

CHAPTER 5

FEASIBILITY STUDY

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5-1 Approach

5-1-1 Changes In Situations Surrounding The Study

The feasibility study was re-started in 2002 after an interval of two years since the Master Plan was formulated in 2000. In the meantime, the surrounding situation of artisanal fisheries of Guinea underwent various changes. The major changes are as follows:

International environment

The World Summit²⁵ held in Johannesburg from August to September 2002 with the theme of environment and development focused on a major issue of reducing poverty in developing countries. At the same time, this Summit pointed out excessive exploitation of global fishery resources and declared the need for sustainable fishery development promotion in the future. The declaration contributed to controlling unregulated fishing by massive fisheries and confirming the policy of promoting orderly utilization of fishery resources aiming enhance natural regenerative forces.

Issue of tense national boundaries

In September 2000 rebel forces of the Republic of Liberia and Sierra Leone invaded Guinea and the invasion intermittently lasted until January 2002. At a certain time during that period, nearly 500,000 refugees entered the Guinea Forest Region and Forécariah prefecture. Despite relief activities conducted by the Office of the United Nations High Commissioner for Refugees (UNHCR), various nations' governmental organizations and NGOs, national border areas remained unstable. In 2001 in Sierra Leone, a peace pact was reached with the anti-government insurgent group and in Liberia a general election was held in the Guinea Forest Region, regaining equanimity. However, in September 2002 another insurgent activity occurred in the neighboring country of Ivory Coast, bringing about another flow of refugees to the Guinea Forest Region.

Changes in domestic economy

In the latter half of 1990s the Guinean economy was growing steadily. GDP posted growth of 4.6% in 1998 and 4.5% in 1999. However, because of inflow of refugees and rebel soldiers from neighboring countries as mentioned above, many people in this region had to evacuate and the country incurred great damages to physical as well as human resources. As a result, in 2000 the growth rate of the first industry was minus 1%, a large setback from the previous year, which posted plus 7.9%. Subsequently, after 2001 this region started to regain stability as well as economic growth and it is expected to make a growth of 3.6% in 2001 and 4.2% in 2002. However, due to increased destabilizing factors caused by escalating military activities in the Ivory Coast since September 2002, the future situation is unpredictable.

25 International Summit regarding sustainable development. (August 26th – September 4th, 2002)

Intensification of quality control and sanitary supervision of fishery products by EU

In recent years, the EU has been intensifying sanitary supervision of developing countries and with a view to establish import environment for fishery products with quality in accordance with HACCP, EU has been conducting, by sending study teams to various regions of Africa, detailed inspection and assessment of fisheries landing facilities, fishery product processing facilities, transportation facilities, sanitary inspection systems, etc. of various countries. Such a study team was sent to the Republic of Guinea in October 2000. As a result, the EU issued recommendations to instruct facility improvement to almost all fishery product-processing factories of the country. At the same time, it made a judgment, with respect to fisheries landing facilities, that fishing port facilities except for the Boulbine Fishing Port are not sanitarily appropriate to handle fishery product for import and recommended to improve sanitary conditions.

Export drive of fishery product

Export of fish by artisanal fisheries as of 2000 was implemented in the form of air transport of fresh fish. However, exporting methods were diversified afterwards and the export of frozen small croaker and sole especially to Asia (South Korea) was expanded. This is thanks to an increase in the export of frozen fishery product as a result of private fishery companies' efforts in expanding areas of pick-up, providing materials and equipment, instructing the use of ice and methods of maintaining freshness to fishing people and reinforcing quality inspections. On the other hand, several export companies were established, bringing about competition among them in pursuit of securing high-quality fishery products. As a result, artisanal fishing people have come to enjoy transactions with more advantageous prices than before due to increased sales prices, etc.

Utilization of unused fishery resources

The recent study of natural resources confirmed the existence of black tiger shrimp in the Guinean offshore and a slight increase in tiger prawn. Also, the study confirmed the existence of unused resources of cephalopod such as common cuttlefish and octopus. With a view to realize efficient exploitation of these resources, the Fishery Ministry advocates their active development in the Industrial Fishing Implementation Plan of 2003.

Implementation of PPTE of the World Bank

The World Bank has decided to implement, beginning 2003, debt repayment grace to heavily indebted poor countries and a domestic utilization of the repayment fund. The Guinean fishery industry is allocated US \$ 20million and has started selecting businesses to be implemented with this fund, establishing targeted figures and formulating implementing plans. The plan includes varied operations such as maintenance of access roads to fishing communities, fishing facilities at coasts and the nurturing of fish farmers. From now on the specific plans will be implemented.

Trend of fishery-related assistance

FAO initiated in 1999 SFLP (Sustainable Fisheries Livelihood Program) for promoting artisanal fishermen in 25 countries of the western African region. Guinea is one of such countries and several small-scale fishery projects are currently being implemented. Also, it is planned in 2002 through financing by the African Development Bank, to establish a system

to lend materials and equipment to artisanal fishermen and to develop infrastructure. The first of such plans includes the establishment of a bridge in Bongoron in 2003.

5-1-2 Background of the Plan

BSD (Beureau de Stratégie et de Développement: Strategy Development Room) under the supervision of the Guinean Ministry of Fisheries and Aquaculture has established a basic development policy to realize development of the fishery industry in Guinea by a target of 2010. This policy formulates a main aim of increasing per capita consumption of fishery product to an annual 17 kg by 2010. To achieve this goal, it was preconditioned to formulate specific plans on the following six items, which were summarized in line with the Master Plan of the artisanal fishery industry development plan.

- 1) Improvement of fishing technology (Plan to improve fishing equipment and methods)
- 2) Establishment of fishery industry support facilities (Kenian Fish Market Development Plan)
- 3) Aquaculture Center development plan (Forest Guinea Region)
- 4) Inland water fisheries distribution improvement plan
- 5) Smoking improvement plan
- 6) Establishment of the Fishery Development Fund

However, two years have already passed since the Master Plan was formulated. In the meantime, domestic as well as the international situation underwent changes as mentioned above. Furthermore, individual plans faced the following changes. Namely, 2) for the development of fishery support facilities (Kenian Fish Market Development Plan) Japan International Cooperation Agency conducted a basic engineering study beginning April 2002 and the construction was scheduled to start in 2003 as a grant aid project by the Japanese Government. While, 3) the Aquaculture Center Development Plan (Forest Guinea Region) is still faced with uncertain factors, leaving the situation difficult for conducting safe study.

For these two projects the study team dispatched by JICA for resuming the study in July 2002 and the Guinea Fishery Ministry confirmed the following changes in the content of the study. That is, for the establishment of artisanal fisheries support facilities, the study shall be implemented in two places; namely, facility development of Koukoudé in Boffa prefecture, the biggest fishing village in Guinea, and of Kaporo fishing port in the Ratoma region of Conakry City where the neighboring population is increasing remarkably. On the other hand, in the field of inland water aquaculture, Mamou and Dalaba prefectures in Middle Guinea are selected for the study.

Furthermore, after starting the study in October 2002, the following facts came to light. Namely, even though there used to be concerns over the deterioration in the motorization rate of fishing boats due to aging outboard motors and delayed renewal, fishermen have gradually started buying outboard motors thanks to the introduction of a lending system for fishermen offered by domestic financial institutions and it has been confirmed that results are promising.

As a result, it was decided that the feasibility study would target the following items:

Fishing Equipment and Methods Research and Development Project
Establishment of fishery industry support facilities
 Koukoudé Fishing Community Facility Development Project
 New Kaporo Fish Landing Facility Development Project
Project for Development of Inland Water Aquaculture (Middle Guinea)
Project for Development of Inland Water Fisheries
Project for Improving Smoking Methods
Analysis of the Fishery Development Fund

5-1-3 Basic Policy for the Implementation of Feasibility Study

Subjects of the study are varied, their areas are widely dispersed and each project is intricately related to each other but the plan has been drafted in consideration of the following basic policy:

- To take approaches to reduce poverty, promote economic as well as social independence
Guinean fishermen are generally poor and are incurring to live under socially disadvantageous situations. The study will consider realizing reduction of poverty by way of nurturing the fishery industry, creating employment and increasing the income of residents.
- To formulate the plan with the participation of residents
By way of RRA, workshops for residents and interviews, the plan will include as many residents' ideas as possible in designing a basic framework for drafting. Maintenance of facilities and equipment shall be conducted by allowing for voluntary operations by residents and the scale, manners and methods of operations shall be determined accordingly.
- To formulate the plan in consideration of natural and social conditions
Under the plan, facilities shall be established in consideration of tropical weather with heavy rains and other natural conditions such as a large difference in tide levels in coastal areas and a large difference in quantity of flow between the dry season and the rainy season in inland rivers. Also, the plan shall be drafted for administration and management with consideration for traditional culture of the society, social institutional systems, etc.
- To try to avoid duplication and overabundance of assistance
The plan shall be designed for effective use of limited aid resources and to avoid duplication of development programs and excessive construction of facilities. Especially, by monitoring the trend of other aid organizations, and active collaboration with such organizations shall be promoted.

- To pay attention to appropriateness of technology and facilities to be introduced
 Artisanal fisheries perform economic activities based on individual efforts and voluntary organizations of fishermen. Introduction of excessive fishing methods, equipment and facilities will likely ravage the small-scale industry itself. Therefore, the plan shall be drafted by duly considering operation methods, budget, level of technology and timing of introduction.
- To consider sustainable utilization of resources
 Fishery resources are limited but renewable. Due consideration must be paid to prevent excessive fish catches and efforts shall be made to realize an appropriate level of catches. At the same time, processing and distribution shall be designed so as not to make losses after fish catches minimal.
- To take note of environmental impact
 Guinea is blessed with an extensive land of mangrove and rich water resources. The plan shall be drafted to enable development aiming at guaranteeing food and economic development while preserving such favorable natural conditions as much as possible.

In line with the aforementioned basic policy, the field study was conducted from October 2002 to January 2003 and the plan has been prepared based on the study.

5-2 Method of the Study

5-2-1 Method of the Study Employed for Establishing the Plan

For the sake of avoiding having the plan become armchair theory and affirming the basic approach and ideas employed in the plan this study employs, not only interviews of general beneficiaries and existing materials but also experimental testing, seminars and etc. At the same time, for the implementation of facility development, the study was conducted with the participation of NGOs in addition to making sure utilization of beneficiaries' opinions with a view of enabling them to participate in formulating the plan. Detailed contents and methods of the study are as follows:

(1) Experimental Testing of Fishing under Fish Attraction Lamp

Testing was designed to make sure the potentials of a part of fishing technology to be researched and developed in the "Fishing Equipment and Methods Research and Development Project" at the stage of establishing the plan and to transfer the process of such operations technology to counterparts. More specifically, testing of fishing with fish attraction lamps was conducted offshore Conakry and Koukoudé aiming at efficient fish catches of pelagic fish which still has comparatively large potential for increased catches. Also, testing was conducted on a fish aggregating device designed for catching large migratory fish. These technologies have basically never been experienced in Guinea. For details, refer to attached materials.

(2) Social Economic Study

A social economic study was held through the use of questionnaires in Kaporo in Conakry City and Koukoudé village in Boffa prefecture, candidate sites for the development of fishing support facilities. Study lists were prepared by the team's fishing village and gender study members and interviews based on the list were reassigned to and implemented by local NGO (BERTAD) and the list was duly completed.

(3) Participatory Workshop

In manners similar with the social economic study, desires of the residents of Kaporo and Koukoudé were confirmed and workshop was conducted by reassigning to local NGO (EUPD) with a view to make them aware on the management of facilities to be developed and promote discussion among them. For details, refer to attached materials

(4) Topographic Survey

A topographic survey and sounding survey was conducted in Kaporo and Koukoudé where development of facilities is planned. The work was re-assigned to a local survey company (BET).

(5) Inland Water Fisheries Distribution Improvement Plan

In order to confirm in advance the effectiveness of fresh fish distribution promotion to be proposed in the "Project for Development of Inland Water Fisheries", small-sized oil-fired refrigerators and scales were provided to three fishing villages in Kankan prefecture and data was gathered before installing refrigerators. Of the three fishing villages, two villages were accepted for the proposed project. Also, equipment was provided to fishermen's groups for maintenance and management and in return fishermen were instructed to keep records of fish catches everyday.

(6) Seminar on Unified Methods of Fishery Statistics

A seminar was held to unify methods of taking fishery statistics, which are so different in each prefecture into a practicable one in light of the manpower and operational expense of each prefecture's branch. The branch head of each prefecture participated in the seminar along with representatives of fishermen and the method of taking statistics was adopted with unanimous agreement of participants.

(7) Social Economic Study of Fishermen in Kankan Prefecture

Similar to the social economic study of Kaporo and Koukoudé, in order to understand the social economic environment in fishing villages of Kankan prefecture in Upper Guinea, the study was conducted in the form of a questionnaire in five major fishing villages of fishing equipment and materials owned by fishermen, conditions for operation, fish catches, income from fishing and the level of concurrent business with agriculture.

(8) Market Study of Middle Guinea

Middle Guinea is a new study area subsequently added to this F/S phase and it is necessary to assess whether cultured fish is acceptable to residents here under economic

reason and preference of residents. Accordingly, a consumption study in the form of a questionnaire was conducted among consumers of Mamou and Dalaba prefectures.

(9) Rearing Test of Cultured Fish

This testing is designed to clarify if the aquaculture technology proposed in this plan is appropriate by actually rearing fish in the pond of the Tolo-Bafing Fish Farm, the activity base for the “Project for Development of Inland Water Aquaculture” and to keep records of growth. The plan also plays the function of technology transfer the training of aquaculture technology to the manager and staff of the Center at the same time.

5-2-2 Method of Environmental Impact Assessment

In line with the regulations concerning environmental assessment based on the Environmental Protection Law of Guinea (Code sur la protection et la mise en valeur de l’environnement, Ministère des ressources naturelles et de l’environnement, 1987) and the Environment-Conscious Guidelines concerning the fishery development study (JICA, March 1994), an environmental impact assessment of the planned projects was carried out. Also, in order to take a measure of choosing the least environmentally detrimental option in the process of formulating projects, consultations were held with other members in the process of formulating projects regarding detailed information on the natural environment surrounding each project and points to consider in environmental preservation.

Relations between development tasks and important points are summarized in the following table.

Table 5-1 Relations between Development Tasks and Important Points for Environmental Preservation

Project	Important points to consider
Koukoudé Fishing Community Facility Development Project	Impact on mangrove forest and other coastal ecological system (Physical impact, impact on water quality, etc.)
New Kaporo Fish Landing Facility Development Project	Impact of waste caused by fishing activities Impact of cutting down mangrove for smoking purpose on the ecological system in the mangrove forest
Project for Development of Inland Water Aquaculture	Impact on the ecological system of rivers especially on the breeding system of fish and water quality
Project for Development of Inland Water Fisheries	Measures against sediment discharge
Fishing Equipment and Methods Research and Development Project	Impact on fishery resources
Project for Improving Smoking Methods	Preservation of mangrove forest

In light of this project, the Ministry of Fisheries and Breeding as the assigned operator shall apply for environmental impact assessment (EIA) to the Environment Bureau (Direction Nationale de l'Environnement, DNE) when operations are specified.

Procedures of Guinean environmental impact assessment are summarized as follows:

- First, as a screening procedure of the plan, the operator submits a simple environmental impact study dossier to the Environment Bureau.
- The Environment Bureau examines the dossier and grants approval of the operation in case in its judgement the environmental impact of the relevant operation is minor and EIA is not required. The procedure takes one month.
- In case it is judged the dossier is inadequate or the operation will likely cause some kind of impact on the environment, the Environment Bureau instructs the operator to implement EIA.
- Explanation meeting to residents shall be held once at the time of F/S and once after the environmental study to explain the result of the study.
- EIA shall be conducted by certified consultant companies.
- For fisheries development business the reviewing committee shall be composed of the Ministry of Fisheries and Breeding and the Environment Bureau.
- When transfer of residents is involved, the Ministry of Residency and the Ministry of National Land shall join the committee.

The Impact Assessment Section (Section Etude d'Impact) consists of five staff members who so far have conducted 50 cases of assessment, of which two are environmental impact assessments (EIA) of fisheries development operations, the construction business at the Kamsar fishing port and Koba shrimp culture business. In Conakry there are five certified consultant companies. Analysis of water quality can be entrusted to the laboratory affiliated with the Ministry of Industry in Matoto.

Results of environmental impact assessment of planned projects are mentioned at the end of each plan. Environmental impact is classified into four grades from A to D (A has the most impact and D has small impact.)

5-2-3 Method of Economic and Financial Analysis

The financial assessment is designed to assess appropriateness of projects from the viewpoint of a financial aspect of the implementing organization.. Assessment of projects involving profits is made on the appropriateness of balance of payments, pricing, etc. Profitability of projects is assessed in this manner. Projects not involving profits are examined from the aspect of funding plans, etc.

Economic assessment of projects is designed to select best projects to optimally utilize resources from a national point of view. Therefore, benefits to be brought about by the relevant project to the nation's economy and costs required for the implementation of the project are calculated and by comparing both benefits and costs, assessment is made whether the implementation of the project is appropriate for the nation's economy. This is a method of assessing efficiency of public projects.²⁶

²⁶ "Study of economical evaluation method in development projects (common version)" compiled by the Social Development and Research Department of JICA in March 2002.

Benefits and costs in financial assessment are calculated by sales and expenses of projects based on market value. Benefits and costs in economic assessment are calculated in consideration of the effects of the projects on the nation's economy and opportunity costs²⁷ based on the economic cost. Accordingly, economic assessment requires a process of conversion from the market price to the economic cost. Furthermore, economic assessment of benefits is limited to countable benefits and uncountable benefits are in principle described qualitatively. Before conducting an economic and financial assessment of each project, a common framework of economic assessment shall be established.

Conversion from market value to economic cost

As economic assessment of projects is designed to assess values of resources from the viewpoint of the entire nation, estimated market values of costs and benefits should be modified to economic costs. Standards for modification of costs are twofold. They are a) whether resources are actually used for the relevant project and b) whether the value reflects the real cost. The former standard is subject to tax, interests, subsidiaries, etc. and as they are only transfer items from the viewpoint of the entire nation, they are omitted from the economic cost. The latter is related to an issue of price distortion²⁸ and by conversion distorted prices are modified to costs that truly reflect the "true values". The cost modified based on these standards is the "economic cost" and this is, in a way, fictitious cost.

Method of conversion to economic cost

Conversion to economic cost is conducted in the following manner:

a) Standardization of Price Levels

In making economic assessment, various commodities should be valued in economic costs by employing a standardized cost level of either the domestic cost or the national border cost, or in local currency or foreign currency. The method to be used in this study is standardized at the national border cost level in the local currency (FG) generally used for JICA projects. Accordingly, in case of tradable commodity²⁹ CIF cost is used for import commodity and FOB cost is used for export commodity, while non-tradable commodity is converted to the national border cost based on the standard conversion coefficient.

b) Division of Assets

Conversion of market price to economic cost is conducted by multiplying by a certain coefficient subject to the kind of commodity. Thus, it is necessary to classify commodities in the first place.

Classification of tradable commodity and non-tradable commodity

To begin with, costs and benefits of projects are classified into tradable commodity and non-tradable commodity. Tradable commodity is commodity to be imported and exported. The rest is non-tradable commodity. Non-tradable commodity is re-classified into tradable commodity, skilled labor, raw labor, land, other non-tradable commodities and transfer items.

²⁷ If the existing resources (ex. funds, lands, labor, etc.) are used in projects, they can not be used for other purposes. Opportunity costs are the benefits generated from alternative uses that are withheld by implementation of projects.

²⁸ For example, they are exchange rates artificially established, speculative nature of land price and high level of wages due to the Minimum Wage Law and labor unions despite the existence of potential jobless people.

²⁹ Commodity actually imported and exported.

In this study, classification of costs and benefits and the conversion rate to economic costs are as follows:

- **Tradable commodity:** Domestic cost is often distorted due to trading policy such as customs duties, export subsidy and import quota. International markets are considered under more free competition. Accordingly, international market value is considered as economic cost.
- **Skilled workers:** Generally, it is judged the wage of skilled workers reflects the market mechanism. Therefore, the market wage is quoted as the economic cost as it is.
- **Raw labor:** Guinea has many jobless and potential jobless people and the country is in the state of excessive manpower in terms of raw labor, which makes their economic cost lower than the market wage. Accordingly, in this study a cost conversion rate for raw labor is set at 0.5.
- **Land:** Economic cost is calculated based on the opportunity cost³⁰ of land use when projects are not implemented. As the land belongs to the Government, imposing no expense for its use and lands to be used for projects are situated on the coastline or inland marsh making them not appropriate for other economic use, the economic cost of the land is zero.
- **Non-tradable commodity:** In this study economic cost is standardized at the national border level. Accordingly, non-tradable commodity needs to be converted to the national border cost. The conversion employs the standard conversion coefficient calculated as follows:

$$\begin{aligned} \text{Standard conversion coefficient} &= (\text{Import amount} + \text{Export amount}) / \{(\text{Import amount} + \\ &\quad \text{Import tax}) + (\text{Export amount} - \text{Export tax})\} \\ &= (1070 + 1074) / \{(1070 + 146) + (1074 - 5)\} = 0.94 \end{aligned}$$

In this study, the standard conversion coefficient is set at 0.94 based on the tariff statistics of 1998- 2002.

Table 5-2 Statistics of Import and Export Amounts

	(Million FG)				
	1999	2000	2001	2002	Average
Total Import Amount (CIF)	872,659	1,343,399	1,102,314	961,755	1,070,032
Import Tax	118,596	206,916	127,841	128,698	145,513
Total Export Amount (FOB)	1,141,189	936,244	1,118,877	1,101,152	1,074,366
Export Tax	3,413	4,781	6,867	2,968	4,507

Source: Statistics by the Custom Office

Also, based on the above-mentioned standard conversion coefficient, the conversion coefficients by types of engineering works are as follows:

³⁰ Estimate the value of land if it were to be used for purposes other than >this project.

Table 5-3 Conversion Coefficient by Type of Engineering Work

	Ratio of materials and machinery	Standard conversion coefficient	Ratio of personnel expense	(of which the ratio of skilled workers)	Conversion coefficient of skilled workers	(of which the ratio of raw labor)	Conversion coefficient of raw labor	Conversion coefficient of each engineering work
Related to affiliated facilities	0.80	0.94	0.20	0.6	1	0.4	0.5	0.912
Related to ground facilities	0.85	0.94	0.15	0.8	1	0.2	0.5	0.934
Related to equipment and materials	0.95	1	0.05	0.8	1	0.2	0.5	0.995

The fish landing facilities development plan for Koukoudé and Kaporo under this F/S proposes not only development of fish landing facilities but also social infrastructure such as water supply and clinics. However, economic as well as financial assessment of projects will be conducted only on the development of fishing facilities and with respect to the development of social infrastructure, reference is made only on qualitative aspect of its economic benefits. The reasons are as follows:

- Economic as well as financial assessment requires as a premise, quantification of benefits and it is basic to make qualitative descriptions when quantification is not possible. Development of social infrastructure in Koukoudé and Kaporo districts involves development of water supply for supply of drinking water, development of sewage system for accommodating sanitary environment and other BHN projects such as clinics, nurseries and assembly halls. It is important to improve the living standards of residents but it is not easy to quantify their economic benefits.
- For BHN projects, calculated statistics such as internal economic earning rate does not make index for the selection of projects.³¹
- The current study team does not include members informed of drinking water and health care and correct assessment is impossible.

Economic as well as financial assessment are conducted for the following projects:

- A. Koukoudé Fishing Community Facility Development Project (Entire terms from the first to the fourth term)
- B. New Kaporo Fish Landing Facility development Project
- C. Fresh fish distribution promotion component for Project for Development of Inland Water Fisheries
- D. Project for Development of Inland Water Aquaculture

31 "Research of economic assessment methods for development study (common edition) " by JICA, Social Development Study Division in March 2002.

**FISHING EQUIPMENT AND METHODS RESEARCH
AND DEVELOPMENT PROJECT**

5-3 Fishing Equipment and Methods Research and Development Project

5-3-1 Background of the Project

Artisanal fisheries in Guinea is only a recent development, and most of the fishing equipment and methods were brought by visiting fishermen from neighboring countries, and therefore, they were not developed for nor made use of unique aspects in this country such as the coastal oceanic condition, characteristics of local fish and fishermen's customs. Thus, fishing efficiency is not always high, and this is one of the reasons that the country has not been able to increase the amount of catches. Additionally, lack of organizations in the Guinean Ministry of Fisheries and Breeding to develop and promote technology in artisanal fishery and lack of personnel knowledgeable in artisanal fisheries have resulted in slow development of artisanal fisheries as well.

