

**PROJECT FOR DEVELOPMENT OF
INLAND WATER FISHERIES**

5-7 Project for Development of Inland Water Fisheries

Inland water fisheries are generally regarded as fragile economic activities that are easily influenced by natural or social environments. Since the location for activities are rivers and accompanying lakes and marshes, if drought continues for a long time and water bodies become sterile, it becomes difficult for even excellent fishermen to make sufficient catches. In fact, inland Guinea experienced a long drought that lasted for over 10 years beginning in the 1980s. Guinea depends on imports for all fishing equipment and a rise in the price of fishing equipment due to fall of their currency would cause serious effects to the business of fishery households. These problems are not something the fishing industry sector in Guinea alone can deal with. It should aim at a comprehensive development of inland water fisheries by clearing issues that can be coped with, and that are suggested in Master Plan Edition in Chapter 4 of this report.

Until today, inland water fishery is a minor sub-sector of the fishing industry in Guinea and the fact that marine fishery is the main body of fisheries development has not been changed. Many of the development plans have concentrated on coastal areas and assistance for small-scale fisheries households to equip powered facilities has been realized and fish landing facilities have been installed. In contrast, the only project for inland water fisheries that has ever been implemented was “Project Micro Realization” undertaken by EU Finance in the early ‘90s. It was a project to provide fishing equipment and was related to Micro Finance. Nevertheless, inland water fisheries are gradually gaining attention since the Poverty Reduction Strategy Paper (PRSP) was created pointing out that the population of inland farming villages is actually at a serious level of poverty. With such winds of change, what efforts should be taken to develop inland water fisheries that face difficult environmental and socioeconomic situations? The main purpose of this Project is to propose comprehensive answer to this question.

The Project aims to achieve its objectives by undertaking countermeasures aimed at four important issues extracted from the three different environments that influence inland water fisheries as shown in the figure on the next page.

The objective of this Project is to improve the living environments of artisanal fishermen through the sustained use of inland water fishery resources.

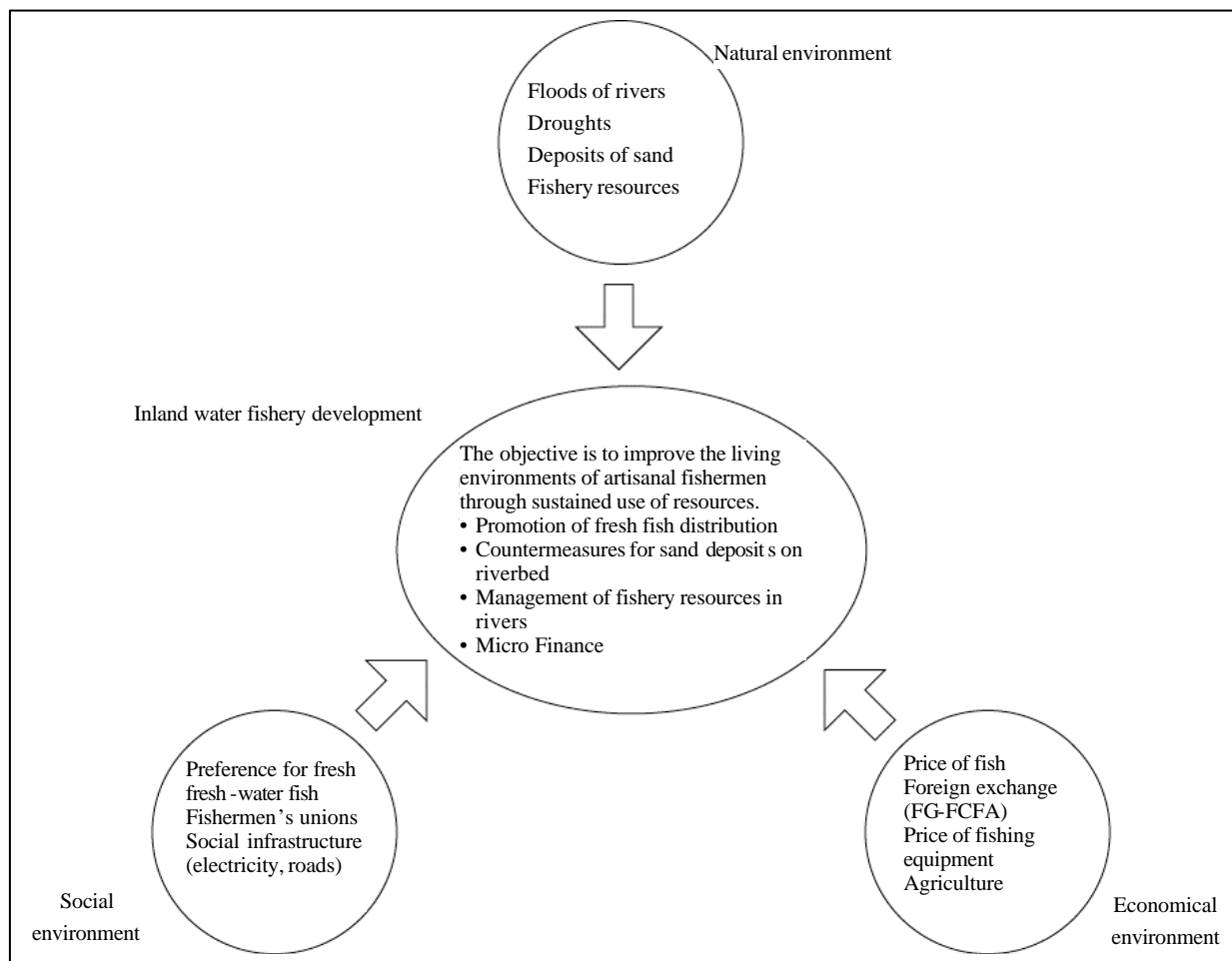


Figure 5-25 Environments Surrounding Inland Water Fisheries, and Development Project

The four extracted issues are presented as individual projects to be implemented. The list of the four tasks below is in the order of implementation priority in consideration of current trends at foreign aid agencies, and the Japanese government's trend for selecting projects.

1. Increase the profit share for fishermen through promotion of fresh fish distribution.
2. Undertake countermeasures for sand deposits on riverbed interdepartmentally with ministries and agencies.
3. Encourage fishermen in self-management of river fishery resources.
4. Aim at supplying fishing equipment by fishermen themselves through a Micro Finance project.

The implementation timing of each component is shown in the bar chart below. The component that should be started first is countermeasures against sand deposits on riverbeds because it will take time before its positive effects appear so it may require large amount of time and work to establish the Project. Next, undertake the management of river fishery resources, the first step of which was taken forward during this Development Study. As for the component pertaining to promotion of fresh fish distribution, it will not be too late to start this even after the manager of a prefectural branch office of Inland Water Fisheries Agency takes time to rear fishermen' union human resources and enlightens unions on organizational reinforcement by using small refrigerators that were experimentally installed. Finally, Micro

Finance shall be undertaken after observing the intentions of existing financial institutions and other donors as mentioned later.

Component	1 st year	2 nd year	3 rd year	4 th year	5 th year	6 th year	7 th year	8 th year	9 th year	10 th year
Promotion of fresh fish distribution		■	■							
Countermeasures for sand deposits on riverbed	■	■	■							
Management of river fishery resources	■	■	■	■	■					
Micro Finance				■	■					

Figure 5-26 Implementation Timing for Each Component

The Master Plan Implementation Promotion Team will lead the project and is composed of the staff who were counter parts to the Study Team. This team will be positioned in the office of Strategy Development Section. A full-time Inland Water Fishery Development Leader will undertake coordination with related organizations for the implementation of this Project, creation of required documents, and implementation management of work in cooperation with the inland water fishery section and each the chief of prefectural branch bureau. Also, they shall work in closer cooperation with each prefectural governor, Agriculture and Livestock Division, Water Affairs and Forestry Division, Hydrology Division and Mine Division as the need arises (refer the figure below).

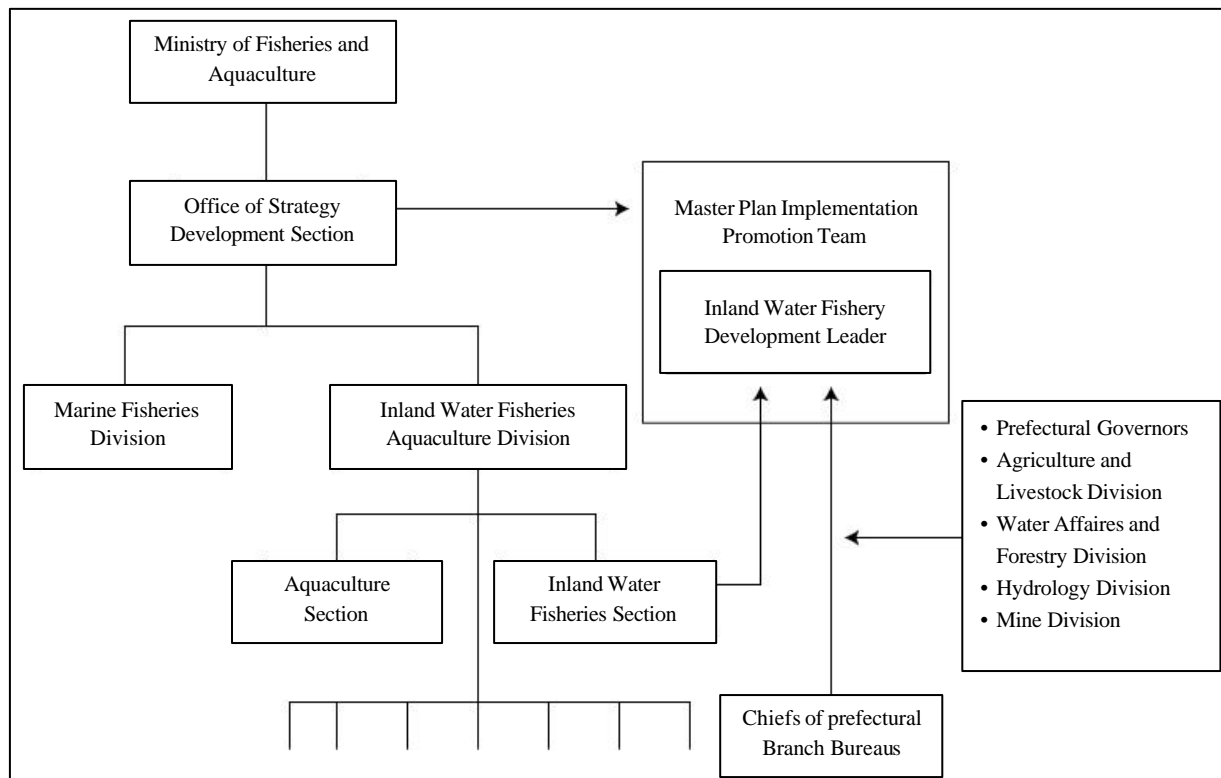


Figure 5-27 Implementation Organizational Structure of Project for Development of Inland Water Fisheries

The total project cost is 1,887,550,840 FG (¥113,253,000 in Japanese yen). The itemized project costs for the components are as follows:

• Promotion of fresh fish distribution	81,608,000FG
• Countermeasures for sand deposits on riverbed	1,441,295,000FG
• Management of river fishery resources	244,072,000FG
• Micro Finance	120,575,840FG

Large-scale investment is not suitable for inland water fisheries. Small-scale installment of facilities and projects in which beneficiaries participate are suitable for inland water fisheries. Fortunately there are already some projects underway besides this Project. Moreover, operation cost is also provided to regional branch offices of the Ministry of Fisheries as a part of the policy of decentralization of power that is promoted by the World Bank and the International Monetary Fund (IMF). The foundation upon which the maximum result can be obtained with small funds is being established. The aforementioned description is an overview of this Project and the description of each component is given in the following sections.

5-7-1 Promotion of Fresh Fish Distribution Component

Since Upper Guinea (Haute Guinée) is located inland several hundreds kilometers away from the sea, fresh marine fish is not distributed there. Distribution sales of frozen marine fish (kinds of pompanos and seerfish) by private freezing companies and smoked fish produced in Senegal supplement consumption demand. However, consumers' taste is basically for fresh, fresh-water fish caught in rivers. In Kankan City, located in the center of Upper Guinea, there is a refrigerator for preservation and a hygienically improved fish market provided and developed by the Japanese government. And support for activation of aquatic product distribution is starting there. The objective of this component is to promote fresh fish distribution by installing preservation facilities for catches on the producing side, more specifically, at Sansanbaya and Sabadou Baranama villages in Kankan prefecture, located opposite the consuming district where a cold chain is being prepared.

Background

Since fishermen move along rivers by camping during the dry season, there are no particular fishing landing spots. Distribution is managed by fishermen's wives and by brokers. If the fish caught in morning are not brought to markets by evening, all fish, with the exception of a type of catfish that are very strong, go bad and lose their commercial value. Currently, fishermen's wives and brokers forward the fish to markets after they smoke the fish at riverbeds or in villages to prevent rotting. However, the smoking process decreases the price of fish so the actual income of fishermen decreases. Additionally, whereas a 3kg whole fish is priced at 4,000 – 5,000 FG, if it is cut into 1kg pieces, each piece is priced at 1,000 FG with 3 pieces totaling only 3,000 FG – giving a loss of 1,000 – 2,000 FG. In this sense, forwarding fresh whole fish as they are has higher profit rate for fishermen.

However, it is difficult to forward fish fresh from riverbeds that are far away from markets in a situation where no preservation methods exist in nearby villages. Moreover, it is impossible to install general electric refrigerators in Upper Guinea where no public electric

power is supplied. To install preservation facilities by overcoming such geographical and social infrastructure difficulties, two methods can be considered. One is solar powered electric refrigerators and the other is kerosene absorption-type refrigerators.⁵⁰ The former is the same system as the one provided to Kankan City by Grant Assistance for Grassroots Projects (GGP) by the Japanese government. Its initial cost is high but it has the merit of almost no operation cost. As to the absorption-type refrigerator, its initial cost is low but it has the demerit of requiring skill for operation. A merit and demerit comparison of both systems is shown on next page.

Table 5-70 Comparison Table of Solar Powered Electric Refrigerators and Kerosene-type Refrigerators

	Solar Powered Electric Refrigerator	Kerosene-type Refrigerator
Merits	<p>Handling, management and maintenance is easy.</p> <p>There is no particular operation required for the refrigerator or overall system, and it works properly if there is enough sunlight. Life of solar battery panels is 25 years --comparatively long. However, in order to maintain the efficiency of solar power generation, cleaning of the surface of panels is essential.</p>	<p>Devices are cheap.</p> <p>They are a bit more expensive than ordinary refrigerators.</p> <p>Costs for management and maintenance are low and parts can be obtained locally.</p> <p>Kerosene-type consumes kerosene 1 liter/day, and the cost of fuel is 33,000 FG/month.</p> <p>Are widely used in areas without electricity.</p> <p>It is widely used to store medicines /chemicals at general stores or public health centers, and there are technicians who are skilled with handling.</p>
Demerits	<p>Initial cost is high.</p> <p>The total cost of the whole system for a chest-type freezer with 300-liter inner capacity is about \$10,000. Also, electricity is stored in batteries but since they are constantly discharged and charged, the expensive batteries eventually need to be replaced and have a nominal rating of 5 years.</p>	<p>Difficult to handle</p> <p>When a device is installed, delicate adjustment is required. It does not require high technique but does require experience and skill.</p>

During this Study period (November 2002 – January 2003), kerosene-type refrigerators were experimentally placed in three villages to observe the feasibility of this component. One worked without problems but two did not function effectively. Sufficient instruction for handling was supposed to have been given but it is assumed that it was still not enough. The other solar-powered refrigerator in Kankan City has been working with no problems since its completion in February 2002. If the initial cost can be covered and costs raised for batteries that need to be renewed every 5 – 6 years, the solar-powered refrigerator is considered the appropriate technology for this component.

