

**NEW KAPORO FISH LANDING
FACILITY DEVELOPMENT PROJECT**

5-5 New Kaporo Fish Landing Facility Development Project

5-5-1 Outline

Both Kaporo and the adjacent Nongo fish landing beaches are located on the northern shore of the central part of the Conakry Peninsula and they are the farthest east of all coastal fishery bases on this peninsula. This area is located at the mouth of Kaporo River, known as the place where Lusitanian people first visited the Conakry Peninsula and where a fishing settlement was established very early. Comparison of fishery statistics of 1992 and 1998 shows a temporary decrease in the number of fishing boats operating at Kaporo and Nongo fish landing beaches toward the latter part of the 1990s. This is considered to be attributable to the advance of general city residents into this region at around the same time due to development of urbanization and to a (temporary) shift of fishing boats from Kaporo and Nongo regions to other fish landing beaches on the Conakry Peninsula due to active development of fishery bases under ODEPAG (Guinea Artisanal Fishery Development Plan).

On the contrary, in recent years the number of fishing boats operating in Kaporo and Nongo regions drastically increased (by 57 boats – about 65% in the 4 years since 1998) and the current number of boats operating is 170. This is considered to have resulted from the geographical superiority of this region as an urban fish landing spot in view of increased needs for fishery products in this region and proximity to consumer markets under situations where the population of Conakry has increased and sprawled to the central as well as eastern parts of the Conakry Peninsula. Because of this phenomenon of sprawl, the Kaporo and Nongo regions, that in the past were sparsely populated villages relying half on farming and half on fishing and 20 years ago were suburban areas where luxury homes were developed on farm lands on low coastal grounds, have now turned out to be densely populated areas.

Under the Conakry City Plan formulated 20 years ago, it was planned to develop unused highland in the west area of Ratoma as a city center business area. The plan must have been based on expected increase in population and future sprawl. At present, sprawl has extended to the Enta area, the base area of the Peninsula, and so the Ratoma area has become the center of Conakry City not only geographically but also from the viewpoint of population distribution (Refer to Figure 5-15: Rough sketch of the Conakry Peninsula).

Currently, Kaporo and Nongo regions, including four sectors of Kaporo and the first sector where Nongo fish landing beach is situated, have a population of about 28,000 and about 2450 households (average household size is 11.4 persons). Assuming, based on the interview survey, 1,300 persons are engaged in fishery industry in both regions, more than 0.5 persons per household are related to fishery, it thus indicates fishery is one of the main industries of this region.

5-5-2 Natural Conditions

(1) Climate Conditions

The southern part of the coastal Guinea comprising the Conakry Peninsula has the heaviest annual rainfall in the Republic of Guinea, which is already a region with heavy rain. The rainfall in Conakry exceeds 4,500mm during a heavy rainy season and reaches almost 3,000mm (since 1990) when the rainfall is not heavy. During the rainy season

that lasts from May to November, the period from June to October records especially heavy rain with more than 20 days of rainfall a month. Above all, July and August record the heaviest rainfall with 35 mm or more per day.

The rainfall mechanism is of a global scale; i.e., atmospheric motion caused by heat-exchange process in the summer time causes heavy rain showers when passing over the highlands of coastal Guinea. Accordingly, rainfalls are likely to follow strong winds and air turbulence. However, generally this region is not considered a region with strong winds and has an average annual wind velocity on the Beaufort Wind Scale <3>: 3.4m/sec, which indicates the most gentle of breezes. The wind direction is almost fixed throughout the year with more than 85% of winds from the west or the southwest.

Hurricanes (tropical low pressures when present) generated in the Atlantic Ocean off Guinea-Bissau or Senegal advance westbound while growing, then northbound to the southeastern part of the United States of America. Thus no influence is exerted on this region. The maximum wind speed in Conakry, which results from gusty wind generated by the aforementioned climatic mechanism, is about 30m/sec. Therefore, ordinary land facilities are not likely to experience any influence.

Being surrounded by the sea in three directions, Conakry enjoys the most gentle weather in Guinea with an average temperature of 27.0 and an average annual temperature range of only slightly over 10 . Given that in other regions temperatures range 20-25 , Conakry can be said to have a peculiar environment.

(2) Hydrographic and Tidal Conditions

Kaporo and Nongo regions are located along the northern shore of the Conakry Peninsula, which is considered to have the steepest topography of the seabed. However, since the inclination of the seabed off the point of the Peninsula is only about 1/1,250 and as this region is at the nose of newly created deposits at the deepest end with gentler inclination, big waves that might affect operations of artisanal fishing boats operating on the coastline are rarely generated throughout the year.

In the waters off Kaporo and Nongo the velocity of sea winds is about 4m/sec on average, and it is considered that wind swells do not likely create much effect there. However gusty winds, generated especially during the rainy season, sometimes reach 35m/sec on the sea so that they may cause danger when blown at the side of boats. This influence is especially strong in July and August when fishing is not in prime season – when the number of operating days is less than half the number of that during prime season. The decreased fishing in this season may likely have something to do in part with gusty winds.

Influence of ocean waves on the seashore is extremely light because the entry angle of waves is almost parallel to the seashore. At the mouth of the Kaporo River a small sand reef island is formed (Tayili Island). Thus, it is not necessary to worry about influence of waves on the fish landing sites in Kaporo and Nongo, which are located inside this Island. Rather it can be said in the Kaporo and Nongo regions, the fish landing sites at the river mouth, are more under influence of speedy tidal waves. Generally speaking, a difference in tide levels tends to enlarge inside the river mouth compared to offshore or

seashore regions. Accordingly, fishing boats of Kaporo and Nongo regions with small engines may likely be affected when entering or leaving ports (Refer to Figure 5-16: Surrounding view of Kaporo and Nongo regions).

According to survey results at the commercial ports of Conakry, the difference in tide levels is about 3.3m. However, it will be necessary, after conducting careful observation, to forecast a level of tides in reference to tidal level tables before implementing the plan in Kaporo and Nongo regions. In light of the vast area along the Kaporo River that is considered to exceed 15km², careful attention should be paid in conducting observation to the overall impact and intensity of flush water volume from the river at the time of heavy rains during the rainy season.

(3) Topographic Features, Soil and Vegetation

The Kaporo and Nongo regions include fish landing sites developed at the river mouth of a valley of the Kaporo River on the eastern side of the central part of the Conakry Peninsula. This valley is rather large, stretching across the Peninsula about 5km at the maximum and over a length of about 4km, forming a flood plain of about 150m in width downstream about 2km. Fish landing sites in Kaporo and Nongo regions are located on the western shore (about 250m upstream of the river mouth) and on the eastern shore (about 250m upstream from the river mouth) respectively, both utilizing areas 0 to 3m high above sea level (MSL standard) as fish landing beaches. The Kaporo River runs from upstream through the river mouth area passing beneath a bridge on the national road, along the Nongo fish landing beach and then flows out to the Atlantic Ocean on the east side of the island after meandering for a long distance. During the dry season at low tide, the flow of the Kaporo River reduces to a slight trickle, enabling passage on foot to Taeri Island. Except for times with the lowest tide, in this area water achieves a certain level of water depth, enabling fishing boats to run back to the front side of the Kaporo fish landing beach. Therefore, fish landing operations are carried out, though on a small scale. The national road is at its lowest altitude around the bridge (about 3m high above sea level) and the road inclination around the reclaimed area is gentle at about 1/150. However, areas away from the flood plain are considerably steep uphill slopes on both sides (Kaporo side about 1/30, Nongo side about 1/20).

Near the river mouth laterite metamorphic rocks are sporadically exposed. Results of interviews at the Mining Geography Department, suggest that underneath this area lie foundation rock of basalt or granite and a layer of cohesive soil above, and around the flood plain at the river mouth facing fish landing beaches are silt, clay and sand layered above laterite metamorphic rocks. Outside the river mouth of the Kaporo River is the sand reef Taeri Island made of sediments exiting the river and influenced by ocean waves, tidal currents, tides, etc. Taeri Island is indicated on maps issued in 1953 and 1981. These maps are still used today with no changes to size, etc. In implementing this plan, careful investigation by way of drilling survey should be conducted with respect to bottom sediments as well as composition, intensity, and thickness of layers of laterite metamorphic rocks considered to lie beneath.

In the flood plain of the Kaporo River and at offshore islands, mangroves grow naturally. Land areas that were most likely covered with tropical trees in the past were first converted to farmlands and then were developed for housing. They have now become crowded urban areas and now only several trees that narrowly escaped trimming appear –

almost like monuments. It is advised in this respect that the plan should be implemented by carefully considering avoiding harmful effects to the remaining natural mangrove forests in the flood plain while making efforts to preserve monumental trees in the area (old trees of baobab and mangrove) standing adjacent to the fish landing beach of Kaporo.

5-5-3 Socioeconomic Conditions / Fishermen's Settlement

The situation of Kaporo is very different from Koukoudé. Kaporo is a section within the Ratoma municipality of Conakry town. The total population of the section is 22 250 people – 10 670 men and 11 580 women – making up a total of 1 945 households (pers. comm. Soumah, Section Chief, quoting a census in 2002)⁴². The landing site itself is located in sector 2 of Kaporo and most of the fisheries sector operators are found in this area. Opposite Kaporo, across the water, the Nongo landing site is located. An important number of fishers, fish smokers and traders are based there. There are also fish traders coming from other parts of town to buy fish in Kaporo and Nongo.

The number and types of persons to interview for the survey were selected based on the total number of people active in the different professions represented in fisheries business in Kaporo and Nongo. These figures are presented in Table 5-41 together with the total number of operators in each category. As in Koukoudé, the average age of the persons surveyed was relatively high – 37 years for women and 38 for men – and most were household heads or wives of household heads.

Table 5-41 Total Workforce and Survey Sample Size in Kaporo

Socio-professional groups	Number of operators			Sample size – number of persons surveyed			
	Men	Women	Total	Men	Women	Total	
Boat owners	575	0	575	7	1	8	
Boat owners cum fishers				26	0	26	
Fishermen				36	0	36	
Fish smokers cum traders	50	396	446	2	44	46	
Women fish smokers cum brokers				1	10	11	
Fish smokers				0	21	21	
Fish traders	0	215	215	0	21	21	
Others	40	10	50	1	0	1	
				Net repairers	1	0	1
				Shopkeepers / traders	0	2	2
TOTAL	665	621	1 286	74	78	152	

42 This information is however contradicted by figures given by the office of the Ratoma municipality according to which Kaporo had 10 708 inhabitants in 1996. With an annual population growth rate of 3.1%, their estimate for 2003 is 13 308 inhabitants only.

(1) Description of the Fisheries Sector Workforce

80% of the persons surveyed in Kaporo belong to the ethnic group Soussou. Other ethnic groups represented include Baga, Teminés, Wolofs, Malinké, Mandeniyi, Peuls and Kissien. Most of the 152 operators interviewed live in Kaporo or Nongo: 98 in Kaporo – 80 in sector 2 where the landing site is – and 48 in Nongo. However, only 43% of them are born in Conakry and there are thus an important number of operators that has come from other parts of the country to settle in Kaporo/Nongo (see Figure 5-13). 12 of the 152 persons surveyed declared having a second residence and not live in the area the whole year around.