Experimental tests during the study period showed the effectiveness of using relatively simple technologies such as fish attracting lamps and fish aggregating device for attracting pelagic fish. Diversification of fisheries can be expected as well by introducing new fishery equipment such as purse seine nets, octopus pots, refinement of gill nets, and improving line fishing. Considering the current situation, this plan includes structuring an organization that focuses on technology development for improving fishing equipment and methods and widely spreads the technologies among fishermen.

5-3-2 Objectives

Increase artisanal fisheries output by upgrading and developing fishing gear and methods to increase income of fishermen. Direct beneficiaries are all members of the coastal artisanal fishermen.

5-3-3 Implementing Organizations

Artisanal Fisheries Technology Development and Promotion Center (tentative name)

Boussoura Fishing Boat Motorization Center of the Ministry of Fisheries and Breeding/Center National des Sciences Halieuitques de Boussoura

5-3-4 Summary of the Project

The plan consists of three stages: 1) establishment of Artisanal Fisheries Development and Promotion Center and staff training; 2) accommodation of international technological support and technological development; and 3) promotional project. The plan aims to make local personnel and resources and materials available by the end of the third stage, and to subsequently reduce outside support for further independent development.

Stage 1 : (2003 - 2005)

(1) Setting up a Preparation Team for Establishment of the Artisanal Fisheries Development and Promotion Center and Staff Training

As organizations related to development and promotion of fishery technology in Guinea, there are the Boussoura Motorization Center of the Ministry of Fisheries and Breeding, Center National des Sciences Halieuitques de Boussoura, the Maritime Technology School of the Ministry of Professional Training (Maritime Technology School). Their current status are shown below:

The Boussoura Motorization Center has performed training and promotion of outboard motor repair and maintenance techniques, but the Center has completed its role because the trained personnel there are already working at landing beaches throughout the country, and guidance from import agents and makers of outboard motors has recently become more substantial. Center National des Sciences Halieuitques de Boussoura is actively involved in resource and environmental survey, but it is a research institution and they don't have personnel to oversee artisanal fisheries or naval engineering. On the other hand, the Maritime Technology School affiliated to the Ministry of Professional Training focuses on education and training of fishermen in navigation technology, shipbuilding technology, fishing equipment and manufacturing technology to prepare them as ship crews in industrial fisheries. However, they have almost no ties to artisanal fisheries and perform no promotional activities either. It is necessary to work out ways to efficiently utilize these three institutions and their personnel and to gain international support from international aid organizations and countries such as neighboring countries that are advanced in fishery industry, FAO, Japan and France wherever they are needed.

At the first stage, it is necessary to create local organizations for effective operation within the country. Accordingly, the "Preparatory Committee for Establishment of the Artisanal Fisheries Technology Development and Promotion Center³²" will be established together with the above-mentioned three institutions and the Sea Fisheries Department of the Ministry of Fisheries and Breeding (President). The Committee will adopt a mission statement and activity strategies and ensure the best personnel and a budget necessary for operation of the committee. For the time being, the relationship between Center National des Sciences Halieuitques de Boussoura and the Maritime Technology School involves renting the facilities and providing support of lecturers and technical advisors.

³² As members of the committee, the Sea Fisheries Department Director (President), the National Boussoura Center for Fisheries Science, the Boussoura Motorization Center, the Strategy Development Room of the Ministry of Fisheries, the Maritime Technology School, the Association of Artisanal Fisheries, the Ministry of Overseas Cooperation (observer) are considered.

(2) Center Staff Placement

There is about 7 full-time staff and 4 part-time staff at the Center and the following arrangement will be made. The Boussoura Motorization Center will be used as a center office and workshop after remodeling.

- Center Manager : Full time (starting 2004). Responsible for Center operation and management. Formulate development/promotion strategies, and request and adjust human and monetary support from inside and outside the country.

- Fishery Technology Development Manager :
Full time (starting 2004). Responsible for technology development and promotion. Implement development and promotion of artisanal fisheries suitable for Guinea with experts and technicians from both inside and outside the country.

- Social and Economic Development Manager :
Full time (starting 2004). Responsible for empowerment by organizing fishermen and for strengthening management efficiency of fish farmers. Lead educational and promotional campaign through OJT guidance by branch staff, and indirectly support better living for fishermen.

- Survey Boat Captain as well as Engine Chief:
Full time (starting 2005). Responsible for operation and maintenance of research boats.

- Technical Assistant : Full time (starting 2005). Work under the Fishery Technology Development Manager on a survey ship or when making fishing gear. Young person with actual experience in artisanal fisheries needed.

- Driver : Full time (starting 2005). Responsible for driving and maintaining vehicles used for promotion.

- Secretary : Full time (starting 2004). Assist the Center Manager with his operations such as accounting and paperwork.

- Fishery Technician : Part time (starting 2005). Give advice related to fishing grounds and methods at fishing testing. Experienced fisherman from Guinea is to be hired. Also serve as a promotion worker when promoting to fishermen.

- Resource Survey Researcher :
Part time (starting 2005). Give advice about fishing grounds related to fishing testing implementation and support

compilation of report of fishing testing results. It is appropriate to have personnel support from Center National des Sciences Halieuitques de Boussoura.

- Fishing Equipment Production Advisor :

Part time (starting 2005). Give advice on production of new fishing equipment. It is appropriate to have personnel support and to rent a manufacturing plant for fishing equipment from the Maritime Technology School.

- Fishing Vessel Improvement Advisor :

Part time (starting 2005). Give advice on fishing vessel improvements, which take landing facility situations and economical efficiency of artisanal fisheries into consideration, and its installation. It is adequate to make use of support of instructors and shipbuilding facility from the Maritime Technology School.

- Navigation Technique Advisor :

Part time (starting 2005). Give advice on navigation techniques to captains of artisanal fishing boats for operations of offshore artisanal fishing. Also examine a license system for navigation of fishing boats. It is appropriate to receive personnel support from the Maritime Technology School.

(3) Staff Training

It is considered that staff's lack of experience and knowledge in artisanal fisheries at this point is evident, even if the most qualified candidates are selected. Full time technical staff in particular needs to utilize every opportunity to master the following skills from 2003 to 2004 (in order of importance).

Center Manager: Organizational operations and management, project evaluation, formulation of fisheries development plans, overall operations of resource management and artisanal fisheries, communication and presentation skills, beginning level computer software skills

Fishery Technology Development Manager :

Resource management and artisanal fisheries techniques (purse seine net, gill nets, long line, vertical long line, trawling, octopus pots etc), construction and installation of artificial fish bank, communication and presentation skills, beginning level computer software skills

Social and Economic Development Manager :

Development of fishermen's association, operation of fishermen association, management of fish farmers, communication and presentation skills, beginning level computer software skills

For training opportunities, fishery-related training could use the Maritime Technology School and Center National des Sciences Halieuitques de Boussoura in Guinea and the third country training in Morocco and group training run by JICA. For operation and management of organization, communication and presentation skills, and computer software skills, participate in training within the country.

(4) Preparation and Submission of Technical Support Request Document

In line with the establishment of the Center and staff placement, request technical cooperation projects from oversea. Since it is only a short time after start of the Center, request for personnel to support the Center operation as well. In addition to specialists, request small ship and resources and materials needed for fisheries technology development.

Stage 2 : Acceptance of international technical cooperation and start of technology development (2005-2007)

(1) Discussion with Donor Nations and Organizations

Discuss overview of the plan and work out revisions with an appraisal review team provided in the request document. Make sure placement of counterpart of the Center and formulation of a project budget on the Guinean side are properly implemented.

(2) Formation of the Project Team

Duly receive specialists and supplied resources and materials. Formulate detailed implementation plan and yearly activities plan between the Guinean side and the specialists. Well-planned project operation is required, as visiting technicians will be invited on a short-term basis from overseas in addition to full time and part time local staff.

(3) Study of Local Fishing Communities' Conditions

Update information such as fisheries numbers (number of fishermen and fishing boats of different types) of fishing gear and methods used, number and types of processing facilities in about 100 coastal fishing communities and collect baseline data before the project begins.

(4) Visiting Survey of the Neighboring Countries

After formation of the project team, conduct artisanal fisheries inspection survey in the neighboring countries at an early date. Study the fishing equipment and processing technology already put to practical use in neighboring countries and for those with possibility for use in Guinea, include them in the manual. Also, look for potential personnel to be invited to Guinea as an instructor among fishermen practicing these fisheries (processing) (there is a possibility to request them to work as a master fisherman and give advice during installation and to provide technical guidance during progress. Candidates for visiting countries are Morocco, Tunisia, Mauritania, Senegal, Sierra Leone, Ghana, etc. 2 to 3 countries will be visited.

(5) Research Subjects

As of this stage, the following research development subjects can be considered. In addition to the topics mentioned below, necessity for technical guidance related to processing and preserving freshness is expected to be brought up by the artisanal fishermen, but as these techniques are considered to be installed without working out special development, workshops will be held to meet the demand. Also, as it is impossible to work on all subjects at once, they will be implemented in order of priority.

1) Introduction of Small Purse Seine Net and Testing of Economic Efficiency

To effectively catch small pelagic fish attracted by fish attracting lamps and fish aggregating devices, difficulty may arise in some cases in catching the attracted fish by using the surrounding net and encircling gill net currently used, depending on the depth of water and the quality of sea floor (rocky). Feasibility testing will be conducted for the introduction of small purse seine net, stick-held dip net, etc., which are usable even in those fishing grounds. The size of small purse seine net to be used is 100 to 200 meters long, 10 to 15 meters wide, and 15 to 25 millimeters opening net. In this scale, the net can be used on the existing encircling gill net boat and purse line can be tightened by hand. Target fish will be mainly Bonga seri and mackerel species, which are already caught with encircling net and are well established in the domestic market. Initial capital investment in fishing equipment material cost is high because of small net opening size and a large number of floaters and foot ropes but the size of the purse seine net is about one tenth that of an encircling net, and unlike an encircling net, the purse seine net will not be damaged by dragging on the ocean floor. Promotion activities will start after economic efficiency of the net is well proven.

2) Technology Development of Line Fishing (including long line)

Line fishing in Guinean artisanal fisheries consists only of hand line fishing targeting snappers for export and bottom long line fishing targeting whiting and sea horned pout around coastal mud areas. There is also a possibility for development in trawling fishing of medium to large pelagic fish such as bonito, tuna, and dorado (also possible to be attracted by fish aggregating device as stated later), cuttlefish fishing, vertical long line fishing targeted at bottom fish, and floating long line fishing of sharks. In addition, although it is not fishing, commercialization of octopus pots is considered highly probable.

3) Development of Fish Aggregating Devices (FADs)

Fish aggregating device (FAD) has an important role in the view of increasing economic efficiency of fisheries. Although FADs are not devices to increase fish population, it is expected that FADs will contribute to increase the catch of less utilized pelagic fish. Accordingly, step-by-step development of FADs is recommended. FADs will be tested with various fishing methods (purse seine net, trawling, line fishing) in the depth of more than 20 meters. Prototype FADs will be constructed solid to prevent theft, but in the future a spread of low cost versions enabling joint management of production and installation by fishermen groups will be undertaken. Also, sign buoys to indicate the border of artisanal fisheries' exclusive area (10 nautical miles offshore) will be considered, which will serve the same effects as FAD. The buoy is considered very effective in clearly showing the

illegal operation area for trawling boats operating inside the buoys as well as in verifying, for artisanal fishermen, their position in relation to fishing grounds.

4) Development Research of Artificial Fish Reef

Using the result of the ongoing artificial fish reef project in Senegal³³ as a reference, develop fishing grounds in the artisanal fisheries exclusive area. Fishing grounds in the waters in the area are considered to have been damaged by trawling nets operations conducted for a long period of time so far, and establishment of artificial reef serves the role to restore resting places and habitats for the fish. Also, a prevention effect of illegal operation of trawling boats is expected. Research will be conducted on the shape, materials, size, and location of the fish reef.

5) Development Research of Weir Fishing

Guinean coastal area is shallow and the bottom material is mixture of sand and mud. It seems there is a good potential to introduce set net type fishery. However, as the water level differs large between high and low tides as well as its shallow coastal area, the fishing area dries up during low tide. Therefore, it is reasonable to erect weir using bamboo and other wood material that is cheap and abundant. Before setting up the weir, it is pre-requisite to obtain agreement among neighboring fishermen for the exclusive use of the fishing area. There is no traditional right or regulations for village fishermen to use the adjacent water area exclusively. In addition, as this fishing gear is easy and cheap to erect, there is a potential of over exploitation without controlling the number of the weir. It is necessary to study about establishing fishing regulations to limit fishing season, gear size as well as the minimum distance between the two weirs (at least 5 miles).

6) Upgrading Fishing Vessels

Usage rate of outboard motors on artisanal fishing boats is considered around 40%, but old model boats before motorization are still being used. For this reason, outboard motors do not necessarily run effectively and it is possible that their fuel efficiency is not good. The remaining 60% of non-powered boats use both sail and oars, but they cannot move toward the wind because the hulls of the ships are not made for sailing. This limits the potential fishing grounds and operating time in the sea. For these reasons, it has become necessary to upgrade the shape of the boats to fit the style of fishing in Guinea.

7) Development of Fish Searching Technology etc.

Conduct research and provide fishermen with information on fish finders, utilization of GPS, ocean water temperature (surface temperature, thermo-cline), relationship between salinity and emergence of fish, and seasonal migration of fish.

³³ Overseas Fishery Consultant Association (OFCA) started a study to investigate efficiency of two kinds of artificial fish reef (made of artificial concrete and of natural stone) in 2002 in offshore of Senegal. According to the follow-up study conducted several months after the installation (in November), fish-attracting effect was confirmed.

8) Development of Processed Goods

Of processing methods popular in the neighboring countries, introduce processing methods that can be employed in Guinea. Consider potential for exporting to neighboring countries as well as domestic consumption

(5) Preparation for Promotional Operations

In order to combine research development and promotional operations smoothly, it is necessary to include demands and issues from the fishermen's side sufficiently in implementing promotional operations in addition to bringing in new technology from the side of the Fishery Ministry. Also, the Social Economic Department should lead the Fishery Ministry's branch staff to proceed with development activities and unionization of fishermen by extracting demands and issues through conversations with fishermen. This way, fishermen's organizations will be able to play the role in these promotional operations as well. It is also possible to utilize existing organizations such as Artisanal Fishermen's Association. Furthermore, find personnel to play a leading role on the side of fishermen for revitalization and development of fishing communities and fisheries, and improve their abilities as a leader. Specifically, gather fisherman candidates who are eligible to become leaders of communities and provide small-scale seminars on such themes as improving communication skills, *raison d'être* and operation methods as well as management of fishermen's organizations. Select a leader of each community from among these fishermen, and deepen discussion among these leaders by holding workshops at the Fishery Ministry. Developing sense of community among artisanal fishermen will also be one of the main objectives.

On the part of the Fisheries Technology Department, they should carry out hands-on experience in fisheries and processing in artisanal fishery communities together with the branch staff of the Fishery Ministry and directly experience the issues that fishermen are facing. In cooperation with the Social Economic Department, find fishermen who are willing to employ actively new fisheries techniques and educate them as key persons in promotional activities.

Stage 3 : Promotion of technology (2007 ~ 2009)

In the third stage, in cooperation with the Social Development Division (in charge of education activities) and the local branch of the Ministry of Fishery, promotion activities will be conducted through visiting instruction and nurturing fishermen in a model case.

(1) Introduction of Universal and Well-established Technology

Of the fishermen's needs, handling and processing techniques after catching fish are instructed directly to fishermen through practical training to skilled technicians within the country or the neighboring countries. Also, it is possible fishing techniques partially employed in Guinea and not used in other regions will be promoted.

With respect to these techniques, it is efficient to hold workshops for voluntary fishermen from fishing communities by inviting technicians. At the same time, the fishermen side too is requested to actively take part in management of workshops through fishermen's organizations.

(2) Promotion of Improved and Developed Technology

Techniques introduced from the neighboring countries and overseas will be tested by the Fishery Technology Division and examine its economic efficiency as suitable technology in Guinea. The technology that is confirmed of its economic efficiency will be introduced at visiting workshops in fishing communities.

Workshops provide videotapes and photos to show actual operational procedures and scenes of fish catches with a view to indicate operation cost and estimated profits based on sales. At the same time, by providing as much information as possible on biological characteristics of target fish and seafood as resources (quantity of resources, total allowable catch, sexual maturation size, etc.), establish necessary basis for active participation in resources management. In the latter half of workshops operation demonstration is performed by fishery technicians.³⁴ Fishermen are also invited to participate in actual operations to feel by their hands new fishing methods. At the end of workshops, fishing equipment may be rented to fishermen's organizations desiring to rent them. Renting should be limited by term and reporting on fish catches should be obligatory. Furthermore, fishermen actively aspiring to purchase fishing equipment and to engage in new fisheries will eventually be eligible for instruction on manufacturing of fishing equipment and financing.

5-3-5 Project Cost

The accumulated project cost of this plan is 5,512,600,000FG, of which 88,200,000FG (1.6%) shall be borne by Guinea. Details are described in the attached sheets. This project cost after conversion to dollars based on US\$1.00=2,000FG is US\$2,756,300. Also, project costs estimated in dollars after conversion to yen based on US\$1.00=120 yen is 330,756,000 yen.

5-3-6 Environmental Impact Assessment

The purpose of assessment is to improve productivity of artisanal fisheries by improving and developing fishing equipment and methods as well as to increase income of fishermen. At the same time by establishing an artisanal fisheries technology development and promotion center and under the supervision of activities by the renovated Boussoura motorization center, introduction of small-scale purse seine nets and testing of economical efficiency, technological development of line fishing (including long-line fishing), development and utility testing of fish aggregating device, research and development of artificial fish-breeding reef, improvement of fish boats, development of fish school finding technology as well as research activities for promotion will be conducted. Even though research activities themselves do not likely affect the environment, because of expected environmental impact in the future as mentioned below, promotion activities include compliance with ordinances related to environment and waste.

- In line with an increasing number of newly-joining fish boats, issues of wood consumption, waste and marine contamination are expected.

³⁴ Ask domestic and foreign fishermen to provide demonstrations. Such >experts are asked for their cooperation from the study / development stage.

- Increasing use of fishing equipment will likely cause issues of seabirds swallowing discarded nets, spillage of polypropylene, etc.
- Expansion of icing storage distribution brings about scattering and discard of heat shield materials.

Table 5-4 Results of Environmental Impact Assessment of Planned Projects

Planned projects	Component	Degree of environmental impact*	Reason	Environmental preservation measure
Fishing Equipment and Methods Research and Development Project	Establishment of artisanal fisheries technology development and promotion center and promotion activities	C	Research activity	Because of expected environmental deterioration due to expanded fisheries activities in the future, promotion activities shall include compliance with ordinances related to environment and waste.

5-3-7 Economic Benefits

As quantification of economic benefits of this project is difficult for the following reasons, qualitative descriptions are made as follows.

- Relations between the project and benefits are indirect.
- As nothing has been decided at this stage, it is difficult to forecast fish catches by using new fishing equipment and methods to be developed in the future and to forecast a resulting increase of income.
- It is difficult to foresee how many fishermen will decide to employ new fishing equipment and fishing methods after implementing this project.
- Benefits of the project are varied.

Benefits to be realized by this project are as follows:

Increase in income

- Increase in fish catches and fishermen's income through the introduction of efficient fishing equipment and methods.
- Increase in fishermen's income due to higher sales prices to be realized by the acquisition of freshness-keeping technology.
- Increase in fishermen's income due to manufacturing of high value-added products to be realized by propagation of processing technology.

Decrease in cost

- Decrease in worthless consumption of gasoline and time to find fish thanks to easier ways of finding locations of fish by using fish aggregating device and fish finding equipment.
- Economical consumption of gasoline due to more efficient operation of fish boats (power boats)

- Decrease in fishery operation time due to improved operational efficiency of fish boats (dumb craft)
- Saving of investment in fishing equipment such as nets to be realized by the use of small-scale purse seine nets even when efficiency of fishery operation is the same.
- Decrease in costs (search cost, damage or loss of boats and fishing equipment, loss of human life) due to reduced sea accidents and disaster.

Preservation of environment

- Diversification of fish catches including kinds of fish that have not been caught so far (octopus, cuttlefish, bonito, blue-fin tuna, etc.) enables decrease of pressure of fish catches on specific kinds of fish while maintaining levels of fish catches, thereby making possible long-term use of resources.

Acquisition of foreign currencies

- Increased export of expensive fish
- Decrease in domestic consumption of imported fresh fish and imported smoked products

5-3-8 Proposal for Project Implementation

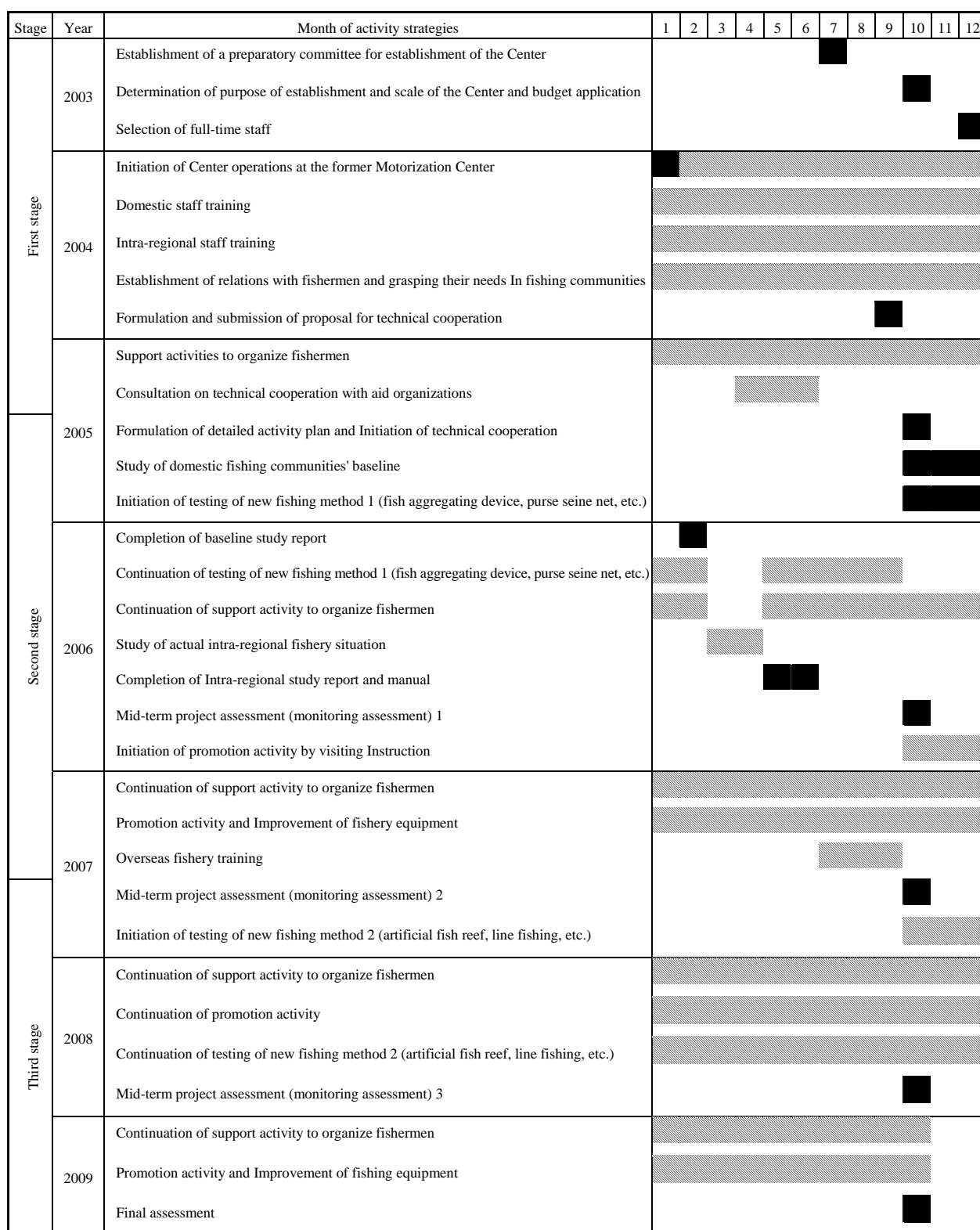
Since this project combines procurement of materials and equipment with technical assistance, it is deemed that technical cooperation scheme will be adequate to cope with this project. It is planned that the Artisanal Fisheries Technology Development and Promotion Center, the implementation organization of the Project, will be established during the first stage of the Project, and it is desirable to conduct preparation work for the Project by dispatching experts (consultants) who will conduct securement of human resources and coordination with concerned organizations. The Motorization Center facility was developed with grant aid of Japan, and effective utilization of this facility will be attempted in the Project.