50 Different from regular mechanical refrigerators, it does not require compressor. It is a system that heats refrigerant (ammonia) and absorbent (water), creates refrigerant gas of high temperature and pressure by harnessing the difference of boiling points, and liquefies them. After liquefaction, it vaporizes them into gas of low temperature and pressure and decreases temperature by taking vaporization heat away in the process of vaporization. The refrigerant gas gets absorbed into absorbent again and changes back to liquid. Ammonia has the property of being extremely well absorbed by water. There is a system that uses water for refrigerant and lithium bromide for absorbent, and it is mainly used for air conditioning.

Reasons Why Sansanbaya and Sabadou Baranama Villages have been chosen

The purpose of this component is to establish a cold chain for fresh fish distribution by installing preservation facilities on the production side. Therefore, a requirement for the target production location is to have consumption markets where facilities exist. Since Kankan City is currently the only location in the Upper Guinea tract that has a preservation facility and consumption market, production locations that distribute fish to Kankan City are targeted.

Next, there are several fishing villages that provide fish to Kankan City but the important condition for the target villages is that they are villages from which fishermen do not move so much throughout year, in other words, that they have relatively rich fishing locations. In Kankan prefecture, the Milo River runs through from south to north, the Nyandan River runs in the southwest, and the Dion River runs in the southeast, and resources in upper basins far away from cities are generally kept in good condition. There are several big fishing villages in the northern part of the prefecture namely the lower Milo basin but the catches at neighboring fishing locations are not enough. Therefore it is not rare for fishermen to travel to the upper Milo basin or to the Guinea Forest Region across river systems.

Furthermore, whether or not a village is also a planned location for another project that is simultaneously in progress is also a very important factor. In Upper Guinea, the fishing village development project with debt relief fund for Pays Pauvre Très Endetté (PPTE = HIPC: Heavily Indebted Poor Country) and the fisheries and aquaculture promotion project undertaken by Banco Africano de Desenvolvimento (The African Development Bank) /Agence Francaise de Developpement (French Agency for Development) [BAD/AFD] are planning to implement fishing village development projects at 3 sites each. (Refer the Figure below) For this component, the sites of the above projects were avoided. Also, the Japanese Embassy in Guinea is planning to target Kouroussa Prefecture for the fish market development project following Kankan City. If a solar-powered refrigerator is installed in the market in Kouroussa, in keeping with the concept of this project, it will be desirable to also install preservation facilities at the producing regions of Kouroussa.

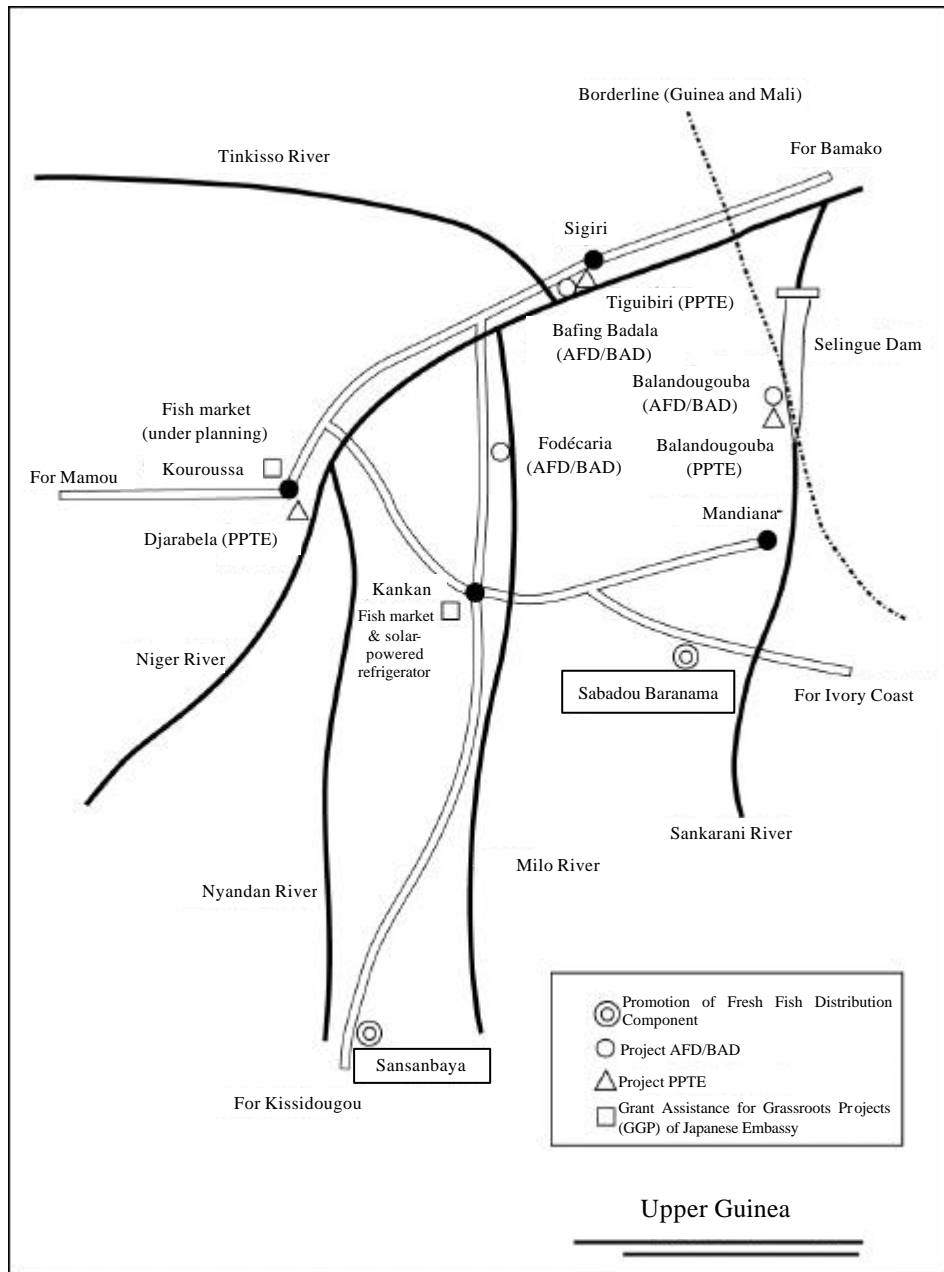


Figure 5-28 Planned Sites for the Inland Water Fisheries Development Project

Social Economic Conditions of the Two Villages

Villages in Upper Guinea have similar backgrounds and social economic structures. The two villages are not exceptions and they share similar characteristics. (Refer the following table.)

Table 5-71 Social Conditions of Sansanbaya & Sabadou Baranama Villages

	Sansanbaya Village	Sabadou Baranama Village
Geographical Conditions	This village is in Sous-préfecture de Tokounou, 95 km south from Kankan. The distance from Tokounou is 25 km. It is located where the Nyandan and the Balé intersect. It is connected to Kankan with a paved road.	The village is the county capital of Sabadou Baranama County and is 75 km away from Kankan to the east. It is located where the Dion and the Sankarani intersect. It is connected to Kankan with a paved road.
History of Village	During the time of the Kingdom of Mali (1200-1450), the ancestors of village were driven here from the Kingdom. The founder is Mr. Ibrahima Baro.	During the time of the Kingdom of Mali (1200-1450), the ancestors of village were driven here from the Kingdom. The founder is Mr. Fakoly Kourouma.
Social Economic Structure	The population of taxable persons over 18 years old in the village is 310. Industries in the village, ranked in order of importance are: agriculture, stockbreeding, fishery, and hunting.	The population of taxable persons over 18 years old in the village is 681. Industries in the village, ranked in order of importance are: agriculture, stockbreeding, fishery, and commerce.
Social Infrastructure	There is an elementary school (3 classes) and 2 teachers are working there. For junior high school, children need to go to Tokounou. There is no well and people drink river water. A public health center is currently under construction.	There is an elementary school (6 classes) and 6 teachers are working there. There is also a junior high school (4 classes) with 5 teachers. There are 5 wells. There is a public health center where 4 health nurses work.
Decision Making Machinery	After the villagers' opinions are heard in village meetings, the committee elders (9 people) and the village office (9 people) make final decisions.	The village people belong to either one of 3 groups. Each group selects 3 representatives and, including the village chief, 10 people compose the committee of elders. This committee of elders makes decisions.
Fishermen's Group	There is an officially registered Groupement des Pêcheurs with 26 member fishermen.	There is an officially registered Groupement des Pêcheurs with 25 member fishermen.

Fishery Situation of the Two Villages

Both villages are located where two rivers intersect and their fishery resources are relatively rich. Since no statistics on fishing exist, all fish landings were recorded by providing scales to the fishermen's groups and hiring researchers as part of the test installment of kerosene-type refrigerators. Research was undertaken from the end of November to the beginning of December for about 10 days. As a result, the daily mean average of fishing landings in Sabadou Baranama village was 83kg and in Sansanbaya, 53kg. This research was right during the period of Ramadan so it is said that this data is a lot lower than the yearly mean average figures. Generally speaking, river fishery peak time is in the dry season and low season is in the rainy season. It is said that if the catch of the peak quarter (April – June) is set as 100, the other quarter catch ratios are: 70 for the January – March quarter, 30 for the July – September quarter, and 15 for the October – December quarter. (According to the Kankan branch manager) The reason why the catch decreases the most in the October – December quarter instead of in the rainy season, contrary to expectations, is because as air and water temperatures go down, fishermen do not go fishing.

The situation of fisheries is as noted in Chapter 3 and there is nothing requiring special mention here. The main fishing methods are gill nets, drift nets, long lines, etc. The catches are of types of cyprinoids such as Horned pouts, Labeo, Hydrocynus, etc., Capitan (*Lates niloticus*), etc., and are landed between 8 – 9 AM in the morning. The camping season of fishermen is usually January to June every year but the fishermen in this area move only within 20 – 30km. This is because sufficient resources are present in areas neighboring the village areas so there is no need to travel to locations far away.

Contents

Facilities for icing fish in insulating fish boxes by making ice with solar-powered refrigerators shall be planned. The contents of the facilities are as below. The facilities for the two villages are almost identical but since there is no well in Sansanbaya village, a foot pumping, deep well to secure water for washing the catch and making ice will be installed.

Sansanbaya

Facility and equipment	Quantity	Specifications
Building	1	Concrete block structure, one story building, 50m ² (disposal of fish and ice room + office)
Freezer	1	300-liter inner capacity, chest freezer type
Solar battery panel	6	Nominal rating 75W, sized about 1,200 x 500 mm
Battery	8	12V, 115 Ah
Accessories for solar-powered refrigerator	1	Battery charger controller, cables
Heat insulation fish box	1	300 liters
Small heat insulation fish box	10	30 liters (polystyrene foam box + strengthening wooden frame)

Sabadou Baranama

Facility and equipment	Quantity	Specifications
Building	1	Concrete block structure, one story building, 50m ² (disposal of fish and ice room + office)
Freezer	1	300-liter inner capacity, chest freezer type
Solar battery panel	6	Nominal rating 75 W, sized about 1,200 x 500 mm
Battery	8	12V, 115 Ah
Accessory for solar-powered refrigerator	1	Battery charger controller, cables
Heat insulation fish box	1	300 liters
Small heat insulation fish box	10	30 liters (polystyrene foam box + strengthening wooden frame)
Well	1	Foot pumping type

Operation Maintenance and Management Plan

Operation maintenance and management of the facilities of this Project will be undertaken by fishermen's unions, Groupement des Pêcheurs. Currently, fishermen's union activities are not extensive but it is considered that operation should be undertaken by Groupement des Pêcheurs for the purpose of striving to promote ties between fishermen and to reinforce the economic infrastructure. Since fishermen lead their lives camping during the dry season and as mentioned previously they do not often return to their villages, persons who have a business sense and can do simple reading, writing and calculations shall be recruited to be in charge of facility operation. Luckily, it is known that there are human resources like the young men who cooperated in the feasibility test in Sabadou Baranama village. However, it is not always guaranteed that there will be plenty of human resources to whom operation maintenance and management of distribution facilities can be trusted in regional fishing villages even when the size of those facilities is small. Moreover, these unions are lacking awareness of operational organization. Therefore, prefectural branch managers shall guide the unions, as mentioned in the beginning of this section.

Basically, a refrigerator will be used as an icemaker in this Project. There is business selling frozen water in small plastic bags in big cities, and plastic bags for this use can be obtained cheaply. Each plastic bag can hold 500cc of water and can be sold as 0.5kg of ice at 100FG per bag. The revenue of the facilities of this Project will be from these sales of ice. Meanwhile, operating costs include the labor cost for the caretakers, maintenance cost for buildings, and renewal cost of batteries and the main bodies of the refrigerators. The costs for buildings will be depreciated equally for 20 years. Batteries will be renewed every 5 years and refrigerators will be renewed every 10 years.

Integration of Project Cost

For initial costs, 40,554,000FG will be appropriated for Sabadou Baranama village and 41,054,000FG will be appropriated for Sansanbaya village giving a sum of 81,608,000FG. This is the equivalent of about ¥4,896,480. Therefore, it is considered to be appropriate to implement this component with Grant Assistance for Grassroots Projects (GPP).

5-7-2 Component of Countermeasures for Sand Deposits on Riverbed

The Niger River has several shallow spots that dry up in the dry season, enabling people to walk through. This makes it almost impossible to conceive that this river is the third largest in the African Continent. Until a few decades ago, major cities along the Niger River were connected by water transport and they had trading relations with the far-away city of Bamako. However, due to development of land transport, the docks from those days now remain unused. As this fact illustrates, the roles of rivers have changed with the passage of time and river traffic has almost lost significance except that rivers are still significant as fishing grounds for inland water fisheries. In this sense, sand deposits on riverbeds pose a serious concern about the loss of fishing grounds in the long-term perspective.

As a general trend, it is evident that areas along the main course of the Niger River and the downstream area of the Milo River are rather densely populated and certain economic activities of inhabitants are contributing to the issue of sand deposits. As a countermeasure against this issue, it is considered necessary to discipline human economic activities that trigger sand deposits over a long period of time rather than to implement large-scale civil

engineering work to dredge sands from riverbeds. Because the work involves vast nature, it will take 30 to 50 years before results of such works become noticeable. Thus, the work should be started as soon as possible.

Background

It has been over the last ten years or so that sand deposits in the main stream of the Niger River and the downstream area of the Milo River have become evident. In each prefecture a Hydrology Division was established to watch the river and they monitor water levels of main rivers but they do not follow changes in the riverbed. Accordingly, there is no scientific data with which to argue sand deposits on riverbeds. However, it is evident as pointed out by community elders and river fishermen, that rivers are getting clogged. Therefore, even though causes for sand deposits are not clear in the absence of systematic scientific survey, discussion with related people point to two main causes. One is clay digging for a large-scale manufacturing of blocks in suburban areas and the other is farming extended to riverbanks.

Clay blocks are widely used in Upper Guinea as an inexpensive construction material. Generally, concrete blocks made of cement mixed with sand are used as another construction material and in Conakry concrete blocks are very common. But they are hardly used at all in the local city of Kankan because of high prices. One concrete block costs 600? 700FG in Conakry, while a clay block in Kankan costs 200FG, almost one-third the price of a concrete block. If concrete blocks were to be used in the Upper Guinea area, it would serve to simultaneously solve the controversial issue of sand deposits and to preserve surface soil along rivers. However, since the issue involves economic power as well as the living customs of residents, we do not delve into this matter any further here.

There are three kinds of clay blocks. From the most economical one, they are:

- 1) Simple mold sinter block Add water to clay and mold in a wooden frame, then sinter in a oven.
- 2) Pressure mold sinter block Put clay in metal mold, compress mold, then sinter in a oven.
- 3) Cement mixture mold block Mix some cement with clay and compress mold. No sintering.

As clay molds require a certain volume of water, block manufacturers choose to work on riverbanks where a large quantity of water is available free. In the Upper Guinea area, layers of clay are extensively present so horizontal distribution of clay cannot be a decisive factor in the choice of digging spots. Soil texture near the surface, is comprised in order from the surface downward with surface soil, clay and sand. The clay layer itself is 1.0 to 1.5m thick. When a layer of clay is totally depleted, a layer of sand appears. Then, workers move to other spots to find other layers of clay. In this manner, surface soil and layers of clay are stripped and a layer of sand is left exposed while digging work is repeated in other spots. This is how, it is assumed, that sands are carried by floodwaters to riverbeds and accumulate there.