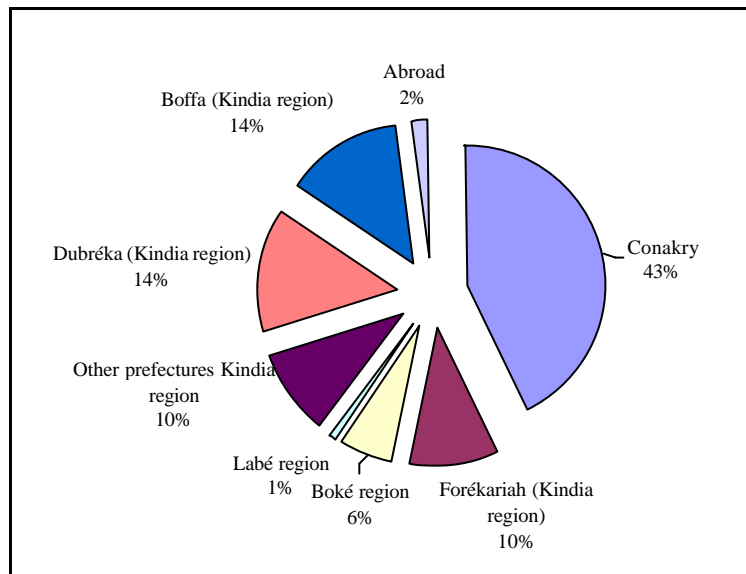


Figure 5-13 Place of Birth of Persons Surveyed in Kaporo

(2) Housing

About 85% of the households surveyed live in houses made of cement bricks with roofs of corrugated iron sheets. Some respondents reported to live in mud brick houses and some in apartments or studio apartments. 90% of the households have electricity but storm lanterns and candles are also used for light. The most common household fuel is coal but firewood is also used. There is a public water supply in the area and most people take their water from taps. Still, there are also ordinary wells and water sellers constitute another source of water. There is no sewage system. Only 7% of the households surveyed have access to water closets; the remaining part uses latrines.

(3) Assets and Land Holdings

As in Koukoudé, some of the interviewed households own land even though the number of landowners in Kaporo is lower than in Koukoudé. On the other hand, the average size of the agriculture landholdings is larger in Kaporo than in Koukoudé (see Table 5-42).

Table 5-42 Land Holdings of the Households Surveyed in Kaporo

Type of land	Number of owners among interviewed households	Place (prefecture)	Average area
Land for housing	103	Conakry : 57	-
		Dubréka : 16	
		Boffa : 10	
		Coyah : 8	
		Other : 12	
Agricultural land	79	Dubréka : 28	10.6 ha
		Boffa : 14	
		Coyah : 8	
		Conakry : 7	
		Forécariah : 7	
		Kindia : 6	
		Other : 9	

11% of the households surveyed in Kaporo own livestock – seven animals on average – and 22% keep fowl. With regard to other assets, it can be noted that the households in Kaporo generally have more belongings than their counterparts in Koukoudé. The most common pieces of equipment are radios and fans. Household electrical appliances such as refrigerators and freezers are available to 20% of the households (see Table 5-43).

Table 5-43 Possessions of the 152 Households Surveyed in Kaporo

Type of asset	Radio	Video player	Music stereo	Television	Refrigerator	Freezer
Number of owners among interviewed households	125	15	4	52	30	33
Type of asset	Cooking stove	Washing machine	Fan	Air conditioner	Rifle	Sewing machine
Number of owners among interviewed households	4	0	119	2	4	5
Type of asset	Car / van	Motorbike / scooter	Bicycle	Canoe	Fish smoking ovens	Furniture
Number of owners among interviewed households	12	5	11	58	52	55

(4) Educational Level of Persons Surveys and Children's Schooling

The illiteracy rate of the persons surveyed in Kaporo is 71% for the women and 14% for the men (see Figure 5-14). Still, compared to Koukoudé, more people have attended primary and secondary school and two persons have higher education. The literacy rates of the survey sample population in Kaporo – 26% for women and 53% for men⁴³ – are thus higher than the national averages, which are 15% for women and 37% for men. However, the rates are lower than the general literacy rates for Conakry town; 43% for women and 63% for men⁴⁴.

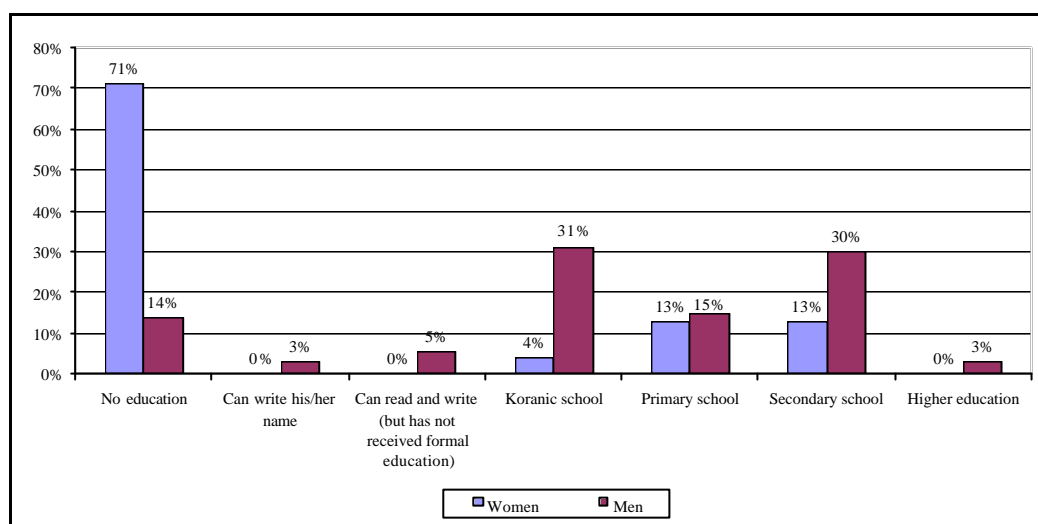


Figure 5-14 Educational Level of Persons Surveyed in Kaporo

Among the 1,320 household members covered by the survey, there were 574 pupils of which 249 were girls. 336 of these pupils are less than 13 years old and are thus of primary (or nursery) school age. In the age group 7-12 year olds, there are 226 pupils and 23 children who do not attend school. The majority of the pupils go to school in Kaporo, Nongo or in another part of the home municipality Ratoma. About half attend privately funded school and half attend government schools.

5-5-4 Fisheries Situation

(1) Fishery Industry

In the fish landing beaches of Kaporo and Nongo, fishing boats employing encircling gill nets and fixed gill nets and long line fishing boats (simultaneously perform hand line fishing) are used primarily, although surrounding nets are not used. This most likely has something to do with the depth of water at both of the fish landing beaches. There are good fishing grounds of bonga and bobo off these shores and most fishing boats employing encircling gill net target them in one-day fishing operations. Long line fishing boats generally operate offshore Boffa Prefecture (one sailing takes three days with two-day operations) and long line fishing boats of Nongo generally sail to Koba off

43 These estimates exclude persons who have attended Koranic school.

44 Permanent Secretariat of the PRSP, 2002: Poverty Reduction Strategy Paper – Guinea.

of Dubreka Prefecture for one-day fishing but occasionally sail off both Boffa and Boke Prefectures. In such cases their voyages take five or six days.

Fishery communities of Forecariah and Boffa Prefectures occasionally send their boats to land catches here because of good fishing grounds and chances of advantageous transactions due to proximity to consumption regions. In particular, at the time of spring tides, occurring twice a month totaling about 15 days, some fishing boats choose to stay in Kaporo to operate. These boats are registered at least at nine fishing communities (five in the northeastern part of Conakry, two in Dubreka Prefecture and two in Boffa Prefecture), of which five fishing communities are registered at the Fishery Ministry. Five fishing communities including three fishing communities in the Conakry Peninsula are called "Islands" because for them access by land route is difficult.

According to the interview survey with the port manager, the number of fishing boats operating in Kaporo and Nongo as shown in the following table as 170 in total, of which fishing boats with encircling gill net account for 60%. As explained in a section of the Outline above, this number of fishing boats shows an average increase of about 65% over the number of registered fishing boats in 1998. In particular, the number of long line fishing boats and fishing boats with fixed gill nets aimed at higher economically valued fish, increased considerably, The motorization ratio in Kaporo is about 2/3, whereas all the fishing boats in Nongo have been motorized. According to the interview survey in Nongo region, half of owners own one boat whereas nine owners own multiple fishing boats. The number of fishermen in Kaporo ranges from 300 to 350 and in Nongo from 200 to 250. These fishing boats mostly accommodate three to four crewmembers.

Fishing boats employing encircling gill nets and fixed gill nets do not use ice, while long line fishing boats use ice for fishing. They utilize about 200 kg of ice for a two to three day trips in their operations.

Table 5-44 Number of Fishing Boats Operating in Kaporo and Nongo and the Number of Yearly Operating Days

	Encircling gill net	Fixed gill net	Long line	Visiting boats	Total
Kaporo	65	5	15	17	102
Nongo	40	10	10	8	68
Total	105	15	25	25	170
Number of fishing boats in 1998	76	8	4	?	88
Rate of increase	138.2%	187.5%	625.0%	?	164.7%
Yearly operating days	155 days	190 days	126 days	75 days	?

Note) In all cases, estimated numbers of yearly operating days are based on the statistical yearbook of the National Boussoura Center for Fisheries Science and interviews.

The number of fishing boats in 1998 is that of registered fishing boats.

Total number of fishing boats and the rate of increase in 1998 do not include visiting boats.

Kinds of targeted fish by operating features (fishing methods) indicate that while a variety of fish are caught by encircling gill nets, which mainly target bonga and bobo, long line fishing generally targets sea catfish and whiting although some fishermen target capitaine. Fishing with fixed gill nets also result in catches a variety of fish but mostly target bobo.

Table 5-45 Kinds of Targeted Fish in Kaporo and Nongo by Fishing Methods

	Kinds of targeted fish
Fishing with encircling gill net	Bonga, bobo, sea catfish, large-sized croaker, mullet, etc.
Fishing with fixed gill net	Bobo, sea catfish, large-sized whiting, etc.
Long line fishing	Sea catfish, bobo, large-sized croaker, etc.

Note) Based on interviews and fishery statistical yearbooks.

The high season is from October to February and although fish catches decline to almost half in the period from March to April, another high season returns in May and June. Then from July to September fish catches decline to half again.

An estimation of the number of operating days for each method of fishing is shown in the table below. However, according to the table, operations are conducted only once every other day except for fishing with fixed gill nets. It is, therefore, expected that the number of operating days will increase when the fishery base facilities in this region are operational.

Table 5-46 Yearly Operating Days in Kaporo and Nongo by Fishing Methods

(unit: day)

Monthly operating days	1	2	3	4	5	6	7	8	9	10	11	12	Total
Fishing with encircling gill net	18	18	15	15	10	10	5	5	5	18	18	18	155
Fishing with fixed gill net	20	20	18	18	15	15	8	8	8	20	20	20	190
Long line fishing	15	15	10	10	8	8	5	5	5	15	15	15	126

Note) In all cases, the number of yearly operating days is estimated based on interviews and fishery statistical data.