Guinea Fishing Equipment and Methods Improvement Plan (Artisanal Fisheries Technology Development and Promotion Center Plan)
 Implementing Organization: Artisanal Fisheries Technology Development and Promotion Center

Beneficiaries: Fishermen of entire coastal region and the Ministry of Fisheries and Breeding Implementation period: From 2005 to 2009

Project summary	Indicator	Source of Indicator	Outside factor
<p>Topside purpose</p> <p>To promote new fishery, enhance kinds and quantity of landing of coastal fishery and transformation to diversified artisanal fisheries with improved economic efficiency and sustainability.</p>	<ul style="list-style-type: none"> • Number of fishermen (boats) employing new fishing methods • Increased landing quantity of pelagic fish such as Bonga seri • New kinds of fish appear in markets. 	<ul style="list-style-type: none"> • Annual report of fisheries statistics • Annual report of the Fisheries Development Department • Observational research of landing grounds • Interview survey of fishermen 	
<p>Purpose of project</p> <p>To establish conditions for operations of the Artisanal Fisheries Technology Development and Promotion Center to enable promotion activities.</p>	<ul style="list-style-type: none"> • Appropriate budget is provided to the Center. • Research activity is implemented along with the annual activity plan. • Promotion activity of developed technology is conducted along with the annual activity plan. 	<ul style="list-style-type: none"> • National budget, draft budget • Annual report of the Center 	<ul style="list-style-type: none"> • Development policy of artisanal fisheries of the Ministry of Fisheries and Breeding remains unchanged. • Economic situations do not deteriorate.
<p>Results</p> <ul style="list-style-type: none"> • Operation and management systems of the Center will be established. • Research and development activities of the Center will get into gear. • Promotion methods of the Center will be introduced, realizing full-fledged activities. • Artisanal fishermen's organizations will activate their activities and enhance their operational efficiency. 	<ul style="list-style-type: none"> • Personnel management is performed properly. • Budget is managed properly. • Needs of artisanal fishermen can be clearly identified. • More than two kinds of efficient fishing methods are developed. • More than two technology manuals for artisanal fishermen are compiled. • More than two materials for enlightenment and promotion are prepared. 	<ul style="list-style-type: none"> • Annual report of the Center • Research report • Record of consultations with fishermen • Study report of neighboring countries 	<ul style="list-style-type: none"> • Main staff of the Center do not quit. • Quantity of resources that is used a little or not at all is not so little as expected. • Ample cooperation is extended by artisanal fishermen.
<p>Activities</p> <ul style="list-style-type: none"> • Formulation of detailed project implementation plan • Workshop on project management / intensification of organization management capacity • Support for organizing fishermen and activities to strengthen organization's capacity • Study of artisanal fishery communities' baseline • Survey of actual conditions of neighboring countries' fisheries • Development testing of fish aggregating device • Introductory testing of purse seine net • Development testing of artificial fish reef • Introductory testing of line fishing, etc. • Development of promotion measures • Implementation of OJT of C/P through above-mentioned measures 	<p>Injection</p> <p><u>Personnel</u></p> <p>International consultant 106 man-months Intra-regional consultant 14 man-months Domestic consultant 14 man-months Full-time staff of the Ministry of Fisheries 336 man-months</p> <p><u>Activity cost</u></p> <p>Traveling cost for study of neighboring countries Overseas training Domestic research travel cost Entrustment fee for domestic survey</p> <p><u>Resources and equipment</u></p> <p>Fishery investigation boat (Aggregate tonnage: 5 tons) and measuring instrument gauge for navigation and fishery such as GPS fish finding equipment. Manufacturing materials for net-fishing equipment such as purse seine net Manufacturing materials for line fishing Vehicles Materials and equipment for promotion</p>		<ul style="list-style-type: none"> • Security situation of Guinea does not deteriorate more than the present situation. • Japan's aid policy for Guinea does not change.

Attached Materials



Note) Black bars in the above figure indicate concentrated activities during this period and bars with diagonal lines indicate intermittent activities or activities are implemented at certain points during these period.

Figure 5-1 Annual Implementation Schedule by Year (2003 ~ 2009)

Table 5-5 Draft Annual Budgets by Year (excluding allowance for the Center staff) From 2003 to 2009

Accumulated project costs: 5,512,600,000FG (Portion to be borne by our country 88,200,000FG)

Year	Cost item	2003		2004		2005		2006		2007		2008		2009	
		To be borne by our country	Foreign aid	To be borne by our country	Foreign aid	To be borne by our country	Foreign aid	To be borne by our country	Foreign aid	To be borne by our country	Foreign aid	To be borne by our country	Foreign aid	To be borne by our country	Foreign aid
	Project operation management cost	400	0	400	0	400	0	400	0	400	0	400	0	400	0
	Domestic training for 3 men	0	0	3,000	0	0	0	0	0	0	0	0	0	0	0
	Intra-regional training for 3 men	0	0	0	60,000	0	0	0	0	0	0	0	0	0	0
	Domestic travel/daily allowance 200 man-day	FG40/man/day	0	0	8,000	0	8,000	0	8,000	0	8,000	0	8,000	0	8,000
	Overseas training	FG30,000/man/month	0	0	0	0	0	0	0	0	120,000	0	0	0	0
	Center remodeling cost	FG2,000/m ²	0	0	20,000	0	0	280,000	0	0	0	0	0	0	0
	Center administrative cost	FG200/month	0	0	2,400	0	2,400	0	2,400	0	2,400	0	2,400	0	2,400
	Travel cost for actual intra-regional fisheries situations study	FG12,000/man· month	0	0	0	0	0	0	72,000	0	0	0	0	0	0
	Fishery communities' baseline study cost	FG4,000/month	0	0	0	0	60,000	0	0	0	0	0	0	0	0
	Testing of fisheries methods cost (fuel, materials)		0	0	0	0	12,000	0	48,000	0	48,000	0	48,000	0	48,000
	Fuel cost of vehicles	FG80/times	0	0	0	0	800	0	4,800	0	4,800	0	4,800	0	4,800
	Fisheries development professionals	FG30,000/month	0	0	0	0	90,000	0	360,000	0	360,000	0	360,000	0	270,000
	Fishery technology professionals 1	FG30,000/month	0	0	0	0	0	0	0	0	270,000	0	0	0	0
	Fishery technology professionals 2	FG30,000/month	0	0	0	0	90,000	0	360,000	0	90,000	0	360,000	0	270,000
	Professional researchers of fishery communities	FG30,000/month	0	0	0	0	90,000	0	30,000	0	0	0	0	0	0
	Professionals in education and promotion	FG30,000/month	0	0	0	0	0	0	0	0	180,000	0	0	0	0
	Technicians of fishery technology	FG500/month	0	0	0	0	0	0	8,000	0	8,000	0	8,000	0	4,000
	Survey boat		0	0	0	0	0	0	1,000,000	0	0	0	0	0	0
	4-wheel pick up truck		0	0	0	0	0	0	60,000	0	0	0	0	0	0
	Van		0	0	0	0	0	0	50,000	0	0	0	0	0	0
	Fishery equipment and materials		0	0	0	0	0	0	160,000	0	0	0	0	0	0
	Materials and equipment for education (projector, computer, video, etc.)		0	0	0	0	0	0	60,000	0	0	0	0	0	0
	Total	400	0	33,800	60,000	10,800	622,800	10,800	2,212,800	10,800	1,080,800	10,800	840,800	10,800	607,200

5 - 26

Note) Center remodeling cost for 2005 is scheduled for additional construction of a portion on the second floor of the existing Motorization Center to accommodate workrooms for professionals and C/P. Floor area is estimated 140m² and construction cost is estimated 2 million FG/1m².

After conversion to dollar based on US\$1.00=2,000FG the project cost is US\$2,756,300.

After conversion of projects costs in dollar to yen based on US\$1.00=120yen the project cost is 330,756,000 yen.

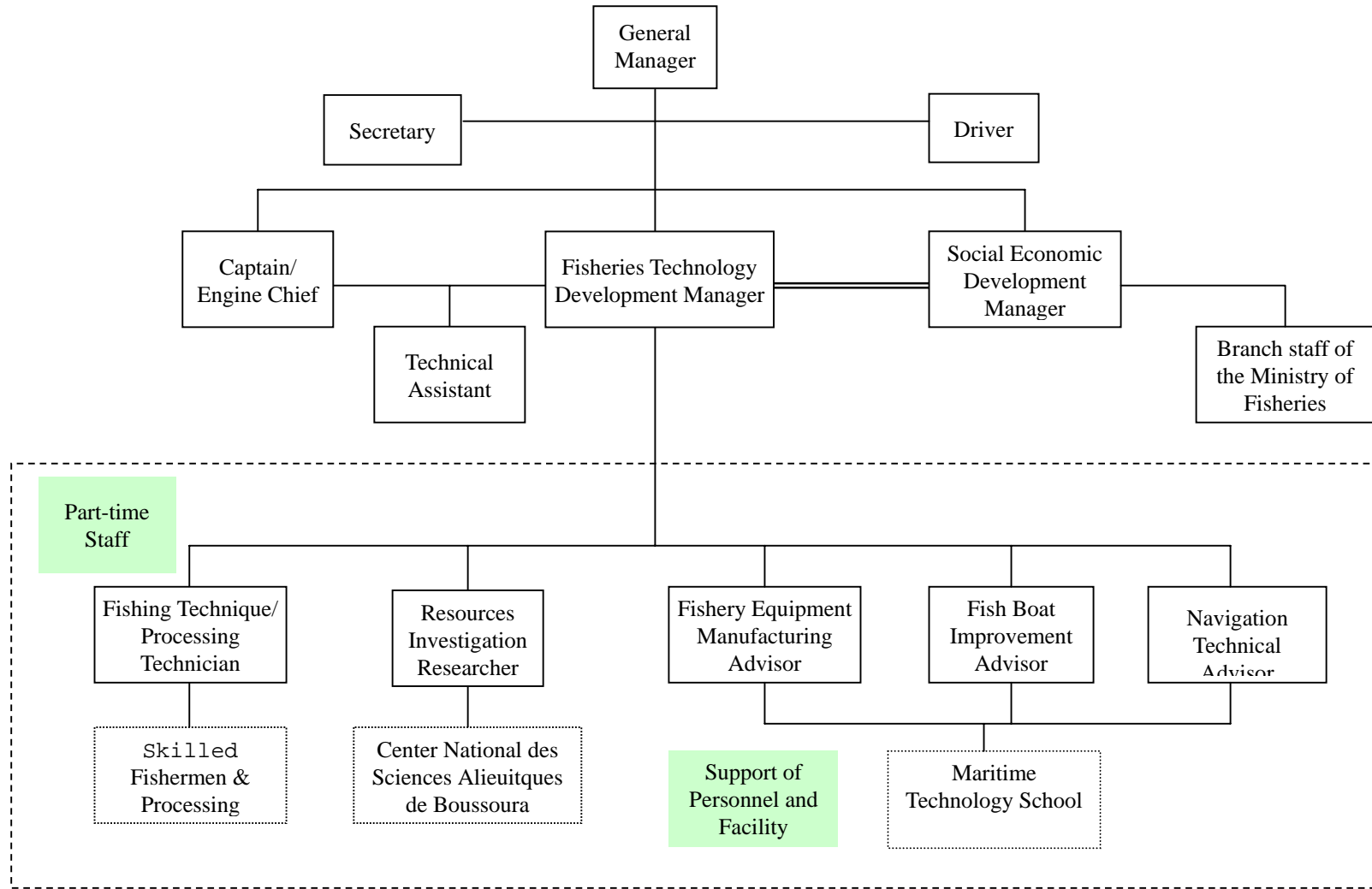


Figure 5-2 Draft Organizational Chart of the Artisanal Fisheries Technology Development Promotion Center

Contents of operations to be requested to:

Specialists

Fishery development (4 years) project management:

To decide directions of research, development and promotion plans and to engage in daily organizational management and project management

Fishery technology 1 (First 2 years) (FADs • purse seine)

To take charge of the environmental study of grounds to establish FADs, designing, the construction and installation of FADs. The duty also includes fishing with fish attracting lamp and designing, manufacturing as well as the operation of small-scale purse seine net.

Fishery technology 2 (Latter 2 years) (artificial fish reef • hand line fishing)

To take charge of the environmental study of grounds to establish artificial fish reefs, designing, the construction and installation of artificial fish reefs as well as to take charge of line fishing using fish aggregating device and artificial fish reef

Fisheries communities study (4 months):

To take charge of the study of fisheries communities' baseline

Promotion technology (6 months):

To take charge of preparing teaching materials for promotion and technology transfer of promotion methods

Fishery technicians (as needed)

Skilled fishermen or processing technicians recruited from within the country or neighboring countries with the ability to instruct specified fishery technology to support technological development and its promotion

Materials and equipment

A small Fishing boat for experimental fishing

Boat with overall length of about 12m and a total tonnage of 5 tons capable of operating small-scale purse seine and long line fishing. The draft of the boat is less than 1 meter.

Equipment : Inboard motor with 250 horsepower, fish hold of 1 ton, live fish tank of 0.5 ton, 2 beds, fishery equipment storage, toilet, oil pressure line hauler, Capstan, fish attracting lamp, etc.

Navigation gauge : Radio communication set, GPS, fish finding equipment, compass, radar, sonar, etc.

Workroom for professionals and counterparts

Second floor will be additionally built on the existing Motorization Center. 4 rooms in a space of 140m² (10m × 14m).

Materials for fishing equipment (accessories such as nets and floats, rope, fish hook, etc.)

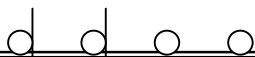
Pick-up track for transport of equipment (Double cabin 4-wheel drive)

Van for loading materials and equipment for visiting instruction (capacity of 4 persons)

Generator, video equipment, projector, etc.

Float line Overall length: 170.28m, Footrope Overall length: 194.53m, Depth of spick net 17.3m, Tense moment 24.2m

30cm Buoy (Buoyancy 600g) × 600 pieces, Float net PE14mm, combination of two 170.28m



Edge net N210D 3/30 27.5mm Depth 7 meshes Length 248m Hanging ratio 30%				
Fish catching part N210D 3/9 15mm	Encircling net N210D 3/6 15mm	Encircling net N210D 3/6 15mm	Encircling net N210D 3/6 15mm	Encircling net N210D 3/6 15mm
400meshes 60m × 4 pieces	400meshes 60m × 4pieces	400meshes 60m × 4pieces	400meshes 60m × 4pieces	400meshes 60m × 4pieces
Edge net N210D 3/30 27.5mm 7 meshes 248m Hanging ratio 20%				

Encircling net 7mm

2m	1m	1m	Purse ring line Tetron 7mm 32pieces	Sinker line Tetron footrope 14mm	Combination of 22 ropes 194.53m	Sinkers 225g × 350 pieces
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Purse line Nylon compound 18mm 250m

Figure 5-3 Outline of Small-scale Purse Seine Net Design

Overall length : 12m, width: 3m, total tonnage: 5 tons, engine horsepower: 250HP

Equipment : Oil pressure capstan, line hauler
GPS-fish finding equipment, radar, sonar

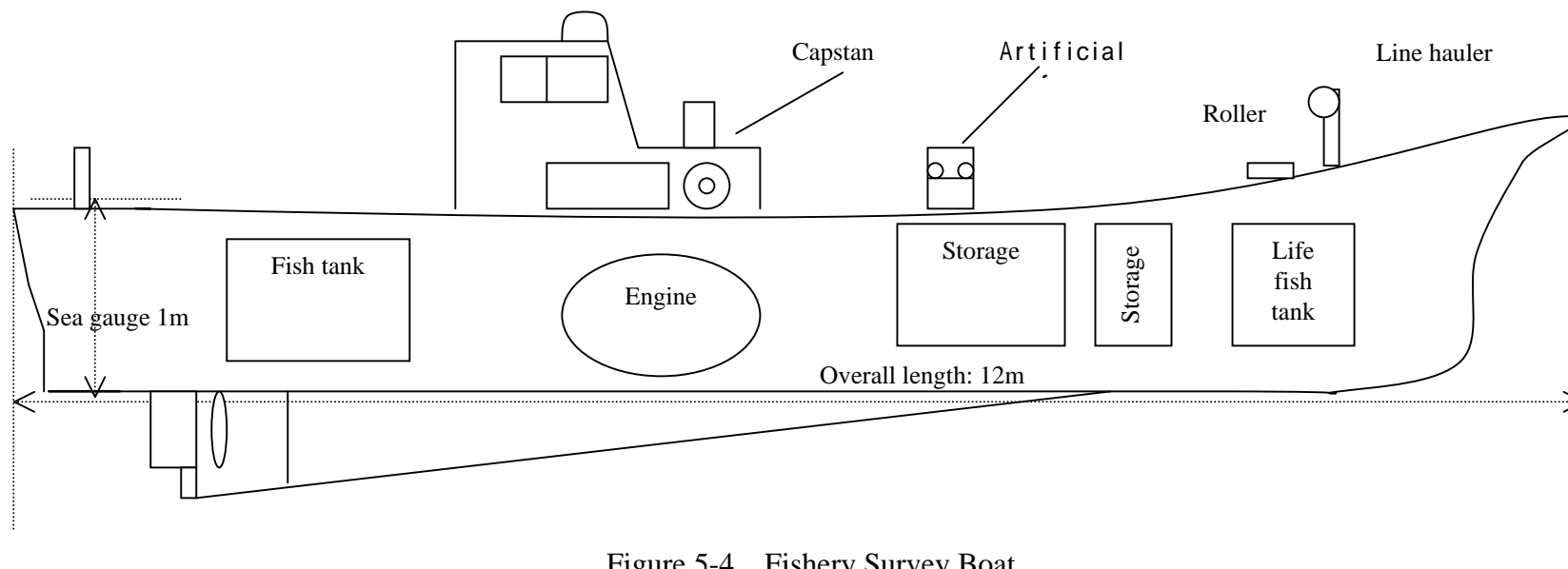


Figure 5-4 Fishery Survey Boat

Organizational structures of Boussoura National Center for Marine Sciences (CNSHB) and Maritime Technology School

CNSHB

(Center National des Sciences Halieutiques de Boussoura: National Boussoura Center for Fisheries Science)

This Center was established in 1985 with the support of French IRD (Institut de Recherche pour le Development : former ORSTOM) in order to support scientific aspect of fisheries management policy to be implemented by the Ministry of Fisheries and Aquaculture. About 65 staff are assigned including researchers, technicians, and managers. Of them are 36 research staff, 2 technical experts in zoological science, 1 technical expert in biology, 10 doctors of biological sciences, 4 veterinarians, 1 botanist, 1 corporate fisheries technologist, 2 technologists in geography, 1 zoologist, 1 biology doctor, 1 doctor of veterinary medicine, 1 agricultural doctor, 1 doctor of oceanographic biology, 2 doctors of ichthyology, and 1 doctor of engineering.

The Study Department, under supervision of the Director General (Directeur General), consists of 5 departments; i.e. the Corporate Fishery Division, the Artisanal Fishery Division, the Inland Water Fishery Division, the Social Economic Division and the Coastal Administration Division. In addition, the Fishery Supervisory Division, the Information Processing Division and the Information Services Division are affiliated as supporting divisions. In February 2003 a fishery survey boat with overall length of 30 m will be installed under Japan's fishery grant aid.

Actual activities include the collection and management of statistical data, following changes in the situation of resources, a maritime environmental study (temperature and salinity of seawater, etc.), reproduction research in mangrove region (not started yet), biological information by kind of fishery resources (ray, cuttlefish, octopus, etc.) research, and the study of pelagic fish and aquaculture.

CFPM

(Centre de Formation Professionnelle Maritime de Conacry: Maritime Technology School)

Liberal arts course (Mathematics, French, English, Physics) 9 teachers

Shipbuilding course (10 to 18 classes) training chief, 1 training section chief, 6 teachers

Marine agency (12 to 18 classes) 1 training chief, 1 training section chief, 7 teachers

Fisheries navigation course (12 to 18 classes) 1 training chief, 1 training section chief, 6 teachers

Training boat ; Laalaba Captain, engine chief, Second class mate, second class engine operator, engine members, crew 6 members

Specification of training boat

Trawl boat with overall length of 19.5m.

Magnetic compass, gyrocompass, GPS, fish finder, walkie-talkie which has remained out of order for 5 years

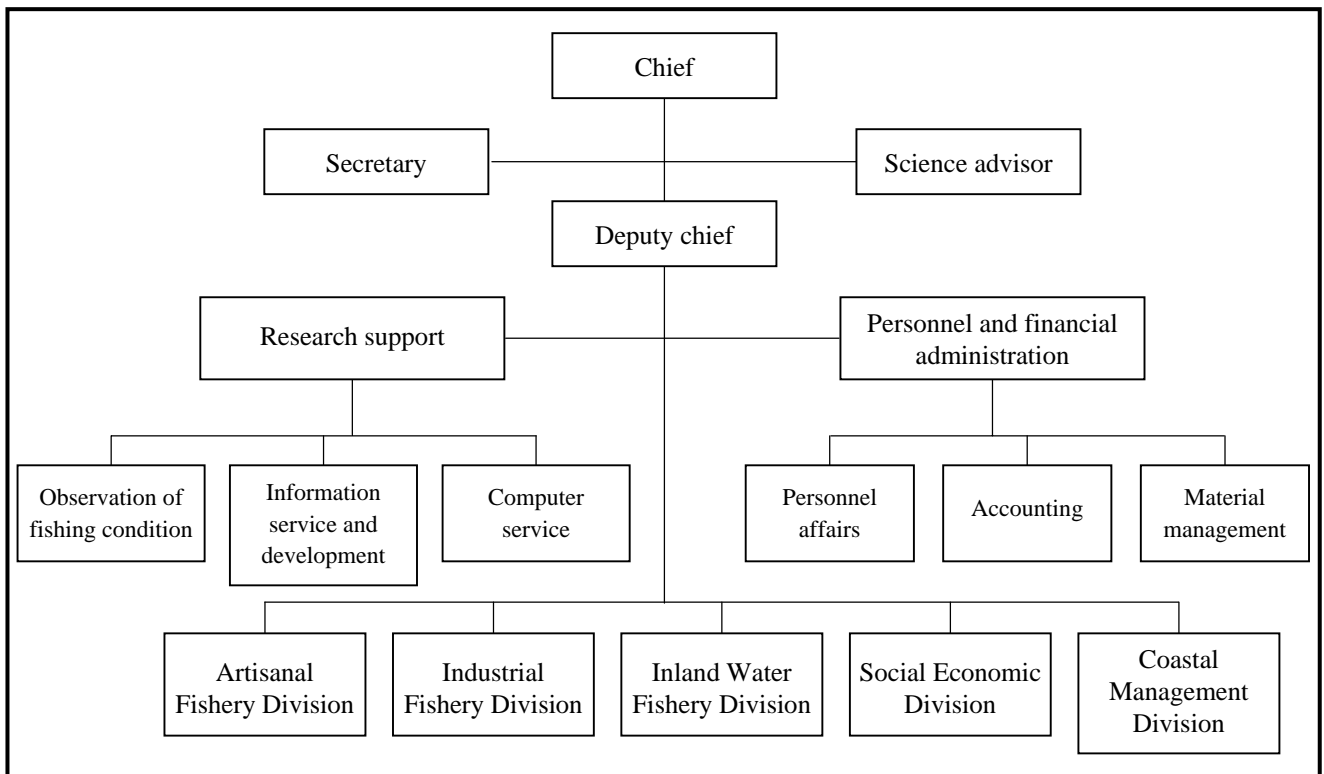


Figure 5-5 Boussoara National Center for Marine Sciences Organizational Chart

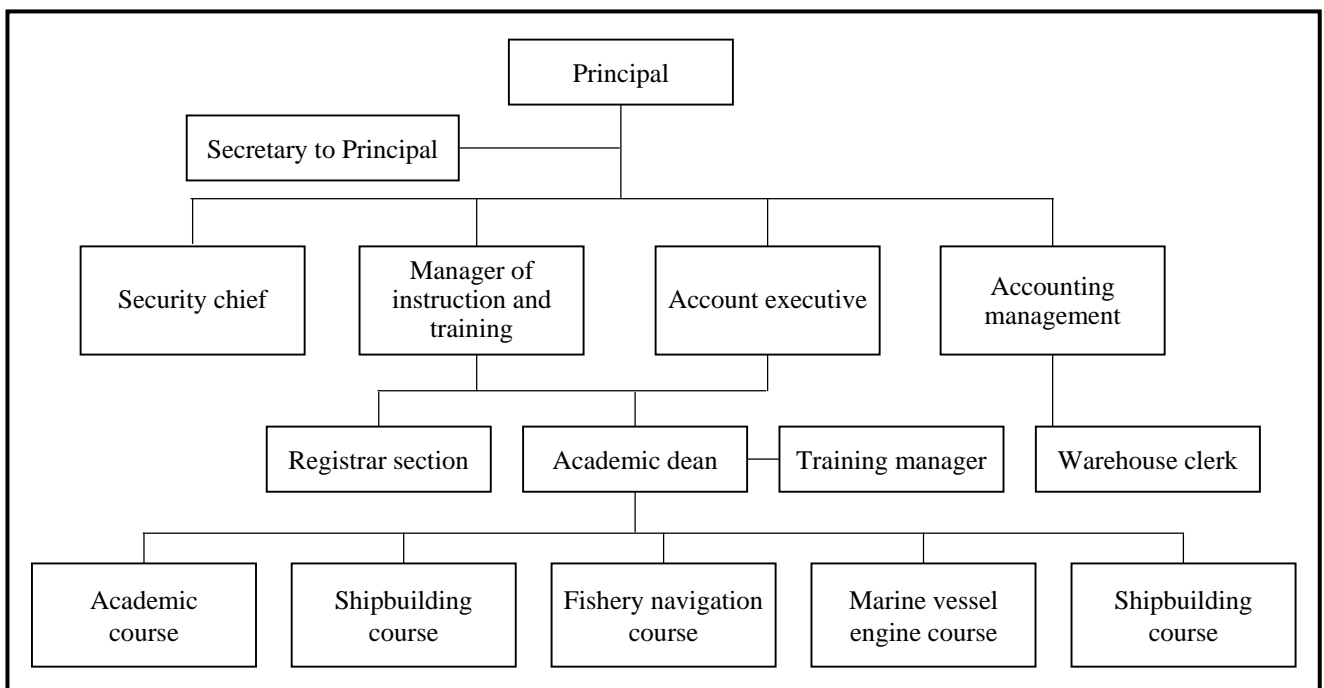


Figure 5-6 Maritime Technology School Organizational Chart

**KOUKOUDE FISHERY COMMUNITIES'
FACILITY DEVELOPMENT PROJECT**

5-4 Koukoudé Fishery Communities' Facility Development Project

5-4-1 Outline

Koukoudé village is situated on the northern side of Belga Cape in the north of Boffa Prefecture. Offshore Belga Cape are great fishing grounds for bonga, pelagic fish, etc. and an abundance of premium fish thanks to a number of scattered shore reef rocks. Other coastal areas of this prefecture are difficult to access via land routes as the area is thick with forests of mangroves; fish landing beaches scattered in an area of about 30 km around the Belga Cape are the only fishing communities accessible by land. However, due to slow development of base facilities including access roads, fish landed here have been shipped to all over the country but only after smoking. In recent years, roads connecting to the national roads are under development, thereby improving distribution to domestic markets. As a result, these fishing communities have enhanced road conditions and access due to bridges that have been built over rivers and they are deepening their mutual relationships. Currently, fishery activities are becoming increasingly active in these fishing communities and the number of active fishing boats operating around here has drastically increased (207 boats or about an 87% increase in the past four years). Commercial brokerage firms equipped with ice (especially targeted at bobo) have started coming to Condeire and Bongoron, gradually changing the characteristics of these regions as not only traditional production bases of smoked products.