As for the second cause, farming extended to riverbanks, it is thought that low productivity farming per unit area is leading to this problem. In other words, because of poor farm

production, farmers put priority on expanding cultivated areas and in doing so expand to areas close to the riverbanks, which offer good access to water. At the same time, in their effort to expand their cultivated area, they are cutting green zones that protect riverbanks from erosion. As a result, riverbanks are unable to prevent erosion by water. Furthermore, it may be partly because of inappropriate farming technology, but land gradually becomes sterile and loses its gripping force, resulting in the in flow of surface soil into rivers during big rainfalls and floods.

These are considered the main causes of sand deposits on riverbeds, but additionally, there is the large issue of forest conservation in the river drainage basin. But this issue involves an extensive area that is beyond the scope of the fishing industry. For this reason, this Study does not go into this point. In connection with this issue, under the financing of EU, the Catchment Basin Conservation Plan (Programme Régional d'Aménagement des Bassin Versants) was implemented for a period of 8 years beginning 1991. Also, head spring protection of small streams that pour into main rivers, development of infrastructure such as schools and wells as well as educational campaign and specific activities regarding forest conservation including afforestation have been conducted, bringing about certain achievements. After terminating this Study, the plan will be renamed the Integrated Management Plan for Natural Resources (Appui à la Gestion Intégrée des Ressources Naturelles: AGIR) and is on going from 2000 to the end of 2005.

Contents

Establishment of Implementing Organization

The issue of sand deposits on riverbeds has been talked about a lot so far and yet no specific measures have been taken. The reason may be found in that the issue is under the jurisdiction of several government offices. More specifically, clay digging is under the jurisdiction of the Ministry of Mines, farming by the Ministry of Agriculture and Animal Resources and green belt conservation by the Water Affaires and Forestry Division. In addition, clay block manufacturing has a tax imposed on it by the Kankan Prefectural Government and it is one source of income for the Prefecture. In light of these complicated stakes and supervisory relations an independent organization of the Sand Deposits Countermeasure Committee (Comité de lutte contre l'ensablement) will be established comprising the following Government offices in Kankan, the center of Upper Guinea. Full-time staff will not be employed but responsible persons at the existing branch offices of Government offices will be assigned to serve concurrently.

- Ministry of Fisheries and Aquaculture, Inland Water Fishery and Aquaculture Division, Prefectural branch manager
- Ministry of Agriculture and Animal Resources, Prefectural branch manager
- Ministry of Mines, Prefectural branch manager
- Hydrology Division, Prefectural branch manager

Focus Group

A focus group shall be chosen from clay block manufacturers. While the importance of farm productivity and appropriate technology is fully recognized, given that this Study is a fishing industry development study and the study team does not include authorities in farming, improvements of riverbank farming shall be left to the hands of a farm project to be conducted in the future based on the idea, "Everyone for his own trade." We do not delve into this issue here. The same will also apply for forest conservation in the catchment basin.

Action Plan for Clay Block Manufacturers

As mentioned above, use of clay blocks as a construction material is an important industrial sector. Therefore, our basic idea is not to unilaterally restrict activities but to find alternate work locations, improve work environments and gradually transfer manufacturers to new work locations. For an educational campaign, to block manufacturers and afforestation of riverbanks, which are reclaimed, actively employ NGOs based in Kankan. In Kankan there are branches of NGOs that operate nationwide, which are well experienced in anti-illiteracy education and organizational reinforcement. They are fully experienced mainly in farming areas. As for afforestation, the Water Affaires and Forestry Division as well as NGOs in the field of forest and environment areas developed under the Catchment Basic Conservation Plan (EU; 1991-1998) have accumulated know-how on kinds of trees suitable to the Upper Guinea in terms of weather and soil. Specific steps of the plan are as follows:

Conduct a socioeconomic study to grasp the employment and living situations of manufacturers and a participation-type study to ensure the will of the target group.

With a view to facilitate transfer to alternate work locations, promote an educational campaign for the establishment of union by traders.

Select alternate work locations and make agreements with manufacturers on the location and conditions for transfer.

Improve work environment (such as wells) of alternate work locations

Transfer manufacturers to alternate locations

Revitalize riverbanks, whose surface soil is excavated (back filling and afforestation)

Subject areas are four prefectures, i.e., Kankan Prefecture, Siguiri Prefecture, Kouroussa Prefecture and Mandiana Prefecture. The implementation period shall be three years. Work plan is as follows:

	First year				Second year				Third year				
	1	2	3	4	1	2	3	4	1	2	3	4	
Socioeconomic survey & participation-type survey	■												
Educational campaign after establishing unions			■										
Selection of alternate locations & reaching consensus				■									
Environmental considerations for alternate places					■								
Transfer									■				
Revitalization of river bank										■			

Figure 5-29 Revitalization Work Plan for Riverbanks to Collect Clay

Integration of Project Cost

Total project cost is 1,441,295,000FG (about 86,477,700 Japanese yen). In view of the scale of project cost, it is considered possible to use collateral funds from the Government of Guinea or proposal-type technical cooperation for implementation. Detailed integration of project cost is provided in the attached sheets.

5-7-3 Self Management of River Fishery Resources

River fishery resources do not accommodate changes well in the natural environment and the economic activities of residents. Climate change, yearly scale of river flooding, efforts for fish catches, etc. can easily fluctuate the volume of resources. Under the present situation, there is no way of knowing the state of resources because no well-maintained data system is available. Therefore, it is indispensable, in the first place, to establish a simple standardized statistical system in Upper Guinea in order to collect reliable data on fish catches over the long term. As the first step of such efforts, the current Study implemented a seminar for standardized statistical system in Kankan. At the seminar, discussion was held on a practical statistical system, which could be implemented rather easily with a limited budget and human resources of the Ministry of Fisheries in cooperation with fishermen, and a resolution was adopted with the unanimous agreement of the administration side and the fishermen. This component proposes activity plans to be implemented as subsequent steps.

Background

The amount of fishery resources in the main and subsidiary streams of the Niger River of the Upper Guinea is estimated at 5,000 tons a year. The estimate is calculated by multiplying the amount of fishery resources in the central delta area of the Niger River in the neighboring Republic of Mali, which is estimated at 50 kg per hectare of inundated area of flood plain, by the inundated area of flood plain of the Upper Guinea, which is about 100,000ha. On the other hand, fishery statistics in 2001 (The Inland Water Fisheries Aquaculture Division) reports the total fish catches not only in Upper Guinea but also in all the prefectures where prefectural branches of the Inland Water Fisheries Aquaculture Division is 1,176 tons. In light of the aforementioned 5,000 tons, catches seem to have large room to be expanded. However, judging from the absence of substantial reasons for the volume of resources of 5,000 tons, lack of credibility in the existing statistical data etc., it is difficult to estimate a utility level of resources. Generally speaking, fishery resources are decreasing and in fact, a fishermen representative reported at the aforementioned seminar that the size of fish is getting smaller and that certain kinds of fish are extinct. It is true that most fishermen believe fish will be back after the high water season in rivers, as in the previous year. However, as it is too late to try to regain after losing, it is very important that fishermen make their own judgment and act on their own by sharing with the administrative side common knowledge on the sustainable use of resources.

The river system of the Niger River in Upper Guinea, seemingly one single river, has the main stream and four main branches (Sankarani, Tinkisso, Nyandan and Milo; refer to Figure 5-29) and each river environment is slightly different. In the river systems of the Niger River there are no known fish that transfer between the multiple river systems during their life spans, therefore it is assumed that there would not be any problem if we consider resources by river system. At the same time, from a sociological point of view, fishermen of Siguirri Prefecture who are based around the main stream of the Niger River alone acts beyond its

river system. Therefore, it is reasonable to assume independent river systems comprise each fishing environment and socioeconomic environment. Based on this viewpoint, branch managers of Prefecture and fishermen involved in such river systems argued at the seminar in Kankan specific measures for management of fishery resources of each river system. The following table is the summary of discussion.

Table 5-72 Resources Management Methods of Main River Systems

Items for resources management	Main stream of Niger River	Sankarani	Tinkisso	Nyandan	Milo
Prohibited fishing method	Poison spill Dynamite	Poison spill Collective fishing	Poison spill	Poison spill Dynamite	Poison spill Dynamite
Minimum opening size of strand	25mm	25mm	25~30mm	25mm	25mm
Prohibited fishing area	Mouth of a river		Baging~Koba	Existing sanctuary	Morigbèdou
Prohibited fishing period	6/15~2/15	High water season	9/15~2/15	September December	June December
Designated number of boats	Undecided	Annual increase: Less than 10 boats	Dabola Pref.: 6 boats Siguiri Pref.: 50 boats	Undecided	80 boats
Interpretation of the fishing right	Belong to the Government	Belong to the Government and fishermen	Belong to the Government	Coexistence of the right belonging to the Government and the traditional right	The right belongs to the Government but fishermen have the right to use.
Role of unions	Resources management	Resources management	Surveillance of fishing area, Fishermen educational activity	Resources management	Fishermen educational activity, Compliance with fishing regulations
Other resources management methods	Decreased pressure for fish catches due to diversified income sources	Establishment of a fishery surveillance committee for each river system	Compliance with fishing regulations by establishing a fishery surveillance committee	Fishermen educational activity and radio programs of discussion agenda	Establishment of a fishery surveillance committee, diversification of income sources and enactment of local fishing regulations

As illegal fishing methods such as poison spills and use of dynamite that can adversely affect resources are still being used in certain areas, it is very important to take prompt measures against them. However, such methods are conducted in extremely far away upper river areas and it is difficult for administrative authorities to intervene due to difficult and costly transfer means and operational expenses involved. With respect to the necessity of a minimum opening size of fishing nets, restrictions on fishing areas and periods, etc., even though these needs are well recognized, lack of scientific data and analytical capacity have failed to produce credible statistics. Thus, statistics by experience only are presented.

In implementing resources management, it is extremely important that fishermen have a sense of ownership of resources. The Guinean Inland Water Fisheries Law (L96/007/AN) in

Article 15 stipulates that the right of fishing belongs in principle to the Government but that it may be transferred free of charge or through payment to voluntary organizations. In spite of this fact, it is interesting that many fishermen still think the fishing right does not belong to them but to the Government. Article 26 of the same law stipulates that the right to preserve and manage fishery resources may be assigned to local administrative organizations or related organizations. In other words, in legal terms there are sufficient conditions for the Government to grant fishing rights to fishermen's unions and to assign responsibility for fishery resources management. Fortunately, aside from the issue of the fishing rights, many related persons are of the opinion that fishermen's unions should take charge of resources management.

Objective

The purpose is to enable fishermen to independently manage river fishery resources with a view to continuously enjoy sustainable benefits from resources. The immediate purpose, however, is to establish and stabilize a collection and analysis system of statistics on inland water fisheries.

Contents

Contents of actual plans are twofold: namely, intensify administrative capacity for fisheries and educational activities for fishermen. To begin with, based on the consensus of the seminar on standardized statistical system held in Kankan in December 2002, to strengthen the present statistical collection system. The agreed items at the seminar are as follows: (For details, refer to the material version.)

- Each fisherman measures and records a total of daily fish catches.
- Branch staff of the Fishery/ Fishing Industry Division collects data once every 3 months.
- Each prefecture conducts annual fishery census once.
- Register fishing vessels.

As fishermen engaged in inland water fisheries are mostly illiterate, plans do not demand a large amount of information from the beginning and limit their participatory activities to simply measure and record total daily fish catches. However, if the system starts working smoothly, collection of biological data such as statistics of fish catches of the main kinds of fish and the length and the weight of individual fish is targeted for the future. All data collected every three months will be transferred to the Center National des Sciences Halieutiques de Boussoura in Conakry for input and analysis.

With a view to satisfy the need for fishermen to understand the idea of resource conservation, activities to enlighten fishermen on self-management of fishery resources by each fishermen's union will be conducted simultaneously. Unions shall determine management policy of fishery resources together with all members of the respective communities including decision-making bodies such as community leaders and meetings of eminent persons. In case one river system area involves several fishermen's unions they shall obtain advice from their senior authorities at the prefectural level or the branch managers of the Inland Water Fisheries Division, establish a resources management committee for each river system (Refer to the following table.) and compile manuals for resources management based on consensus.

Manuals shall be duly informed through unions or radio programs to fishermen and community members. Manuals contain the following items:

- Composition and activities of the resources management committee
- Collection methods of fish catches statistics
- Resources management standard (prohibited fishing areas, prohibited fishing periods, prohibited fishing equipment, minimum opening size of net, etc.)
- Handling of fishermen not complying with surveillance methods and regulations
- Methods of arbitration among fishermen’s unions in the same river system

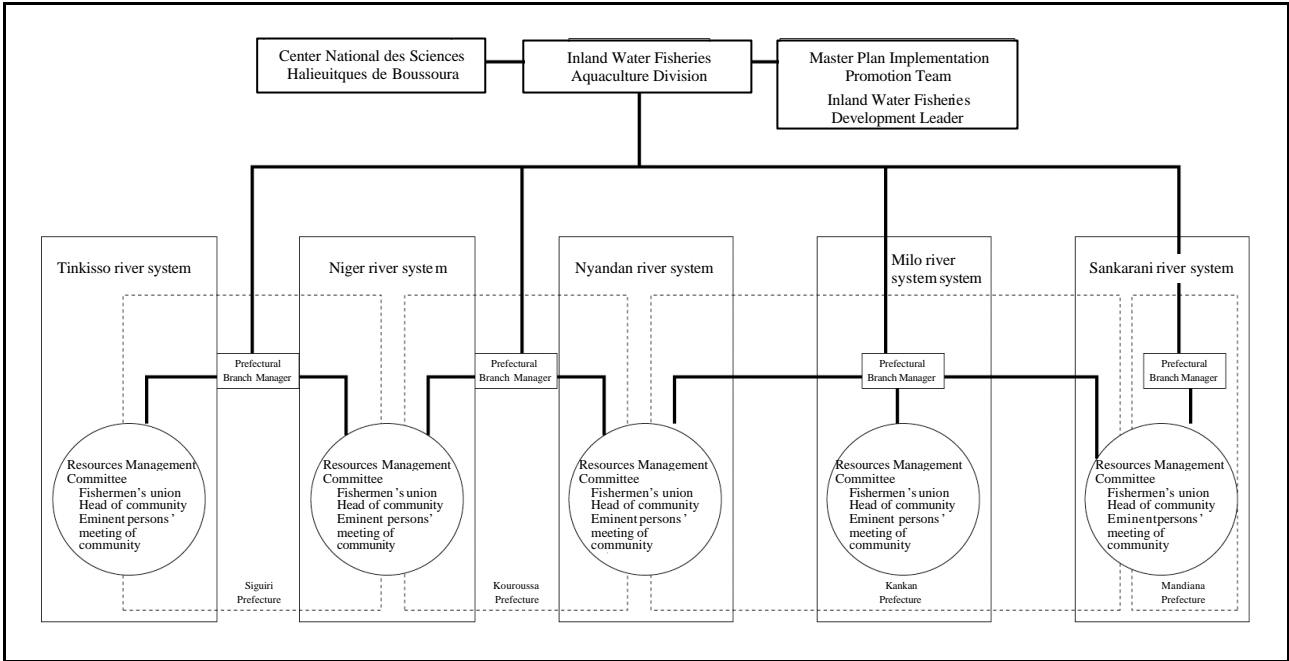


Figure 5-30 Resources Management Committees and Related Organizations

Administrative Management Plan

This component shall be implemented by the Ministry of Fisheries and Aquaculture, the Inland Water Fisheries Aquaculture Division in cooperation with its prefectural branches and the Center National des Sciences Halieutiques de Boussoura by occasionally conducting fishermen educational activities by employing NGOs as needed. The period of implementation is 5 years.