On bumper days fishermen may sail out to fish twice a day but such cases are not reflected in this table.

Judging from the contents of interview surveys and various statistical data, estimated fish catches in Kaporo and Nongo regions altogether exceed 2,500 tons a year. This figure is equivalent to 4% of the total fish catches of the Guinean artisanal fishery industry. In light of the actual results, it is considered highly desirable to develop the infrastructure base in this region to establish a stronghold for supply and distribution of fishery products for the eastern part of Conakry City as well as in neighboring cities.

Table 5-47 Yearly Fish Catches in Kaporo and Nongo by the Fishing Methods

(Unit: ton)

	Daily fish catch	Average monthly fish catch	Yearly fish catch	Daily fish catch/per boat	Average yearly fish catch/per boat
Fishing with encircling gill net	6.5 ~ 19.5	26.25 ~ 283.5	2,200.0	0.05 ~ 0.15	18.75
Fishing with fixed gill net	0.45 ~ 0.9	3.6 ~ 18.0	144.0	0.03 ~ 0.06	9.60
Long line fishing	0.875 ~ 1.75	4.375 ~ 26.25	189.9	0.035 ~ 0.07	7.60
Total	7.8 ~ 22.2	36.7 ~ 361.5	2,533.9	?	?

Note) In all cases, fish catches are estimated based on interviews and fishery statistical data.

(2) Fishery Distribution

Fresh fish are sold through direct negotiation between fishermen and brokers on the fish landing beaches where fish are landed. The total number of brokers that buy fresh fish in Kaporo and Nongo is considered to be more than 650 and they are mostly women – in particular, retailers are all women. Brokers include wives of fishing boat owners and sailors and although not a rule, such women are entitled first to buy the fish. Accordingly, female brokers whose husbands are engaged in other jobs generally have to buy fresh fish from women whose husbands are fishery operators. However, since commercial brokerage firms with foreign capital are engaged in the purchase of high valued fish for export in this region, fishermen choose to sell to such firms first because they offer better purchase prices. Fishing boat owners who borrow money at the time of poor catches or those who are provided with outboard motors or fishing equipment by these broker commercial firms grant the firms first purchase rights with even slightly less purchase prices as interest payments pending repayment⁴⁵.

At both fish landing beaches, in addition to commercial brokerage firms with foreign capital, brokers are coming from other areas of Conakry City and neighboring prefectures such as Koya and Kindia to operate although their exact number is not known. They are generally small-scale distributors and typically come by taxi or carryall with packing tools (plastic basins, etc.) and carry fish with ice and wrapped with a cloth or other material.

The brokers operating in this region include retailers and those engaged in the smoking of fish. Their ratio is said to be 1:2 though the actual situation is complex. Retailers sell landed fish in the market where they are bought and then smoke the remaining fish and sell them if not sold fresh. Also, many of those basically engaged in the smoking of fish also sell fresh fish. Accordingly, it is difficult to draw a line between retailers and those engaged in smoking of fish.

45 Relations between such borrowings (It is a general practice to borrow fuel fee for sailings.) and the pre-emptive right are customary practices seen between fishing boat owners and brokers.

When going to the city market, everyone brings ice that was frozen in plastic bags in his/her home freezer⁴⁶. But such ice is shaped like a cylinder and unless it is crushed into small pieces, it doesn't serve to effectively keep fish cool because the surface area of the ice is too small to cover fish. Some people use ice flakes bought from the Kenyan market but they are small in number. In either case, ice is not available for sale at the beaches. Accordingly, the body temperature of the fish rises while they are on sale, making it impossible to keep them fresh even though they are covered with a small amount of ice brought from outside⁴⁷.

(3) Smoking

There are about 1,300 bandas in Kaporo and Nongo and they are mostly metal drum type fuel ovens (drum type oven). There are a few banda-type smoke ovens but they are mostly traditional bandas and improved bandas are rarely found.⁴⁸ According to an interview survey, people engaged in the smoking of fish in Kaporo and Nongo total about 300 and the number of those engaged in the smoking of fish, which was made a parameter in the socioeconomic survey, may have included a number of people who are only occasionally engaged in the smoking of fish. At the same time, the number of high valued fish that is smoked is not known either. Therefore, a careful survey will have to be conducted to find out the number people actually engaged in fish smoking operations and the volume of smoked fish before this plan is implemented.

Smoked products are mostly retailed directly by those engaged in the smoking of fish or their families. Sales take place in markets in Conakry City, etc. Also, in some cases brokers come directly from neighboring prefectures such as Koya and Kindia and buy at the locations of smoking facilities. When selling to brokers from other prefectures, about 5,000 bongas have to be ready for sale. When transactions occur, brokers enwrap products in panniers (containers knitted with grasses) and deliver them back themselves.

Some of those engaged in large-scale smoking operations choose to sell smoked products in other prefectures on their own. In those cases, they may choose to sell in the neighboring towns of Koya and Kindia but the Guinea Forest Region has a higher demand. However, since they cannot prepare for this volume of demand alone, they cooperate with a few others engaged in smoking operations, and at a maximum of twice a year during the period from January to March, hire a 2 to 3 ton truck for sales in the Guinea Forest Region.

46 Ice made at home is called "glace domestique" (domestic ice) and is sold on both fish landing beaches. Comparing with flake ice available in the Kenyan market by weight, this ice is not necessarily cheaper but advantages are that it can be bought in small quantities and is comparatively hard to melt.

47 The most effective use of ice is to use ice and water together (put ice in a bucket or tub of water together with fish). It will be necessary to educate and instruct effective means for maintaining freshness of fish.

48 According to the estimate based on the socio-economic survey under the heading of < Socio-economic conditions/ fishery communities settlement >, there are $177 \times 446 \div 57 = 1,385$ implicit smoke ovens in Kaporo and Nongo. Of them, based on the similar calculation, improved bandas total 39 and traditional bandas total 133.

5-5-5 Existing Bases

Although there is a concrete seawall (about MSL +1.4 m high) at some places between the Kaporo fish landing beach and the river, it is not suitable for use as a docking pier because the tide rarely reaches the quay. The seawall is not tall enough so it overflows at high tide. The side of the beach facing the ocean forms a natural ramp, about 20 meters in width and 25 meters in depth, and it is used for simple repairs of fishing boats.

On land, there are facilities scattered around including a landing office with an outboard motor repair shop, a kiosk mostly used for repairing fishing nets (a shack with only a roof and pillars, no walls), an almost abandoned small smoking depot, a fishermen's café, and a small lodging house for international refugees; however, there is no warehouse facility to store fishing equipment. The existing kiosk for repairing fishing nets is quite small, about 7 meters by 14 meters, and a number of fishermen use the fish landing beach under the scorching sun or the tops of boats during low tide for repair work.

This landing beach is also used as a market to sell fresh fish. Fresh fish just landed here are sold on a gentle slope of the beach, using a cloth spread out on the ground or trays and basins made of metal or plastic. To avoid direct sunlight, many fishermen use the space around the kiosk for repairing fishing nets.

At Nongo, fishery activities are carried out on a stone-covered shore protection area outside of fences surrounding an upscale residential area. This operating area is about 120 meters long, parallel to the river at the back of buildings along a national road. There is a flat area about 10 meters deep running about 50 meters on the national road side that is occupied by four kiosks, primarily selling daily commodities, and by two small houses about 2.5 meters by 6 meters in size (used by fishermen as a place to gather and as a place to eat, and for the repair of fishing nets). The remaining 70 of 120 meters is a sloping seawall and there are no flat sections. Off shore preparation activities such as departure preparation, landing, and repairing fishing nets are performed on this sloped seawall. Flat parts are used for retail of fresh caught fish. Retail here is similar to Kaporo; carried out using a cloth spread out on the ground and using basins and trays.

There are no facilities for smoking fish at either of the fish landing beaches. There is a shared smoking facility on the mountain side of the landfill along the national road for fish smokers from Nongo but it is not adequate and most of the fish smokers work at home to produce smoked goods.

The current Kaporo fish landing beach is located about 150 meters toward the ocean side from the national road, and including the road shoulder, this national road has adequate width and is well maintained. Furthermore, there are plans to expand the width of the road to 40 meters and to reconstruct the bridge, and although these activities were originally planned for implementation between 1995 and 2000 there is not yet a move to implement these plans.

There is a private restaurant on the access road but the width of the road is only about 4 meters there and the road condition is not good. For a new fish landing facility, an adequate access road is essential so relocation of this restaurant is a prerequisite for the plan. Within

the fish landing beach, there is also a cafeteria for fishermen and a small housing facility for refugees from out of the country, and relocation of these facilities is necessary as well.

In the northern part of the Conakry peninsula, which Kaporo and Nongo belong to, there are many well-planned residential areas in a relatively good environment. However, except for the area along the ocean developed for vacation houses, the ocean side of Kaporo and areas along the national road in Nongo have naturally developed into a dense residential area, and many fishermen dwell in these areas. In these dense urban districts, possibly due to rapid urbanization, minor roads in residential areas are not well maintained, many houses lack adequate access in urban areas surrounded by naturally formed community roads, and the districts have no local infrastructures such as drainage facilities, parks and plazas. Although city services such as drinking water supply and electricity are provided to most of the residences, there are still many people who use community hydrants in the district, hurricane lamps (pressurized kerosene lamp) and candles. Because an adequate sewage system is lacking and residences are often too small to contain a bathroom, many people are seen relieving themselves in the river flood plain or at the beach. The needs for elementary and secondary education facilities has been fulfilled by expanding the school district to Kaporo and Nongo areas, and there are small mosques built by the Atsushi family, but local infrastructure such as commune meeting places and health care facilities are lacking.