It has been determined that fishermen started settling in Koukoudé village 30 years ago. According to accounts by the manager of the fishermen's association who moved in this village 26 years ago, the population at that time was about 250 persons and 13 fishing sailboats were operating. At that time in Koukoudé village a great landowner called the chef de village (chief of village) owned most of the land and was engaged in the farming of palm oil, etc. and it seems that fishing was considered a side job. Since then, the fishery industry has gradually increased in prominence and the situation has greatly changed due to a large-scale development of fishery bases by ODEPAG about 15 years ago.

At present it has been determined that there are 3,000 residents in the village, meaning the population has drastically grown, by more than 10 times in the past 25 years and most residents are connected to the fishery industry. The village has been transformed into an almost genuine fishing community. More than 10% of Koukoudé's population is immigrants from Sierra Leone and their fishing techniques are considered to have greatly contributed to fishery development in Koukoudé.

5-4-2 Natural Conditions

(1) Climate Conditions

The climate in Koukoudé village seems to have characteristics of the northern part of Coastal Guinea. In other words, Coastal Guinea is generally an area with heavy rain. Compared with the southern part, the annual rain fall records 1,000mm less and even though it exceeds 3,000mm in years with heavier rainfall, it does not reach even 2,000mm in years with lighter rainfall. The rainy season is from May to November like in Conakry and July through August records the largest number of rainy days although heavy rainfalls do not exceed total of 1,000mm in a month. The rainfall mechanism in

this area is the same as in the south part and strong winds usually blow before rainfalls. Generally though, the area has a gentle climate with an average wind velocity of about 3.3m/sec (Beaufort wind scale <2>: light breeze) and the maximum wind speed is about 25m/sec, which does not exert much impact on land facilities. Wind direction is mostly from the southwest and the south. The temperature is moderate with an average temperature of about 25.5 although a yearly difference of average temperatures reaches as high as 25 . The highest average monthly temperature is nearly 40 around the spring equinox and it sometimes falls below 15 in the winter time around January.

(2) Hydrographic and Tidal Conditions

Offshore of Koukoudé village the seabed has an extremely gentle inclination like other areas of this country (1/2,000-1/3,000). Sea breezes are also gentle (3-4m/sec) and big waves that might impact artisanal fishing boats operating on the coastline are rarely generated through the year. However, gusty winds occurring especially in the rainy season sometimes reach 35m/sec on the sea, possibly putting small fishing boats at risk when they blow at the sides of the boats. Their impact is especially great in July and August but this period is low season and the number of operating days drops to below half of that in high season.

In this area ocean waves impact the coast lightly because the entry angle of gentle ocean waves is almost parallel to the seashore. Fish landing beaches in Koukoudé are on the rocky belt around the Belga Cape and they are generally free from impact by windswells. Accordingly, these are extremely blessed beaches for artisanal fishing boats. The only exception is in the south-southwest of beaches where there are a few reefs and there is a natural navigation channel through which windswells sometimes advance from offshore. In this area large-size pirogues normally are at anchor and are occasionally damaged by hitting reefs. As mentioned above, it is also possible that boats are sometimes at risk when passing through the offshore rocky reef belt.

In Koukoudé no data is kept on the difference of tide levels. According to visual observations conducted in reference to the records of tide levels of the Conakry commercial port and the Kamsar port of Boké Prefecture, the difference in tide levels at spring tide is considered to be about 3.3~3.5m. Judging from the difference of latitude and longitude of both above-mentioned ports, it seems better to refer to the difference in tide levels (5.3m) of the Kamsar port which is geographically closer, but the above-mentioned visual observation is more similar to that of the Conakry commercial port. This is considered to have resulted from an expanded difference in tide levels caused by the location of the Kamsar port as the river port facing the Nunez River. It is important to conduct careful observation prior to implementation of this plan and conduct an actual measurement survey in reference to records of tide levels of both ports.

(3) Topographic Features, Soil and Vegetation

Bereïredistrict about 3km south of Koukoudé village is a small settlement situated west of Koundiende village, where development of a sightseeing facility is under way. Guinea has great hopes for developing sightseeing. Probably for this reason, too, there is a plan to construct an access road (paved) from the national road about 25 km northeast of Bereïré. An unpaved soil packed road has already been almost completed

up to Koundiende village southeast of Koukoudé and it is now being extended to Bell Air (Refer to Figure 5-10: Belga Cape Area Map).

The fish landing beach at Koukoudé is a sand beach but the front part forms a rocky reef area up to 1-4km off shore and a passage from the beach to the outer sea is impossible unless through natural channels on both sides of the sand bank west-southwest of the beach. In particular, large-sized fishing boats are unable to go through this rocky reef belt to the outer sea (Figure 5-10). The rocky reef in front of the beach consists of laterite metamorphic rock. According to an interview survey at the Mine Geology Department, it is assumed that underneath exists a foundation of basalt or granite and on top of that lies a layer of cohesive soil. Above the laterite metamorphic rock silt mixed with sands is piled up. At low tide, an area on the west side of the ODPAG facility covering about 120m toward the edge of rocky reef and about 200m from the beach used by small fishing boats such as long line fishing boats, becomes a land area (Refer to Figure 5-11: General Condition Map of Koukoudé Village). At the time of detailed designing of this plan, it is necessary to conduct careful surveys including drilling surveys of silt, sand-mixed silt, structure, intensity, thickness of the layer of laterite metamorphic rock.

5-4-3 Socioeconomic Conditions / Fishermen's Settlement

The questionnaire survey was undertaken on villagers who are belonging to the vocational groups shown below. The average age was 47 years for the men interviewed and 39 for the women. The total number of households in Koukoudé is estimated to be between 400 and 420 and the survey thus covered about 37% of all families. The number of persons surveyed in each socioprofessional group is shown in Table 5-6 below.

The “boat owners” own pirogues but do not fish themselves; instead they employ fishermen as crews. The “boat owners cum fishers” own their own boats and employ crews but they also fish themselves. In Koukoudé, many of the people who are engaged in smoking are also brokers, and there might be only few or even no people who are called as brokers. The roles of fish smoker-cum-broker are taken up usually by women and rarely by men. Fish processors are people who are engaged in dry-salting and drying processes, and the number of them is much less than the number of fish smoking men and women.

Table 5-6 Questionnaire Survey: Sample Population in Koukoudé

Socio-professional groups	Men	Women	Total number of respondents
Boat owners	4	1	5
Boat owners cum fishers	34	0	34
Fishing boat crew	3	0	3
Fish smokers cum brokers	29	72	101
Fish smokers	0	3	3
Fish processors	1	0	1
Carpenters	1	0	1
Mechanics	1	0	1
Shopkeepers/traders	2	1	2
<i>TOTAL</i>	<i>75</i>	<i>76</i>	<i>151</i>

(1) The Population

The population of Koukoudé was estimated at 3 600 people for this Study. This number was based on an average household size of 8.8 members and a total number of households of 410. The situation of migrant fishermen is unknown. The numbers below are from the survey held in December, 2002. The below table gives details on the estimated number of men and women and the age group distribution of the population.

Table 5-7 Estimated Age Group Distribution of the Koukoudé Population

Age group	Men	%	Women	%	Total	%
1-6 years (preschool age)	333	19%	374	21%	707	20%
7-12 years (primary school age)	363	20%	376	21%	739	21%
13-16 years (secondary school age)	151	8%	121	6%	272	7%
17-59 year	863	48%	901	50%	1 764	49%
60 years	85	5%	33	2%	118	3%
TOTAL	1 795	100%	1 805	100%	3 600	100%

The majority of the population is of the ethnic group Soussou but there are also minorities of other groups such as Peuhl, Malinke, etc. Most of Koukoudé's inhabitants (76%) are born in the Kindia region and only one third in the Boffa prefecture itself. 8% are foreigners (from Sierra Leone). Other places of birth reported include Boké (8%), Conakry (4%), Labé (2%), Mamou (1%), Kankan (1%) and N'zérékoré (1%).

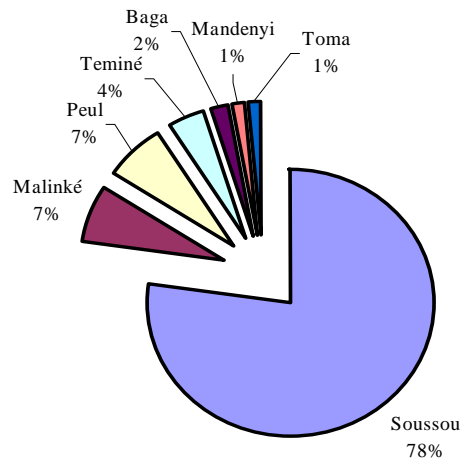


Figure 5-7 The Koukoudé Population by Ethnic Groups

(2) The Different Professions

Data collected on the different economic occupations of the members of the surveyed households confirm that most people in Koukoudé work in the fisheries sector. Table 5-8 below shows the findings of the survey in this respect.

Table 5-8 Main Occupations of Persons Surveyed and Their Household Members in Koukoudé (> 6 years)

Sector	Number of men	Number of women	Main professions
Fisheries	170	1	Fishers and boat owners
Fish smoking/processing/trading	108	225	Fish smokers cum traders, etc.
Transport and services ³⁵	15	10	Drivers, bakers, tailors, etc.
Building and construction ³⁵	23	0	Carpenters, mechanics, etc.
Trade	13	46	Shopkeepers, traders, etc.
Other economic activities	4	3	Farmers, teachers, etc.
Pupils	177	128	
No economic occupation	21	108	Children, house wives, pensioners.
TOTAL	531	521	

If it is assumed that the figures in Table 5-8 are representative for the whole population, it would appear that more than 40% of the women work in the fish smoking and trading subsector, that a third of the men are fishers and/or boat owners and that 20% of the men work in post-harvest activities. If the children – the pupils in Table 5-8 – are excluded from the calculation, the fisheries activities show an even more dominating role. However, it is possible that the figures are overestimated considering the composition of the sample population.

It can be noted that agriculture is quite rare as a main economic activity. However, 9% of the persons interviewed reported farming as a secondary occupation and 32% as something they had done previously.

(3) Administrative Structure and Professional Organisations

Koukoudé is a district of the Douprou sub-prefecture in Boffa prefecture and there is a district office in the village. There is a “harbour office” in the village and the Ministry of Fisheries and Aquaculture (Ministère de la Pêche et de l’Aquaculture) is represented by the National Directorate of Marine Fisheries (Direction Nationale de la Pêche Maritime) and by the Boussoura National Fisheries Research Centre (CNSHB - Centre National des Sciences Halieutiques de Boussoura). The maritime agency (ANAM - Agence de Navigation Maritime) and the National centre for fisheries surveillance (CNSP - Centre National de la Surveillance de la Pêche) are also present in the village.

In 2001, a landing site development committee (CDD - Comité de Développement du Débarcadère) was established on the initiative of the ministry. However, it appears that the committee is not acknowledged publicly. Nevertheless, it has a board consisting of seven members and three advisers, elected by the fishers of Koukoudé. The CDD

³⁵ Some of these professions are related to the fisheries sector, e.g. carpenters for boat building.

constitutes an important link between the district – representing the government administration – and the fishers. Some of the CDD board members are also members of the district board. It is however noteworthy that the CDD does not seem to represent the whole community of Koukoudé; not all socio-professional groups are represented and there is no woman on the board. The criteria for standing or voting for board members are not clear and it also appears that the duty of the CDD is not clearly defined. Generally speaking, the main functions of the CDD are to “deal with problems of fishers” and to “develop the landing site” At present, the actual activities of the CDD include tax collection from inhabitants on behalf of the district office. The committee is also concerned in the administration of loans given to fishers, through their cooperatives, by Crédit Rural (a rural credit union). In summary, the CDD appears to be something in between a traditional village council and a government body.

There are three cooperatives in Koukoudé that are recognised by the prefecture: the fishers (boat owners) cooperative Nafaya, the women fish smokers cooperative Limanya and the cooperative Langui Fan with a mixed membership of fishers, and smokers cum brokers. In addition, there are 13 newly formed groups that are still to be formalised. More than half of the persons surveyed declared that they were members of a group or a cooperative. There are more men being members than women: among the 75 men interviewed, 54 – or 72% - were members of some sort of association compared to 46% of the women (35 of a total of 76 women surveyed). Out of this total of 89 members, 12 are members of the Nafaya cooperative, 12 of Limanya cooperative and 16 of Langui Fan. The rest are members either of cooperatives based in a different location (e.g. Conakry) or of one of the new groups.

(4) Housing

The houses in Koukoudé are sheds or huts with walls made of thatch or straw. Only 21% of the persons surveyed reported to live in houses with brick walls (mud or cement bricks). The roofs are mostly of thatch as well, or corrugated iron sheets. This makes the village look temporary or unfinished, especially if one compares it with other neighbouring villages where houses appear more solidly constructed. The choice not to build more permanent houses in Koukoudé may be explained by the migratory character of the fishers and by the fact that the village is relatively new; the first inhabitants settled down in 1953. Moreover, the land close to the coast is considered public land. At the end of the 1980s when the first fisheries centre was built in the village by the Artisanal fisheries development bureau of Guinea (ODEPAG - Office de Développement de la Pêche Artisanale de Guinée), many people had to give up their houses and move in order to provide space for the new buildings. This experience may have made people reluctant to invest in more permanent houses.

Since there is no electricity in the village³⁶, storm lanterns are used for light and firewood is used as domestic fuel. There is only one functional deep well (made by drilling) in the village and most villagers use this for water source as well as the other 10-15 ordinary wells in the village. Only half of the interviewed households use latrines; the other half declared not having access to any sanitary facilities. There are no public latrines in the village except for next to the big smoking house but these are at present out of order.

³⁶ Only one household reported to have a generator.

(5) Assets and Land Holdings

The questionnaire survey included questions on the possessions and assets held by the households. The results are presented in Table 5-9 below.

Table 5-9 Possessions of the 151 Households Surveyed in Koukoudé

Type of asset	Radio	Video player	Music stereo	Television	Refrigerator	Freezer
Number of owners among interviewed households	120	0	0	2	1	1
Type of asset	Cooking stove	Washing machine	Fan	Air conditioner	Rifle	Sewing machine
Number of owners among interviewed households	0	0	2	0	10	6
Type of asset	Car / van	Motorbike / scooter	Bicycle	Canoe	Banda smoking oven	Furniture
Number of owners among interviewed households	4	12	31	55	118	40

Most of the households have Banda ovens, which confirms the importance of fish smoking as an economic activity in Koukoudé. Many households also own canoes³⁷. With regard to other assets, the radio is the most common item. Since there is no electricity in the village, household electrical appliances are uncommon. For transport, some of the households surveyed use bicycles or motorbikes/scooters and a few own cars or vans.

33 of the 151 persons interviewed declared owning livestock. On average, these households hold 6.5 cattle each – goats, sheep and cows. Poultry is more popular than livestock and 85 households have chickens and geese. The average number of poultry per household is 15.

Many of the households are landowners and own plots for housing or agricultural land (see Table 5-10). Among the landholdings reported in the Boffa prefecture some are in Koukoudé itself while others are in neighbouring areas. According to the information received, not all agricultural land is used for farming at present. It would appear that landholdings are also considered investments for the future.

37 These results are maybe not surprising since the sample population included a large number of boat owners and fish smokers.

Table 5-10 Land Holdings of the Households Surveyed in Koukoudé

Type of land	Number of owners among interviewed households	Place	Average area
Land for housing	125	Boffa : 69 Kindia : 14 Forécariah : 10 Other prefectures : 25 Abroad : 7	-
Agricultural land	100	Boffa : 52 Kindia : 13 Forécariah : 13 Other prefectures : 15 Abroad : 7	6.8 ha

(6) Schools and Schooling

There are three schools in Koukoudé, i.e. a semi-private French-Arabic primary school, a government French primary school and a community nursery school. The closest junior high school is in Boffa. The *French-Arabic school* was started in 1992 and has today a total of 242 pupils of which 101 are girls. The curriculum covers the six years of primary school. The community pays four out of the school's seven teachers and the school would hence be classified as a partly privately funded government school. At present (January 2003), construction work is on-going for improving and expanding the facilities. The government *French school* is housed in a new building at the entrance of the village. The school curriculum was to include the three first years of primary school in three separate classes but due a lack of teachers there is at a moment only one class. The school has 88 pupils of which 32 are girls. The community *nursery school* has 74 children (40 girls) in the age of three to seven years. The teacher is paid by means of monthly school fees.

420 children of school age were covered by the survey. Two thirds of them – 280 children – attend school in Koukoudé, i.e. one of the schools mentioned above. About 50 children of primary school age (7-12 years) – 12% of the total of this age group – do not attend school. The remaining 21% attend school in one of the neighbouring villages (Foulayah, Tougoufili) or in another prefecture (Kindia, Coyah, Conakry). There are more girls than boys in the group of 50 children who do not attend school; 40 girls. About 60% of the total number of children reported to be pupils are boys. In spite of this difference between boys' and girls' enrolment, it appears that more girls attend school today than in their parents' generation. As can be seen from Figure 5-8 below, 86% of the adult women interviewed have not received any schooling and cannot read and write. The illiteracy rate for the men participating in the survey is 23%. Moreover, an important share of the men – 43% – has attended Koranic school.

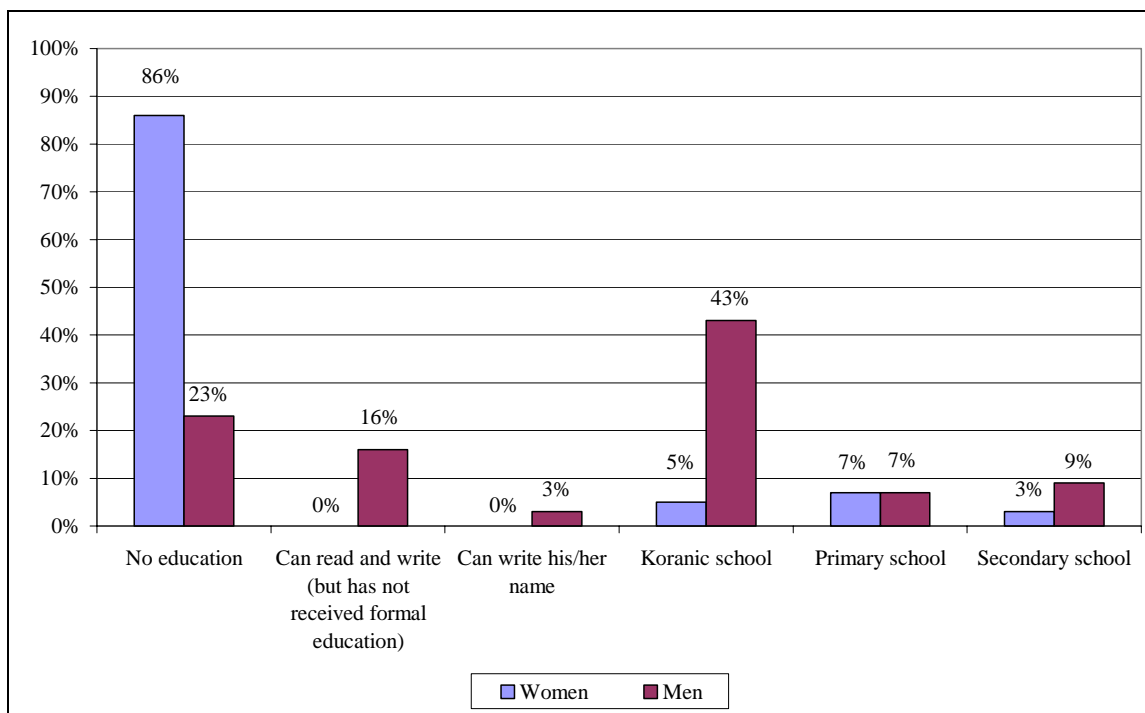


Figure 5-8 Educational Level of Persons Surveyed in Koukoudé

(7) Health Services

Health services are provided by four small private clinics. The clinics are only equipped in a very basic way and there is a lack of qualified doctors; the clinics are – at least in most of the cases – run by (male) nurses. There is no public health centre or post in the village. The nearest health post is in Kombaya village, 5 km from Koukoudé, and there is a health centre in Douprou, the sub-prefecture, 17 km away. For medical services beyond simple primary care, the villagers have to turn to the hospitals in Kamsar or Boffa.

Nevertheless, there appear to be a certain degree of collaboration between the private clinics in Koukoudé and the public health services. For example, once a month medical staff from Douprou come to Koukoudé to give vaccinations to new-born babies of which registers are kept by the private clinics. 93% of the persons interviewed declared that they themselves or someone in their household had been inoculated. A large share of the persons surveyed – 28% – said they use traditional treatments and medicines when ill. 42% reported that they and their households use the private clinics in Koukoudé and 23% had also turned to the health services in Kombaya or Douprou. The hospitals in Kamsar and Boffa had received 21% of the households interviewed. Medical care is sometimes also sought in other places, e.g. in Conakry and Kindia.

(8) Fishing Boats and Gear

According to an inventory in 2001, there were 432 fishers and 74 canoes in Koukoudé. A similar survey carried out in January 2002 indicated that the number of canoes had increased and there were at that time 110 canoes of which 95 were operational. The number of canoes generally varies during the year and during the rainy season there are normally only some 60 boats around while in the dry season the number may increase to

120. It seems that the total number of boats has increased as compared to six years ago with the arrival of more migrant fishers. With regard to fishing gear, it is particularly the numbers of bonga driftnets and large-mesh size gillnets that are increasing. However, overall, the most common gear are currently the bonga encircling gillnets and the longlines. Table 5-11 gives the numbers of canoes and main gear used in Koukoudé in 2002.