Activity	First year	Second year	Third year	Fourth year	Fifth year
Campaign to buy fish weight measuring apparatus	■				
Campaign to register a fishing vessel (boat)	■				
Fishery census (routine)	■	■	■	■	■
Fishery statistics follow-up		■			
Resources management education (for unions)			■		
Resources management follow-up					■

Figure 5-31 Work plan

For the establishment of a Resources Management Committee a large scale campaign of educational activities will be staged in the third year by entrusting a NGO and in the last stage a seminar will be held with the participation of administrative authorities in order to compile resources management manuals with the consensus of all participants. Furthermore, two years later, follow-ups will be conducted to make sure manuals are properly implemented and to give technical advice where necessary

Integration of Project Cost

The implementation cost of this component is 244,072,000FG (14,644,320 yen). (Refer to details of integrated cost in attached sheets.) As No. 1-6 of the list are covered by the regular budget of the Inland Water Fisheries Aquaculture Division, outside funds are injected to the remaining items only (7-11). Accordingly, the ratio of foreign funds and domestic funds is as follows:

Foreign funds: 186,600,000FG (76%)
Domestic funds: 57,472,000FG (24%)

5-7-4 Micro Finance

The biggest issue for fishermen of inland water fisheries, as it is clearly shown from the interview, is difficulty in obtaining fishing equipment. However, this does not mean that there is no fishing equipment on market. Desired fishing equipment is always available at fishing equipment stores at Kankan and Bamako. So why is it difficult to obtain fishing equipment? The true nature of the problem is that they don't have enough money when it's needed to purchase fishing equipment on market.

Background

Currently, there are mainly three ways fishermen obtain fishing equipment. The first option is to purchase by cash at fishing equipment stores in Kankan, the second option is to purchase by cash at fishing equipment stores in Bamako, and the third option is to use credit to purchase from merchants. A survey was conducted on fishing equipment available in

Bamako of Mali, which supplies fishing equipment in the Upper Guinea area, in comparison with fishing equipment from a store in Kankan city (Table 5-73).

Table 5-73 List of Retail Price of Fishing Equipment in Bamako and Kankan

Name of fishing equipment material	Kankan	Bamako	Price ratio
Mono-filament			
0.16mm in diameter	130,000	82,500	58%
0.20mm in diameter	140,000	82,500	70%
0.28mm in diameter	250,000	135,000	85%
0.33mm in diameter	350,000	210,000	67%
0.40mm in diameter	300,000	270,000	11%
Multifilament			
210d/2	80,000	78,000	3%
210d/6	300,000	195,000	54%

Exchange rate of Republic of Mali's currency, FCFA and Guinean franc, FG is 1FG=3FCFA.

Distance between Bamako and Kankan is 350km. Travel expense is 50,000FG.

In conclusion, the price of fishing equipment in Kankan is on average 50% higher than in Bamako, and considering such factors as cost of transportation between Bamako and Kankan, exchange rate, inappropriate levy of custom duty at border (fishing equipment is essentially tax exempt), and profit for fishing equipment store, they are not necessarily overcharging in Kankan. Some fishermen who know the way around Bamako and have connections with fishing equipment stores go to Bamako to buy fishing equipment, but it is still a cash transaction and this method does not work for fishermen without much capital. There is no accurate data on how much higher the fishing equipment prices resulting from informal relationships with merchants, compares to the retail price in Kankan, but it is never as high as twice the retail price. However, this connection detracts from business independence and this problem needs to be improved in the long run.

Part-time Farming

One important factor in managing fishery households is farming as a side business. In Upper Guinea, 70% of river fishermen farm on the side, and interestingly they are economically in a better situation than full-time fishermen. According to a socioeconomic survey result conducted with one hundred fishermen in Kankan, the average yearly income of full-time fishermen was 1,464,910FG, compared to that of part-time farmer-fishermen, which was 1,846,936FG. Furthermore, 26.5% of farmer-fishermen earn more than 50% of their household income from farming, and 86.8% of them earn more than 25% of their income from farming. This shows that it is difficult to support households just with fishing and farming is a very important income source. In the first place, the reason that it is possible to run these two different occupations is that fishing and farming work are conveniently in different seasons. That is, the harvest time for fishing is when river water runs low in dry periods, whereas farming activities are done in the wet season when the river water increases. Fishermen camp near rivers to fish until the river water level is too high to camp along the river, at that time they return to the village to farm. The activity calendar for the two occupations is shown below.

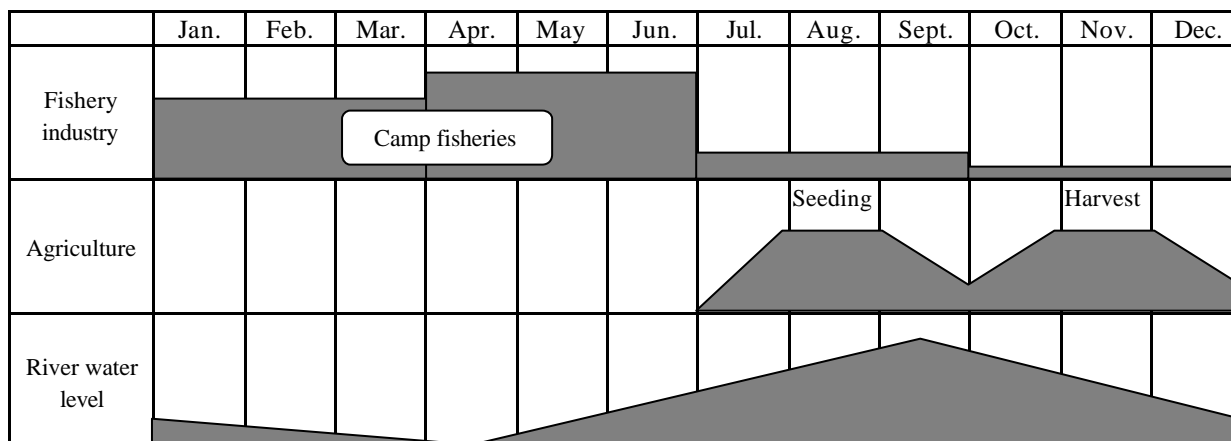


Figure 5-32 Work Calendar of Fishery Industry and Agriculture

According to the socioeconomic survey mentioned above, 64% of farmer-fishermen own their farm, and only 36% of them are tenant farmers who rent the farm from a farmer. Also, the combined average farm area of both owner farmers and tenant farmer is 3.4 ha. With this much area for farming, assuming a low harvest per hectare of 1 ton of rice, an annual harvest rice of 3.4 ton can be expected. This amount is enough to feed a fisherman's household and there is still enough left to sell for profit. However, farmer-fishermen are only part time farmers, so they cannot be compared to full-time farmers in terms of available farming equipment and techniques. Farmer-fishermen without draft ox and harrow pay for cultivation of paddy fields; generally 1/4ha can be cultivated in a day, and it would take almost 15 days to cultivate 3.4ha at this rate. Moreover, farming activities are concentrated during particular periods and full-time farmers put higher priority on their use of farming equipment, so it takes a while for farmer-fishermen to access the farming equipment and there is a chance they might miss the right timing for cultivation. Ideally, farmer-fishermen should own their farming equipment so they can work to their own schedule without having to adjust to full-time farmers. However, it is risky for them to individually own equipment right away so it is probably adequate for each union to own the equipment and share it among members. If equipment is shared, technical guidance by farm promoters is essential. Fortunately, the farm has agreed to fair technical guidance.

As stated above, for management of fishery households, it is important to diversify income sources to reduce risk, rather than to depend on income solely from river fisheries which are susceptible to environmental change, and then to stabilize river fisheries over the long run. Furthermore, when the river is high, it is breeding season for many species of fresh-water fish, and it is desirable from a fisheries resource protection point of view for the river fishermen to stay away from the fishing grounds and to engage in farming activities during this period.

Objective

In this component, in order to provide fishing equipment consistently and strengthen farming as a part-time income source, Micro Finance for fishermen will be examined. However, there are some movements such as introducing small scale loans by existing financial institutions for artisanal fishermen with their own capital and planning of Micro Finance by AFD/BAD, so implementation will be discussed after assessing these movements.

Content

Among fishing methods in river fisheries, there are gill net, drift gill net, trawl line, cast net and basket but the main method is gill net. There are two types of net fabric for gill nets: monofilament and multi-filament. Monofilament is transparent and is hard to see by fish so the fishing efficiency is high, but it is not as durable as multifilament, and is more expensive. The lifetime of monofilament is only one year, and it is necessary to update a considerable amount of fishing equipment every year before leaving for camp fisheries. It is at this time of year that fishermen have capital needs. According to results from surveying one hundred fishermen in Kankan prefecture, capital investment before last year's camp fishing activity was on average 400,000FG. In this plan, the capital needs for fishermen who cannot go camp fishing because of lack of capital are calculated as loan amounts sufficient to provide three gill nets. Other fishing equipment such as trawl line and cast net are not considered here because they do not need to be replaced every year and their capital requirements are not as high as that required for gill nets.

In addition, this plan includes capital loans for farm resources and materials to encourage full-time fishermen to become part-time farmers and farming development for farmer-fishermen. Specifically, loans consist of capital for providing draft ox and harrow to each fishermen's union and for purchasing seed rice.

Administration and Management Plan

Implementation of this component is basically assigned to existing financial institutions. In Upper Guinea, currently there is only one existing financial institution, a branch of Credit Rural de Guinée in Kouroussa Prefecture, but in the near future, they are planning to open branch offices in Kankan Prefecture and Siguiri Prefecture. Also, NGOs and PRIDE, which implement Micro Finance, are located in Kankan, but under the current situation, they only extend loans to the commercial sectors and expansion in the fishery sector is not clear.

Loans to fishermen will be extended under the collective responsibility system through fishermen's unions, and in the event of defaults, union members will make payments instead. As existing financial institutions have already accumulated know-how on loan programs for fishermen, the Ministry of Fisheries shall only monitor their progress.

Integration of Project Cost

The total fund is estimated 120,575,840FG (7,234,550 Japanese yen). Breakdown is as follows: Given the size of the budget, it is possible to use Grant Assistance for Grassroots Projects (GGP) and collateral funds.

Table 5-74 Micro Finance of Estimated Capital Needs

Item	Amount (FG)
Gill net	85,155,840
Draft ox + harrow	14,000,000
Seed rice	21,420,000
Total	120,575,840

5-7-5 Environmental Impact Assessment

In the Niger River and its tributaries, rising riverbeds accumulated with sediments and lack of water during the dry season have affected water transportation in recent years. Until ten years ago, passenger ferries were operated from Kankan to Boumeko every year from the end of June to September. Sediment accumulation is due to current extensive farming practices, collection of clay for bricks in cultivated lands, and timber logging along the river. Timber logging is operated along the river in order to make bricks, with the volume of the transported timber per truck amounting to 8m³. The stumps that are left behind are consumed by insects in the dry season and are carried out to the river in the rainy season, taking all the sediment around them. At the Center for Environmental Study and Research (Centre d'Étude et de Recherche en Environnement, CÉRE), the "Upper Niger River Preservation Project" (GENIS) funded by Belgium is in progress and research on the sedimentation mechanism is being conducted. Based on the results of the research it was proposed that pressurized bricks, instead of fired bricks, should be used to prevent forest degradation along the river. Moreover, there is also a proposal to construct a glass factory in the area, which uses sediments as the raw material. Recently the Ministry of Geology granted permission to collect river sediments at 10 m³ for 500 FG. In order to revive transportation by water, forest preservation is a top priority. Forests play a role of keeping river levels down and reducing sediment discharge during the rainy season, and maintaining the water level in the dry season.

There is a proposal to dredge the river and develop a port in Kankan, Siguiri, and Kuremare. However, dredging of sea lanes not only requires a huge amount of capital, even if the dredging was successfully conducted, the lanes would soon likely become impassable because of the current condition of sediment deposit build-up. Because dredged soil could potentially contain toxic substances, significant environmental issues arise including selection of toxic substance disposal sites and the impact to the downstream ecosystem by diffusion of the sediment. It seems appropriate to ban activities that prevent sediment accumulation and let nature take care of itself. In the case of the Mekong River, the Mekong Riverbank Protection Project led by JICA is being implemented jointly with shore protection projects at ports of major cities. Research objectives include protection from flood damage, improvement of river transportation and prevention of receding riverbanks, but not large scale dredging projects.

Water pollution in the Niger River is also an issue. Heavy metal pollution of the river water due to mineral mining is a concern. The Conakry University CERE conducted an on-site survey. In Siguiri, there are gold panning placers at three locations along the Niger River's subsidiary and there are quite a few artisanal miners. As they mine for gold, they dispose surplus sediment in the river. Furthermore, there appears to be no fish living in the river because of direct disposal of toxic substances (mercury, cyanide, chrome, nickel, manganese etc.) used for refining. The CÉRE will compile a report around March of 2003 with demands to the placer mining companies and the Ministry of Mining, etc. to take necessary environmental measures.

On February 16, 2002, at the summit meeting of the Niger Basin Authority, consisting of nine nations, the Prime Minister of Guinea made the announcement that upon realizing the significance of sustainable management of the river basin and providing downstream water supply, he has designated six locations in the Upper Niger River basin, totaling 4.5 million ha,

for registering under Ramsar Convention. Before these locations were designated, there used to be support from the World Wide Fund for Nature (WWF), the Ramsar Convention Bureau, and the Niger River Basin Committee.

Additionally, in Upper Guinea, EU and USAID in cooperation with the Water Affaires and Forestry Division (Direction Nationale des Eaux et Forêts, DNEF) are actively involved in the management of forest resources of the Upper Niger River basin and preservation of biodiversity. In 1997, the Niger National Park in the upper Kouroussa was approved under Presidential decree. As a result of zoning in the park, regulations on the fishing seasons and the number of fishing boats and supervisory operations by the Groupement des Pêcheurs, fish catches in and out of the park began to increase, enabling sustainable fisheries.

Table 5-75 Wetlands to be Registered under the Ramsar Convention

Number	Name	Date of Designation	Location	Area (ha)	Coordinates	Designation in Guinea
1163	Niger-Mafou	Jan. 17, 2002	Kankan, Faranah	1,015,450	09 ° 53'N 010 ° 37'W	Management type nature reserve
1164	Niger-Niandan-Milo	Jan. 17, 2002	Kankan	1,046,400	10 ° 30'N 009 ° 30'W	Management type nature reserve, national park
1165	Niger Source	Jan. 17, 2002	Faranah	180,400	09 ° 20'N 010 ° 40'W	Management type nature reserve
1166	Niger-Tinkisso	Jan. 17, 2002	Kankan	400,600	11 ° 20'N 009 ° 15'W	Management type nature reserve
1167	Sankarani-Fié	Jan. 17, 2002	Kankan	1,015,200	10 ° 25'N 008 ° 30'W	Management type nature reserve
1168	Tinkisso	Jan. 17, 2002	Faranah, Kankan	896,000	11 ° 13'N 010 ° 35'W	Management type nature reserve

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

Results from the four proposed components of the environmental impact assessment are shown next page.

Table 5-76 Result of Environmental Impact Assessment of the Project Planning

Project Planning	Components	Degree of Environmental Impact*	Reasons	Environmental protection measures
(1) Improvement of fresh fish distribution	Solar Powered Electric Refrigerator	Positive	Reduction of fossil fuels	
	Disposal of batteries and refrigerators	B	Increase in toxic waste	Appropriate waste treatment
(2) Countermeasures for sand deposits on riverbed	Planning activities related to restoration of river bank and relocation of brick makers	Positive	Reduction of sand deposits on river bed	
(3) Self-management of fishery resources in rivers	Resources conservation principle enlightenment activities	Positive	Elimination of waste disposal to river bank and logging activities in proximity	
(4) Micro finance	Disposal of fishing nets which will increase in future	B	Increase in waste	Appropriate waste treatment

5-7-6 Economic and Financial Analysis

Of the four proposed components, economic and financial analysis will be conducted only for the improvement of fresh fish distribution component, for which a quantitative economic benefit analysis is possible. For the other components, qualitative remarks will be made for economic benefits.

(1) Summary of the Fresh Fish Distribution Component

The objectives of this component are to install fresh fish refrigeration equipment which is low priced and easy to maintain and increase fishermen's income by increasing the proportion of fresh fish sales in the areas where smoking is the only means of preservation in the absence of other methods (Sabadou Baranama and Sansanbaya) as well as to increase fresh fish supply to Upper Guinea residents, especially Kankan residents.

