermen Organization	O	•	Education and training activities for leaders of women groups will be provided.

Note: The sections in bold font indicate the benefits anticipated for only that zone, and all others are benefits that will be shared by all the priority zones.

4.4 Overall Evaluation

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

However, in terms of long-term goals, the creation of a resources management system is important not only for Indonesia, but for the global community as well. It is also an important source of protein for the Indonesian people. A project that strengthens the capabilities of the small-scale fishermen is a vital first step to improving the coastal fishing communities of Bima district. In particular, there is strong enthusiasm to improve the coastal communities in Bima district through this project, and it can be sufficiently developed as a model project not only for the eastern region of Indonesia, but for the entire country.

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

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