Table 5-11 Number of Canoes and Fishing Gear Used in Koukoudé

Gear	Canoes in operation	Canoes not in use
Encircling gillnet for bonga (ethmalose)	30	4
Encircling gillnet for bobo	8	2
Seine net	6	0
Driftnet for bonga (ethmalose)	8	2
Longline	39	5
Gillnet (large mesh size)	4	2
TOTAL	95	15

The 39 boat owners (and boat owners cum fishers) interviewed for the survey own – with a few exceptions – one or two canoes. Many of the canoes do not have engines or have only small engines (see Figure 5-9).

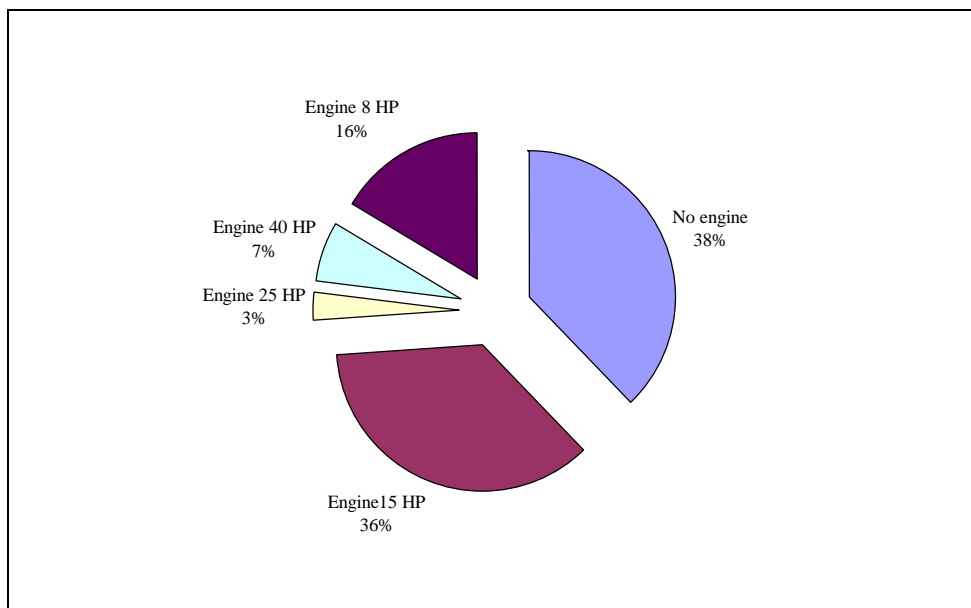


Figure 5-9 Use of Engines by Canoes in Koukoudé

(9) The Fish Smoking Subsector

An inventory carried out in early November 2002 gave the following results with regard to the number of smoking ovens in Koukoudé:

Table 5-12 Number and Types of Smoking Ovens in Koukoudé

	Total
Home use smoking ovens	168
Banda type ovens	154
Banda's stoke holes	833
Drum type smoking ovens	149

According to this survey, 168 households of the total 410 in the village own fish smoking ovens. The total number of Banda ovens is estimated at 154. In order to give an idea of the size of the ovens, the number of stoke holes was also counted in the survey and it appears that a Banda has four or five stoke holes on the average³⁸. In addition, there are 149 simple drum type ovens, so called "Komboustes". The questionnaire survey in December 2002 gave some indication that these figures may be underestimated but it was not possible to arrive at more exact values. Estimates of the capacity of different ovens suggest that an average size improved Banda oven (with four or five stoke holes) can smoke 4,000 – 5,000 bonga at the time. A traditional Banda oven, which is not partitioned, takes 1,500 – 2,000 fish. The drum type ovens are small and have a capacity of only some 150 – 400 bonga (according to the survey, the average capacity was less than 200 fish).

5-4-4 Fishery Situations

(1) Fishery Industry

In the Koukoudé fish landing beach, there are surrounding nets, encircling gill net, drift gill nets, fixed gill net and long line fishing boats (simultaneously perform hand line fishing) in operation. This area consists of a complex submarine topography, including a gently sloping sea floor and a range of rocky ledge reaching 1~4 km off shore, making the area one of the most diverse fishing grounds in coastal Guinea. Thus, although there are occasional trips to the sea offshore of Kamsar in Boké prefecture, the fishery operations at this beach are mostly a single day operation. Because this region is good fishing ground, there are six surrounding net boats from Boulbinet in operation except during the off season from July to September and the number of the boats increases to twelve or thirteen during the peak season.

The six fishing communities around Belga Cape (Refer to Figure 5-10) operate in their own area, and while occasional landing at Koukoudé is possible depending on the current and wind condition, usually there are no visiting boats from other fishing communities.

³⁸ The number of stoke holes is equal to the number of fireboxes or furnaces. A so called improved Banda oven is usually partitioned into different sections in such a way that the different partitions can be used separately.

According to the interview survey to the port manager and Gendarmerie (military policemen), the total number of active fishing boats operating in Koukoudé is 107 (including 12 boats from Boulbinet), as shown in the table below. Most fishing boats do not carry ice during the operation, but some long-liners leave the port with ice. Interviews with the owners of the long-liners suggest that if ice is available during operation, some fishermen wish to go to the sea off shore of Kamsar in Boké prefecture. (there are already some fishermen conducting such operations with ice supplies)

Table 5-13 Number of Operating Fishing Boat in Koukoudé and Yearly Operating days

	Surrounding net	Encircling gill net	Drift gill net	Fixed gill net	Long line	Total
Koukoudé (2002)	18 boats	38 boats	8 boats	4 boats	39 boats	107boats
Koukoudé (1998)	9 boats	31 boats	? boat	3 boats	30 boats	73 boats
Rate of increase	200%	122.5%	?%	133.3%	130.0%	146.6%
Yearly operating days	177	154 days	150 days	180 days	90 days	.

Note) In all cases yearly operating days are estimated based on interviews and fishery statistical data. The number of fishing boats in 1998 indicates the number of registered fishing boats. The total of fishing boats and calculation of the rate of increase in 1998 do not include boats visiting the port.

The table below shows breakdown of the target fish for each operation method (fishing method). The surrounding net and encircling gill net both can be used to catch a wide variety of fish, but they are mainly used for Bonga. The difference between the two nets is that the encircling gill net is not very suitable for fishing Bonga-seri, which comes in season after the Bonga season. The drift net, fixed gill net, and long line are mostly used for premium fish. The drift net and fixed gill net are used mainly to target Bobo, and the long liners usually target sea catfish and large-sized whiting.

Table 5-14 Targeted Kind of Fish by Fishing Method in Koukoudé

	Targeted kind of fish
Surrounding net	Bonga, bonga-seri, bobo, etc.
Encircling gill net fishing	Bobo, bonga, barracuda, etc.
Drift gill net fishing	Bobo, bonga, barracuda, etc.
Fixed gill net fishing	Bobo, large-sized whiting, etc.
Long line fishing	Sea catfish, large-sized whiting, sea bream, barracuda, sea carp, shark, etc.

Note) Based on interview survey.

For each of the operation methods, the peak fishing season is from October to February, the off-season is from July to September, and the months that do not belong to either are referred to as the non-peak season. The weather is usually bad and the sea condition is rough during the off season, making operating around the rocks especially dangerous, so this season is used for repairing equipment and resting.

For surrounding net, encircling gill net, and drift net operations, the fishing ground during the non-peak season is a little further than during the peak season. Fishing during the non-peak season and off-season does not target Bonga, but it is not necessarily thought as a bad fishing season, considering increasing fishing opportunities for Bonga-seri (especially with surrounding net) and Bobo especially during the spring non-peak season. There is no specific harvest season for the fixed gill net and long line fishing, and fishing operations are carried out throughout the year. With the long line fishing, operation is busy during the peak season, but also in August, and the ropes and fishhooks are changed to the larger size from March to September when the target fish become larger. In addition, while operation is usually carried out during the day with the other methods, the long line is operated at nighttime, with boats usually departing in the evening and arriving at the port early next morning.

The operating days for each method is estimated as shown in the table below, but they are expected to rise if operation safety is increased by the development of the basic fishery facilities in the area.

Table 5-15 Yearly Operating Days by Fishing Method in Koukoudé

(Unit:day)

Monthly operating days	1	2	3	4	5	6	7	8	9	10	11	12	Total
Surrounding net fishing	18	18	15	15	15	15	10	10	10	15	18	18	177
Encircling gill net fishing	18	18	14	14	14	14	4	4	4	14	18	18	154
Drift gill net fishing	17	17	14	14	14	14	4	4	4	14	17	17	150
Fixed gill net fishing	15	15	15	15	15	15	15	15	15	15	15	15	180
Long line fishing	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	90

Note) In all cases, yearly operating days are estimated based on interviews and fishery statistical data.

In bumper days fishermen may sail out fishing twice a day but such cases are not reflected in this table.

According to the interview survey and various statistical sources, the annual landings in the Koukoudé district are estimated to be about 4,200 tons. This amount is equivalent to about one thirteenth (more than 7%) of the total coastal artisanal fish landings in Guinea during 2000. This high percentage suggests that there is a great need to develop the basic facilities in this area in order to become the main fishery communities around Belga Cape and to serve as a marine resources distribution base to supply and distribute fishery products nationally.

Table 5-16 Yearly Fish Catch by Fishing Method in Koukoudé

(Unit:ton)

	Daily fish catch	Average monthly fish catch	Yearly fish catch	Daily fish catch volume/per boat	Average yearly fish catch/per boat
Surrounding net fishing	1.08~15.3	10.8~275.4	1,713.6	0.18~0.85	117.00
Encircling gill net fishing	2.584~17.1	10.336~307.8	1,794.2	0.2~0.45	47.22
Drift gill net fishing	0.36~1.32	1.44~22.44	141.7	0.045~0.165	17.71
Fixed gill net fishing	0.28	4.2	50.4	0.07	12.6
Long line fishing	2.73	20.48	245.7	0.07	12.6
Temporarily visiting boat	0.5~1.5	3.5~24.5	166.9	0.05~0.15	16.69
Total	7.5~38.2	75.8~675.3	4,405.5	-	-
Bonga, seri	3.3~28.3	70.8~508.7	3,222.9	-	-
Premium fish	4.0~8.9	28.2~121.6	1,182.6	-	-

Note) In all cases, fish catch volume is estimated based on interviews and fishery statistical data.

(2) Fishery Distribution

Trading of the fish landed at the beach is performed face to face but usually the price set in a deal by the first boat back to the port affects the general transaction price for that day. However, because of lack of road infrastructure and ice making equipment to supply other areas the supply could exceed the demand during the peak season or at a large catch. In these cases, the transaction price at the beach drops substantially.

Among the so-called brokers, there are a few that purchase large-sized whiting (capitan) to salt and dry and they sell to Senegal where the salted and dried products are popular, but according to interviews, the number is few compared to that of the smoke brokers.

While there is no tradition which allows females to have the purchasing priority in Koukoudé, the fishing owners and the brokers accommodate each other with a loan, usually from the financially stronger fish smokers to the fishing boat owners, and in those cases, the purchasing priority is given to the smoking people instead of charging interest and the transaction appears to be lower than at the market price.

(3) Fish Smoking

It is estimated that the number of fish smokers in Koukoudé district is 730, the number of Banda type smoking ovens is 154, the number of Banda type smoke nets is 833, and the number of drum type smoking ovens is 149. The smoked products in the Koukoudé district are long-term smoked products, produced by a long smoking process of about 12 hours, which makes long-term preservation possible. Thorough smoking for about 12 hours is performed when preparing smoked products for sale to the Guinea Forest Region. By doing so, it is possible to ship to the Guinea Forest Region when the smoked products are in short supply there. On the other hand, the smoking time is

reduced to about 3-4 hours when preparing for sale within the Boffa prefecture and to the neighboring prefectures such as Boké, Foulaya, Conakry, Kindia, and Telimele, where the short time smoked products are preferred.

Among the large-scale smoking firms common in male fish smokers, there are some that only target the small pelagic fish such as bonga and bonga seri, and do not touch smoking of large premium fish. According to interviews, smoked products of premium fish have a high risk because of high purchase price and unstable market for this product. Although some of the large scale smoking firms process 30,000 to 40,000 fish every month, usually about 10,000 to 20,000 are smoked each month.

These distributors of smoked products do not target this prefecture or the neighboring prefectures and generally travel to far away regions such as the Guinea Forest Region, the Guinea Highland Region, Conakry or Kindia to sell smoked products. Because they sell a large amount of smoked products at once, they sell to wholesale dealers with a lot of capital.

Many brokers visit Koukoudé to buy good quality smoked products in bulk. Because they buy a large quantity of smoked products, sometimes smokers sell to such brokers. For both parties, transaction prices are relatively advantageous. During the peak season, some people buy smoked products from small-scale smokers to sell, acting as brokers during this period. Transactions are mostly done on credit and it takes quite some time to collect capital. To determine the right time to sell and to avoid the period when the market is saturated, it is important for them to consistently keep an eye on the market and the situation of products produced in the competing region of Boké prefecture shipped from Kamsar. Distributors of smoked products in Koukoudé do not own transportation means of their own and hire professional carriers.

On the other hand, small-scale smokers using a home drum type oven, which is popular among women smokers, or the banda for common use, are not only equipped with small production capacity but also lack sources of funding capacity and information. Thus, they mainly sell to backland farm villages, within their own prefecture or in the neighboring prefectures. These areas do not provide advantageous markets because there are many areas with competing smokers. However, as people are fond of short-term smoked products, they offer certain advantages such as shorter time spent on smoking and relatively quick recovery of funds. These small-scale smokers sometimes entrust the sales of their products to brokers of Koukoudé (large-scale smoke products distributors).

In Koukoudé there are a variety of smokers, small-scale and large-scale. Therefore, merchants can regulate quantities by ordering different sizes of pannier (basket) for packing. According to the interview survey, there are 15-20 pannier makers in Koukoudé and generally they make a pannier for about 1,000-9,000 fish.

The purchase price of bonga on the beach is generally 500FG/5-6 fish but at the time of good catches (when the season is at its peak) they may drop as low as 500FG/9-10 fish. The sales price of smoked products is 1,000FG/7-8 fish³⁹. Accordingly, the amount

³⁹ In Kamsar , purchase price of fresh bonga is about 500FG/about 10 fish. The sales price in Conakry is generally 1,000FG/about 7 fish for those from Koukoudé (those from Kamsar sell at 500FG/about 7 pieces) and in case of excess supply, 1,000FG/about 8-9fish.

smoked in one banda once generates about 40,000 FG (if the fish is bought at a lower price, the income can be almost doubled). The profit is calculated by deducting from the income the costs of fuel, packing, transportation, and if necessary, purchase price on the beach and cost of transportation from the beach.

5-4-5 Existing Bases

In Koukoudé, a section of a long sand beach is used as a fish landing beach. The offshore environment is very rocky with a number of rocks on the surface, but there are two natural channels north and south and many fishing vessels use them during departure and arrival to the port. While the southern channel is adequately deep so that it allows uses by a large boat such as Flimbote and Salan, the northern channel is not as deep so only small boats can pass. On the shore side of the southern channel, there is a range of rocks (rocks west of ODEPAG facilities) which are usually above the water surface, but the northern channel is located in an area concentrated with smaller rocks of less height which disappear under the surface during high tide, causing some danger when traveling in this area.

The ODEPAG facility adjacent to the southern channel is a fishery base developed about 15 years ago. The facility includes a fish landing management office, ice making and refrigerating buildings (10-ton ice making capability), an outboard motor repair shop, generator, fuel station (including fuel tanks), small scale multi-purpose warehouse and staff dormitory (two wings), and Gendarmerie guard station. In addition, there is a newly built icehouse which is still in a trial period. The building the Gendarmerie currently use was originally planned as a disposal facility for fresh fish just landed. This building is surrounded by walls and is not suitable for disposing activities. Also, it is not large enough to handle the current landings. The ice making and refrigerating facilities, which were loaned to a private company after completion, failed after being used only for a short period and have not been in use since then. (According to relevant personnel, the cause of the failure was inability to change only a minor electric component.) The outboard motor repair shop performs only a small amount of work thus does not fulfill its function due to difficulty in supplying parts. In the management office, an emergency room and a storage room were planned in addition to the port manager office room, secretary room and a general office room, but currently the storage room is used by the Fishery Surveillance Department (CNSP), and the emergency room is not used.

Backland of the middle part of the Koukoudé fish landing beach (middle of the two channels in north and south) collects rainwater, forming a water-filled area. The size of the water-filled area differs seasonally, though usually is about 40 meters by 10 meters. It expands during the rain season and overflows from the north side to the beach. Along this water-filled area and backland of the north side of the beach is mainly used for smoking operations, and there are more than 20 smoke houses within about 40 meters of the shore line at the beach.

Behind the fish landing beach is a residential area for the fishermen. There are no planned sectional roads in the area, and only naturally formed streets exist. Although the population density is not all that high at 120 to 150 persons per ha, the area is dense from the point of disaster prevention since many buildings in the area have thatched roofs and walls as in other fishing communities in Boffa Prefecture. In this area, there are 300 or so smoke houses of traditional type without perimeter boundaries (walls) in various sizes, and in 1992 and 1998,

there were major fire caused by a fire spill from a smoke house, destroying more than 100 buildings each time. After the first major fire, the smoke houses were set up along the beach in the burned area, and “marche” was constructed surrounded by buildings made of concrete bricks. Also, a mosque was build after the second major fire. Both were created through the self-help efforts of the community itself.

The residential area is divided into two administrative sectors. Bordering the water filled area mentioned above, the southern side is Sector 1, and the northern side is Sector 2 (Refer to Figure 5-11). In Koukoudé village, in the past, the basic fisheries facility as well as the large-scale reinforced concrete community smoke house in the residential area of Sector 1, were developed by the ODEPAG (the access road to the current ODEPAG facilities was installed at that time). However, development of local infrastructures was neglected and there has been no official development except for treadle type wells about ten years ago and more recently, a public school. The access road to the Koukoudé fish landing beach splits near the village entrance, one arm reaching the ODEPAG facilities through Sector 1, and the other arm passing through near the border of the two sectors and reaching the back side of the smoke houses at the beach. These access roads are unpaved and the road condition is not good, requiring maintenance by the district several times a year. Except for the naturally formed ditch along the old access road to the beach (the ditch leads to the water filled area mentioned above), there is no rainwater drainage system, causing puddles everywhere during the rainy season and worsening the sanitary condition in the community. There are no administrative facilities, and the ODEPAG facilities, which were developed about 15 years ago, are used for events such as commune assembly. Educational and medical facilities are both lacking and frequent visits to the facilities in the surrounding farming communities are necessary. For more information about educational and medical facilities, refer to the section in “5-4-3 Socioeconomic conditions/fishermen community” for more details.

5-4-6 Issues in the District

Following are issues in the districts brought up by the community residents in the participating-type workshop.

Table 5-17 Issues in the District

Issues	Reasons
Inadequate safety measures in the fish landing area and on the sea.	<ul style="list-style-type: none"> • Degradation of pirogue • Inadequate supply of electricity • Inadequate resource equipment for patrolling • Transmission difficulty • Inadequate navigation aids • Lack of breakwater • Inadequate sea lanes • Inadequate life jackets • Lack of docking pier development
Difficulty in preservation and processing of fish	<ul style="list-style-type: none"> • Inadequate upgraded smoking ovens • Inadequate fish processing equipment • Degradation and insufficient number of smoking oven wire mesh • Inadequate fish drying places (fish drying process) • Lack of available refrigerators for fishermen • Inadequate products storage • Nonfunctional refrigerators • Inadequate participation by the community in the maintenance and management of the fishery facilities
Difficulty in distribution of fish	<ul style="list-style-type: none"> • Inadequate spaces for landing fish and retail • Lack of access road development • Lack of parking facilities • Lack of development in market
Inadequate development of social infrastructure (schools, restrooms, drinking water, medical centers)	<ul style="list-style-type: none"> • Lack of capital for development • Lack of loan and saving system • Inadequate administrative support
Inadequate administrative infrastructures (offices, meeting rooms, guest houses, culture centers, mosque)	<ul style="list-style-type: none"> • Lack of capital • Lack of loan and saving system • Inadequate administrative support
Difficulty in child care	<ul style="list-style-type: none"> • Inadequate child care centers • Inadequate children's playgrounds • Inadequate training centers
Lack of places to eat	
Insufficient income from fisheries	<ul style="list-style-type: none"> • Inadequate fishing equipment • Degradation of the fishing equipment • Inadequate training related to fishing equipment maintenance • Inadequate operation capital • Inadequate parts storage

5-4-7 Objective of the Project

Develop the Koukoudé Fish landing beach as a national base for supply and distribution of processed fishery products and premium fresh fish around the country including the Guinea Forest Region. At the same time, develop local infrastructures in the Koukoudé community, which is rapidly increasing in population and is becoming one of the most populated districts in the Boffa Prefecture.

5-4-8 Basic Policy

Basic policy of this project is as follows.

- a. Facilities development focuses on premium bottom fish as well as the traditional pelagic fish for smoking caught by large surrounding nets and encircling gill net boats.
- b. This fish landing beach is in a shallow water area with many rocks and development of breakwater for bad weather is not realistic in terms of cost effectiveness and easy maintenance. In development of fishery base facilities, the plan shall retain as much sand of the beach as possible, as it is currently utilized for landing in bad weather.
- c. The plan shall be made so that each section in the large fish landing beach is interconnected organically to function as a whole. The plan assumes redevelopment of the existing ODEPAG facilities as well as installation of new fish landing facilities and land facilities.
- d. The plans to meet demand for ice to encourage premium bottom fish fisheries and development of refrigeration facilities for temporary storage in case of large catches shall give adequate consideration to the relationship between the neighboring fishery communities.
- e. The development plan will be based on the increasing trend of known registered fishing vessels, increasing trend of visiting fishing vessels, and improvement to the operating environment caused by the new fish landing beach facilities.
- f. Improve the capability of the existing unions so that operations management and maintenance of the new fish landing beach will be performed by the users themselves.
- g. Improve the overall employment condition including welfare for the staff as well as improvement in functioning of fisheries, marine resources distribution industry and marine product processing industry. Development of smoking facilities shall include planning of a complex facility for disaster prevention for the surrounding buildings, and give adequate consideration to fuel efficiency and welfare of working women.
- h. Bare minimum of local infrastructures in the district and commune facilities shall be integrated in the plan with the basic fishery facilities.

- i. The living condition development plan in the district shall adapt a reservation idea (areas to adjust development) to adapt to population increase in the future and to proceed with development of local infrastructures.
- j. The plan includes drainage system to cope with the rainy season.
- k. The plan assumes improved access to the paved road leading to the national road in the development process. (Urge development by the Agricultural Ministry's Agricultural Engineering Division (Génie Rural) and based on the Poverty Reduction Strategic Paper (PRSP)).
- l. The plan shall be made so that the backland would not be flooded during high tide.
- m. Development of facilities and equipment in this plan should give adequate consideration to the backland urban areas and the surrounding environments, including live plants.
- n. When dredging bottom soil in the river around a sloped pier or quay, operate during low tide only to the extent that the fisherman is capable of removing the deposit and dredging should not be done more than necessary.
- o. For development of facilities, the needs for a facility shall be discussed in detail, and plan only to the extent that the future maintenance is possible with adequate consideration to cost effectiveness.
- p. This plan will be implemented in two parts. First, conduct development of the southern part of the beach, which is used by large vessels. Then, move on to the northern part, which is used by smaller fishing boats such as a long liner. Construction is assumed to be implemented over several terms, taking the scale of work into consideration.

On the southern side of the beach, redevelopment of the current ODEPAG facilities is carried out in the first term focusing on the sloped quay along the shoreline rocks, and in the second term, redevelopment in the fish landing beach backland around the water-filled area. On the northern side of the beach, develop the port civil engineering facilities in the first term, focusing on the sloped quay along the shoreline rocks of the northern part of the fish landing beach, and develop the land facilities in the second term. Temporary fishery operations will be arranged in the northern part of the beach during the first basic fishery facilities development, and in the completed southern part of the beach during the second basic fishery facilities development.

5-4-9 Details of the Project

a. Development of Fishery Related Facilities

Consider development of channel marker lights, sloped pier, ramp, ship landing place, fishing equipment storage, outboard motor repair shop (improvement of the existing facilities), fishing boat repair shop (partly roofed), fishing equipment and net repair shop (partly roofed), etc.

b. Development of Facilities for Disposal of Goods and Distribution

Consider development of fresh fish disposal area, fresh fish retail market, related products retail market, etc.

c. Development of Marine Products Processing Facilities

Consider development of smoking house through use of improved Banda, warehouses, etc.

d. Development of Fishery Support Facilities

Consider development of access roads, parking areas, pavement within the premises, rain water drainage system, gas stations (utilizing the existing facilities), lights on the premises, water supply system, wastewater treatment system, ice machines and freezers (improvement of the existing facilities and equipment), refrigerators, power generators (diesel generators or solar power), etc.

e. Development of Welfare Provisions at Fish Landing Sites

Consider development of place of worship, childcare centers, emergency rooms, restrooms and shower facilities, sewage treatment system, garbage disposal facilities, etc.

f. Development of Fish Landing Management Facilities

Consider development of fish landing management office (partly utilizing the existing facilities), offices for fisheries association and other unions, guard house, security facilities (Gendarmerie guard station), surrounding facilities (such as fences), etc.