Specifically, freezers will be operated by solar power to produce ice, which will then be sold to fishermen. Fishermen will take the ice for fishing operation and use it to preserve caught fish. By using ice, the same fish, which would be worth 1,000 FG/kg if smoked, can be sold fresh for 1,500 FG/kg. It is estimated that implementation of this project will change the sales ratio of smoked fish and fresh fish from 60%: 40% to 40%: 60%. Profit from selling ice will be used for management and maintenance of the equipment.

(2) Financial Assessment

Sales price of the ice shall be 100 FG (500g bag) and daily production shall be 100 bags (50 kg). The ice will be sold mainly to fishermen and fresh fish brokers but during the fishery off-season from July to December it will be sold to non-fishery related people such as village people as well in order to cover the maintenance expenses of the equipment. Assuming annual operations of 350 days, annual income will be 3.5 million FG. Necessary expenses include 1.6 million FG every year, battery replacement every five years (2.78 million FG) and replacement of freezers every ten years (3.79 million FG).

Table 5-77 Internal Financial Rate of Return

Project area	Internal financial rate of return
Sabadou Baranama	-5%
Sansanbaya	-5%

The internal financial rate of return of this project is -5% for both Sabadou Baranama and Sansanbaya, thus financial benefit cannot be expected from implementation of this project. However, in case the initial equipment investment of the project is funded by international capital (e.g. aid or government expense), there will be no concern over the annual management and maintenance of the equipment, including the battery change every five years and freezer replacement every ten years. However, a decline of more than 27% in annual sales (below 2.55 million FG/year) is likely to disrupt the management and maintenance of the equipment.

(3) Economic Assessment

1) Economic Benefit

Because preservation of fresh fish will become possible by the implementation of this project, fishermen will be able to sell a larger amount of the higher priced fresh fish, thereby earning better income. Assuming that implementation of this project will improve the ratio of smoked fish sales to fresh fish sales from the current estimate of 60%:40% to 40%:60%, increase in fishermen's income to be resulted from the implementation of this project is as follows:

Table 5-78 Economic Benefit Assessment

Project areas	Fish catch (kg)	Amount of sales (current)	Amount of sales (after implementation)	Economic benefit
Sabadou Baranama	89,225/year	107.07 million FG/year	115.99 million FG/year	8.93 million FG/year
Sansanbaya	56,975/year	68.37 million FG/year	74.07 million FG/year	5.70 million FG/year

2) Results of Assessment Index Calculation

The internal financial rate of return and the result of sensitivity analysis are shown in the following table. If fresh fish sales are improved by 20% from the current 40% to 60% (the amount of fresh fish increases 50% from the current figure) according to the plan, the internal financial rate of return for Sabadou Baranama and Sansanbaya is 17% and 7%, respectively.

Table 5-79 Sensibility Analysis

Change in fresh fish sales	Sabadou Baranama	Sansanbaya
20% improvement (50% increase)	17%	7%
15% improvement (37.5% increase)	10%	1%
10% improvement (25% increase)	1%	Calculation error

Qualitative assessments for the three remaining components are summarized in the following table.

Table 5-80 Qualitative Assessment of Economic Benefit

Component	Economic benefit
River bed sand deposit countermeasures	Prevention of decrease in future fish catches
Self-management of river fishery resources	Prevention of decrease in future fish catches
Macro finance	Financing will improve fishermen's income by changing their cash flow, which enables them to use fishing and farming equipment previously unaffordable. However, because the economic assessment focuses on examining the usability of capital, it is not suitable to gain benefits for businesses, which circulate capital – such as loan programs.

5-7-7 Proposal for Project Implementation

Considering the project scale of the Improvement of Fresh Fish Distribution Component, it is proper to implement it with small scale grant aid. As for the Countermeasures for Sand Deposits on Riverbed Component, utilization of collateral funds reserved by the counter part country or proposal-type technical cooperation is proposed. In order to allow future expansion to other projects such as conservation of river basins, it is necessary to dispatch study teams from the forestry or agriculture sectors. As for the Management of the River Fishery Resources Component, it is assumed that the dispatch of short-term experts several times and the contribution of operation costs for these dispatches will be sufficient. Lastly, for the Micro Finance Component, investment of financial funds using small scale grant aid or collateral funds is judged to be the most appropriate.

Project Estimation and Economic Financial Analysis of ‘Promotion of Fresh Fish Distribution Component’ (Sabadou Baranama Village)

1. Basic Data

Fish price in the Kankan market		2,500 FG
Price for smoked fish		1,000 FG
Price for fresh fish		1,500 FG
Haul (sample survey period)		83 kg/day
Quarter regime cost	Jan - Mar	70
	Apr - Jun	100
	Jul - Sep	30
	Oct -Dec	15
Average number of operating days /month		25 day
Estimated annual haul		89,225 kg
Current smoked fish ratio		60 %
Current fresh fish ratio		40 %
Planned smoked fish ratio		40 %
Planned fresh fish ratio		60 %
Local consumption ratio		80 %

2. Planned Location

Sabadou	Baranama	
Village		Sabadou Baranama County
		75 km from Kankan City

3. Detail of Project

Equipment of Fresh Fish Preservation Facilities

Items	Quantity	
Fresh fish preservation building (Goods disposal room + heat insulation room)	50 m ²	CB structure, one story building
Solar powered freezer	1set	inner capacity: 300 liters
Heat insulation fish box	1	inner capacity: 300 liters
Small heat insulation fish box	10	inner capacity: 30 liters

4. Project Cost

(FG)

	Market price			Economic price		Durable years
	Quantity	Unit price	Cost	Conversion factor	Cost	
Equipment cost						
Fresh fish preservation building	50	389,000	19,450,000	0.94	18,283,000	25 years
Solar battery panel	6	1,756,000	10,536,000	1	10,536,000	25 years
Freezer	1	3,790,000	3,790,000	1	3,790,000	10 years
Battery	8	348,000	2,784,000	1	2,784,000	5 years
Other equipment	1	3,394,000	3,394,000	1	3,394,000	
Heat insulation fish box	1	100,000	100,000	1	100,000	
Small heat insulation fish box	10	50,000	500,000	1	500,000	
Total			40,554,000		39,387,000	
Operating cost						
Labor cost	1	600,000	600,000	1	600,000	
Building maintenance		1,000,000	1,000,000	0.94	940,000	
Total			1,600,000		1,540,000	

5. Operation Management

Sabadou Baranama Fishermen's Union

6. Estimation of Cost Benefit

Benefit:

Production of ice	100 bag/day
	in weight
	50 kg/day
Price of ice	100 FG/bag
Operating days/year	350 day
Annual sales of ice	3,500,000 FG
Financial benefit	3,500,000 FG
Total value of fish for the case of 60% of haul is smoked and 40% is sold as fresh fish (without Project)	107,070,000 FG
Total value of fish for the case of 40% of haul is smoked and 60% is sold as fresh fish (without Project)	115,992,500 FG
Economic benefit	8,922,500 FG

7. Financial Analysis

Annual	Revenue	Cost	Balance	Note
1		40,554,000	-40,554,000	
2	3,500,000	1,600,000	1,900,000	
3	3,500,000	1,600,000	1,900,000	
4	3,500,000	1,600,000	1,900,000	
5	3,500,000	4,384,000	-884,000	Battery renewal
6	3,500,000	1,600,000	1,900,000	
7	3,500,000	1,600,000	1,900,000	
8	3,500,000	1,600,000	1,900,000	
9	3,500,000	1,600,000	1,900,000	
10	3,500,000	8,174,000	-4,674,000	Battery + refrigerator renewal
11	3,500,000	1,600,000	1,900,000	
12	3,500,000	1,600,000	1,900,000	
13	3,500,000	1,600,000	1,900,000	
14	3,500,000	1,600,000	1,900,000	
15	3,500,000	4,384,000	-884,000	Battery renewal
16	3,500,000	1,600,000	1,900,000	
17	3,500,000	1,600,000	1,900,000	
18	3,500,000	1,600,000	1,900,000	
19	3,500,000	1,600,000	1,900,000	
20	3,500,000	8,174,000	-4,674,000	Battery + refrigerator renewal
21	3,500,000	1,600,000	1,900,000	
22	3,500,000	1,600,000	1,900,000	
23	3,500,000	1,600,000	1,900,000	
24	3,500,000	1,600,000	1,900,000	
25	3,500,000	1,600,000	1,900,000	Battery renewal

Financial internal rate of return = -3%

8. Economic Analysis

Annual	Benefit	Cost	Net economic benefit	Note
1		36,664,000	-36,664,000	
2	8,922,500	1,400,000	7,522,500	
3	8,922,500	1,400,000	7,522,500	
4	8,922,500	1,400,000	7,522,500	
5	8,922,500	4,184,000	4,738,500	Battery renewal
6	8,922,500	1,400,000	7,522,500	
7	8,922,500	1,400,000	7,522,500	
8	8,922,500	1,400,000	7,522,500	
9	8,922,500	1,400,000	7,522,500	
10	8,922,500	7,974,000	948,500	Battery + refrigerator renewal
11	8,922,500	1,400,000	7,522,500	
12	8,922,500	1,400,000	7,522,500	
13	8,922,500	1,400,000	7,522,500	
14	8,922,500	1,400,000	7,522,500	
15	8,922,500	4,184,000	4,738,500	Battery renewal
16	8,922,500	1,400,000	7,522,500	
17	8,922,500	1,400,000	7,522,500	
18	8,922,500	1,400,000	7,522,500	
19	8,922,500	1,400,000	7,522,500	
20	8,922,500	7,974,000	948,500	Battery + refrigerator renewal
21	8,922,500	1,400,000	7,522,500	
22	8,922,500	1,400,000	7,522,500	
23	8,922,500	1,400,000	7,522,500	
24	8,922,500	1,400,000	7,522,500	
25	8,922,500	4,184,000	4,738,500	Battery renewal

Economic internal rate of return = 18%

Project Estimation and Economic Financial Analysis of 'Promotion of Fresh Fish Distribution Component' (Sansanbaya Village)

1. Basic Data

Fish price in the Kankan market		2,500 FG
Price for smoked fish		1,000 FG
Price for fresh fish		1,500 FG
Haul (sample survey period)		53 kg/day
Quarter regime cost	Jan - Mar	70
	Apr - Jun	100
	Jul - Sep	30
	Oct -Dec	15
Average number of operating days /month		25 day
Estimated annual haul		56,975 kg
Current smoked fish ratio		60 %
Current fresh fish ratio		40 %
Planned smoked fish ratio		40 %
Planned fresh fish ratio		60 %
Local consumption ratio		80 %

2. Planned Location

Sabadou	Baranama	
Village		Tokounou County
		95 km from Kankan City

3. Detail of Project

Equipment of Fresh Fish Preservation Facilities

Items	Quantity	
Fresh fish preservation building (Goods disposal room + heat insulation room)	50 m ²	CB structure, one story building
Solar powered freezer	1set	inner capacity: 300 liters
Heat insulation fish box	1	inner capacity: 300 liters
Small heat insulation fish box	10	inner capacity: 30 liters
Deep well	1	foot pumping

4. Project Cost

(FG)

	Market price			Economic price		Durable years
	Quantity	Unit price	Cost	Conversion factor	Cost	
Equipment cost						
Fresh fish preservation building	50	389,000	19,450,000	0.94	18,283,000	25 years
Solar battery panel	6	1,756,000	10,536,000	1	10,536,000	25 years
Freezer	1	3,790,000	3,790,000	1	3,790,000	10 years
Battery	8	348,000	2,784,000	1	2,784,000	5 years
Other equipment	1	3,394,000	3,394,000	1	3,394,000	
Heat insulation fish box	1	100,000	100,000	1	100,000	
Small heat insulation fish box	10	50,000	500,000	1	500,000	
Total	1	500,000	500,000	0.94	470,000	
Operating cost			41,054,000		39,857,000	
Labor cost						
Building maintenance	1	600,000	600,000	1	600,000	
Total		1,000,000	1,000,000	0.94	940,000	
			1,600,000		1,540,000	

5. Operation Management

Sansanbaya Fishermen's Union

6. Estimation of Cost Benefit

Benefit:

Production of ice	100 bag/day
in weight	50 kg/day
Price of ice	100 FG/bag
Operating days/year	350 day
Annual sales of ice	3,500,000 FG
Financial benefit	3,500,000 FG
	68,370,000 FG
Total value of fish for the case of 60% of haul is smoked and 40% is sold as fresh fish (without Project)	
	74,067,500 FG
Total value of fish for the case of 40% of haul is smoked and 60% is sold as fresh fish (without Project)	
Economic benefit	5,697,500 FG

7. Financial Analysis

Annual	Revenue	Cost	Balance	Note
1		41,054,000	41,054,000	
2	3,500,000	1,600,000	-1,900,000	
3	3,500,000	1,600,000	-1,900,000	
4	3,500,000	1,600,000	-1,900,000	
5	3,500,000	4,384,000	884,000	Battery renewal
6	3,500,000	1,600,000	-1,900,000	
7	3,500,000	1,600,000	-1,900,000	
8	3,500,000	1,600,000	-1,900,000	
9	3,500,000	1,600,000	-1,900,000	
10	3,500,000	8,174,000	4,674,000	Battery + refrigerator renewal
11	3,500,000	1,600,000	-1,900,000	
12	3,500,000	1,600,000	-1,900,000	
13	3,500,000	1,600,000	-1,900,000	
14	3,500,000	1,600,000	-1,900,000	
15	3,500,000	4,384,000	884,000	Battery renewal
16	3,500,000	1,600,000	-1,900,000	
17	3,500,000	1,600,000	-1,900,000	
18	3,500,000	1,600,000	-1,900,000	
19	3,500,000	1,600,000	-1,900,000	
20	3,500,000	8,174,000	4,674,000	Battery + refrigerator renewal
21	3,500,000	1,600,000	-1,900,000	
22	3,500,000	1,600,000	-1,900,000	
23	3,500,000	1,600,000	-1,900,000	
24	3,500,000	1,600,000	-1,900,000	
25	3,500,000	1,600,000	-1,900,000	Battery renewal

Financial internal rate of return = -3%

8. Economic Analysis

Annual	Benefit	Cost	Net economic benefit	Note
1		37,164,000	-37,164,000	
2	5,697,500	1,400,000	4,297,500	
3	5,697,500	1,400,000	4,297,500	
4	5,697,500	1,400,000	4,297,500	
5	5,697,500	4,184,000	1,513,500	Battery renewal
6	5,697,500	1,400,000	4,297,500	
7	5,697,500	1,400,000	4,297,500	
8	5,697,500	1,400,000	4,297,500	
9	5,697,500	1,400,000	4,297,500	
10	5,697,500	7,974,000	-2,276,500	Battery + refrigerator renewal
11	5,697,500	1,400,000	4,297,500	
12	5,697,500	1,400,000	4,297,500	
13	5,697,500	1,400,000	4,297,500	
14	5,697,500	1,400,000	4,297,500	
15	5,697,500	4,184,000	1,513,500	Battery renewal
16	5,697,500	1,400,000	4,297,500	
17	5,697,500	1,400,000	4,297,500	
18	5,697,500	1,400,000	4,297,500	
19	5,697,500	1,400,000	4,297,500	
20	5,697,500	7,974,000	-2,276,500	Battery + refrigerator renewal
21	5,697,500	1,400,000	4,297,500	
22	5,697,500	1,400,000	4,297,500	
23	5,697,500	1,400,000	4,297,500	
24	5,697,500	1,400,000	4,297,500	

Project Cost Estimation and Expenditure Plan for Component of Countermeasures for Sand Deposits on Riverbed

Item of expenditure	Quantity	Unit price	Amount	Note
Committee Work Management Cost	1set	109,095,000	109,095,000	
Moving of clay block manufacturer	4prefectures	333,050,000	1,332,200,000	
Total			1,441,295,000	FG
Dollar conversion	Exchange rate: US\$1.00=2,000FG		720,648	US\$
Yen conversion	Exchange rate: US\$1.00=120yen		86,477,700	yen