5-5-6 Issues in the Districts

A summary of issues in the districts is compiled by organizing the results of research and analysis conducted by specialists in each field of this Survey, workshops, and the results of the ocean topographic survey.

a. Issues Related to Fisheries

- Fishing boats cannot reach alongside the pier because of a large difference between high and low tides and shallow water at the mouth of the river, causing high workload during sailing preparations and landings.
- Neither fish landing beach is large enough to satisfy needs for places to land fish, trade, and to repair fishing nets.
- There is a repair shop for outboard motors in Kaporo. Although it is adequate in size, the shop does not function well because of inadequate layout and lack of repair materials.
- There is a ramp for docking boats in Kaporo, but there are no facilities for boat repairs. Only minor work such as waterproofing can be performed on the ramp.
- Both fish landing beaches are small and crowded with people doing various work, and there is no area to build facilities for fishermen to store their fishing equipment.
- In terms of maritime safety, almost no fishing vessel in the area is equipped with a radio or GPS, making it impossible to communicate with the mainland in emergency situations. Possible emergencies include injuries during sailing operation, fishing boat accidents, and discovery of illegally operating fishing boats, etc.

b. Preservation of Fresh Caught Fish

- When a boat returns to the port late or after a night operation, requiring temporary storage of fish, there is no adequate place on the beach for temporary storage. As supply rarely exceeds demand on this beach, price collapse of fresh fish does not occur often. However, it is important to work out means of quality preservation by storing in refrigerators, etc.
- The beach has almost no place to smoke fish, which is one technique for the preservation of landed fish. The smoking process is performed near home because of this but large-scale smoking facilities cannot be built in the dense residential areas where the people engaged in smoking activities live.

c. Distribution of Fresh and Processed Fish

- In order to distribute landed fresh fish and locally produced smoked goods to other areas, it is essential to ensure car access between the fish landing beach and the smoking facilities, and well-paved roads such as a national road, but neither beaches have access roads that are well maintained.
- This also affects the sale of fresh fish at the beach because the small size of the beach makes it difficult to ensure enough space to open fish stores. Besides, even if stores can be opened it will be difficult to maintain freshness of the fish for a long period because of intense heat from the sun.

d. Fish Landing Site Management Facilities

- A port manager is assigned and works actively at both fish landing beaches, but there is no special office or a space for meeting and assembly. (In Kaporó, workshop assembly was held using a tent outside the outboard motor repair shop and the cafeteria building.)

e. Conveniences at the Fish Landing Beach

- There is no welfare provision at either fish landing beach. There are vendors selling cold drinks and snacks at the beaches (there is a cafeteria in Kaporó and a kiosk in Nongo), but there are no needed facilities such as restrooms, showers, snack bar, place of worship, emergency room, and childcare center.

f. Development of Local Infrastructure in Residential Areas

- Development of local infrastructure is not adequate in the residential areas where fishermen live. Even though the community should subsidize provision for the safe and healthy daily lives of residents, hardly any local infrastructure has been publicly developed. Insufficient infrastructures include minor roads, storm water drainage ditches, electricity, drinking water, wells, public restrooms, septic systems, garbage cans (also garbage collection system), fire prevention equipment such as water tanks, playgrounds for children, parks, green spaces, commune meeting places, place of worship, child care centers, emergency rooms, and administrative facilities.

5-5-7 Objectives of the Project

The fish landing sites in Kaporo and Nongo shall be integrated and serve as a base for distribution of marine resource supply to the eastern part of Conakry city and to neighboring cities. At the same time, objectives of this project include development of local infrastructures in backland dense urban areas where many people involved in the fishery industry reside.

5-5-8 Basic Policy

Basic policy of this project is as follows.

- a. The fish landing sites in Kaporo and Nongo will be integrated and the flood plain on the Kaporo side will be reclaimed to develop a new fish landing site. For fishery related facilities, from the viewpoint of cost effectiveness and ease of maintenance and management, there will be no redevelopment of port facilities that would dramatically increase fishing opportunities, and instead, the objectives focus on increasing efficiency for daily maintenance and management of fishing vessels and equipment and reducing workload during departure and arrival into the port.
- b. Distribution of freshly caught fish at both fish landing beaches occurred naturally. Organize this and develop facilities to increase distribution of freshly caught fish, recognizing that this is an urban fish landing site with a market with a strong preference for fresh fish.
- c. In both districts, major smoking activities are performed in the back of dense urban area of the fish landing beaches. Develop facilities to make the smoking process safe and efficient.
- d. The plan includes development of facilities to supply ice for maintaining freshness while waiting for the tide and promoting high valued bottom fish fisheries, and refrigeration equipment for temporary storage in the case of large catches.
- e. The development plan shall be based on the increasing numbers of known registered fishing vessels and visiting fishing vessels, improvement to the operating environment realized through the new fish landing site facilities, and in increasing demand in the backland market.
- f. The reclamation site has soft riverbed soil so the land facilities shall be built limited to one-story, to minimize impact to the foundation ground.
- g. Improve the capability of the existing union so that the users themselves will undertake management operation and maintenance of the new fish landing facility.
- h. Improve overall employment conditions including benefits for staff as well as improvement in the functioning of fisheries, the marine resources distribution industry, and the marine product processing industry.

- i. At the same time, with direct contribution of the development of facilities at the new fish landing site, to improve living conditions in backland dense urban areas, provide part of the current fish landing beach to encourage development of social welfare facilities lacking in the backland.
- j. The plan includes improvement of essential access to the national road.
- k. The plan shall assume removal or relocation of the restaurant adjacent to the current Kaporo fish landing site and the other existing facilities around the current fish landing beach.
- l. The facilities shall be developed to facilitate handling of high tides and flooding during the rainy season. (In terms of the height of the foundation on the premises)
- m. Development of facilities and equipment in this project should give adequate consideration to the backland urban areas and the surrounding environment, including plant life.
- n. When dredging bottom soil in the river around sloped piers or quays, engage in operations only during low tide, as much as the fisherman are capable of removing, and only as much as is necessary.
- o. For development of facilities, needs should be discussed in detail, and plans should be made to the extent that they can be maintained and managed in the future with adequate consideration for cost effectiveness.
- p. Considering the scale of construction, this plan assumes implementation during two separate terms. The plan consists of port and harbor civil engineering development during the first term, and land facilities development during the second term. During construction, make arrangements for temporary operations at suitable places at the Nongo side on the opposite shore and the flood plain on the Kaporo River.

5-5-9 Details of the Project

- a. **Development of Fishery Related Facilities**
Development includes channel marker lights, sloped pier, alongside mooring pier, ramp, ship landing location, fishing equipment storage, outboard motor repair shop, fishing boat repair shop (partly roofed), fishing equipment and net repair shop (partly roofed).
- b. **Development of Facilities for Disposal of Goods and Distribution**
Development includes fresh fish disposal area, fresh fish retail market, and related products retail market.
- c. **Development of Marine Product Processing Facilities**
Development includes smoking house using improved Banda and warehouses.

d. Development of Fishery Support Facilities

Development includes access roads, parking areas, pavement within the premises, rainwater drainage system, gas stations, lights on the premises, water supply system, wastewater treatment system, ice making machines, freezers, and refrigerators.

e. Development of Social Infrastructure at Fish Landing Facility

Development includes place of worship, childcare centers, emergency rooms, restrooms and shower facilities, sewage treatment system, and garbage disposal facilities.

f. Development of Fish Landing Management Facilities

Development includes fish landing management office, offices for a fisheries association and other unions, safety guardhouse, security facilities (Gendarmerie guard station), and exterior surrounding facilities (ex. fences).

g. Development of Local Infrastructures in the Backland Fishermen Residential Areas

Suggested development includes a public square, green space, children's playground, community assembly hall, drinking fountains, public restrooms, public sewage treatment system, and garbage disposal system.

For more details, refer to Figures 5-17 and 5-18 and Table 5-51.

5-5-10 Maintenance and Management Plan

The Kaporo Fish Landing Development Committee (CDD), which should become a parent organization of the management committee, is currently functioning relatively well. Since its establishment in 1998, the committee has been actively involved in maintenance and management of the fish landing station and coordination among users. Collection of capital from the users themselves, to perform construction of the port office and management of the fish landing station, is worthy of special mention. Because the development of a new fish landing site is based on the plan to combine the two existing adjacent fish landing sites in Kaporo and Nongo, it is necessary to establish a new union and a committee for fish landing development by including users from both Kaporo and Nongo. Establishment of an operating system for the planned facilities according to the new organizations shall follow, and further improvement of the organizations and deeper understanding among the users shall be realized through educational campaigns and training. Fortunately, the Kaporo fish landing site is located in the capital city of Conakry, there is available a considerable number of personnel with experience and knowledge related to business operations such as organization management and accounting. Refer to Table 5-52 for staff arrangement of the management organizations and budget planning.

The Guinea government needs to establish a management committee and initiate training programs at least one year before the start of construction of the facilities. For management of the ice making machine and refrigerators, it is preferable to entrust a private company as in the Kamsar. Technical review related to maintenance shall be conducted in advance and bidding shall be made with qualifying businesses to select a management company.

5-5-11 Budget Allocation Summary

Construction expenses for the coastal fishery base development in the Kaporo district (including fisheries in Nongo) is as follows (Refer to Table 5-53 for details):

First term construction	: Mainly civil engineering work for construction of the fish landing site.	1,475,250US\$
Second term construction	: Mainly by construction work for the land facilities.	2,485,665US\$
Total construction cost	:	3,960,915US\$

In addition, construction expense shown below for local infrastructure development in the districts is included.

Second term construction	: Mainly construction work for land facilities.	269,353US\$
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5-5-12 Environmental Impact Assessment

Since landfill operation of riverbeds is likely to affect marine resources and mangroves due to sediment discharge to the sea area, measures shall be taken against sediment discharge. Also, as digging of raw ore heaps and earth and sand quarry for landfill materials are likely to cause mudslides following the abruption of surface soil, measures shall be taken against erosion. Changes in landform caused by landfill operations affect flow conditions, ocean waves and drift sand. But since the sea around this Project Site area includes shoals, it is determined that flow conditions and ocean waves will not be considerably affected. Sand deposits in shipping lanes caused by drifting earth and sand shall be monitored and necessary measures shall be taken. Dredging of the riverbed around inclining bridges and piers shall be limited to only when it is possible for fishermen to remove sediments by themselves, at low tide, and kept to a minimum, so that outflow of dredged earth and sand will only minimally affect the marine environment. Shore protection shall be designed with consideration for the preservation of mangroves. Baobabs will not be cut down because local people have special attachment to them. With respect to removal and transfer of a restaurant and removal of about five illegal households, alternate land and sufficient compensation shall be provided. As for the expected increase of litter and discarded insulation caused by expanded distribution of ice storage materials, measures shall be taken against waste materials and water pollution. In view of these points, environmental impact assessment was conducted as shown in the following table.

Table 5-48 Result of Environmental Impact Assessment of the Project Planning

Project planning	Component	Degree of environmental impact*	Reason	Environmental protection measures
Base facilities development plan for coastal fishery and living in Kaporo and Nongo	Riverbed landfill operations	B	Impact on marine resources and mangroves	Employment of construction method to prevent outflow of earth and sand
	Digging of raw ore and quarry for landfill operations	A	Mudslides by the abruptness of surface soil	Measures against outflow of earth and sand
	Change in coastal landform by shore protection	B	Impact on discharge-duration, ocean waves, drift sand and mangroves	Monitoring of and measures against sand deposits in shipping lanes, and preservation of mangroves
	Dredging	C	Removal of sediments by fishermen	
	Removal of restaurant and domiciles	B	Land for fish landing facilities	Provision of alternate lands and sufficient compensation
	Expansion of icing storage distribution	B	Increase in waste and water pollution	Formulation of appropriate plans for waste disposal and water pollution

5-5-13 Economic and Financial Analysis

(1) Financial Assessment (Development of fish landing sites)

By implementing this project, annual income of 235.41 million FG is projected -- centered on sales income of ice (Table 5-54). In terms of expenditure, it is projected the facility cost for the first year is 7 billion 921.83 million FG, working expense is 219.4 million FG every year and renewal cost of icing and freezing equipment is 1 billion 94 million FG every 10 years (Table 5-55). Based on these conditions we tried to calculate an internal financial rate of return for 30 years but calculation was not possible. Therefore, financial benefits are not expected in this project. However, as it is clearly shown, annual income exceeds expenditure and therefore, the project is financially manageable under the following conditions if facility investment is covered by outside funds such as aid or Government funds.