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

Propose maintenance of public square, green space, children's playground, public elementary schools (expansion of the existing facilities), public clinic and health care center, community assembly hall, drinking water supply and fountains, wastewater treatment system (including rain water), public restrooms, public sewage treatment system, garbage disposal system, disaster prevention equipment such as water tank (utilizing the existing shallow wells and rain water drainage system), development of the district administrative facilities and land use planning (zoning), and reservation plans, etc..

Detailed facilities location diagram and scaling option of each facility are provided at the end of the chapter respectively in Figure 5-12 and in Table 5-23.

5-4-10 Maintenance and Management Plan

The management organization consists of full time staff and the management committee, which determines the basic management policy of the planned facilities. Although the “Koukoudé fish landing site development committee (CDD)” is considered here as a parent organization of the management committee, it has not been fully exercising the expected activities at a satisfying level because it is still a young organization (established in 2001). Moreover, knowledge and experiences in organization management and financial management are lacking and the committee has not established a firm position as a representative of the fish landing site users. Even among the users, there hasn’t been an attitude at this point that the users themselves need to be involved in operations management. Also, because Koukoudé is not close to a town and lacks electricity supply, operation cost for the ice making machines and refrigerators is high due to the planned use of diesel electricity generation as a power source. For this reason, operation of the ice making machines and refrigerators require a rather higher degree of management capability compared to other fish landing sites. Especially in the early phase of the new fish landing site operation, it might be necessary to set a quite high price for ice to show any profit during the time of low operation rate of the ice making machines and refrigerators.

For these reasons, it is ideal to have the management committee and the public work together in management of the Koukoudé fish landing site, and the construction of the facilities shall be carried out after appropriate training on enlightenment, organization management and financial management⁴⁰. The plan deals with management of the ice making machines and refrigerators by entrusting a private company⁴¹, but if the ice price is too high, it might be necessary to consider operations directly led by the government in the first few years while conducting training for enlightenment, organization management and financial management to the fish landing site users. However, local personnel shall be utilized for full time staff as much as possible. Refer to Table 5-24 for staff arrangement of the management organization and the budget planning.

5-4-11 Budget Allocation Summary

Construction expenses for the coastal basic fishery development in the Koukoudé district is as follows (Refer to Table 5-25 for details).

First term construction	:	Mainly civil engineering work for building the fish landing site	1,956,625US\$
Second term construction	:	Mainly construction work for building the land facilities.	1,275,965US\$
Third term construction	:	Mainly civil engineering work for building the fish landing site	1,218,667US\$
Fourth term construction	:	Mainly construction work for building the land facilities.	1,307,789US\$
Total construction cost	:		5,759,046US\$

40 In Kamsar, capacity building of the union members were carried out for two years before the completion of the facilities by training on financial management and organization management methods. Likewise, in the current plan, construction of the facilities shall be implemented after adequate capacity building of the management committee by the Guinea government.

41 Technical review related to maintenance shall be conducted in advance and bidding shall be made on qualifying businesses to select a management company. Bidding items shall be lease amount and sale price of ice.

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

Second term construction	:	220,323US\$
Second term construction	:	1,495,718US\$
Fourth term construction	:	217,486US\$
Total construction cost	:	1,933,597US\$

5-4-12 Environmental Impact Assessment

The mouths of the Kapatchez River and the Pongo River are located 30km northwest and 40km southeast of Cape Belga respectively, and the surrounding areas are covered by mangrove trees. These areas are designated as registered wetlands under the Ramsar Convention (Table 5-18).

Table 5-18 Registered Wetlands under Ramsar Convention

Registered number	Name	Date	Area	Coordinates	Environment condition
573	Rio Kapatchez	November 18, 1992	20,000 ha	10°25' N 014°33'W	Traditional fisheries and rice farming, mangroves, and habitat for rare waterfowls and flamingos
574	Rio Pongo	November 18, 1992	30,000 ha	10°08'N 014°08'W	Traditional fisheries and rice farming, mangroves logging by intruders, and associated damage to nesting habitats for birds.

Source : The Annotated Ramsar List of Wetlands of International Importance GUINEA, Office of the Ramsar Convention

In maintaining the facilities and the equipment, the plan shall be made so that negative impacts toward the backland residences and the surrounding environment are minimized, and give adequate attention to the surrounding vegetation as well. Development of smoking facilities shall include planning of a complex facility for disaster prevention to the surrounding buildings and environment, and give adequate consideration to fuel efficiency and welfare of working women. The drainage system is planned in the district to manage the rainy season, thus reducing the number of puddles to prevent development of malaria carrying mosquitoes. Also wastewater is discharged outside of the port to keep the water quality in the port. For reclamation project, prevention measures shall be taken against sediment discharge to minimize potential impacts by sediment discharge to the marine resources. Further, there is a possibility for mudslide caused by loosened surface soil at excavation site for digging of sediment for reclamation, prevention measures shall be taken against mudslide. Reclamation also changes the shape of the coastal topography, affecting the current and wave conditions, and drift sand. Because it is a shallow beach, affects to the current and wave should be minimal. Sediment deposit to the sea-lane caused by drift sand shall be monitored and appropriate measures shall be taken. Environmental impact to the ocean by the dredging of soil should be negligible because only a bare minimum of dredging operations will be carried

out – for dredging of the riverbed around sloped piers, and only as much dredging as can be done by the fishermen themselves during low tide will be carried out.

There is a Ramsar Convention registered wetland to the north of Koukoudé, called Rio Kapatchez, but it is far enough away not to be affected by the project. Adequate compensation and alternate locations shall be provided for the removal of domiciles or retail stores.

Table 5-19 Result of Environmental Impact Assessment of the Project Planning

Project planning	Components	Degree of environmental impact	Reasons	Environmental protection measures
Base facilities development project for coastal fishery and local infrastructures in the Koukoudé district	Development of wastewater drainage system	Positive impact	Preventing malaria carrying mosquitoes development and polluting the port water and environment	
	Excavation of soil for reclamation	A	Mudslide by loosened surface soil	Sediment discharge prevention measures
	Change in coastal topography by shore protection	B	Impact on current, wave and drift sand	Monitoring of discharged sediment in sea lane and preventive measures
	Dredging	C	Removal of sediments by fishermen	
	Removal of domiciles and retail stores	B	Land for fish landing facilities	Provision of alternate lands and sufficient compensation

5-4-13 Economic and Financial Analysis

- (1) Financial Assessment (fish landing site development, excluding non-manufacturing commune development)

Implementation of this project will bring an estimated income of 342.57 million FG annually, mainly generated by profit from sales of ice (Table 5-26). Expenses include the facilities development cost of 11,518.09 million FG in the first year, the operation cost of 278.26 million FG annually, and the ice making and refrigeration equipment renewal cost of 1,488 million FG every ten years (Table 5-27). The internal financial rate of return for 30 years was calculated based on these figures, but the calculation was not possible (Figure 5-28), indicating that financial profit cannot be expected from this project. However, because the projected annual income is greater than the expense, the project is financially manageable under the following conditions if the facilities investment is funded by outside sources such as through aid or by the government.

- Replacement of ice making machines and refrigerators every 10 years is not possible (limited to 40% of the required fund)

- Increase in working expense by 24% or more will likely impede management.
- Decrease in income by 19% or more will likely impede management.

(2) Economic Assessment (fish landing site development, excluding non-manufacturing commune development)

1) Economic Benefits

Benefits consist of increase in fish catch volume, and subsequent increase 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 weather and ocean conditions, 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 a 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 do 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.
- In most cases, smoking houses are close to fish smokers' homes so 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.
- Half of fixed gill net fishing boats and long line fishing boats would shift to 4-day-operations from 1-day-operation because of ice supply.

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 5-20. The estimates are based on the following conditions.

Table 5-20 Predicted change in fish catch by development of the fish landing site

	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	3,173	230	329		559
Fish for domestic consumption such as catfish	543	67	48	53	168
Fish for export	390	54	35	37	126
Total	4,106	351	412	90	853

Increase in fish catches due to increased frequency of sailing

The number of annual operation days will increase because the port is developed and boats can be parked at convenient locations for departure. There is no change in operation days of surrounding nets and fixed gill nets but the number of operation days will increase from 154 days to 177 days for encircling gill nets, from 150 days to 170 days for drift nets, and from 90 days to 108 days for long line fishing. Also, 4 drifters (not powered) will switch to long line fishing when the Bonga are not in season. (Refer Table 5-29 at the end of this chapter for more detail.)

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), contributing to a 10% increase of fish catches due to more freedom during operating hours. For fixed gill nets and long line fishing, it is set that half of the fishing boats would have 10% increase in fish catches.

Increase in fish catches due to ice supply

Half of fixed gill net fishing boats and long line fishing boats would shift to 4-day-operations from 1-day-operation because of ice supply, and fish catches would increase 10%. (50% of the fishing boats will have 50% increase in fish catches.)

The economic benefit calculated based on the assumptions above is 918.85 million FG per year (Refer to Table 5-30, 31, 32, 33, 34 and 35 at the end of this chapter for individual calculations of economic benefit). The breakdown is as follows:

- Economic benefit from the increase in volume of fish catch due to increased frequency of sailing: 174.59 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 increase in volume of fish catch per operation due to increased sailing hours: 234.44 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 ice supply: 98.42 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: 366.4 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: 45.01 million FG per year

2 of 4 fixed gill net fishing boats will shift to 4-day-operations from 1-day-operation and this will have an effect of 50% reduction of gasoline consumption volume. For example, assuming that the current gasoline consumption volume per fishing boat is 20 liters per day and total operation days in a year is 177, the gasoline consumption volume will be reduced 50% from 3,540 liters to 1,770 liters per year.

20 of 39 long line fishing boats will shift to 4-day-operation from 1-day-operation and this will have an effect of 50% reduction of gasoline consumption volume. For example, assuming that the current gasoline consumption volume per fishing boat is 40 liters per day and its total operation days in a year is 108, the gasoline consumption volume will be reduced 50% from 4,320 liters to 2,160 liters per year. A price of 93FG per liter is used.

2) Calculated Assessment Index

Internal economic rate of this project is 4.2% (Table 5-36)

3) Method and Result of Sensitivity Analysis

Sensitivity analysis was conducted for the construction cost and the management cost in the cases they are increased by 10%, 20%, and 30%. The result is as follows:

Table 5-21 Sensitivity Analysis

Increase in construction cost by 10%	3.4 %	Increase in management cost by 10%	4.0%
20%	2.8%	20%	3.9%
30%	2.2%	30%	3.8%

(3) Project options

Development of the Koukoudé fish landing site consists of development in two locations. The first part is the expansion construction of the existing fish landing facilities and the accompanying redevelopment of the coastal section, proposed in the first and second term construction. The second part is the construction of the northern fish landing development and the accompanying redevelopment of the coastal section. Thus, for a financial reasons, there is a possible option to limit to the first and second term construction only. For reference, the economic and financial assessment for this option was conducted. The result is as follows:

1) Financial Assessment (fish landing site development only)

Implementation of this project will bring an estimated income of 260.42 million FG annually, mainly generated by profit from sales of ice. Expenses include the facilities development cost of 6,465.18 million FG in the first year, the operation cost of 231.64 million FG annually, and the ice making and refrigeration equipment renewal cost of 1,262 million FG every ten years. The internal financial rate of return for 30 years was calculated based on these figures, but the calculation was not possible, indicating that financial profit cannot be expected from this project. However, because the projected annual income is greater than the expense, the project is financially manageable under the following conditions if the facilities investment is funded by outside sources such as an aid or the government.

- Replacement of ice making machines and refrigerators every 10 years is not possible (limited to 20% of the required fund)
- Increase in working expense by 13% or more will likely impede management.
- Decrease in income by 12% or more will likely impede management.

2) Economic Assessment (fish landing site development only)

Internal economic rate of this project is 11.1% (Table 5-40)

3) Method and Result of Sensitivity Analysis

Sensitivity analysis was conducted for the construction cost and the management cost in the cases they are increased by 10%, 20%, and 30%. The result is as follows:

Table 5-22 Sensitivity Analysis

Increase in construction cost by	10%	9.9 %	Increase in management cost by	10%	10.9%
	20%	8.9%		20%	10.8%
	30%	8.1%		30%	10.6%

(4) Economic Assessment (Development of social infrastructure)

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

Community water supply

- Saving time spent on drawing water by increased number of available waterworks for drinking water
- Decrease in the human mortality rate (especially decrease in the infant mortality rate)
- Reductions in the medical cost by decreased morbidity
- Decrease in the number of non-working days caused by illness (Increase in working hours for both the patient and relatives who take care of them)

Restroom, shower, and sewage

- Improvement in sanitary conditions of the fresh fish for sale and the accompanying increase in exporting opportunities
- Decrease in the human mortality rate (especially decrease in the infant mortality rate)
- Reductions in the medical cost by decreased morbidity
- Decrease in the number of non-working days caused by illness (Increase in working hours for both the patient and relatives who take care of them)
- Improved amenity of the living environment due to removal of human excrement from the living environment

Clinic

- Decrease in the human mortality rate(especially in the infant mortality rate)
- Decrease in the number of non-working days caused by aggravating illness or wounds(increase in the working hours for both the patient and relatives who take care of them))

Child-care center

- Increased labor hours for women
- Reduction in injuries and accidents involving infants

Assembly hall

- Necessary for assemblies of the local communities and for strengthening the relationship among the local residents and for their education and training, although direct economic benefits are not clear in spite of its high social value.

Smoking place

- Decrease in the number of the damaged fish not processed after a good catch, caused by improvement in smoke processing capacity
- Prevention of drop in the fish price after a good catch, caused by improvement in smoke processing capacity
- Preservation of the residents' assets by decreasing fire disasters
- Conservation of the fuel cost by the use of high efficiency smoking ovens
- Environmental preservation by decrease in the use of firewood

5-4-14 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"> • Confirmation of the development of access roads from national road (borne by the Guinean government) • Confirmation of well water quality, spring volume, pump and piping for the existing facilities • Operation confirmation of emergency generator for the existing facilities • Measurement of tide level • Strong wind effect research at times of stormy weather • Fact-finding of fishing boat operations during rainy seasons • Confirmation of drainage condition of backlands during rainy seasons • Capacity reinforcement of Comité de Développement de Débarcadère (CDD) • Survey of the intentions of private enterprises entering the Facility • Reconfirmation of land use permission for the Plan 	<ul style="list-style-type: none"> • Boring sample exploration • Evaluation of current sanitation condition of houses in the area • Understanding of current conditions of medical and health facilities in peripheral villages • Census • Fact-finding of fresh fish and smoked fish circulation

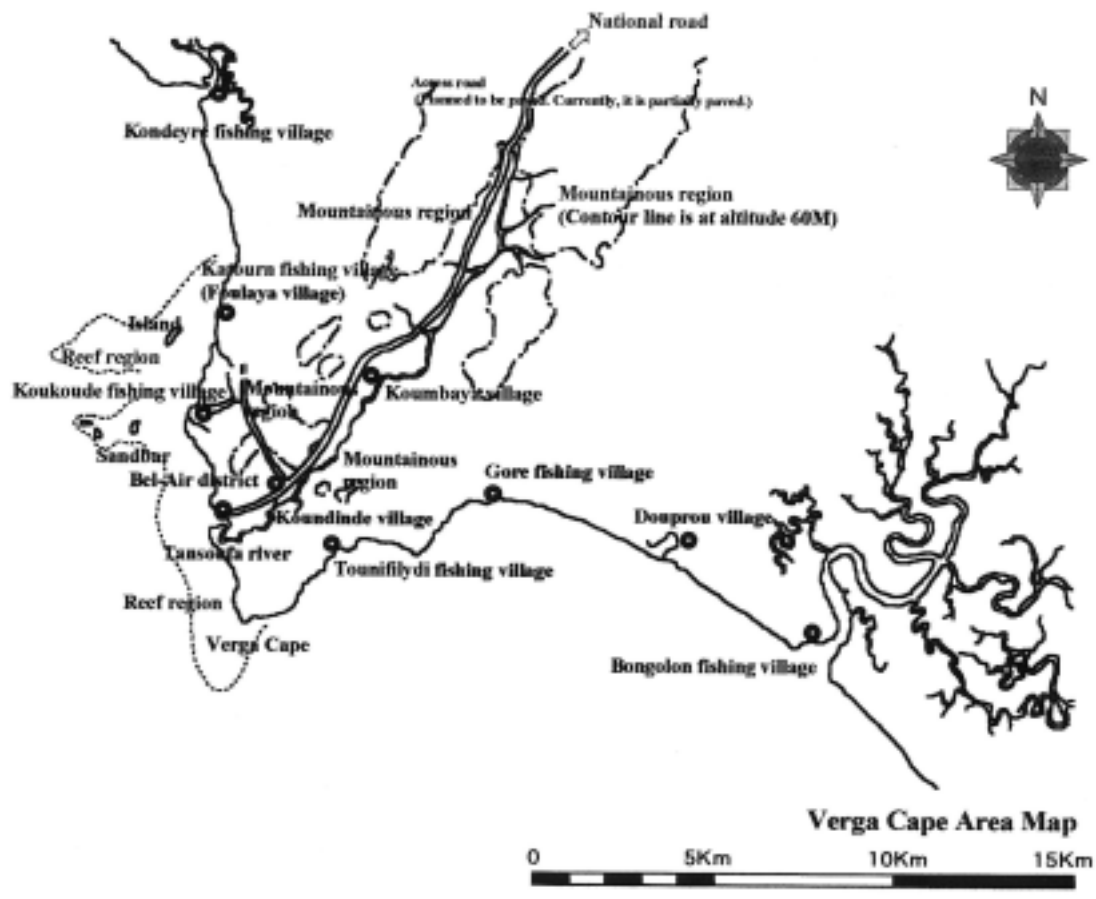


Figure 5-10 Belga Cape Area Map

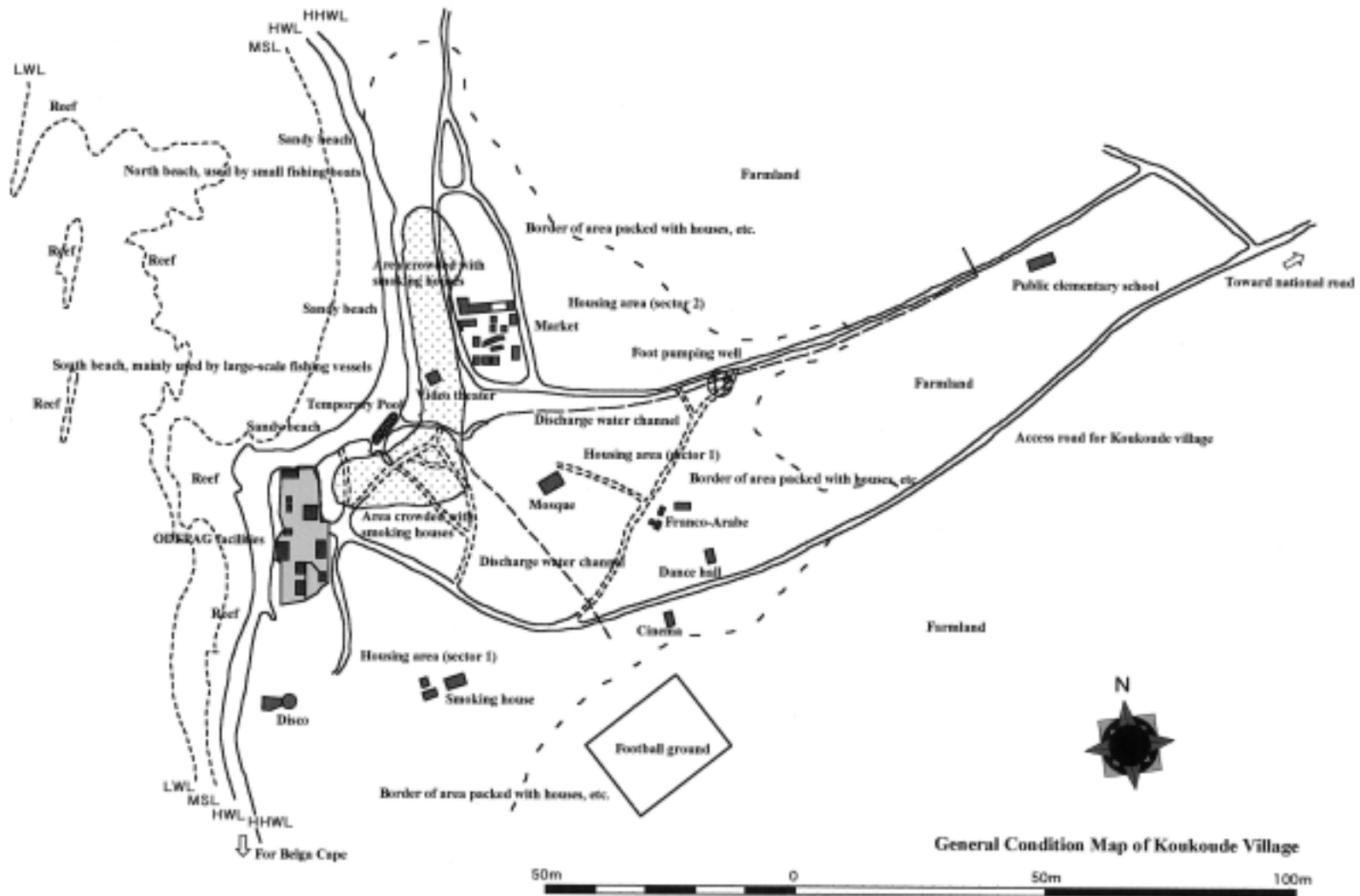


Figure 5-11 General Condition Map of Koukoudé Village

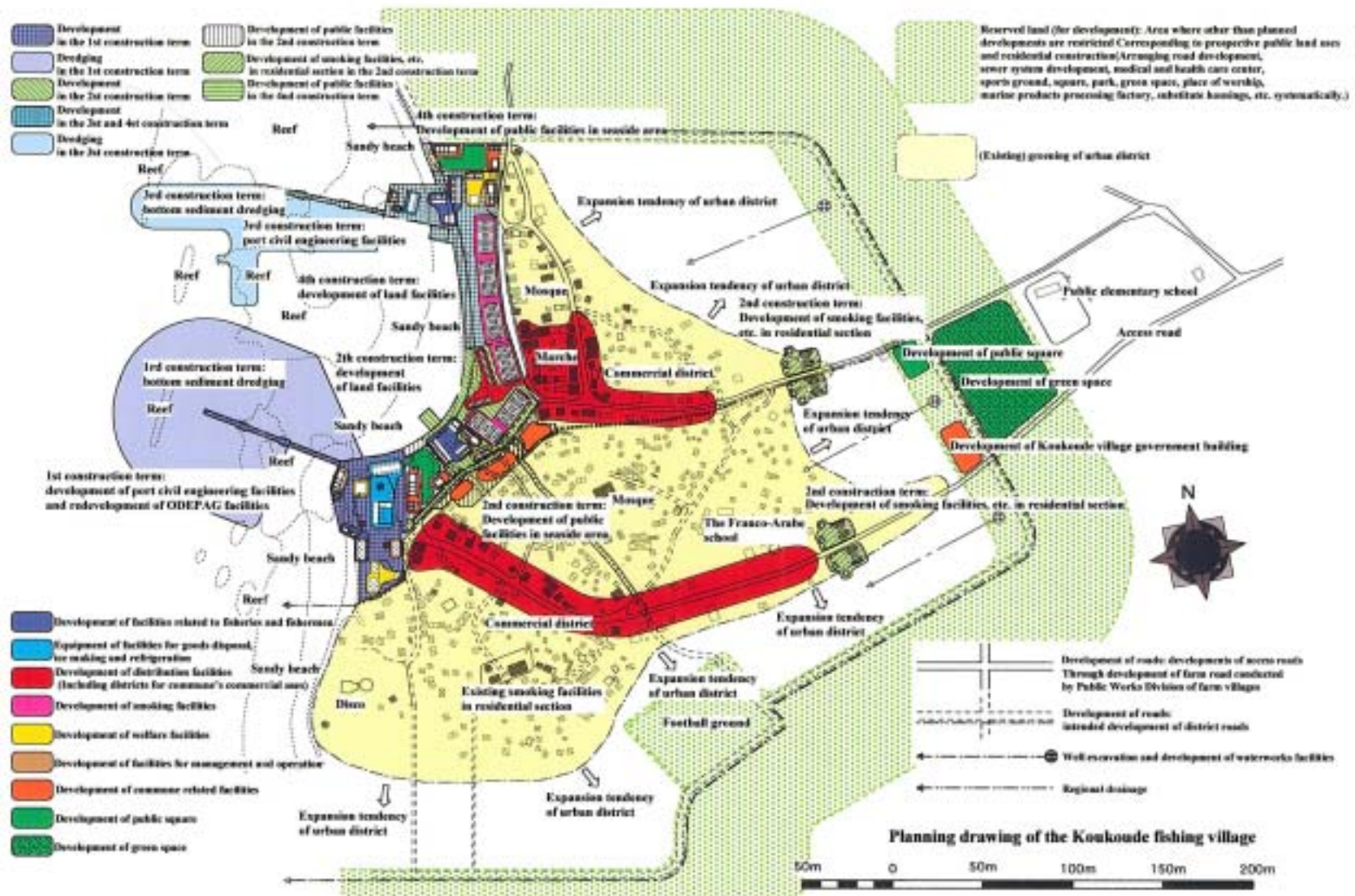


Figure 5-12 Planning Drawing of the Koukoude Fishing Village Development Plan (Part1)