Moving work of clay block manufacturer (per prefecture)

Item of expenditure	Quantity	No.of per.	Unit price	Amount	Note
Social economy survey	3days	5	30,000	450,000	
Participation style survey	3days	5	40,000	600,000	
Organization of traders & activities to encourage moving	60days	3	40,000	7,200,000	
Environmental development of substitute land	2places		5,000,000	10,000,000	Note 1)
Regeneration of riverbank clay excavation site	2places		157,400,000	314,800,000	Note 2)
Subtotal				333,050,000	

Committee Work Management Cost

Item of expenditure	Quantity	No.of per.	Unit price	Amount	Note
Vehicle for business (4WD)	1		30,000,000	30,000,000	
Copying machine	1		5,000,000	5,000,000	
Computer	1		6,000,000	6,000,000	
Small generator	1		2,000,000	2,000,000	
Secretary	36months	1	150,000	5,400,000	
Driver	36months	1	150,000	5,400,000	
Business trip expense	90days		50,000	4,500,000	
Fuel for vehicle	36000L		1,100	39,600,000	1,000L/month
Vehicle maintenance cost	1set		6,000,000	6,000,000	20% of vehicle purchase price
Miscellaneous expenses	5%			5,195,000	5% of operational control cost
Subtotal				109,095,000	

Note 1)

Cost Items for Environmental Development of Substitute Land

Item of expenditure	Quantity	No.of per.	Unit price	Amount	Note
Well excavation	2wells		500,000	1,000,000	
Engine pump	2pumps		2,000,000	4,000,000	
Subtotal				5,000,000	

Note 2)

Cost Items for Regeneration of Riverbank Clay Excavation Site

Item of expenditure	Quantity	No.of per.	Unit price	Amount	Note
Backfill of top soil	1ha		150,000,000	150,000,000	15,000
Education activities for neighboring inhabitants	15days	4	40,000	2,400,000	
Tree planting	1ha		5,000,000	5,000,000	
Subtotal				157,400,000	

Annual Expenditure Plan

Item of expenditure	Y1	Y2	Y3
Social economy survey	1,800,000		
Participation style survey	2,400,000		
Organization of traders & activities to encourage moving	28,800,000		
Development of substitute land		40,000,000	
Regeneration of riverbank clay excavation site			1,259,200,000
Committee Work Cost			
Fixed expenditure	43,000,000		
Activity expense	22,031,667	22,031,667	22,031,667
Total	98,031,667	62,031,667	1,281,231,667

Project Cost Estimation and Expenditure Plan for Component of Fishery Resource Management

No	Item of expenditure	Quantity	Unit price (FG)	Amount (FG)	Note	Kind of financial resources
1	Scale for weighing fish	510	8,000	4,080,000		Domestic funds
2	Fishing boat registration cost	792	2,000	1,584,000		Domestic funds
3	Motorcycle for promotion activities	4	5,600,000	22,400,000		Domestic funds
4	Business expenses	31,680	100	3,168,000	Statistical data sheet	Domestic funds
5	Fuel cost for motorcycle	4,800	1,300	6,240,000	200km/mth., fuel 10L	Domestic funds
6	Fishery census execution cost	20	1,000,000	20,000,000		Domestic funds
7	CNSHB information processing device	1	6,000,000	6,000,000		Outside funds
8	Fishery statistics follow-up	1	3,000,000	3,000,000		Outside funds
9	Resource management education + manual creation	200	120,000	24,000,000	Apply 3 NGO per.	Outside funds
10	Resource management follow-up	30	120,000	3,600,000	Apply 3 NGO per.	Outside funds
11	Technical assistance by specialists	5	30,000,000	150,000,000		Outside funds
	Total			244,072,000		
	Dollar conversion	Exchange rate: US\$1.00=2,000FG		122,036		Domestic funds
	Yen conversion	Exchange rate: US\$1.00=120yen		14,644,320		Outside funds

Domestic funds	57,472,000
Outside funds	186,600,000

5 - 195

Item of expenditure	Y1	Y2	Y3	Y4	Y5
Scale for weighing fish	4,080,000				
Fishing boat registration cost	1,584,000				
Motorcycle for promotion activities	22,400,000				
Business expenses	633,600	633,600	633,600	633,600	633,600
Fuel cost for motorcycle	1,248,000	1,248,000	1,248,000	1,248,000	1,248,000
Fishery census execution cost	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
CNSHB information processing device	6,000,000				
Fishery statistics follow-up		3,000,000			
Resource management education + manual creation			24,000,000		
Resource management follow-up					3,600,000
Technical assistance by specialists		30,000,000	90,000,000		30,000,000
Total	39,945,600	38,881,600	119,881,600	5,881,600	39,481,600
Domestic funds	33,945,600	5,881,600	5,881,600	5,881,600	5,881,600
Outside funds	6,000,000	33,000,000	114,000,000	0	33,600,000

PROJECT FOR IMPROVING SMOKING METHODS

5-8 Project for Improving Smoking Methods

More than 80% of the catches of artisanal fisheries in the Republic of Guinea is distributed as smoked products. One reason for this is that cold chains that are essential for fisheries distribution are only available in limited regions because the domestic distribution network is behind in development. However, the fact that smoked fish has been around for long time and has a firm hold in the diet of Guineans is also a big reason. When one considers the fish sauce recipes introduced in Supplementary Material 1, it would seem that smoked fish is used more for the purpose of brewing stock than for consumption of animal protein. Even in inland regions such as Middle Guinea, if you ask people how often they eat fish, “every day” is the answer. Similar answers were also heard a lot in the interview survey for the Project for Inland Water Aquaculture, and scenes of small bags of smoked fish powder being sold were often encountered in the Guinea Highland and Guinea Forest Regions.

Smoked products have good smell and long shelf life. Aldehydes, ketones, alcohols, organic acids, and phenols contained in smoke increase the shelf life of the products. Generally, the flavor of smoked products is produced in the mixture of components of smoke and components arisen from carnosity of raw materials while it is being heated. Gloss of smoked products is produced because aldehyde and phenol, that are contained in smoke, react each with each other and form kind of resin membrane coating surface like a grease membrane. This gloss makes the products look good and has good hygienic effect. If smoked products are not appropriately stored, deterioration with mold, rot, discoloration, insect damage, etc. can occur and they become inedible. The important component of fish meat for flavor is inosinic acid that is generated by posthumous resolve of ATP in fish.

5-8-1 Background of the Project

There are basically three fish smoking systems in Guinea (refer to photos): the traditional Banda smoking oven, the drum type oven and the improved Banda oven. The traditional Banda ovens are simple wood constructions with netting on top on which fish are put. The sides are open which makes it difficult to use the fire efficiently and to control the smoke. Drum type ovens are cut oil drums fitted with wire netting, and are simple and small in size. Ovens of this type are mostly homestead ovens, are kept very close to the house and privately used. The improved Banda ovens are made out of bricks or concrete blocks with netting on top, and the fire is thus protected in the oven, making it is easier to control the fire. These ovens consume less firewood and produce better products. The improved Banda ovens are also usually kept close to the house but when the number of ovens increases, they are often organized in a “smoking house” with a roof of straw or corrugated iron sheets. In some of the more important landing sites (Conakry, Kamsar, Koba-Taboriah, Koukoudé, etc), large smoking houses with many ovens have been constructed. These smoking centers are managed by fish smoker cooperatives.

Advantages of improved Banda oven smoking houses are as follows:

- 1) Workers can avoid direct sunlight.
- 2) Firewood for smoking can be dried inside.

- 3) Products can be protected from animals or insects.
- 4) It has safe fire protection.

The improved Banda ovens are liked because of their large production capacity, but it is usually the traditional Banda ovens that are generally used. That is because many fish smokers find the construction costs for improved Banda ovens too high and there is also a lack of technical knowledge and materials for their construction. Hence, the traditional Banda ovens are most widely used. Significant quantities of firewood are needed and the heat and smoke around the ovens create health hazards to the fish smokers. The open construction of the traditional ovens also represents a fire risk, especially when the oven is close to a house made of straw or wood. It would appear that fish smoking is a low-income profession with difficult working conditions, in particular for women who often have to combine their smoking activities with household work and childcare.



Traditional Banda



Drum type Smoking Ovens



Improved Banda

The main type of firewood used for fish smoking is the mangrove *Rhizophora*. According to a study carried out in 1990, 22% of the total volume of mangrove cut down is used for fish smoking. A study of the quantities of firewood used for different types of smoking – “short” and “long” smoking – by the different smoking methods shows that the improved Banda ovens have a very good thermal efficiency.

Table 5-81 Quantities of Firewood Used for Different Smoking Methods in kg of Firewood per kg of Fresh Fish

	“Short” smoking	“Long” smoking
Drum type ovens	2.1	3.6
Traditional Banda ovens	2.4	3.8
Improved Banda ovens	0.9	3.0

Source: OAFIC/IC NET 2000.

It should be pointed out that trials have been made to introduce the Chorkor smoking oven in Guinea. The Chorkor oven has several wire netting trays piled on each other and is popular in many West African countries but due to the technique used for smoking bonga in Guinea, it is not commonly used. Attempts have also been made to develop other smoking methods – for example the Altona oven – but it appears that it is only the improved Banda oven that has received a more general acceptance until now.

The socio-economic survey carried out in December 2002 shows that the majority of the women fish smokers are illiterate. 85% of the women interviewed in Koukoudé and about 70% of those in Kaporo had not received any education and could not read and write. Among the male fish smokers surveyed in Koukoudé, 7% were illiterate, 69% had attended Koranic school and some had finished primary school (10%) or secondary school (14%). These findings seem to confirm the generally disadvantageous situation of women with regard to literacy and education. The national literacy rates are 15% for women and 37% for men. The gross primary school enrolment rate is 38% for girls and 52% for boys.

Over the past several years, the establishment of cooperatives and socio-professional groups has been promoted in the context of development in Guinea. In many of the landing sites along the coast, there are user groups and cooperatives consisting of fisherman, boat owners, smokers – men and women – and fish brokers. However, these organisations are often weak and inactive. This can partly be explained by the general lack of education and the low literacy rates, but there also appears to have been insufficient support and training regarding operation and organizational functions.

5-8-2 Ultimate Goal of The Project

The project will contribute to promoting the use of improved smoking ovens, particularly of improved Banda oven. By replacing traditional ovens by the improved ovens, firewood consumption will decrease and the working conditions of the fish smokers will improve by reducing the exposure to heat and smoke. The reduction of firewood consumption will have a positive impact on the costs of production and hence on net revenues. Moreover, reduced use of firewood – in particular mangrove – will have a positive impact on the forestry resources and the environment.

The project will also contribute to improving the literacy level, to developing beneficiaries' managerial and organizational capacities and to enhancing other skills considered important for the professional development of beneficiaries. These components of support and training will not bring technical improvement but are considered fundamental for improving revenues and working conditions for the fish smokers.

The proposed project strategy is based on an integrated and participatory approach and the intention is to combine activities aiming at improving the work situation with activities supporting beneficiaries in improving their abilities and in their personal and family roles. Needs assessments should be carried out for each beneficiary group in the different subproject sites and, according to the outcome of these assessments, the project will aspire to, for example, increase the primary school enrolment rates and improve the health conditions of household members.

5-8-3 Beneficiaries

The direct target beneficiaries are the female and male fish smokers working with traditional smoking ovens in the coastal area of Basse Guinée. Priority should be given to sites where fish smoking is a particularly important activity and where no assistance has been received earlier. Another requirement is that the site be isolated or far away from urban centers. The project will aspire to work with all members of the community but special attention will be given to the poorest strata of the population of which women are likely to be a particular important group. The family members and community people of the members who will participate in the Project will also become indirect beneficiaries.

The project should work in five to eight different sites and reach at least 300 direct beneficiaries of whom at least 80% should be women. Some of the sites to consider for project activities are the Katchek islands (Boké), Taydi (Boké), Katibinyi (Boké), Sakamah (Boffa), Kindiadi (Boffa), Bokhinene (Boffa), Khounyi (Forécariah), Salatougou (Forécariah) and Sourinene (Forécariah). For these sites, locations with large numbers of fishing boats and fish smokers and without assistance from others were selected based on a survey of CNSHB.

5-8-4 Project Implementation

(1) Project Implementation Method

In order to diffuse improved smoking ovens, construct new smoking ovens in the Project. According to circumstances, repair and improve existing smoking ovens, and also assist training and education in technical or in general ways. It is expected that most of the new ovens to be constructed will be improved Banda ovens but other technical solutions can also be considered. The implementation policies are as follows:

- Individual solutions appropriate to local conditions
- An integrated project approach
- Use of participatory methodologies
- Beneficiary contributions

Within the general framework of the project, each subproject in the different sites should be conceived individually and take local conditions into account. The needs of different communities – as well as of different groups within the same community – are likely to differ and the project must therefore be flexible. Nevertheless, there are certain general principles that are recommended:

- Promotion of group formation and the development of cooperatives. Working with user groups and associations gives many advantages and the project policy should first and foremost assist fish smokers that are organized in groups rather than individuals. The project will assist beneficiaries in forming groups.
- The solutions offered with regard to construction and equipment should be financially and technically appropriate and represent sustainable development options, at a low or a medium risk, to the beneficiaries. As already mentioned, the ovens to be built are likely to be mostly improved Banda ovens. However, the specifications and dimensions of the

ovens may vary from one situation to another. In some cases, the construction of a smoking house with many ovens for a cooperative of more than 20 members may be the appropriate solution. In other cases, a more modest building – suitable for a small user group with only a few members – may be the answer.

The project is an integrated project in the sense that technical assistance for building ovens will be combined with training and technical support activities. These will vary according to local needs but are likely to include, for example, training in functional literacy, basic bookkeeping, various management aspects, health and hygiene issues.

Beneficiary participation will be the key approach of the project and the target communities will be involved, from the very beginning of the project, in the formulation and planning of activities. This is considered essential for the success of the project. It is vital to establish a commitment and a sense of ownership and responsibility by the target communities with regard to the project activities. Moreover, with the view that it is a beneficiary-participation project, the beneficiaries will make contributions for part of the construction costs of the new ovens. These contributions can be in kind or in cash according to the particular situation, but inhabitants must submit them directly.

(2) Institutional Framework and Organization

The foreseen project partners include an international donor, the Guinean government (represented by the Ministère de la Pêche et de l'Aquaculture), the beneficiary communities and a project implementation team consisting of national and international experts and consultants. This team will be responsible for the actual implementation of the project and can be established either through a sub-contractual arrangement with an NGO and/or by recruiting individual consultants. The exact structure of the project and the organization of its staff will depend on the implementation modalities and policy of the donor agency and should be decided on in consultation with the government.

A project coordination committee should be established. This committee will include representatives from all partners and meet on a regular basis. It should approve the outline of the project work plan and review the progress of project activities. Considering the importance of women in the project's activities, the Ministry responsible for female promotion (Ministère chargé de la promotion de la femme) should be invited to the committee. Other ministries or organisations could also be invited to participate in the work as required.

(3) Objectives, Outputs and Activities

1) Development Objective

The development objective of the project is to achieve the reduction of poverty in the fishing village communities in a sustainable and environmentally compatible way.

2) Action Plans

The project has two concrete objectives, i.e.:

- Improvement of the living conditions of female and male fish smokers by increasing the revenues earned from smoking fish and by improving other – both professional and personal – aspects of their lives.
- Reduction of fire wood consumption.

The expected outputs needed for achieving the objectives are:

1. Improved smoking ovens – consuming less firewood per unit of fish smoked and producing less smoke and heat affecting the operators than the ovens they replace – constructed.
2. User groups created and functional and the beneficiaries' managerial capacities improved.
3. The major socio-economic problems – also outside of work – identified and a number of them remedied.

Once the project implementation team has been established, its first task should be to develop – in close consultation with the other partners – a detailed work plan. Another important task would be to identify success indicators and establish a project progress monitoring system.

At the point of formation of the Project implementation team, details of Project implementation methods shall be decided upon. Additionally, achievement guidelines shall be also defined in order to follow up on the progress of the Project (below table).