- Replacement of refrigerators with ice makers every 10 years is not possible (limited to 13% of required funds)
- Increase in working expense by 9% or more will likely impede management.
- Decrease in income by 7% or more will likely impede management.

(2) Economic Assessment (Development of fish landing sites)

1) Economic Benefits

Benefits consist of increase in fish catch volume, and subsequent increases in manufacturing of smoked products and reduction of gasoline consumption volume. Opportunity cost is set as 0 because of the following reasons.

Fishermen

- Fishermen determine whether to sail out fishing based on conditions of weather and ocean, hence it is difficult for them to plan other economic activities before hand. Therefore, it is assumed that loss of other economic activities due to 10% increase of fishing days would be very small.
- On days when fishermen do not sail out fishing, they are engaged in maintenance of fishnets, etc. so they cannot undertake other economic activities.

Fish smokers

- Since the major part of fish smokers work is heat control, 10-20% increase of handling volume would not make working hours increase drastically.
- Most of the cases, smoking houses are close to fish smokers' homes so that they can manage to do other work at the same time.

Other assumptions

- All fish for domestic consumption such as bonga, bonga-seri, catfish, etc. would be smoked.
- Because of ice supply, encircling gill net fishing boats for bobo and catfish (50% of the whole number of encircling gill net fishing boats) would shift to 2-day operation, and half of fixed gill net fishing boats would shift to 4-day operation.

Individual economic benefit is calculated as follows. Estimated change in the catch volume caused by development of the new fish landing site is summarized in Table 5-49. The estimates are based on the following conditions.

Table 5-49 Predicted Change in Fish Catch by Development of Fish Landing Sites

	Current fish catch	Increase in fish catch by implementation of the project			
		Increase in fish catch by increase in sailing frequency	Increase in fish catch by increase in fish sailing hours	Increase in fish catch by ice supply	Total
Bonga• Bonga-seri	1,100	0	110	0	110
Fish for domestic consumption such as catfish	616	0	2	154	156
Fish for export	818	0	5	204	209
Total	2,534	0	117	358	475

Increase in fish catches due to increased frequency of sailing

The number of annual operation days will not change.

Increase in fish catches per one sailing due to increased sailing hours

Accessible hours to the port around high tide is increased from 16 to 20 hours a day (a 25% increase) will create more freedom for fishing operating hours. Therefore, it is assumed that encircling gill net fishing boats for bonga (50% of the whole encircling gill net fishing boats) and half of fixed gill net fishing boats would have 10% increase of fish catches.

Increase in fish catches due to ice supply

Due to the ice supply, encircling gill net fishing boats for bobo and catfish (50% of the whole number of encircling gill net fishing boats) would shift to 2-day operation from 1-day operation, and the whole landing volume would be increased 12.5%. (50% of the fishing boats would increase their catches 25%.) Half of fixed gill net fishing boats would shift to 4-day operation form 1-day operation also because of ice supply, and the whole landing volume would increases 25%. (4-day operation will increase 50% per boat per 1 operation and half of the fishing boats will shift to this 4-day operation.) For long line fishing boats, it is assumed that the annual sailing days would increase 25%, from 126 days to 158 days, so that the landing volume would also increase 25%.

The economic benefit calculated based on the assumptions above is 750.84 million FG per year (Refer to Table 5-56, 57, 58 and 59 at the end of this chapter for individual calculation of economic benefit). The breakdown is as follows:

- Economic benefit from the increase in volume of fish catch per operation due to increased sailing hours: 62.5 million FG per year

This amount is calculated by deducting the distribution cost based on the economic price from the total economic benefit figure calculated by multiplying the increased amount of fish catch by the market rate (FOB rate for export fish).

- Economic benefit from the increase in volume of fish catch due to sailing ice supply: 543.89 million FG per year

This amount is calculated by deducting the fishery operation cost (including fuel, labor, and depreciation calculated at the economic price) and the distribution cost calculated at the economic price from the total economic benefit figure calculated by multiplying the increased amount of fish catch by the market rate (FOB rate for export fish).

- Economic benefit from the increased amount of smoked products: 77.5 million FG per year

This amount is calculated by deducting the smoking operation cost (including labor and firewood cost calculated at the economic price) and the distribution cost calculated at the economic price from the total economic benefit figure calculated by multiplying the increased production of smoked goods due to the increased fish catch by the market rate of smoked products.

- Economic benefit from the reduction of gasoline consumption volume: 66.95 million FG per year

Half of 105 encircling gill net fishing boats, that is 53 boats, will operate encircling gill net fishing targeting bobo and catfish. Assuming that the gasoline consumption volume of a boat is 20 liters per day and a boat operates 155 days annually, a boat is consuming 3,100 liters of gasoline in a year. Ice supply will enable operation to be shifted to every 2 days, and because of this, gasoline consumption volume of a boat would be 3/5, reduced to 1,860 liters/year. It results in 1,240 liters reduction per boat per year.

Among the 15 fixed gill net fishing boats, 4 boats in Nongo have already been practicing 4-day operation. 2 of 5 boats in Kaporo will shift to 4-day operation from 1-day operation. Assuming that the current gasoline consumption volume per fishing boat is 20 liters per day and its total operation days in a year is 190, the total annual gasoline consumption volume is 3,800 liters per boat. If this boat would shift to 4-day operation due to ice supply, its gasoline consumption volume would be 1/2, reduced to 1,900 liters per year. 93FG per liter from economic price is used for gasoline price.

2) Calculated Assessment index

Internal economic rate of this project is 5.2% (Table 5-61).

3) Method and Result of Sensitivity Analysis

Sensitivity analysis was conducted for construction cost and management cost in case they are increased 10%, 20% and 30%. Results are as follows:

Table 5-50 Sensitivity Analysis

Increase in construction cost by 10%	4.4%	Increase in management cost by 10%	4.9%
20%	3.7%	20%	4.6%
30%	3.1%	30%	4.3%

(4) Economic Assessment (Development of social infrastructure)

Social infrastructure development to be proposed under this project and its economic benefits are as follows:

Joint water supply

- Time spent for drawing water is saved by increased waterworks for drinking water.

Restroom • shower • sewage

- Improvement of hygiene of fresh fish for sale and the accompanying increased opportunities for export
- Decrease in human mortality rate (especially in infant mortality rate)
- Medical cost cut due to reduced morbidity
- Reduction in non-business days due to diseases (increased labor hours for both sick people and family members that nurse them)
- Improved amenity of living environment due to removal of human excrement from living environment

Clinic

- Decrease in human mortality rate (especially in infant mortality rate)
- Reduction in non-business days by prevention of deteriorating illness or wounds (increased labor hours for both sick people and family members that nurse them)

Nursery center

- Increased labor hours for women
- Reduction of injuries and accidents of infants

Meeting place

- Necessary for meetings of local communities and for deepening relations among local residents and for their education and training. However, despite its high social value, direct economic benefits are not clear.

Smoking locations

- Improvement in smoke processing capacity will decrease the number of fish that go rotten without being processed during especially good catches.

- Improvement in smoke processing capacity will prevent fish prices from deteriorating during especially good catches.
- Preservation of residents' assets by decreasing fire disasters
- Fuel fee will be saved by using cost-efficient smoking ovens
- Enhanced environmental preservation by decreasing use of wood fuel

5-5-14 Proposal for Project Implementation

Since the Project economic internal rate of return (EIRR) is indicated to positive, it can be inferred that the Project will have a positive economic impact. However, because initial investment for facility development is large, its financial internal rate of return (FIRR) would not be positive. Considering the fact that the facility is not intended to be on a profit-making character but rather to have the character of a public utility, it is desirable to implement the Project with grant aid. Because there was time and manpower restrictions during the F/S, sufficient information to immediately enable a shift to the technical study has not yet been gathered. For the smooth implementation for the technical study, it is considered that the tasks shown below should be finished before the study. Also, study items that should be implemented specifically at the time of the technical study are noted below.

Tasks that should be implemented before the technical study	Tasks that should be specifically implemented at the time of the technical study
<ul style="list-style-type: none"> • Relocation and dismantling of the existing facilities (fishing port office, workshop, tea room, fishing net repair house, smoking facilities, etc.) • Relocation and dismantling of the existing private restaurants • Confirmation of the drainage conditions of backland cities during rainy seasons • Measurement of tide level • Confirmation of water level rise at times of rains • Fact-finding of fishing boat operation during rainy seasons • Status survey of fishing boats coming to the port from neighboring prefectures • Capacity reinforcement of Comité de Développement de Débarcadère (CDD) • Reconfirmation of land use permission for the Plan 	<ul style="list-style-type: none"> • Boring sample exploration • Evaluation of current sanitation conditions in the area • Understanding of current conditions of medical and health facilities in peripheral areas • Census • Fact-finding of fresh fish and smoked fish circulation • Fact-finding of smoking business in areas backland cities