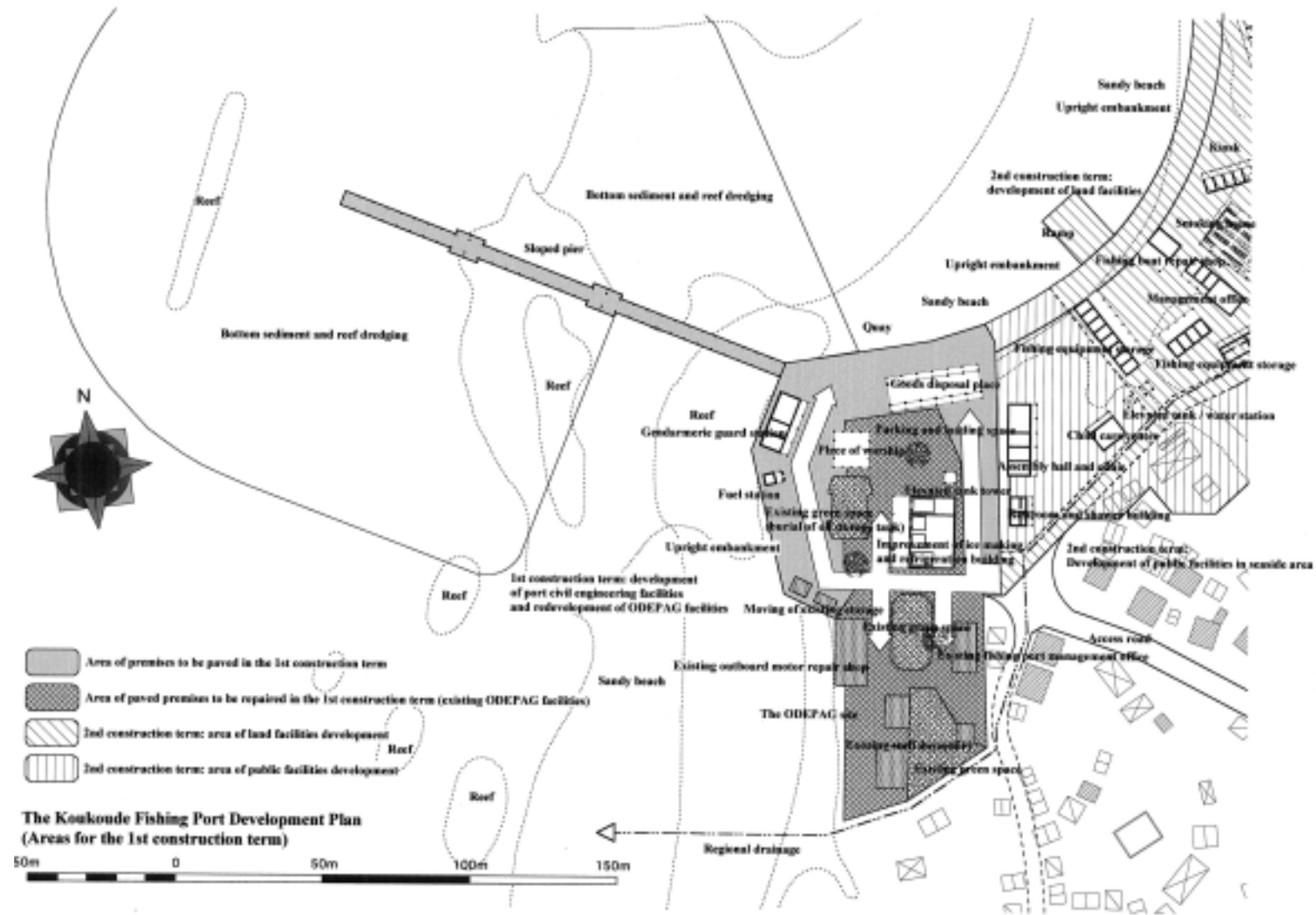


Figure 5-12 Planning Drawing of the Koukoude Fishing Village Development Plan (Part2)

Table 5-23 List of Planned Facilities Scales (Part 1)

1st Construction Term: Expansion of Existing Fishing Port Facilities

Construction of Fishery Landing Facilities				
Sloped pier	stake type	50	m	Assume depth 10m and width 5m. Turning point is located in the middle.
	gravity type	110	m	
Upright embankment	gravity type	75	m	
Upright embankment + armor stone		95	m	
Dredging		1,046	m ³	reef, sand, silt
Banking		2,234	m ³	piste
Pavement of apron		750	m ²	concrete pavement
Improvement of planting		350	m ²	
Roads within premises		360	m ²	asphalt pavement
Repair of roads within premises		720	m ²	asphalt pavement
Pavement within premises		4,200	m ²	asphalt pavement
Repair of existing paved area of premises		1,368	m ²	asphalt pavement
Exterior lighting		8,911	m	
Construction of Land Facilities		Floor space		
Gendarmerie guard station		103.68	m ²	
	corridor	38.88	m ²	open-air, roofed space
Gas station		12.96	m ²	
	corridor	15.12	m ²	open-air, roofed space
Goods disposal place		224.64	m ²	
	corridor	131.04	m ²	open-air, roofed space
Ice making, ice storage & refrigeration (repair of existing facilities)		270.00	m ²	
Ice making & ice storage		108.00	m ²	
Refrigeration		126.00	m ²	
Prayer space		144.00	m ²	
	corridor	25.20	m ²	open-air, roofed space
Total floor space of land facilities		989.28	m ²	except for corridor space
Construction Related to Incidental Facilities				
Elevated tank & tower, water supply piping		1	set	water receiver tank (30m ³), including water supply piping on site
Septic tank (local spec)		1	set	use 2 in turn
Repair of electric piping and wiring on site		1	set	
Equipment				
Winch (hand operation)		2	set	
Course light		3	set	
Ice machine / ice storage box		2	set	5t x 2
Refrigerator		1	set	8 - 10t
Electric generator for emergency		1	set	120KVA
Incinerator		1	set	20kg/h, with burner
Equipment for goods disposal place		1	set	
Equipment for repair place		1	set	

2nd Construction Term: Seaside Area Redevelopment Construction

Civil Engineering Works				
Upright embankment + armor stone	slope	135	m	
Pavement of apron		1,585	m ²	concrete pavement
Slipway		300	m ²	15m×20m
Front road development		680	m ²	asphalt pavement
Banking		6,175	m ²	piste
Ground leveling		9,195	m ²	piste
Development of internal roads		1,270	m ²	asphalt pavement
Rainwater drainage		420	m	reinforced concrete, width 1m, average depth 2m
Exterior lighting		6,175	m	
Construction of Land Facilities		Floor space		
Management and operation office		139.32	m ²	
	corridor	22.68	m ²	open-air, roofed space
Fishing equipment storage		233.28	m ²	
Fishing net repair place		194.40	m ²	open-air, roofed space
Fishing boat repair place		57.60	m ²	
Outdoor repair place		51.84	m ²	open-air, roofed space
Market building		297.00	m ²	
	corridor	138.60	m ²	open-air, roofed space
Smoking house		1404.00	m ²	
	corridor	631.80	m ²	open-air, roofed space
Restroom and shower		103.68	m ²	
	corridor	40.32	m ²	open-air, roofed space
Total floor space of land facilities		2481.12		except for corridor space
Incidental Facilities Related Construction				
Elevated tank & tower, water supply piping		1	set	water receiver tank (10m ³), including water supply piping on site
Septic tank (local spec)		1	set	10m ³ , use 2 in turn
Electric leading-in, piping and wiring on site				from the part of 1st construction term
Equipment				
Electric generator for emergency				use the generator from the 1st construction term
Incinerator				use the incinerator from the 1st construction term
Equipment for repair place		1	set	
Total of equipment		1	set	

Table 5-23 List of Planned Facilities Scales (Part 2)

2nd Construction Term: Seaside Area Redevelopment Commune Related Construction

Civil Engineering Works			
Banking		2,135	m ³ piste
Ground leveling		5,480	m ³ piste
Planting		620	m ³
Exterior lighting		5,188	m
Building Facilities Construction		Floor space	
Assembly hall		103.68	m ²
	corridor	30.24	m ² open-air, roofed space
Clinic		60.48	m ²
	corridor	17.64	m ² open-air, roofed space
Child care center		69.12	m ²
	corridor	20.16	m ² open-air, roofed space
Community water station		7.29	m ² open-air, roofed space
Restroom and shower		51.84	m ²
	corridor	20.16	m ² open-air, roofed space
Septic tank (local spec)		1	set 6m3, use 2 in turn
Total floor space of land facilities		292.41	m ² except for corridor and improvement sections

2nd Construction Term: Residential Section Redevelopment Construction (Commune Facilities Development)

Civil Engineering Works			
Public road development			cope with farm road development project
Rainwater drainage facilities			
Construction of Land Facilities		Floor space	
Smoking house		1209.60	m ²
	corridor	544.32	m ² open-air, roofed space
Assembly hall		138.24	m ²
	corridor	60.48	m ² open-air, roofed space
Community water station		43.74	m ²
Restroom and shower		194.40	m ²
	corridor	90.72	m ² open-air, roofed space
Total floor space of land facilities		1,585.98	m ² except for corridor and improvement sections
Incidental Facilities Related Construction			
Elevated tank & tower		3	set water receiver tank (10m3), including water supply piping on site
Water supply piping within commune		3	set
Septic tank (local spec)		1	set 6m3, use 2 in turn
Solar system			from the 1st construction term
Equipment			
Electric generator for emergency			use the generator from the 1st construction term
Incinerator			use the incinerator from the 1st construction term

3rd Construction Term: North Side Fishing Port Construction

Fishery Landing Facilities Construction			
Sloped pier	stake type	60	m depth 10m, width 5m
	gravity type	80	m
Upright embankment	gravity type	75	m
Upright embankment + armor stone		80	m
Upright embankment + armor stone		155	m
Pavement of apron A		2,550	m ² concrete pavement
Pavement of apron B		1,550	m ² concrete pavement
Slipway		300	m 15m×20m
Dredging		3,694	m ³ reef
Banking		4,590	m ³ piste
Plow-out course leveling		11,650	m ²
Roads within premises		300	m ² asphalt pavement
Equipment			
Winch (hand operation)		2	set
Course light		1	set

Table 5-23 List of Planned Facilities Scales (Part 3)

4th Construction Term: Seaside Area Redevelopment Construction

Construction of Land Facilities		Floor space		
Management and operation office		139.32	m ²	
	corridor	22.68	m ²	open-air, roofed space
Gendarmerie guard station		29.16	m ²	
	corridor	14.58	m ²	open-air, roofed space
Gas station		12.96	m ²	
	corridor	15.12	m ²	open-air, roofed space
Goods disposal place		118.80	m ²	
	corridor	83.16	m ²	open-air, roofed space
Fishing equipment storage		233.28	m ²	
Fishing net repair place		194.40	m ²	open-air, roofed space
Fishing boat repair place		57.60	m ²	
Outdoor repair place		51.84	m ²	open-air, roofed space
Smoking house		1,404.00	m ²	
	corridor	631.80	m ²	open-air, roofed space
Restroom and shower		103.68	m ²	
	corridor	40.32	m ²	open-air, roofed space
Prayer space		81.00	m ²	
	corridor	18.90	m ²	open-air, roofed space
Total floor space of land facilities		2,426.04	m ²	
Exterior Construction				
Front road development		1,680	m ²	asphalt pavement
Pavement within premises		4,824	m ²	asphalt pavement
Exterior lighting		11,650	m ²	
Incidental Facilities Related Construction				
Elevated tank & tower, water supply piping		1	set	water receiver tank (10m ³), including water supply piping on site
Septic tank (local spec)		1	set	10m ³ , use 2 in turn
Piping and wiring on site		1	set	
Total of incidental facilities related construction cost				
Equipment				
Electric generator for emergency		1	set	50KVA
Incinerator		1	set	20kg/h, with burner
Equipment for goods disposal place		1	set	
Equipment for repair place		1	set	

4th Construction Term: Seaside Area Redevelopment Commune Related Construction

Construction of Building Facilities		Floor space		
Assembly hall		103.68	m ²	
	corridor	30.24	m ²	open-air, roofed space
Child care center		69.12	m ²	
	corridor	20.16	m ²	open-air, roofed space
Community water station		7.29	m ²	
Restroom and shower		51.84	m ²	
	corridor	20.16	m ²	open-air, roofed space
Total floor space of land facilities		231.93	m ²	
Exterior Construction				
Ground leveling		2,348	m ²	piste
Planting		620	m ²	
Exterior lighting		1	set	
Septic tank (local spec)		1	set	

Table 5-24 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	150		180		27,000	boat, day	0	0	Raise profit in goods disposal place.
2	Fishing boat fuel station rent					1,597	kltr.	50,000	79,830,000	
3	Fishing equipment storage rental	150		330		49,500	boat, day	100	4,950,000	Circumstances are different from Boulbine.: aggregation system
4	Boat landing facilities rental	150		1		150	boat, day	200	30,000	for cases of self-repairs of fishing boats
5	Tool rental charge	150		1		150	boat, day	3,000	450,000	for cases of self-repairs of fishing boats
6	Fishing boat repair charge	150		2		300	boat	18,000	5,400,000	except for material cost
7	Outboard engine repair charge	150		3		450	number	12,000	5,400,000	except for material cost
8	Goods disposal facilities rental					5,868	ton (fish)	2,500	14,671,239	ton (fish), average of schooling fish and bottom fish
9	Sales of ice	12		180		2,160	ton (ice)	92,000	198,720,000	ton (ice), 15% added to Kaporo
10	Refrigerator rental	10		330		3,300	ton (fish)	8,050	26,565,000	ton (fish), average of schooling fish and bottom fish
11	Kiosk facilities rental	20		300		6,000	No. of times, day	400	2,400,000	
12	Smoking facilities rental	480		330	0.6	158,400	banda, day	500	79,200,000	It uses electricity and water supply
13	Common restroom rental	396		330			No. of times, day	50	6,534,000	
14	Common shower rental	300		330			No. of times, day	100	9,900,000	
	Grand total of annual revenue								434,050,239	
Expenditure										
1	Labor cost								37,032,000	
2	Fuel cost									
	Fuel for generator (diesel)						kltr.		184,404,000	regular price
	Fuel for incinerator (kerosene)						kltr.		21,780,000	regular price
3	Electricity charges									
	Management office lighting	2	10	330	0.7	4,620	kwh			
	Storage pump	4.6	24	330	0.6	21,859	kwh			
	Refueling facilities	1	20	330	0.6	3,960	kwh			
	Fishing equipment storage lighting	1	6	330	0.7	1,386	kwh			
	Fishing boat repair place	10	10	330	0.6	19,800	kwh			
	Outboard engine repair place	20	10	330	0.6	39,600	kwh			
	Goods disposal facilities lighting, etc.			330		19,404	kwh			including electricity for washer
	Ice making & ice storage facilities	54	24	330		427,680	kwh			
	Refrigeration facilities	38.5	24	330	0.4	121,968	kwh			
	Smoking facilities lighting	3	12	330	0.7	8,316	kwh		0	
	Common restroom & shower buildings	1	20	330	0.7	4,620	kwh			
	Lights on premises	6.5	6	330	0.7	9,009	kwh			
	Total					682,222	kwh	0	0	generated by generator
4	Water rate	50		330		16,500	m ³	1,000	16,500,000	appropriate in for maintenance and management cost of generator and solar
5	Maintenance and management cost									
	Office supplies								1,440,000	
	Ice making & refrigeration facilities equipment								6,000,000	
	Consumables on premises								2,850,000	
	Facility repair cost								4,950,000	
	Insurance premium								3,300,000	
	Grand total of annual expenditure								278,256,000	

Table 5-24 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	96,000	96,000		
	(3)	Accounting	4	104,000	416,000		
	(4)	Statistics	2	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	4	average	80,000	320,000	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	4	average	80,000	320,000	Collection of restroom and shower rental fee, and maintenance and management of water-supply facilities and equipment
	(7)	Cleaning, waste treatment, and maintenance and management of incinerator	4		64,000	256,000	
		Total	19			1,408,000	
	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	?				
2	Outboard engine repair place						
	(1)	Shipwright, assistant	4	average	130,000	520,000	
	(2)	Repairman, assistant	2	average	130,000	260,000	
		Total	6			780,000	
3	Ice making, ice storage & refrigeration facilities						
	(1)	Ice seller	3		64,000	192,000	also manage refrigerator
	(2)	Refrigeration engineer, electrician	3	average	150,000	450,000	
		Total	6			642,000	
4	Guard						
		Guard	4		64,000	256,000	
		Grand Total	35			3,086,000	except for dispatches from Ministry of Fishery, and Gendarmerie

Table 5-25 Estimation of Project Costs (Part 1)

1st Construction Term: Expansion of Existing Fishing Port Facilities

		including transportation cost and indirect cost								
		unit: US \$/								
Construction of Fishing Port Outline Facilities										
Slipway pier	stake type	450	/m/m	50	ca	10	m		225,000	depth 10m, width 5m
	gravity type	1,000	/m/m	110	ca	3	m		330,000	
Upright embankment	gravity type	700	/m/m	75	ca	2	m		105,000	
Upright embankment + armor stone	slope	500	/m/m	95	ca	1.5	m		71,250	
Dredging	soil	40	/m ³	1,046	m ³				41,837	
Banking		5	/m ²	2,234	m ²				11,168	
Apron pavement		30	/m ²	750	m ²				22,500	
Improvement of planting		4.5	/m ²	350	m ²				1,575	
Roads within premises		18	/m ²	360	m ²				6,480	
Repair of roads within premises		6	/m ²	720	m ²				4,320	1/3 is appropriated
Asphalt pavement		18	/m ²	4,200	m ²				75,600	
Repair of asphalt pavement		6	/m ²	1,368	m ²				8,208	1/3 is appropriated
Exterior lighting		4	/m	8,911	m				35,643	
Total of fishing port outline facilities construction cost									938,580	
Construction of Land Facilities										
								Area		
Gendarmerie guard station		500	/m ²	14.4	m	7.2	m	1	103.68	51,840
	corridor	120	/m ²	14.4	m	2.7	m	1	38.88	4,666
Subtotal									103.68	56,506 except for the corridor sections
Gas station		400	/m ²	3.6	m	3.6	m	1	12.96	5,184
	corridor	120	/m ²	3.6	m	2.1	m	2	15.12	1,814
Subtotal									28.08	6,998
Goods disposal place		300	/m ²	31.2	m	7.2	m	1	224.64	67,392
	corridor	120	/m ²	31.2	m	2.1	m	2	131.04	15,725
Subtotal									355.68	83,117
Ice making, ice storage & refrigeration (repair of existing facilities)		120	/m ²	18.0	m	15.0	m	1	270.00	32,400
Ice making & ice storage		400	/m ²	18.0	m	6.0	m	1	108.00	43,200
Refrigeration		400	/m ²	6.0	m	21.0	m	1	126.00	50,400
Subtotal									504.00	126,000
Prayer space		350	/m ²	12.0	m	12.0	m	1	144.00	50,400
	corridor	120	/m ²	12.0	m	2.1	m	1	25.20	3,024
Subtotal									169.20	53,424
Total of land facilities construction cost									989.28	326,045
Incidental Facilities Related Construction										
Elevated tank & tower, water-supply piping		48,000	/place						48,000	including water receiver tank and in-site water supply p
Septic tank (local spec)		8,000	/place						8,000	meta-estimate
Repair of electric piping and wiring in site		15,000	/place						15,000	meta-estimate
Total of incidental facilities related construction cost									71,000	
Grand total of land facilities construction cost									397,045	
Equipment										
Winch (hand operation)		6,000	/piece	2					12,000	
Course light		18,000	/piece	3					54,000	
Ice machine /ice storage box		300,000	/piece						300,000	
Refrigerator		150,000	/piece						150,000	
Electric generator for emergency		50,000	/piece						50,000	procured in Japan
Incinerator		30,000	/piece						30,000	procured in Japan, with burner
Equipment for goods disposal place		15,000							15,000	
Equipment for repair place		10,000							10,000	
Total of equipment cost									621,000	
Grand total of 1st term construction cost									1,956,625	

Table 5-25 Estimation of Project Costs (Part 2)

2nd Construction Term: Seaside Area Redevelopment Construction

		including transportation cost and indirect cost						
		unit: US \$/						
Civil Engineering Works								
Upright embankment + armor stone	slope	500	/m/m	135	m	1.5	m	101,250
Pavement of apron		30	/m ²	1,585	m ²			47,550
Slipway		250	/m ²	15	m	20	m	75,000
Front road development (asphalt pavement)		27	/m ²	85	m	8	m	18,360
Banking		5	/m ²	6,175	m ²			30,875
Ground leveling		2	/m ²	9,195	m ²			18,390
Development of internal road (asphalt pavement)		27	/m ²	1,270	m ²			34,290
Rainwater drainage		200	/m	420	m	2	m	84,000
Exterior lighting		4	/m ²	6,175	m ²			24,700
Total of civil engineering works								223,800
Construction of Land Facilities								
Management and operation office		500	/m ²	3.6	m	5.4	m	58.32
		500	/m ²	3.6	m	7.5	m	81.00
		120	/m ²	3.6	m	2.1	m	22.68
Subtotal								139.32
Fishing equipment storage		400	/m ²	3.6	m	5.4	m	233.28
Fishing net repair		120	/m ²	3.6	m	4.5	m	194.40
Subtotal								116,640
Repair of fishing boat		600	/m ²	4.8	m	6.0	m	57.60
Outdoor repair		120	/m ²	4.8	m	5.4	m	51.84
Subtotal								40,781
Market building		300	/m ²	66.0	m	4.5	m	297.00
corridor		120	/m ²	66.0	m	2.1	m	138.60
Subtotal								105,732
Smoking house		350	/m ²	39.0	m	12.0	m	1404.00
corridor		120	/m ²	39.0	m	2.7	m	631.80
Subtotal								567,216
Restroom & shower room		700	/m ²	4.8	m	5.4	m	103.68
corridor		120	/m ²	4.8	m	2.1	m	40.32
Subtotal								77,414
Total of land facilities construction cost								2481.12
Total of land facilities construction cost								980,165
Incidental Facilities Related Construction								
Elevated tank & tower, water-supply piping		36,000	/place					36,000
Septic tank (local spec)		6,000	/place					6,000
Electric leading-in, piping and wiring on site		20,000	/place					20,000
Total of incidental facilities related construction cost								62,000
Grand total of land facilities construction cost								1,042,165
Equipment								
Electric generator for emergency		38,000	/piece					
Incinerator		24,000	/piece					
Equipment for repair place		10,000						10,000
Grand total of equipment related cost								10,000
Total of 2nd term construction cost								1,275,965

Table 5-25 Estimation of Project Costs (Part 3)