Table 5-82 Implementation Plans and Evaluation Indicators

General Planning Activities	<ul style="list-style-type: none"> • Development of an overall work plan. • Identification of indicators and development of a project monitoring system. • Identification of potential project sites by field visits and discussions with other development agents. • Participatory discussions with selected communities. Identification of direct beneficiaries at each site. • Definition of their needs and development of work plans for each subproject. 		
Outputs	Improved smoking ovens constructed.	User groups created and functional and the beneficiaries' managerial capacities improved.	The major socio-economic problems – also outside of work – identified and a number of them remedied.
Indicators	<ul style="list-style-type: none"> • At least 50% of the traditional ovens have been replaced by improved ovens • The total fire wood consumption of the landing site has been reduced by at least 10% • The cost of fire wood per unit of fish smoked has been decreased by at least 10% 	<ul style="list-style-type: none"> • At least 75% of the beneficiaries are organized in user groups • At least 50% of the groups are officially recognized and are functional, i.e. group committee members have been elected, a group constitution and rules have been developed and are accepted by all members and there is an accounting system in place. 	<p>(These indicators can only be defined when the problems have been identified.)</p> <ul style="list-style-type: none"> • At least one person in each household has received at least one week of training with regard to health and hygiene issues. • All women beneficiaries know of existing family planning options and where to get more information and help on this issue. • All children of beneficiary households in the age of primary school attend school.
Activities	<ul style="list-style-type: none"> • Establish, together with each user group, plans for the construction of smoking ovens. The plans should include cost estimates and specify who is contributing what. • Build ovens and purchase accessory equipment • Train operators how to use and maintain the new ovens. • Train local craftsmen how to build and repair ovens and wire netting. 	<ul style="list-style-type: none"> • Create user groups. • Sensitize group members with regard to their new responsibilities. • Assist the user groups in developing a group constitution, electing group committee members, etc. • Train group committee members in management etc. • Identify beneficiaries' basic training needs (e.g. literacy training) and carry out training courses. 	<ul style="list-style-type: none"> • Analyze, by using participatory methodologies, common problems that beneficiaries are facing, in particular with regard to health and education. • Identify organisations and resource persons that can become partners in the project's activities (health centers, midwives, teachers, etc.). • Examine the priorities and develop an action plan taking the project's resources and the beneficiaries' absorption capacity into consideration. • Carry out the plan and evaluate the results.

(3) Project Cost, etc.

1) Project Duration

The project duration is suggested to be five years.

2) Government Contributions

The government will contribute to the project by:

- Providing project offices and other premises as necessary
- Providing counterpart staff for the external experts and consultants
- Making a contribution to the construction costs of ovens and smoking houses

3) Beneficiary Contributions

The exact nature of the beneficiaries' contribution will be decided on during the initial phase of the project. It is likely that it will be in the form of, for example, labor and/or local construction material.

4) Donor Contributions

The donor will finance all external personnel, contractual services, training, equipment and construction material (in addition to the government contribution) and management and operating expenses.

PERSONNEL

Team leader (international consultant)	1	5 years X 12 months	60
Subproject managers (national consultants)	3	5 years X 12 months	180
Various consultants (national)			24
Various consultants (international)			12
Secretary /accountant	1	5 years X 12 months	60
Drivers	2	5 years X 12 months	120
Other	2	5 years X 12 months	120

TRAINING:

The basic training courses should be carried out using existing expertise and organisations (e.g. literacy training). For more specific subjects, specially designed course may be needed and there may hence be a need for expert consultants.

EQUIPMENT:

- Two vehicles.
- Computers and accessories.
- Office furniture.
- Other equipment and supplies.

CONSTRUCTION:

The detail of smoking facilities to be constructed will be decided on during the initial phase of the project. An approximate estimate of the likely construction needs indicates requirements equivalent to five locations of smoking houses and about thirty locations of smaller groups of smoking huts. The labor needed for the construction could partly be covered by contributions from the groups of beneficiaries, or carpenters, plasterers, etc. from each community. However, the whole construction shall be commissioned to local construction companies. In addition to the costs for building the smoking ovens, the funds for providing other minor infrastructure (i.e. restrooms, wells, storage, etc.) and equipment should be prepared. This would be necessary for a flexible project approach and for making it possible to respond to the various needs identified by the target communities. However, it should be remembered that the project is not an infrastructure development project and this type of activities will be kept to a minimum. Only smaller essential facilities, closely related to the core activities of the project, should be considered.

MANAGEMENT AND OPERATIONAL EXPENSES:

The management and operations expenses include, for example, fuel for the project vehicles and staff travel and field visit costs. Frequent field visits are foreseen for all project personnel. The three subproject managers will spend most of their time in the different project sites but the main project office will be located in Conakry.

5-8-5 Risks of the Project

A risk factor lies in the motivation of the target communities to participate in the project and to contribute to the activities. The use of participatory approaches is essential for ensuring that the needs analysis and identification is carried out correctly and that the target communities are committed to the project. Another risk concerns the expected diminution of firewood consumption. The success of the project is based on the assumption that the new smoking ovens will replace older, less fuel efficient, ones. If, instead of replacing old ovens, the new ovens are added to the total capacity, the total fuel consumption may increase rather than decrease. Careful follow-up of this matter is necessary.

5-8-6 Evaluation and Reporting

In addition to the regular project coordination meetings, the project will be reviewed at least twice during its duration. The first evaluation should take place before the end of the second year and will have as its objective to give constructive advice regarding the continuation of the work. Teams consisting of external consultants representing the government and the donor will carry out the reviews. The project implementation team will prepare annual progress reports. These reports will evaluate project progress against the success indicators.

5-8-7 Environmental Impact Assessment

The result of the environmental impact assessment of this Project is shown in the table below.

Table 5-83 The Result of the Environmental Impact Assessment for the Drafted Project

Drafted project	Component	Level of environmental impact	Reasons	Countermeasures for environmental conservation
Development of improved Banda facilities and smoking building facilities including improved Banda facilities	Improved Banda	+ impact	The amount of mangrove cutting will be 70% of before	Having all ovens switched to improved type Bandas is the precondition for percentage reduction noted at left
	Type of smoking building that reduces amount of smoke	+ impact	Hygiene will be improved	
	Improved smoking building	+ impact	Fire risk will be reduced	
Poverty reduction of fishing village societies	Construction of improved smoking oven	+ impact	The amount of firewood use per unit smoked fish will be reduced 10% at each fish landing beach	The requirement is not to enhance the productivity of smoking ovens.
	Reinforcement of professional ability group system, and resolution of social economic problems	+ impact	Hygiene training will be conducted	

5-8-8 Prediction of Economic Benefit

Since many of the benefits of this Project, such as ability reinforcement of smoking fishermen, environmental conservation, and health improvement, are difficult to be quantified, they are described qualitatively.

The benefits of the Project are as follows:

- Conservation of inhabitants' properties by reducing the number of fires
- Saving fuel cost by using smoking ovens with high smoking efficiency
- Environmental conservation by reducing the amount of firewood used as fuel
- Health improvement of people who work at smoking locations through improvement of smoking location environment
- Increase of smoking income through development of human resources

5-8-9 Proposal for Project Implementation

As for financial funds for equipment costs, the Guinean government shall make requests to foreign governments, assistance organizations of other countries, NGOs, etc. Coordination with FAO should be considered for the personnel expenses of dispatched experts; however, part of the expenses may be covered under the dispatches of individual experts. If dispatch of Japan Overseas Cooperation Volunteers becomes possible in the future, cooperation will expand. Since this is basically a resident-participation-type development project, coordination with local NGOs is essential and financial assistance for this will be needed.

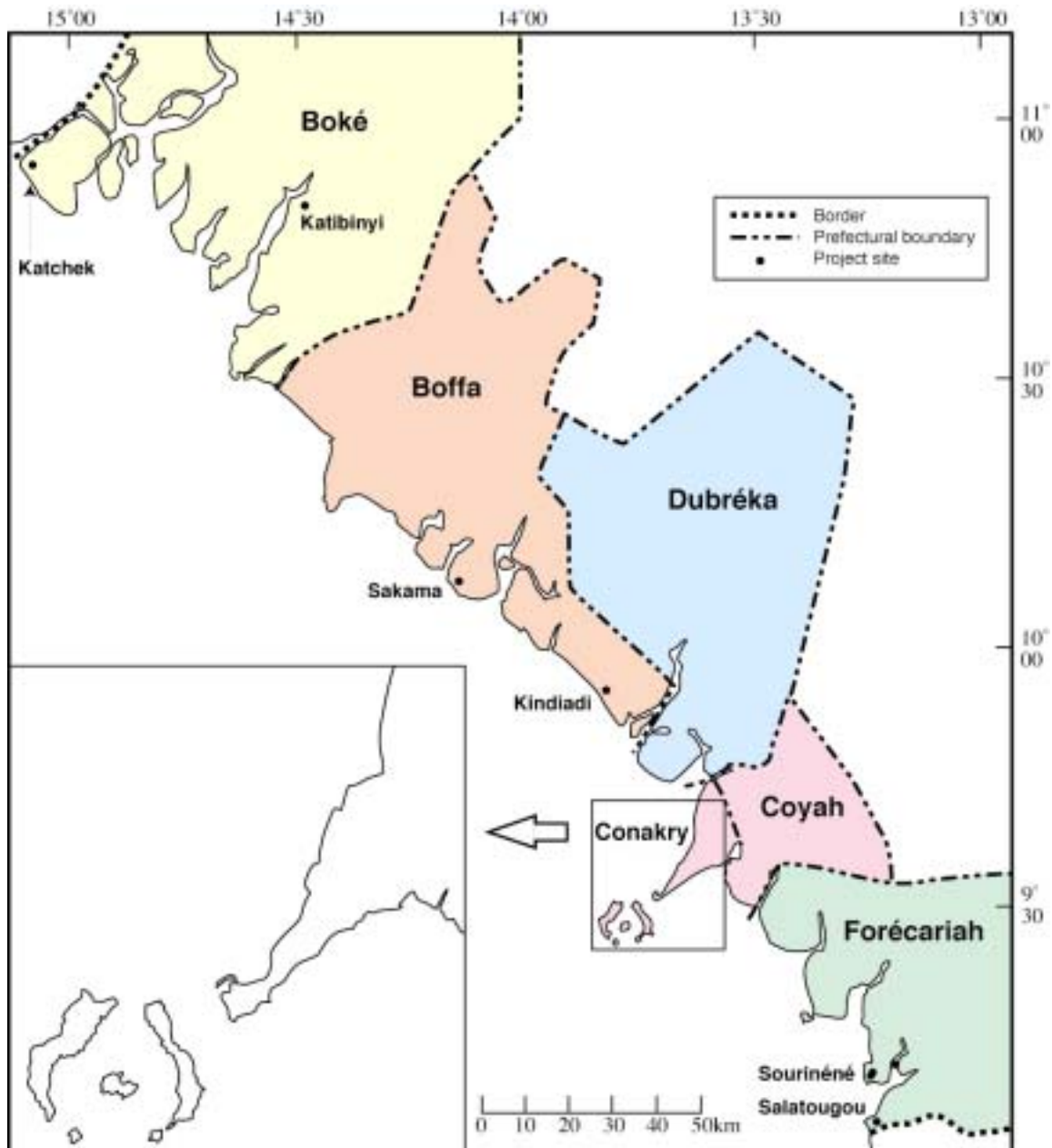


Figure 5-33 Project for Improving Smoking Methods – Subject Fishing Villages for Implementation

Table 5-84 Project Cost Estimation Table

Total Project Cost: 4,614,600,000FG

Item of expenditure	Annual	Unit Price	Y1	Y2	Y3	Y4	Y5	Note
Team leader (international consultant)		FG30,000/mth	360,000	360,000	360,000	360,000	360,000	
Subproject manager 1 (national consultants)		FG10,000/mth	120,000	120,000	120,000	120,000	120,000	
Subproject manager 2 (national consultants)		FG10,000/mth	120,000	120,000	120,000	120,000	120,000	
Subproject manager 3 (national consultants)		FG10,000/mth	120,000	120,000	120,000	120,000	120,000	
Short-term national consultant		FG10,000/mth	40,000	50,000	50,000	50,000	50,000	
Short-term international consultant		FG30,000/mth	0	90,000	90,000	90,000	90,000	
Secretary /accountant	\$250/mth	FG500/mth	6,000	6,000	6,000	6,000	6,000	
Driver 1	\$250/mth	FG500/mth	6,000	6,000	6,000	6,000	6,000	
Driver 2	\$250/mth	FG500/mth	6,000	6,000	6,000	6,000	6,000	
Assistant 1	\$250/mth	FG500/mth	6,000	6,000	6,000	6,000	6,000	
Assistant 2	\$250/mth	FG500/mth	6,000	6,000	6,000	6,000	6,000	
			0	0	0	0	0	
Fuel cost			4,800	9,600	9,600	9,600	9,600	
Counterpart travel expense			7,200	14,400	14,400	14,400	14,400	
Smoking ovens & Smoking house construction equipment cost			0	0	0	0	0	Guinean Government contribution
			0	0	0	0	0	
Vehicles (4WD) x 2			120,000	0	0	0	0	
Computer & accessories x 2 sets			16,000	0	0	0	0	
Copying machine, etc.			16,000	0	0	0	0	
Office furniture			4,000	0	0	0	0	
Office supplies			0	200	200	200	0	
Total			958,000	914,200	914,200	914,200	914,000	

Conversion with US\$1.00=2,000FG: US\$2,307,300

Conversion with US\$1.00=120JPY: 276,876,000JPY

Project Years	Y1				Y2				Y3				Y4				Y5			
Activity Items / Quarters	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Establishment of operational coordination committee	■																			
Establishment of Plan Implementation Team		■																		
Compilation of an overall work plan			■																	
Identification of indicators and development of a project monitoring system				■																
Selection of and contract with local NGOs (e.g. literacy training)					■															
Selection and employment of local consultants						■														
Selection of project sites, implementation of field study, discussions with other assistant agents							■													
Participatory discussions with communities, confirmation of direct beneficiaries' needs								▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Training /education (NGO, experts)									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Construction of improved smoking ovens and small-scale infrastructure									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Organization of user groups and improvement of their function and the beneficiaries' managerial capacities									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Identification and solving of the major socio-economic problems – outside of work									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Annual report (Implementation Team)																				
Interim appraisal (Assistant agents, external consultants)																				
Completion appraisal (Assistant agents, external consultants)																				

(The Project implementing modalities will depend on the budget of the donor agency and discussion with the person in charge from the donor agency.)

- Black bar indicates intensive implementation
- ▨ Bar with slanted lines indicates appropriate implementation

Figure 5-34 Implementation Schedule

Supplementary Material 1

Recipes of Fish Dishes

Fish dishes in Guinea are generally steamed rice, fonio, manioc, etc. with fish sauce poured on top. Sauce is usually cooked in one pan and the rice or grains are cooked in another pan. Fish sauce is made by cooking the ingredients shown below together and adding fish flavor. Since whole (not cut) chili peppers are used, the dishes do not become so hot. Ground peanuts are sometimes added for flavoring and thickening. Fresh or dry-powdered gumbos are also used for thickening in some cases. Red palm oil is often used for cooking. Various seasonable vegetables are also used. Basically, spices, seasonings, fish, vegetables, etc. are first fried with lots of oil, and then water is added and stewed for about 1 hour. Dishes with the savory flavor of smoked fish are unique to this region, and extracting taste from smoked fish by boiling is also characteristic. Locals usually have this dish once a day. Recipes for the main fish dishes are as follows:

Kind of Fish product (Dish name)	Ingredients	Cooking time	Amount of water
Smoked sea catfish (smoked fish sauce)	Mix smoked fish with oil, fresh tomatoes, tomato puree, onions, parsley, potatoes, squash or manioc, and stew.	1 hour	1 litter of water for 1 kg of fish
Fresh bonga (Fish meatball sauce)	After removing scales and internal organs, wash fish and skin. Mash fish meat and mix with onions, parsley, salt, pepper, chili peppers, then roll up into balls. (Add peanut paste or flour.) Fry the meatballs in heated oil. Cook the fried fish meatballs in sauce made with tomatoes, tomato puree, and eggplants.	30 minutes	1.5 litter of water for 1 kg of fish
Smoked bonga (Leaf sauce)	Smoked fish is for flavoring sauce, especially for sauce of sweet potatoes, manioc, and spinach.	1 hour	Same as above
Semi-smoked bonga	Skin, crush bones, and cut fish into pieces. Put into the above mentioned leaf sauce. Gumbos are also added occasionally.	1 hour	Same as above
Fresh whiting (Fish meatball sauce)	Similar to the recipe for fresh fish.	30 minutes	Same as above
Smoked whiting (Fried fish)	Flavor with onions and fry.	30 minutes	None

SUPPLEMENTARY MATERIAL

TECHNICAL DATA ON THE PROJECT FOR IMPROVING SMOKING METHODS

Introduction

The following technical data includes technical aspects of the investigation of a large-scale community smoking facility furnished with an improved type of banda oven.