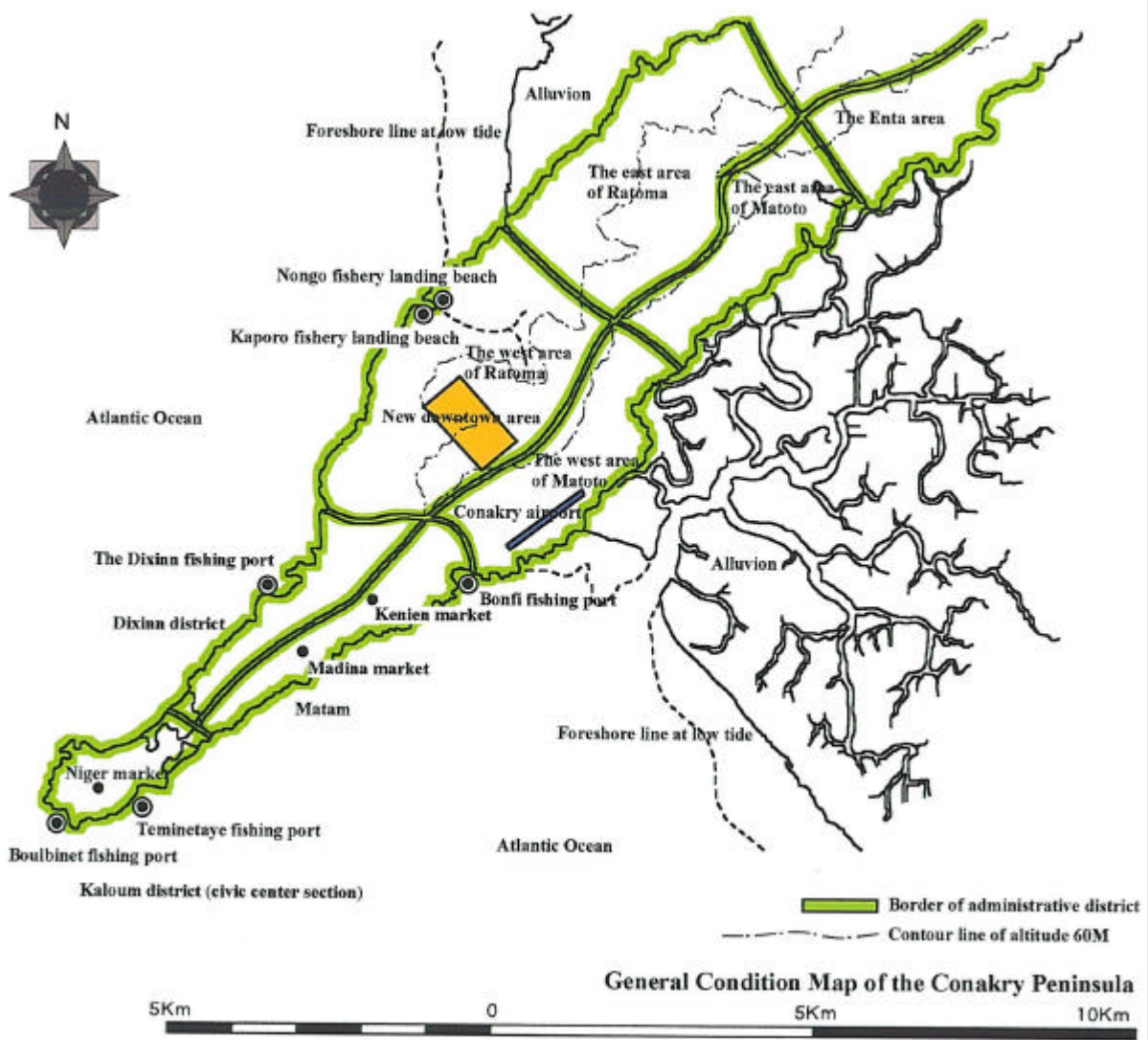


Figure 5-15 General Condition Map of the Conakry Peninsula

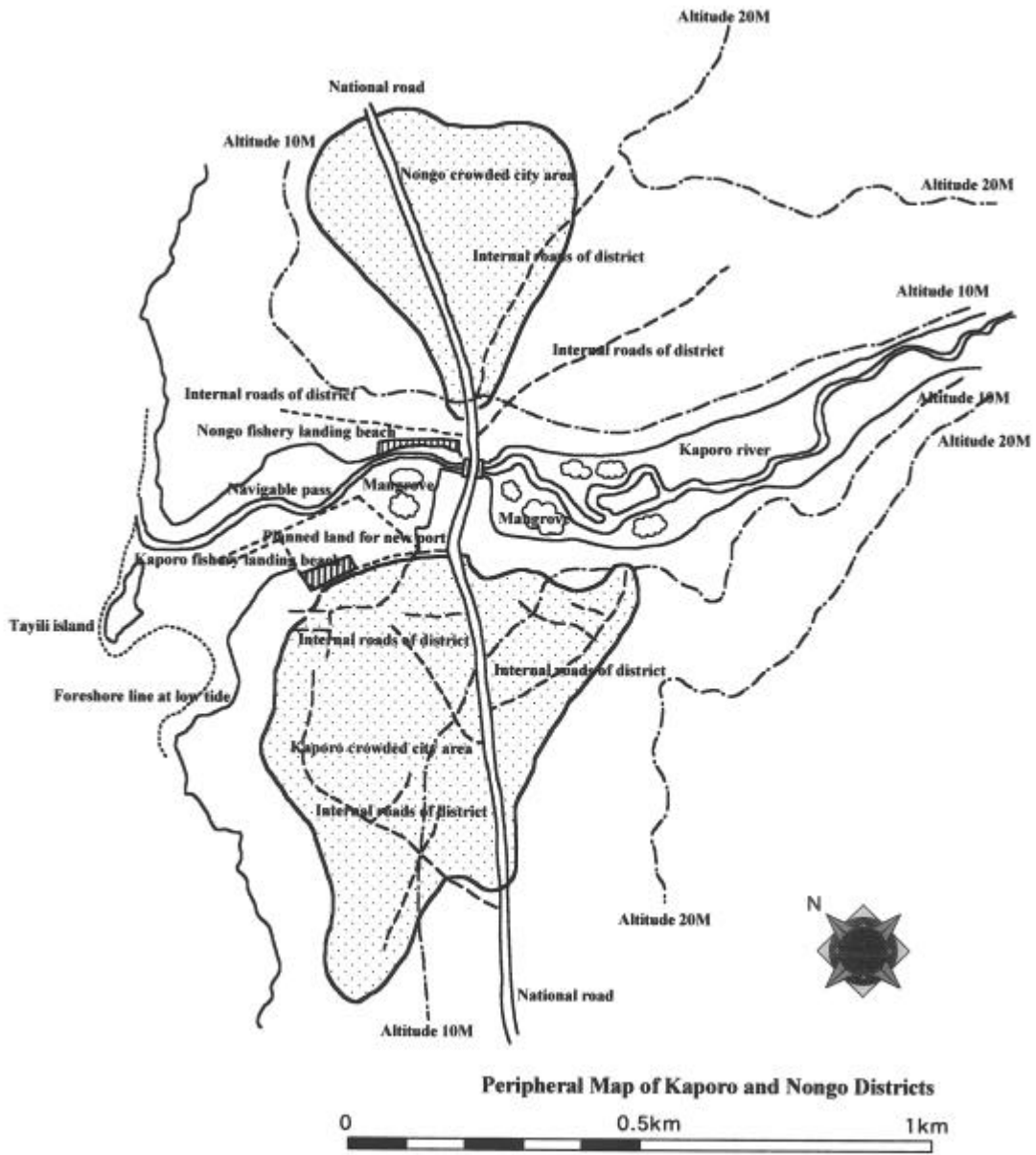


Figure 5-16 Peripheral Map of Kaporo and Nongo Districts

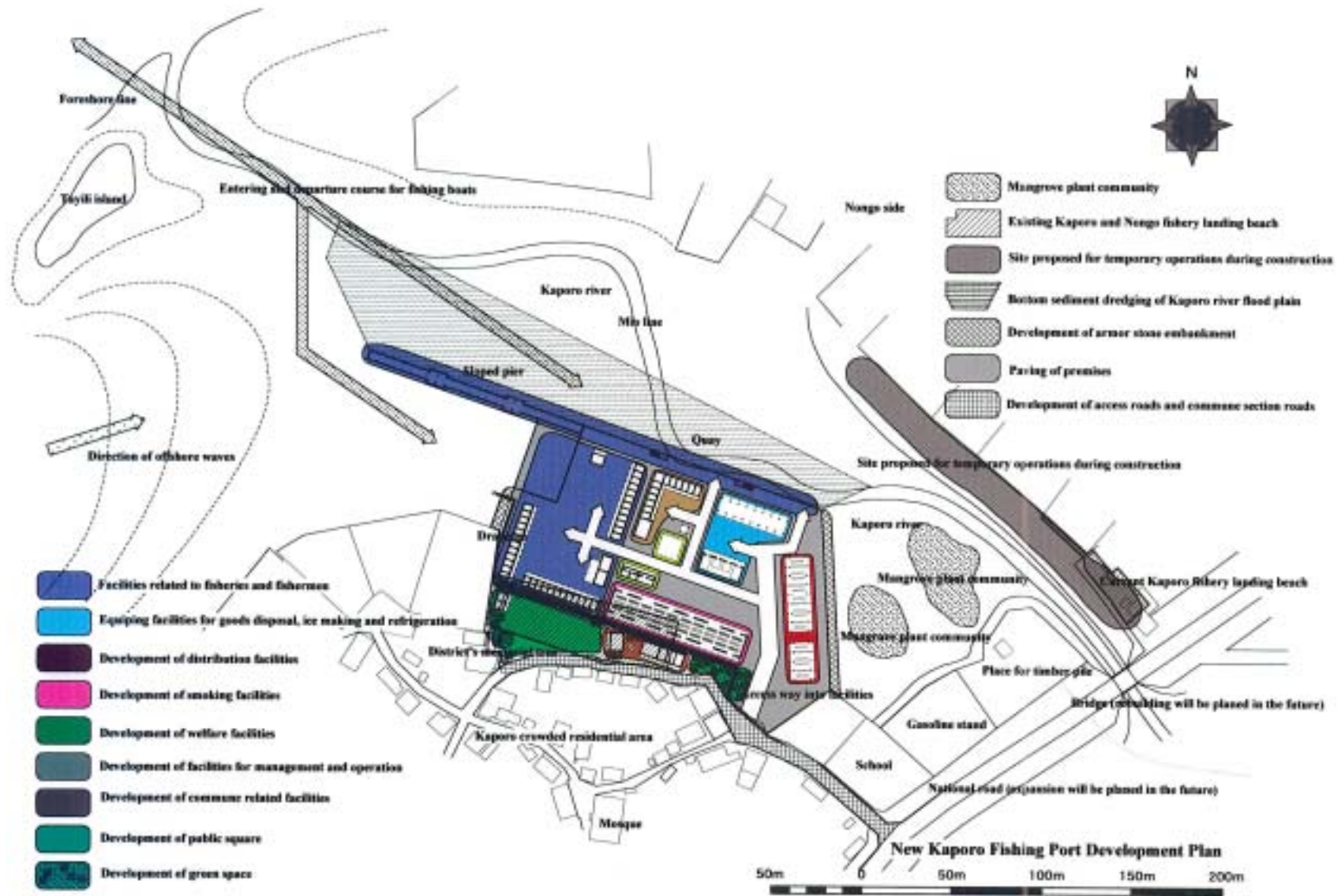


Figure 5-17 Drawing of Kaporo Fish Landing Facilities

Table 5-51 List of Planned Facilities Scales

1st Construction Term: Construction of Fishing Port Facilities

Construction of Fishing Port Facilities				
Sloped pier	stake type	100	m	Assume depth 11m and width 5m. Turning point is located in the middle.
	gravity type	25	m	
Upright embankment	gravity type	135	m	
Embankment + armor stone	slope	145	m	
Slipway		1,000	m ²	25m×40m
Dredging		4,650	m ³	sand, silt
Banking		27,000	m ³	piste
Pavement of apron		1,350	m ²	concrete
Equipment				
Winch (hand operation)				

2nd Construction Term: Construction of Land Facilities

Construction of Land Facilities		Floor space		
Management office		343	m ²	
	corridor	83	m ²	open-air, roofed space
Fishing equipment storage		700	m ²	
Fishing net repair place		583	m ²	open-air, roofed space
Outboard motor & fishing boat repair place		101	m ²	
Outdoor repair place		68	m ²	open-air, roofed space
Gas station		39	m ²	
	corridor	15	m ²	open-air, roofed space
Goods disposal place		276	m ²	
	corridor	161	m ²	open-air, roofed space
Ice making, ice storage & refrigeration		216	m ²	
	corridor	65	m ²	open-air, roofed space
Fresh fish retail market building		367	m ²	
	corridor	171	m ²	open-air, roofed space
Related retail market building		184	m ²	
	corridor	86	m ²	open-air, roofed space
Smoking house		936	m ²	
	corridor	421	m ²	open-air, roofed space
Restroom & shower room		104	m ²	
	corridor	40	m ²	open-air, roofed space
Prayer space		144	m ²	
	corridor	25	m ²	open-air, roofed space
Total floor space of land facilities		4,022	m ²	except for the corridor sections
Construction Related to Incidental Facilities				
Elevated tank & tower		1	set	water receiver tank (30m ³), including water supply piping on site
Septic tank (local spec)		1	set	use 2 in turn
Electric leading-in, piping and wiring on site		1	set	120KVA
Rainwater drainage		1	set	width & depth are both 1m
Exterior Construction				
Development of access road		800	m ²	asphalt pavement
Planting		1	set	
Pavement within premises		13,138	m ²	asphalt pavement, including pavement of reserved land for commune
Exterior lighting		1	set	
Equipment				
Ice machine / ice storage box		2	set	6t x 2
Refrigerator		1	set	10t
Electric generator for emergency		1	set	90KVA
Incinerator		1	set	20kg/h, with burner
Equipment for goods disposal place		1	set	
Equipment for repair place		1	set	