2nd Construction Term: Seaside Area Redevelopment Commune Related Construction

		including transportation cost and indirect cost							
		unit: US \$/							
Civil Engineering Works									
Banking		5	/m ²	2,155	m ²				10,675
Ground leveling		2	/m ²	5,480	m ²				10,960
Planting		9	/m ²	620	m ²				5,580
Exterior lighting		4	/m ²	5,188	m ²				20,750
Total of civil engineering works									47,965
Construction of Building Facilities									
								Area	
Assembly hall		500	/m ²	4.8	m	7.2	m	3	103.68
	corridor	120	/m ²	4.8	m	2.1	m	3	30.24
Subtotal									55,469
									except for the corridor sections
Clinic		500	/m ²	4.2	m	7.2	m	2	60.48
	corridor	120	/m ²	4.2	m	2.1	m	2	17.64
Subtotal									32,357
Child care center		500	/m ²	4.8	m	7.2	m	2	69.12
	corridor	120	/m ²	4.8	m	2.1	m	2	20.16
Subtotal									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
	corridor	120	/m ²	4.8	m	2.1	m	2	20.16
Subtotal									38,707
Septic tank (local spec)		6,000	/place						6,000
Total of building facilities construction cost								292.41	172,428
Total of 2nd term commune construction									220,393

Table 5-25 Estimation of Project Costs (Part 4)

2nd Construction Term: Residential Section Redevelopment Construction (Commune Facilities Development)

		including transportation cost and indirect cost									
		unit: US \$/									
Civil Engineering Works											
Public road development										cope with farm road development project	
Rainwater drainage facilities		120	/m	2,600	m				312,000		
Total of civil engineering works									312,000		
Construction of Land Facilities											
Smoking house		350	/m ²	16.8	m	12.0	m	6	1209.60	423,560	
	corridor	120	/m ²	16.8	m	2.7	m	12	544.32	65,518	
Subtotal										488,678	
Assembly hall		500	/m ²	4.8	m	4.8	m	6	158.24	69,120	
	corridor	120	/m ²	4.8	m	2.1	m	6	60.48	7,258	
Subtotal										76,378	
Community water station		400	/m ²	2.7	m	2.7	m	6	43.74	17,496	
Restroom & shower room		700	/m ²	7.2	m	4.5	m	6	194.40	136,080	
	corridor	120	/m ²	7.2	m	2.1	m	6	90.72	10,896	
Subtotal										146,966	
Total of land facilities construction cost									1,585.98	729,518	
Incidental Facilities Related Construction											
Elevated tank & tower		30,000	/place		3	point				90,000	including water receiver tank and on-site water tap
Water supply piping within commune		12	/m	1,600	m					19,200	
Septic tank (local spec)		6,000	/place		6	point				36,000	meta-estimate
Solar system		55,000	/place		3	point				165,000	from the part of 1st construction term, meta-estimate
Total of incidental facilities related construction cost										310,200	
Grand total of land facilities construction cost										1,039,718	
Equipment											
Electric generator for emergency		38,000	/piece								use the generator from the 1st construction term
Incinerator		24,000	/piece		6	point				144,000	use the incinerator from the 1st construction term
Grand total of equipment related cost										144,000	
Total of 2nd term construction cost										1,495,718	

Table 5-25 Estimation of Project Costs (Part 5)

3rd Construction Term: North Side Fishing Port Construction

		including transportation cost and indirect cost							
		unit: US \$/							
Fishing Port Outline Facilities Construction									
Sloped pier	stake type	450	/m/m	60	m	10	m	270,000	depth 10m, width 5m
	gravity type	1,060	/m/m	80	m	3	m	240,000	
Upright embankment	gravity type	700	/m/m	75	m	2	m	105,000	
Upright embankment + armor stone	slope	500	/m/m	80	m	1.5	m	60,000	
Upright embankment + armor stone	slope	500	/m/m	155	m	1.5	m	116,250	
Apron pavement A		30	/m ²	2,550	m ²			76,500	
Apron pavement B		30	/m ²	1,550	m ²			46,500	
Slipway		250	/m ²	15	m	20	m	75,000	
Dredging	reef	40	/m ²	3,694	m ²			147,767	
Banking		5	/m ²	4,590	m ²			22,950	
Prose-out course leveling		2	/m ²	11,650	m ²			23,300	
Roads within premises		18	/m ²	300	m ²			5,400	
Total of fishing port outline facilities construction cost								1,188,667	
Equipment									
Winch (hand operation)		6,000	/piece	2				12,000	
Course light		18,000	/piece	1				18,000	
Total of equipment cost								30,000	
Total of 3rd term construction cost								1,218,667	

Table 5-25 Estimation of Project Costs (Part 6)

4th Construction Term: Suisun Area Redevelopment Construction

		including transportation cost and indirect cost								
		unit: US \$/								
								Area		
Construction of Land Facilities										
Management and operation office		500	/m ²	3.6	m	5.4	m	3	58.32	29,160
		500	/m ²	3.6	m	7.5	m	3	81.00	40,500
	corridor	120	/m ²	3.6	m	2.1	m	3	22.68	2,722
	Subtotal							139.32	72,382	except for the corridor sections
Genfarmerie guard station		500	/m ²	5.4	m	5.4	m	1	29.16	14,580
	corridor	120	/m ²	5.4	m	2.7	m	1	14.58	1,750
	Subtotal								16,330	
Gas station		400	/m ²	3.6	m	3.6	m	1	12.96	5,184
	corridor	120	/m ²	3.6	m	2.1	m	2	15.12	1,814
	Subtotal								6,998	
Goods disposal place		300	/m ²	19.8	m	6.0	m	1	118.80	35,640
	corridor	120	/m ²	19.8	m	2.1	m	2	83.16	9,979
	Subtotal								45,619	
Fishing equipment storage		400	/m ²	3.6	m	5.4	m	12	233.28	93,312
	Fishing net repair	120	/m ²	3.6	m	4.5	m	12	194.40	23,328
	Subtotal								116,640	
Repair of fishing boat		600	/m ²	4.8	m	6.0	m	2	57.60	34,560
	Outdoor repair	120	/m ²	4.8	m	5.4	m	2	51.84	6,221
	Subtotal								40,781	
Smoking house		350	/m ²	39.0	m	12.0	m	3	1,404.00	491,400
	corridor	120	/m ²	39.0	m	2.7	m	6	631.80	75,816
	Subtotal								567,216	
Restroom & shower room		700	/m ²	4.8	m	5.4	m	4	103.68	72,576
	corridor	120	/m ²	4.8	m	2.1	m	4	40.32	4,838
	Subtotal								77,414	
Prayer space		350	/m ²	9.0	m	9.0	m	1	81.00	28,350
	corridor	120	/m ²	9.0	m	2.1	m	1	18.90	2,268
	Subtotal								30,618	
Total of land facilities construction cost								2,426.04	973,998	
Exterior Construction										
Front road development (asphalt pavement)		27	/m ²	1,680	m					45,360
Asphalt pavement		18	/m ²	4,824	m					86,831
Exterior lighting		4	/m ²	11,650	m					46,600
	Exterior Construction									178,791
Incidental Facilities Related Construction										
Elevated tank & tower, water supply piping		36,000	/place							36,000
Septic tank (local spec)		6,000	/place							6,000
Piping & wiring on site		30,000	/place							30,000
	Total of incidental facilities related construction cost									72,000
Grand total of land facilities construction cost								1,224,789		
Equipment										
Electric generator for emergency		38,000	/piece							38,000
Incinerator		30,000	/piece							30,000
Equipment for goods disposal place		5,000								5,000
Equipment for repair place		10,000								10,000
	Grand total of equipment related cost									83,000
Total of 3rd term construction cost								1,307,789		

Table 5-25 Estimation of Project Costs (Part 7)

4th Construction Term: Seaside Area Redevelopment Corridor Related Construction

		including transportation cost and indirect cost								
		unit: US \$/								
Construction of Building Facilities								Area		
Assembly hall		500	/m ²	4.8	m	7.2	m	3	103.68	51,840
	corridor	120	/m ²	4.8	m	2.1	m	3	30.24	3,629
	Subtotal									55,469
										except for the corridor sections
Child care center		500	/m ²	4.8	m	7.2	m	2	69.12	34,560
	corridor	120	/m ²	4.8	m	2.1	m	2	20.16	2,419
	Subtotal									36,979
Community water station		400	/m ²	2.7	m	2.7	m	1	7.29	2,916
Restroom & shower room		700	/m ²	4.8	m	5.4	m	2	51.84	26,288
	corridor	120	/m ²	4.8	m	2.1	m	2	20.16	2,419
	Subtotal									38,707
Grand total of Construction of Building Facilities									231.93	134,071
Exterior Construction										
Ground leveling		2	/m ²	2,348	m ²					4,696
Planting		9	/m ²	620	m ²					5,580
Exterior lighting		4	/m ²	2,580	m ²					10,320
	Exterior Construction									77,414
Incidental Facilities Related Construction										
Septic tank (local spec)		6,000	/place							6,000
	Total of incidental facilities related construction cost									6,000
Total of 4th term corridor construction										217,486

Economic financial analysis for the case that this Project completes all terms (1st, 2nd, 3rd and 4th)

Table 5-26 Predicted Revenue of Planned Facilities

(FG 000)

		Annual revenue	Note
Fishing boat fuel station rent	300,000FG/month x 12 months	3600	
Fishing equipment storage rental	150 boats x 330 days x 100FG/day	4,950	
Boat landing facilities rental	150 boats x 1time/year x 200FG/time	30	
Tool rental charge	150 boats x 1time/year x 3,000FG/time	450	
Fishing boat repair charge	150 boats x 2times/year x 18,000FG/time	5,400	
Outboard engine repair charge	150 boats x 3times/year x 12,000FG/time	5,400	
Goods disposal facilities rental	5868 tons x 2,500FG/ton	14,670	
Sales of ice	12 tons/day x 180 days x 92,000FG/ton	198,720	FG2300/25kg
Refrigerator rental	10 tons/day x 330 days x 8,050FG/ton	26,565	
Related retail facilities rental	20 pers. x 300days x 400FG/day	2,400	
Smoking facilities rental	480 grills x 330 days x 0.6 x 500FG/day	47,520	
Common restroom rental	792 pers. x 330 days x 50FG	13,068	
Common shower rental	600 pers. x 330 days x 100FG	19,800	
Grand total of annual revenue		342,573	

Table 5-27 Predicted Expenditure of Planned Facilities

(FG 000)

	Market price			Economic price		Note
	Quantity	Unit price	Cost	Conversion factor	Cost	
Facility Cost						
Outline facilities related			4,702,094	0.912	4,288,310	50 years
Land facilities related			5,327,998	0.934	4,976,350	30 years
Equipment related			1,488,000	0.995	1,480,560	10 years
Total			11,518,092		10,745,220	
Operating cost						
Labor cost						
Port manager	1	3,600		1.0	3,600	Personnel of Ministry of Fisheries
Secretary	1	1,152	1,152	1.0	1,152	skilled labor
Accounting	4	1,248	4,992	1.0	4,992	skilled labor
Statistics	2	2,400		1.0	2,400	Personnel of Ministry of Fisheries
Maintenance and management of fishing port facilities	4	960	3,840	0.5	1,920	unskilled labor
Maintenance and management of water supply and drainage facilities and equipment	4	960	3,840	0.5	1,920	unskilled labor
Cleaning, waste treatment, and maintenance and management of incinerator	4	768	3,072	0.5	1,536	unskilled labor
Fishing boat and outboard engine repair	6	1,560	9,360	1.0	9,360	skilled labor
Ice making and refrigeration facilities	3	1,800	5,400	1.0	5,400	skilled labor
Ice seller	3	768	2,304	0.5	1,152	unskilled labor
Guards	4	768	3,072	0.5	1,536	unskilled labor
Fuel cost						
Generator		1.1	184,404	0.5	92,202	
Fuel for incinerator		1.1	21,780	0.5	10,890	
Water rate			16,500	1.0	16,500	
Maintenance and management cost						
Office supplies			1,440		1,440	
Ice making & refrigeration facilities equipment			6,000		6,000	
Consumables on premises			2,850		2,850	
Facility repair cost			4,950		4,950	
Insurance premium			3,300		3,300	
Total			278,256		173,100	

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

Table 5-28 Financial Analysis

Annual	Profit	Facility cost	Operating cost	Balance
1		11,518,092		-11,518,092
2	342,573		278,256	64,317
3	342,573		278,256	64,317
4	342,573		278,256	64,317
5	342,573		278,256	64,317
6	342,573		278,256	64,317
7	342,573		278,256	64,317
8	342,573		278,256	64,317
9	342,573		278,256	64,317
10	342,573		278,256	64,317
11	342,573	1,488,000	278,256	-1,423,683
12	342,573		278,256	64,317
13	342,573		278,256	64,317
14	342,573		278,256	64,317
15	342,573		278,256	64,317
16	342,573		278,256	64,317
17	342,573		278,256	64,317
18	342,573		278,256	64,317
19	342,573		278,256	64,317
20	342,573		278,256	64,317
21	342,573	1,488,000	278,256	-1,423,683
22	342,573		278,256	64,317
23	342,573		278,256	64,317
24	342,573		278,256	64,317
25	342,573		278,256	64,317
26	342,573		278,256	64,317
27	342,573		278,256	64,317
28	342,573		278,256	64,317
29	342,573		278,256	64,317
30	342,573		278,256	64,317

Financial internal rate of return

#VALUE!

Table 5-29 Increase of Landing Volume per Fishing Method under the Project

Present status

	Total Catch	Bonga, Bonga-seri	Fish for domestic consumption such as catfish, etc.	Fish for export such as whiting, etc.
Surrounding net	1,714	1,611	103	0
Encircling gill net	1,794	1,363	215	215
Large mesh fixed gill net	63	0	19	44
Long line	252	0	164	88
Drift net	284	199	43	43
Total	4,107	3,173	543	390

Increase of landing volume due to increased frequency of sailing

	Increase of catch volume	Bonga, Bonga-seri	Fish for domestic consumption such as catfish, etc.	Fish for export such as whiting, etc.
Surrounding net	0	0	0	0
Encircling gill net (increased from 154 days to 177 days)	268	204	32	32
Large mesh fixed gill net	0	0	0	0
Long line (4 boats join for 8 months)	45	0	29	16
Drift net (4 boats, half of all boats, shift to long line fishing for 8 months during poor catch season)	38	27	6	6
Total	351	230	67	54

Increase of landing volume per operation due to increased sailing hours

	Total increase of catch volume	Bonga	Fish for domestic consumption such as catfish, etc.	Fish for export such as whiting, etc.
Surrounding net	171	161	10	0
Encircling gill net	206	157	25	25
Large mesh fixed gill net	3	0	1	2
Long line	15	0	10	5
Drift net	16	11	2	2
Total	412	329	48	35

Increase of catch volume due to ice supply (c)

	Increase of catch volume	Bonga, Bonga-seri	Fish for domestic consumption such as catfish, etc.	Fish for export such as whiting, etc.
Surrounding net	0	0	0	0
Encircling gill net	0	0	0	0
Large mesh fixed gill net	16	0	4.7	11.0
Long line	74	0	48.2	26.0
Drift net	0	0	0	0
Total	90	0	53	37

Total increased volume

	Increase of catch volume	Bonga, Bonga-seri	Fish for domestic consumption such as catfish, etc.	Fish for export such as whiting, etc.
Surrounding net	171	161	10	0
Encircling gill net	474	360	57	57
Large mesh fixed gill net	19	0	6	13
Long line	134	0	87	47
Drift net	54	38	8	8
Total	853	560	168	125

Table 5-30 Economic Benefit from Increase of Catch at One Fishing Occasion

	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	230,000	290	66,7000	290	31,349	0	35,351
Other demersal fish			0		0		
• Domestic consumption ex. Cat fish	67,000	800	53,600	800	25,192	0	28,408
• Export fish	54,000	4,000	216,000	1,750	44,415	60,750	110,835
Total			336,300		100,956	60,750	174,594

Table 5-31 Economic Benefit from Increase of Catch by Increased Number of Sailings

	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	329,000	290	95,410	290		0	95,410
Other demersal fish			0				0
• Domestic consumption ex. Cat fish	48,000	800	38,400	800		0	38,400
• Export fish	35,000	4,000	140,000	1,750		39,375	100,625
Total			273,000			39,375	234,435

Table 5-32 Calculation of Fishing Cost Rate with Economic Price

	KAM-PAG	KK-FMC	KK-FMEE	KK-PA	Total	Economic price
Sales	1,927,813	1,499,888	2,001,708	975,026	6,404,435	6,404,435
Running cost	1,169,688	459,990	693,221	367,740	2,690,639	2,041,763
(Gasoline)	574,625	368,303	608,675	302,328	1,853,931	1,205,055
(Others)	595,063	91,687	84,546	65,412	836,708	836,708
Labor cost	332,975	436,003	243,031	193,734	1,205,744	0
Repair cost	59,500	231,563	55,583	56,000	402,646	402,646
Depreciation	97,024	206,060	180,286	72,917	556,287	556,287
Profit	268,626	166,272	829,587	284,635	1,549,119	1,549,119
					Percentage of general cost at economic price	0.47

Note 1 : Since gasoline retail price includes 35% tax, calculation was made with economic price without tax.

Note 2 : Numbers from the survey on fishing households held in 2000 were used.

Table 5-33 Calculation of Fishing Cost Rate with Economic Price

	Increment of smoked fish (kg)	Market price (FG/kg)	Total economic benefit (1.000 FG)	Price at landing place (FG/kg)	Smoking 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	Cost is shown below	F=(B-D)xAx0.5	G=C-E-F
Bonga, Bonga Seri	0	290	0	290	0	0	0
Other demersal fish			0		0		
• Domestic consumption ex. Cat fish	53,000	800	42,400	800	19,928	0	22,472
• Export fish	37,000	4,000	148,000	1,750	30,433	41,625	75,943
Total			190,000		50,361	41,625	98,415

Table 5-34 Economic Benefit from Increase of Smoked Products Manufacturing

	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	Expenses are noted below	F=(B-D)xAx0.5	G=C-E-F
Smoking production (bonga)	186,333	2500	465,833	1870	180,743	58,695	226,395
Smoking production (catfish, etc.)	56,000	6500	364,000	3500	140,000	84,000	140,000
Total	242,333		829,833		320,743	142,695	366,395

Note 1: Increased smoking production volume in weight is 1/3 of increased catch volume of bonga, bonga-seri, catfish. (Fish weight becomes 1/3 by smoking.)

Table 5-35 Economic Benefit from Reduction of Gasoline Consumption Volume

	Gasoline reduction volume per 1 boat	Number of boats	Economic price of gasoline	Economic benefit
Fixed gill net fishing boat	1770 liters	2 boats	0.963/litter	3,409
Long line fishing boat	2160 liters	20 boats	0.963/litter	41,602
Total				45,011

(,000FG)

Table 5-36 Economic Analysis

Annual	Benefit	Facility cost	Operating cost	Net economic benefit
1		10,745,220		-10,745,220
2	918,850		173,100	745,750
3	918,850		173,100	745,750
4	918,850		173,100	745,750
5	918,850		173,100	745,750
6	918,850		173,100	745,750
7	918,850		173,100	745,750
8	918,850		173,100	745,750
9	918,850		173,100	745,750
10	918,850		173,100	745,750
11	918,850	1,480,560	173,100	745,750
12	918,850		173,100	745,750
13	918,850		173,100	745,750
14	918,850		173,100	745,750
15	918,850		173,100	745,750
16	918,850		173,100	745,750
17	918,850		173,100	745,750
18	918,850		173,100	745,750
19	918,850		173,100	745,750
20	918,850		173,100	745,750
21	918,850	1,480,560	173,100	745,750
22	918,850		173,100	745,750
23	918,850		173,100	745,750
24	918,850		173,100	745,750
25	918,850		173,100	745,750
26	918,850		173,100	745,750
27	918,850		173,100	745,750
28	918,850		173,100	745,750
29	918,850		173,100	745,750
30	918,850		173,100	745,750

Economic internal rate of return 4.2%

Economic financial analysis for the case that this Project is conducted with only 1st and 2nd terms.

Table 5-37 Predicted Revenue of Planned Facilities

(,000FG)

		Annual revenue	Note
Fishing boat fuel station rent	300,000FG/month x 12 months	3,600	
Fishing equipment storage rental	80 boats x 330 days x 100FG/day	2,640	
Boat landing facilities rental	80 boats x 1time/year x 200FG/time	16	
Tool rental charge	80 boats x 1time/year x 3,000FG/time	240	
Fishing boat repair charge	80 boats x 2times/year x 18,000FG/time	2,880	
Outboard engine repair charge	137 boats x 3times/year x 12,000FG/time	4,932	
Goods disposal facilities rental	5497 tons x 2,500FG/ton	13,743	
Sales of ice	10 tons/day x 180days x 92,000FG/ton	165,600	2,300FG/25kg
Refrigerator rental	9.1 tons/day x 330days x 8,050FG/ton	24,174	
Related retail facilities rental	20 pers. x 300 days x 400FG/day	2,400	
Smoking facilities rental	240 grills x 330 days x 0.6 x 500FG/day	23,760	
Common restroom rental	396 pers. x 330 days x 50FG	6,534	
Common shower rental	300 pers. x 330 days x 100FG	9,900	
Grand total of annual revenue		260,419	

Table 5-38 Predicted Expenditure of Planned Facilities

(.000FG)

	Market price			Economic price		Note
	Quantity	Unit price	Cost	Conversion factor	Cost	
Facility Cost						
Outline facilities related			2,324,760	0.912	2,120,181	50 years
Land facilities related			2,878,420	0.934	2,688,444	30 years
Equipment related			1,262,000	0.995	1,255,690	10 years
Total			6,465,180		6,064,315	
Operating cost						
Labor cost						
Port manager	1	3,600		1.0	3,600	Personnel of Ministry of Fisheries
Secretary	1	1,152	1,152	1.0	1,152	skilled labor
Accounting	2	1,248	2,496	1.0	2,496	skilled labor
Statistics	1	2,400		1.0	2,400	Personnel of Ministry of Fisheries
Maintenance and management of fishing port facilities	2	960	1,920	0.5	960	unskilled labor
Maintenance and management of water supply and drainage facilities and equipment	2	960	1,920	0.5	960	unskilled labor
Cleaning, waste treatment, and maintenance and management of incinerator	2	768	1,536	0.5	768	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	768	1,536	0.5	768	unskilled labor
Guards	2	768	1,536	0.5	768	unskilled labor
Fuel cost						
Generator		1.1	166,980	0.5	83,490	
Fuel for incinerator		1.1	14,520	0.5	7,260	
Water rate			13,200	1.0	13,200	
Maintenance and management cost						
Office supplies			1,200		1,200	
Ice making & refrigeration facilities equipment			5,000		5,000	
Consumables on premises			1,850		1,850	
Facility repair cost			4,650		4,650	
Insurance premium			2,300		2,300	
Total			231,636		142,662	

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

Table 5-39 Financial Analysis

Annual	Profit	Facility cost	Operating cost	Balance
1		6,465,180		-6,465,180
2	260,419		231,636	28,783
3	260,419		231,636	28,783
4	260,419		231,636	28,783
5	260,419		231,636	28,783
6	260,419		231,636	28,783
7	260,419		231,636	28,783
8	260,419		231,636	28,783
9	260,419		231,636	28,783
10	260,419		231,636	28,783
11	260,419	1,262,000	231,636	-1,233,217
12	260,419		231,636	28,783
13	260,419		231,636	28,783
14	260,419		231,636	28,783
15	260,419		231,636	28,783
16	260,419		231,636	28,783
17	260,419		231,636	28,783
18	260,419		231,636	28,783
19	260,419		231,636	28,783
20	260,419		231,636	28,783
21	260,419	1,262,000	231,636	-1,233,217
22	260,419		231,636	28,783
23	260,419		231,636	28,783
24	260,419		231,636	28,783
25	260,419		231,636	28,783
26	260,419		231,636	28,783
27	260,419		231,636	28,783
28	260,419		231,636	28,783
29	260,419		231,636	28,783
30	260,419		231,636	28,783

Financial internal rate of return #VALUE!

Table 5-40 Economic Analysis

Annual	Benefit	Facility cost	Operating cost	Net economic benefit
1		6,064,315		-6,064,315
2	918,850		142,662	776,188
3	918,850		142,662	776,188
4	918,850		142,662	776,188
5	918,850		142,662	776,188
6	918,850		142,662	776,188
7	918,850		142,662	776,188
8	918,850		142,662	776,188
9	918,850		142,662	776,188
10	918,850		142,662	776,188
11	918,850	1,255,690	142,662	776,188
12	918,850		142,662	776,188
13	918,850		142,662	776,188
14	918,850		142,662	776,188
15	918,850		142,662	776,188
16	918,850		142,662	776,188
17	918,850		142,662	776,188
18	918,850		142,662	776,188
19	918,850		142,662	776,188
20	918,850		142,662	776,188
21	918,850	1,255,690	142,662	776,188
22	918,850		142,662	776,188
23	918,850		142,662	776,188
24	918,850		142,662	776,188
25	918,850		142,662	776,188
26	918,850		142,662	776,188
27	918,850		142,662	776,188
28	918,850		142,662	776,188
29	918,850		142,662	776,188
30	918,850		142,662	776,188

Economic internal rate of return 11.1%