Commune Related Construction

Civil Engineering Works				
Banking		2,880	m ³	
Ground leveling		2,773	m ³	piste
Planting		220	m ²	
Front road development		1,200	m ²	asphalt pavement
Rainwater drainage		25	m	reinforced concrete
Exterior lighting		2,773	m	
Construction of Building Facilities		floor space		
Assembly hall		104	m ²	
	corridor	30	m ²	
Clinic		60	m ²	
	corridor	18	m ²	
Child care center		69	m ²	
	corridor	20	m ²	
Community water station		7	m ²	
Restroom and shower		52	m ²	
	corridor	20	m ²	
Total floor space of building facilities		292	m ²	except for the corridor sections
Septic tank (local spec)				use 2 in turn

Table 5-52 Prediction of Revenue & Expenditure (Part 1)

		Unit	Time	Day or time	multiplying factor	Total	Unit	Unit price	Amount (year)	
Revenue										
1	Fishing port facilities rental charge	212		180		38,160	boat, day	0	0	Raise profit in goods disposal place.
2	Fishing boat fuel station rent	212	0.05	180		1,908	kltr.	50,000	95,400,000	
3	Fishing equipment storage rental	212		330		69,960	boat, day	100	6,996,000	Circumstances are different from Boulbine.: aggregation system
4	Boat landing facilities rental	212		1		212	boat, day	200	42,400	for cases of self-repairs of fishing boats
5	Tool rental charge	212		1		212	boat, day	3,000	636,000	for cases of self-repairs of fishing boats
6	Fishing boat repair charge	212		2		424	boat	18,000	7,632,000	except for material cost
7	Outboard engine repair charge	212		3		636	number	12,000	7,632,000	except for material cost
8	Goods disposal facilities rental					3,326	ton (fish)	2,500	8,314,845	ton (fish), average of schooling fish and bottom fish
9	Sales of ice	10		180		1,800	ton (ice)	80,000	144,000,000	ton (ice)
10	Refrigerator rental	8.9		330		2,937	ton (fish)	7,000	20,559,000	ton (fish), average of schooling fish and bottom fish
11	Fresh fish retail facilities rental	192		180		34,560	No. of times	100	3,456,000	48 blocks, 4 turns
12	Related retail facilities rental	24		300		7,200	No. of times, day	150	1,080,000	
13	Smoking facilities rental	160		330	0.6	52,800	banda, day	500	26,400,000	It uses electricity and water supply
14	Common restroom rental	371		330			No. of times	50	6,121,500	
15	Common shower rental	288		330			No. of times	100	9,504,000	
	Grand total of annual revenue								337,773,745	
Expenditure										
1	Labor cost								24,960,000	
2	Fuel cost									
	Fuel for generator (diesel)	15	4	330		19.8	kltr.	1,100,000	21,780,000	regular price
	Fuel for incinerator (kerosene)	5	8	330		13.2	kltr.	1,100,000	14,520,000	regular price
3	Electricity charges									
	Management office lighting	1.5	10	330	0.7	3,465	kwh			
	Storage pump	3	24	330	0.6	14,256	kwh			
	Refueling facilities	0.5	20	330	0.6	1,980	kwh			
	Fishing equipment storage lighting	1	6	330	0.7	1,386	kwh			
	Fishing boat repair place	5	10	330	0.6	9,900	kwh			
	Outboard engine repair place	20	10	330	0.6	39,600	kwh			
	Goods disposal facilities lighting, etc.	10	6	330	0.7	13,860	kwh			Including electricity for washer
	Ice making & ice storage facilities	45	20	330		297,000	kwh			
	Refrigeration facilities	35	20	330	0.4	92,400	kwh		23,100,000	
	Retail market lighting	1	3	330	0.7	693	kwh		173,250	
	Smoking facilities lighting	1	12	330	0.7	2,772	kwh		693,000	
	Common restroom & shower buildings	0.5	20	330	0.7	2,310	kwh			
	Lights in premises	3.5	6	330	0.7	4,851	kwh			
	Total					484,473	kwh	250	121,118,250	
4	Water rate	30		330		9,900	m ³	1,000	9,900,000	
5	Maintenance and management cost									
	Office supplies								1,200,000	
	Ice making & refrigeration facilities equipment								5,000,000	
	Consumables in premises								1,500,000	
	Facility repair cost								5,000,000	
	Insurance premium								2,000,000	
	Grand total of annual expenditure								206,978,250	

Table 5-52 Prediction of Revenue & Expenditure (Part 2)

			Number of person		Unit price	Amount (month)	
1	Management and operation office						
	Fishing port office						
	(1)	Port manager	1		Dispatched f/ Ministry of Fishery		
	(2)	Secretary	1		120,000	120,000	
	(3)	Accounting	2		130,000	260,000	
	(4)	Statistics	1		Dispatched f/ Ministry of Fishery		Collection of rental for goods disposal place, and preparation of fish landing and distribution statistics
	(5)	Maintenance and management of fishing port facilities	2	average	100,000	200,000	Collection of rentals for harbor, fishing equipment storage, retail market and smoking building facilities
	(6)	Maintenance and management of water supply and drainage facilities and equipment	2	average	100,000	200,000	Collection of restroom and shower rental, and maintenance and management of water-supply facilities and equipment
	(7)	Cleaning, waste treatment, and maintenance and management of incinerator	2		80,000	160,000	
		Total	10			940,000	
	Union offices						
	(1)	Union manager	1		Dispatched f/ union		
	(2)	Secretary general	1		Dispatched f/ union		
	(3)	Secretary	1		Dispatched f/ union		
		Total each	3				
	Gendarmerie						
	(1)	Chief	1		Dispatched f/ Gendarmerie		
	(2)	Officer	?		Dispatched f/ Gendarmerie		
		Total	?				
	Dispensary						
	(1)	Doctor	1		Dispatched f/ Ministry of Health and Welfare?		
	(2)	Nurse	1		Dispatched f/ Ministry of Health and Welfare?		
		Total	2				
2	Fishing boat & outboard engine repair place						
	(1)	Shipwright, assistant	2	average	130,000	260,000	
	(2)	Repairman, assistant	2	average	130,000	260,000	
		Total	4			520,000	
3	Ice making, ice storage & refrigeration facilities						
	(1)	Ice seller	2		80,000	160,000	also manage refrigerator
	(2)	Refrigeration engineer, electrician	2	average	150,000	300,000	
		Total	4			460,000	
4	Guard						
		Grand Total	20		80,000	160,000	
						2,080,000	except for dispatches from Ministry of Fishery, Ministry of Health and Welfare?, Gendarmerie and unions

Table 5-53 Estimation of Project Costs (Part 1)

1st Construction Term: Construction of Fishing Port Outline Facilities

		including transportation cost and indirect cost							
		unit: US \$/							
Construction of Fishing Port Outline Facilities									
Sloped pier	stake type	400	/m/m	100	m	11	m	440,000	depth 11m, width 5m
	gravity type	1,000	/m/m	25	m	4	m	87,500	
Upright embankment	gravity type	700	/m/m	135	m	3	m	283,500	
Upright embankment + armor stone	slope	500	/m/m	145	m	2	m	145,000	
Slipway		250	/m	25	m	40	m	250,000	
Dredging	sand	15	/m	310	m	50	m	69,750	
Banking		5	/m	180	m	100	m	135,000	
Apron pavement		30	/m	135	m	10	m	40,500	
Total of fishing port outline facilities construction cost								1,451,250	
Equipment									
Winch (hand operation)		6,000	/piece	4				24,000	
Course light		18,000	/piece	0					
Total of equipment cost								24,000	
Grand total cost of 1st construction term								1,475,250	

2nd Construction Term: Construction of Land Facilities

		including transportation cost and indirect cost							
		unit: US \$/							
Construction of Land Facilities									
Management office		500	/m	3.6	m	5.4	m	12	Area
									233.28
		500	/m	5.4	m	5.4	m	1	29.16
		500	/m	3.6	m	7.5	m	3	81.00
	corridor	120	/m	3.6	m	2.1	m	11	83.16
Subtotal								343.44	181,699
									except for the corridor sections
Fishing equipment storage		400	/m	3.6	m	5.4	m	36	699.84
	Fishing net repair	120	/m	3.6	m	4.5	m	36	583.20
Subtotal									349,920
Engine & fishing boat repair		600	/m	4.2	m	6.0	m	4	100.80
	Outdoor repair	120	/m	4.2	m	5.4	m	3	68.04
Subtotal									68,645
Gas station		400	/m	3.6	m	5.4	m	2	38.88
	corridor	120	/m	3.6	m	2.1	m	2	15.12
Subtotal									17,366
Goods disposal place		300	/m	38.4	m	7.2	m	1	276.48
	corridor	120	/m	38.4	m	2.1	m	2	161.28
Subtotal									102,298
Ice making, ice storage, refrigeration		400	/m	24.0	m	9.0	m	1	216.00
	corridor	120	/m	24.0	m	2.7	m	1	64.80
Subtotal									94,176
Fresh fish retail market building		300	/m	40.8	m	9.0	m	1	367.20
	corridor	120	/m	40.8	m	2.1	m	2	171.36
Subtotal									130,723
Related retail market building		300	/m	20.4	m	9.0	m	1	183.60
	corridor	120	/m	20.4	m	2.1	m	2	85.68
Subtotal									65,362
Smoking house		350	/m	39.0	m	12.0	m	2	936.00
	corridor	120	/m	39.0	m	2.7	m	4	421.20
Subtotal									378,144
Restroom & shower room		700	/m	4.8	m	5.4	m	4	103.68
	corridor	120	/m	4.8	m	2.1	m	4	40.32
Subtotal									77,414
Prayer space		350	/m	12.0	m	12.0	m	1	144.00
	corridor	120	/m	12.0	m	2.1	m	1	25.20
Subtotal									53,424
Total of land facilities construction cost								4022.28	1,501,805
Incidental Facilities Related Construction									
Elevated tank & tower		48,000	/place						48,000
Septic tank (local spec)		8,000	/place						8,000
Electric leading-in, piping and wiring on site		60,000	/place						60,000
Rainwater drainage		120	/m	210	m				25,200
Total of incidental facilities construction cost									141,200
Exterior Construction									
Access road development		27	/m	100	m	8	m		21,600
Planting		9		210	m	3	m		5,670
Asphalt pavement		18	/m	13,138	m				236,479
Exterior lighting		4	/m	13,978	m				55,911
Total of exterior construction cost									319,660
Grand total of incidental facilities construction cost									1,962,665
Equipment									
Ice machine /ice storage box		270,000	/piece						270,000
Refrigerator		135,000	/piece						135,000
Electric generator for emergency		38,000	/piece						38,000
Incinerator		30,000	/piece						30,000
Equipment for goods disposal place		20,000							20,000
Equipment for repair place		30,000							30,000
Grand total of equipment related cost									523,000
Total cost of 2nd construction term									2,485,665

Table 5-53 Estimation of Project Costs (Part 2)

Commune Related Construction		including transportation cost and indirect cost							
		unit: US \$/							
Civil Engineering Works									
Banking		5	/m	3,200	m	0.9	m	14,400	
Ground leveling		2	/m	2,773	m			5,545	note
Planting		9	/m	110	m	2	m	1,980	meta-estimate
Front road development		30	/m	150	m	8	m	36,000	
Rainwater drainage		120	/m	25	m			3,000	
Exterior lighting		4	/m	2,773	m			36,000	
Total of civil engineering works cost								96,925	
Construction of Building Facilities									
Assembly hall		500	/m ²	4.8	m	7.2	m	3	103.68
Subtotal		120	/m ²	4.8	m	2.1	m	3	30.24
								55,469	except for the corridor sections
Clinic		500	/m ²	4.2	m	7.2	m	2	60.48
Subtotal		120	/m ²	4.2	m	2.1	m	2	17.64
								32,557	
Child care center		500	/m ²	4.8	m	7.2	m	2	69.12
Subtotal		120	/m ²	4.8	m	2.1	m	2	20.16
								34,560	
								2,419	
								36,979	
Community water station		400	/m ²	2.7	m	2.7	m	1	7.29
Restroom & shower room		700	/m ²	4.8	m	5.4	m	2	51.84
Subtotal		120	/m ²	4.8	m	2.1	m	2	20.16
								2,419	
								38,707	
Septic tank (local spec)		6,000	/place						6,000
								292.41	meta-estimate
Total of building facilities construction cost								172,428	
Total of commune related construction cost								269,353	

Table 5-54 Predicted Revenue of the New Kaporo Landing Facilities

		Annual revenue	Note
Fishing boat fuel station rent	300,000FG/month x 12 months	3,600	
Fishing equipment storage rental	212 boats x 330 days x 100FG/day	6,996	
Boat landing facilities rental	212 boats x 1 time/year x 200FG/time	42	
Tool rental charge	212 boats x 1 time/year x 3,000FG/time	636	
Fishing boat repair charge	212 boats x 2 times/year x 18,000FG/time	7,632	
Outboard engine repair charge	212 boats x 3 times/year x 12,000FG/time	7,632	
Goods disposal facilities rental	3,326 tons x 2,500FG/ton	8,315	
Sales of ice	10 tons/day x 180 days x 80,000FG/ton	144,000	2,000FG/25kg
Refrigerator rental	8.9 tons/day x 330 days x 7,000FG/ton	20,559	
Fresh fish retail facilities rental	192 pers. X 180 days x 100FG/day	3,456	
Related retail facilities rental	24 pers. X 300 days x 150FG/day	1,080	
Smoking facilities rental	160 grills x 330 days x 0.6 x 500FG/day	15,840	
Common restroom rental	371 pers. X 330 days x 50FG	6,122	
Common shower rental	288 pers. X 330 days x 100FG	9,504	
Grand total of annual revenue		235,414	

Table 5-55 Predicted Expenditure of the New Kaporo Landing Facilities

(.000FG)

	Market price			Economic price		Note
	Quantity	Unit price	Cost	Conversion factor	Cost	
Facility Cost						
Outline facilities related			2,902,500	0.912	2,647,080	Durable year: 50 years
Land facilities related			3,925,330	0.934	3,666,258	Durable year: 30 years
Equipment related			1,094,000	0.995	1,088,530	Durable year: 10 years
Total			7,921,830		7,401,868	
Operating cost						
Labor cost						
Port manager	1	3,600		1.0	3,600	Personnel of Ministry of Fisheries
Secretary	1	1,440	1,440	1.0	1,440	skilled labor
Accounting	2	1,560	3,120	1.0	3,120	skilled labor
Statistics	1	2,400		1.0	2,400	Personnel of Ministry of Fisheries
Maintenance and management of fishing port facilities	2	1,200	2,400	0.5	1,200	unskilled labor
Maintenance and management of water supply and drainage facilities and equipment	2	1,200	2,400	0.5	1,200	unskilled labor
Cleaning, waste treatment, and maintenance and management of incinerator	2	960	1,920	0.5	960	unskilled labor
Fishing boat and outboard engine repair	4	1,560	6,240	1.0	6,240	skilled labor
Ice making and refrigeration facilities	2	1,800	3,600	1.0	3,600	skilled labor
Ice seller	2	960	1,920	0.5	960	unskilled labor
Guards	2	960	1,920	0.5	960	unskilled labor
Fuel cost						
Generator	19,800	1.1	21,780	0.5	10,890	
Fuel for incinerator	13,200	1.1	14,520	0.5	7,260	
Electricity charges	484,473	0.27376	132,629	0.85	112,735	
Water rate	9,900	1.0915	10,806	0.85	9,185	
Maintenance and management cost						
Office supplies			1,200		1,200	
Ice making & refrigeration facilities equipment			5,000		5,000	
Consumables on premises			1,500		1,500	
Facility repair cost			5,000		5,000	
Insurance premium			2,000		2,000	
Total			219,395		180,450	

Note 1 : Conversion factor for Fuel Cost is set at 0.5 because the total tax rates for light oil accounts for 50% of the whole. (customs: 17%, VAT: 18%, total tax: FG355/1)

Note 2 : Conversion factor for electricity charges and water rate is set at 0.85 in order to deduct VAT 18%.

Table 5-56 Economic Benefit from Increase of Landing Volume due to Increased Sailing Hours

	Increment of catch (kg)	Market price (FG/kg)	Total economic benefit (1.000 FG)	Price at landing place (FG/kg)	Fishing cost at economic price (1.000 FG) (percentage of general cost 66%)	Distribution cost at economic price (1.000 FG) (percentage of general cost 50%)	Economic benefit (1.000 FG)
Formula of calculation	A	B	C=AxB	D	E=DxAx0.66	F=(B-D)xAx0.5	G=C-E-F
Bonga, Bonga Seri	110,000	400	44,000	400	0	0	44,000
Other demersal fish			0		0	0	0
• Domestic consumption ex. Cat fish	2,000	1,500	3,000	1,500	0	0	3,000
• Export fish	5,000	4,000	20,000	2,200	0	4,500	15,500
Total	117,000		67,000		0	4,500	62,500

Table 5-57 Economic Benefit from Increase of Landing Volume due to Ice Supply

	Increased catch volume (kg)	Market price (FG/kg)	Total economic benefit (,000FG)	Price auctioned at a port of landing (FG/kg)	Fishing cost based on economic price (,000FG) (ratio of general expenses to deposits 47%)	Distribution expense based on economic price (,000FG) (ratio of general expenses to deposits 50%)	Economic benefit (FG)
Formula	A	B	C=AxB	D	E=DxAx0.47	F=(B-D)xAx0.5	G=C-E-F
Bonga, bonga-seri	0	400	0	400	0	0	0
Other bottom fish			0		0		
Catfish, etc. for domestic consumption	154,000	1,500	231,000	1,500	108,570	0	122,430
	204,000	4,000	816,000	2,220	210,936	183,600	421,464
Total			1,047,000		319,506	183,600	543,894

Table 5-58 Economic Benefit from Increase of Smoking Production Volume

	Increased smoking production volume (kg)	Market price (FG/kg)	Total economic benefit (,000FG)	Price auctioned at a port of landing (FG/kg)	Production cost based on economic price (raw material cost + firewood) (,000FG)	Distribution expense based on economic price (,000FG) (ratio of general expenses to deposits 50%)	Economic benefit (FG)
Formula	A	B	C=AxB	D		F=(B-D)xAx0.5	G=C-E-F
Smoking production (bonga)	36,667	2,500	91,667	2,200	47,667	5,500	38,500
Smoking production (catfish, etc.)	52,000	6,500	338,000	6,000	286,000	13,000	39,000
Total			429,667		333,667	18,500	77,500

Table 5-59 Economic Benefit from Economizing Gasoline Consumption Volume

(,000FG)

	Gasoline reduction volume per 1 boat	Number of boats	Economic price of gasoline	Economic benefit
Encircling gill net fishing boat	1240 liters	53 boats	0.963/litter	63,288
Fixed gill net fishing boat	1900 liters	2 boats	0.963/litter	3,659
Total				66,947

Table 5-60 Financial Analysis

(,000FG)

Annual	Profit	Facility cost	Operating cost	Balance
1		7,921,830		-7,921,830
2	235,414		219,395	16,019
3	235,414		219,395	16,019
4	235,414		219,395	16,019
5	235,414		219,395	16,019
6	235,414		219,395	16,019
7	235,414		219,395	16,019
8	235,414		219,395	16,019
9	235,414		219,395	16,019
10	235,414		219,395	16,019
11	235,414	1,094,000	219,395	-1,077,981
12	235,414		219,395	16,019
13	235,414		219,395	16,019
14	235,414		219,395	16,019
15	235,414		219,395	16,019
16	235,414		219,395	16,019
17	235,414		219,395	16,019
18	235,414		219,395	16,019
19	235,414		219,395	16,019
20	235,414		219,395	16,019
21	235,414	1,094,000	219,395	-1,077,981
22	235,414		219,395	16,019
23	235,414		219,395	16,019
24	235,414		219,395	16,019
25	235,414		219,395	16,019
26	235,414		219,395	16,019
27	235,414		219,395	16,019
28	235,414		219,395	16,019
29	235,414		219,395	16,019
30	235,414		219,395	16,019

Financial internal rate of return

#VALUE!

Table 5-61 Economic Analysis

(,000FG)

Annual	Benefit	Facility cost	Operating cost	Net economic benefit
1		7,401,868		-7,401,868
2	750,841		180,450	570,391
3	750,841		180,450	570,391
4	750,841		180,450	570,391
5	750,841		180,450	570,391
6	750,841		180,450	570,391
7	750,841		180,450	570,391
8	750,841		180,450	570,391
9	750,841		180,450	570,391
10	750,841		180,450	570,391
11	750,841	1,088,530	180,450	518,139
12	750,841		180,450	570,391
13	750,841		180,450	570,391
14	750,841		180,450	570,391
15	750,841		180,450	570,391
16	750,841		180,450	570,391
17	750,841		180,450	570,391
18	750,841		180,450	570,391
19	750,841		180,450	570,391
20	750,841		180,450	570,391
21	750,841	1,088,530	180,450	518,139
22	750,841		180,450	570,391
23	750,841		180,450	570,391
24	750,841		180,450	570,391
25	750,841		180,450	570,391
26	750,841		180,450	570,391
27	750,841		180,450	570,391
28	750,841		180,450	570,391
29	750,841		180,450	570,391
30	750,841		180,450	570,391

Economic internal rate of return

5.2%