1. Technical Issues of Smoking Ovens

1-1 Utilization of Smoking Materials and Administration of Smoke

The traditional banda-type oven is a system which foregoes the regulation of temperature and smoke, necessitating urgent improvement of smoking ovens from the view points of economy of those engaged in smoking, sustainable use of resources for smoking such as mangroves, quality management of smoked products, etc.

The metal drum type of smoking oven is a closed type oven and is suitable for a small-scale smoking operation because of its capacity to maintain a certain level of temperature and to regulate smoke. However, because it is made of one layer of steel, the thermal capacity of the oven is low and its structure makes it very difficult to install a door near the burner. If efficiency of fuel consumption is improved by increasing the thermal capacity of the oven while controlling the air supply inside the oven, this system could become an important smoking systems that could be used far into the future because of advantages such as manufacturing cost, sturdiness, and small size convenience.

The improved banda oven is a smoking system that incorporates the traditional smoking method well and has proven to have significantly higher fuel efficiency compared to the other two systems. This oven should be promoted as system to perform a large amount of smoking at one time. However, under the current situation, this oven hasn't spread to the general smoking people due to its relatively high manufacturing cost.

The current improved banda oven still doesn't have adequate features to control temperature and smoke. Right now, opening and closing the door on the oven, meaning that when the door is open it blocks the path in front of the oven controls the air supply. Also, there are cases of those engaged in smoking opening the end of a cloth covering the materials because there is no escape feature to release only a small amount of smoke at a time, making air circulation management of the smoking house difficult. It is necessary to improve effectiveness of operations to control the temperature of the oven and smoke somehow, for example, attaching a lid to the upper part of the banda grate.

1-2 Fire Prevention Capability

While the steel drum type smoking oven and improved banda oven are closed type ovens that are constructed with fireproof materials, the traditional banda oven does not have the structure of an oven. The supporting posts of the banda are generally made of wood, which will dry and carbonize after a prolonged period of constant use, becoming a fire hazard. Even when this does not happen, there is the danger of causing a fire if flammables are placed in the vicinity or winds pick-up sparks from the fire.

The difference in the improved banda oven is basically whether or not walls made of fireproof materials are in place around the oven. Thus, it is necessary to lead fireproofing of the ovens in smoking fishing villages around the nation and achieve this goal rather early. In Koukoudé where the F/S survey was conducted, major fires caused by smoking facilities have occurred about once every five years, burning more than one hundred buildings. Cases of small fires are reported frequently and this could lead to a disaster any time the weather conditions are right, such as occasions of strong winds.

Even with a steel drum type smoking oven or improved banda oven, the top part where the banda grate is placed frequently remains open, and there is a similar fire hazard, particularly when the smoke house is located under a thatched roof or outside.

1-3 Functionality of Smoking Facilities and Improvement in Working Conditions

Because the steel drum type smoking oven is not designed for a large smoking operation but is generally installed near a house for small operations, it doesn't warrant consideration for smoking process management. The traditional banda oven is a kiosk type building and is built only for smoking activities in general so there are no facilities for activities such as washing, preparation including gutting and filleting, and storage of smoked goods.

On the other hand, smoking houses that contain improved banda ovens, especially large-scale ones maintained publicly, often include necessary facilities for all processes related to smoking. As smoking is long and sometimes continues at night, it is necessary to be able to provide space in these buildings for activities such as resting and eating, bathrooms, as well as for main activities including washing, preparation, smoking and storage. Ratings for the smoking houses are determined by combining organically the rational arrangement of smoking processes in the previous paragraph and the living side of those engaged in smoking activities.

The smoke houses constructed thus far are still at a stage at which the facilities are built simply to contain the improved banda ovens, and they still lack consideration for efficiency and amenities for the work performed there. It is important to ensure necessary living space by adequately controlling environmental factors such as lighting, ventilation and air circulation, and to review the required functions and role of each activity and to improve its efficiency.

In particular, for work processes such as smoking, consideration for size, height, etc. to accommodate body sizes and workability of those engaged in the smoking seems inadequate.

For example, in many cases, the size of improved banda ovens and that of traditional bandas differ but there is no rationality for that difference. If anything, in some ways traditional banda ovens have superior workability because of their size. It is important to create comfortable work environment by reviewing the connection to body size.

1-4 Management and Maintenance of Smoking Oven Facilities

There are two sides to management and maintenance. One is the management of smoking equipment and materials and smoked goods in the smoking house, and the other is maintenance to utilize the facilities over a long period in a sustainable manner.

The steel drum type smoking oven is excluded here because it is often used at home, but the traditional banda ovens are almost always contained in buildings without fencing facilities such as walls, making it difficult to supplement with equipment, materials and products inside the building.

In many smoking houses containing improved banda ovens publicly maintained, entrances are often small and even locked because of the high priority for inside management. For similar reasons, in many cases functionality and amenities are compromised, for example by not having large windows. It is possible to resolve this issue on conflict between management of equipment and materials and functionality and amenities if a new system is introduced under which the smoking house users individually manage their belongings

On the other hand, for maintenance of the equipment and facilities, it is necessary to adequately analyze the life time of each component and select affordable and easily obtainable materials, particularly for components with short lives so that they can be easily replaced by the users themselves. If this is not possible, it might instead be necessary to discuss the necessity of that component and examine alternative options that would fulfill necessary functions as a whole without using that specific component.

2. The Scale of Smoking Facilities and Issues

Review of the contents discussed in the previous chapter by scale, is as follows.

2-1 In the Case of Producing a Small Amount of Smoked Goods at Residences of Those Engaged in Smoking

The steel drum type smoking oven is generally used for producing a small amount of smoked goods at home. As discussed in 1-3, this oven is suitable for this purpose.

There are two possible improvement measures that can currently be undertaken: increasing fuel efficiency by appropriate methods such as surrounding the oven with materials with high heat capacity including dirt and sand (currently requires about twice as much smoking materials as improved banda oven): and implementing fire preventing zoning measures, thus keeping ovens from areas where flammable materials are stored.

2-2 In the Case of Producing a Relatively Large Amount of Smoked Goods Near Residences of Those Engaged in Smoking

Those producing a relatively large amount of smoked goods in residential areas (almost always on their property) generally use traditional banda ovens.

These traditional banda ovens not only have poor fuel efficiency (requiring about 2.5 times as much smoking materials as the improved banda oven) but also lack fire prevention features. So, if smoking operations are to continue on residential premises, it will be necessary to revise the fundamental structure of the ovens in ways such as surrounding the structure with fireproof materials like concrete bricks or sun-dried clay bricks. Additionally, it will be important to implement fire prevention zoning measures, by removing ovens from areas where flammable materials are stored. Because of the large scale of smoking, the zoning measures needed here would need to be large as well.

On the other hand, it is also possible for the neighboring people engaged in smoking to cooperate with each other and construct community zoned facilities in which each person can build their own smoking house. If an unused space is available nearby and a community smoking facility is created by surrounding the unused area with fireproof fences, the relocation of the oven from near residence is not too difficult because the structure of the traditional banda oven is generally simple. Not only can each person engaged in smoking individually improve the heating efficiency of their smoking oven but also they can also gradually develop cooperative facilities such as those for washing, pre-processing, and storage.

2-3 In the Case of Producing Smoked Goods Far from Residences for Higher Efficiency of Smoking Operations

Because the fish used for smoking is the fresh fish landed at the beach, smoking ovens should be placed close to the beach for higher smoking operation efficiency. The fish landing beach of a fishing community is generally an important transportation point where all community roads meet. Therefore, it is also quite convenient for shipping smoked products.

For these reasons, large scale community smoking facilities can be developed near the beach and those engaged in smoking not using facilities near their residences can cooperate and construct facilities which overcome the various issues accompanying smoking activities.

By gathering many engaged in smoking in one place, the legitimacy for connection to public services is increased: this could include the development of paths to the access road, development of a cooperative water supply and wastewater system, and installation of an electricity supply which would increase work efficiency at night.

3. Basic Policies for Development of Smoking House Facilities for Improved Banda Ovens

3-1 Proposing Fuel Efficient and User Friendly Smoking Ovens

Examination and proposal for easy and fuel efficient air supply control, effective system (lid for the smoking oven) for circulation of smoke and (adjustable) ventilation, strong oven materials with high heat capacity, most suitable size for the smoking grate and installation height, etc.

3-2 Planning Includes Adequate Analysis of the Functions of the Necessary Features in the Smoking House to Scale the Facilities to Suit Uses by Women, and Taking into Consideration a Wiring Plan for Necessary Components.

Analysis of the process and relationship with features such as: carrying in, washing, processing (for large fish), smoking, temporary storage, packing and shipping and storing equipment as well as examination and proposal of the best size for each facility.

3-3 Planning Includes the Improvement of Working Condition to Create a Comfortable Workspace.

Examination and proposal of ways of ensuring adequate lighting, the smooth ventilation of smoke, prevention measures for rain water leaks, ensuring space for individual belongings, ensuring comfortable resting space, development of day care (nursery) facilities for infants, etc.

3-4 Planning Includes Fire Prevention Measures

Examination and proposal of no spark smoking ovens, oven walls and roofs made with fireproof materials and storage for flammable materials.

3-5 Planning Takes Ease of Management into Consideration

Examination and proposal of management for the safety of the equipment, materials and products, prevention of outside animals such as cats and birds from entering, suitable scaling, etc.

3-6 Equipment and Facilities which Enable Sustainable Operations

Examination and proposal of equipment and facilities for which the repair parts are easily obtainable. Examination and proposal of a mechanism that is easy to repair. In the case materials are hard to obtain, examination and introduction of durable materials that last for many years and mechanisms that fail less often.

Concepts for Improved Banda Smoking Sheds

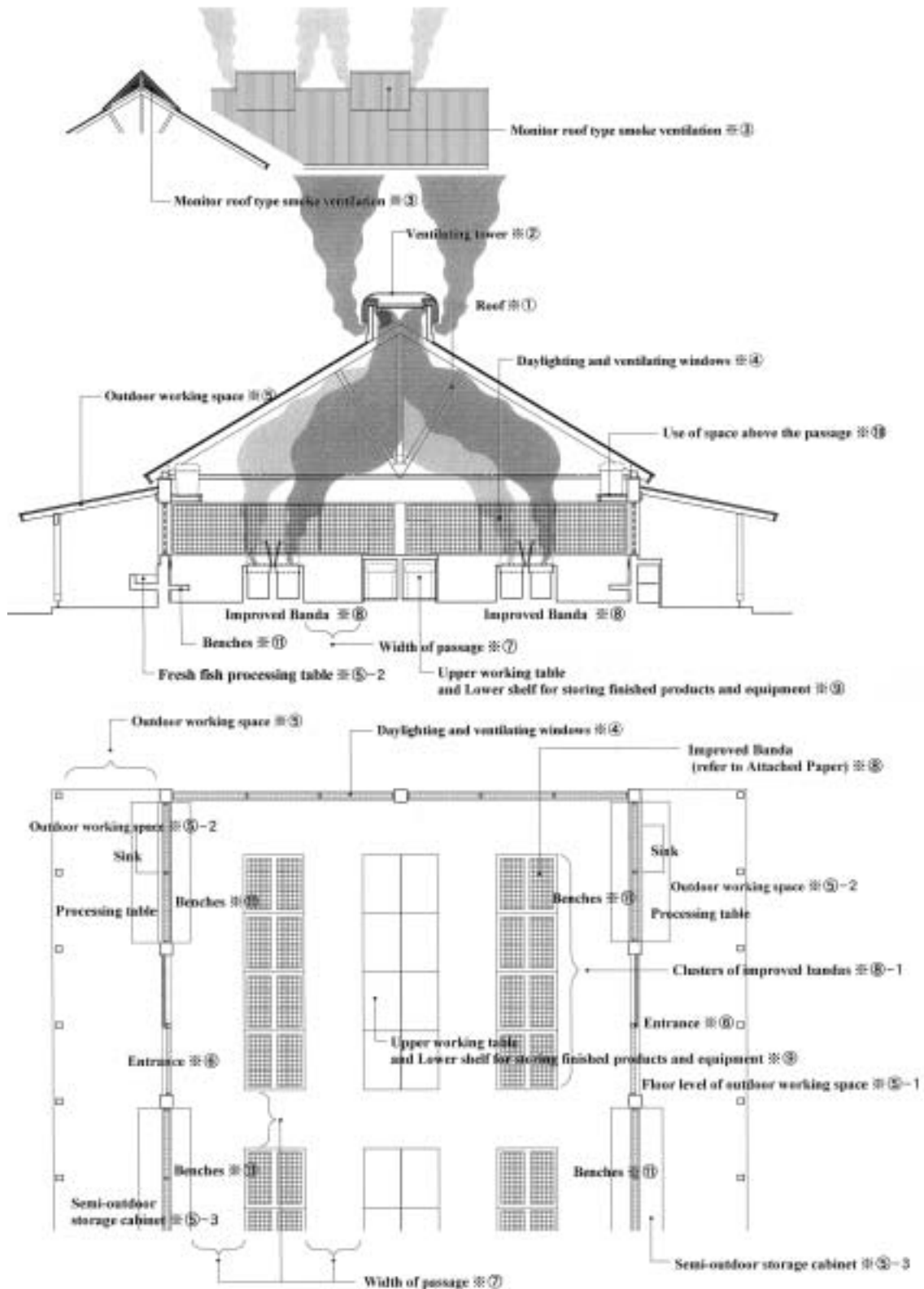


Figure 5-35 Concepts for Improved Banda Smoking Sheds

Concepts for Improved Banda Smoking Houses

Roof

- : If many smoking bands are installed, greater spans (the distance between support beams) in smoking houses is required. In this case, in order to reduce the number of structural members, it is good to utilize truss roofs (assisted by the use of steel materials). To educate people on the use of trusses, it will be advantageous to prepare beforehand a book of recommended roof construction methods (manual), a material supplier list, etc.
- In consideration of roof structure stability and the health of workers which becomes endangered by smoke filled smoking houses, the pitch of roofs shall be to some extent steep, and the space above the suspended ceiling (ceiling cavity) shall be deep.
- As for the roofing material, corrugated sheet metal is the easiest material to procure locally. If wooden sarking (built-up roofing shingle) is utilized together with this corrugated sheet metal, rising temperatures inside the house and the noise of rains are reduced.

Flue

- : For the sake of workability and the health of workers, it is unfavorable if the house is filled with smoke. In order to provide efficient smoke ventilation, it is advantageous to install a flue at the top of the roof and ventilating windows on walls as shown below: The higher the position of the flue and the air temperature within the flue, the greater the ventilation efficiency of the flue.
- Therefore, it is preferable that the flue be constructed with a metal that can easily be warmed by solar heat. The flue shall as much as possible be of a shape that prevents the entry of rain and of cats or birds. The number of flues shall be planned in accordance with the required ventilation volume based on the size and number of bands.

Monitor roof type smoke ventilation pipe

- : If it is not possible to apply such a complex process as shown at right for the smoke ventilation pipe, the monitor roof type shown in this figure is still fine.
- However, to prevent rain from entering gable end vents, the portion of the roof over the gable end shall be sufficiently extended.

Natural lighting and ventilating windows

- : A sufficient number of windows shall be established on the walls of the building to provide natural lighting and ventilation. Though it is not shown in this figure, measures to prevent entry of rain from gable end windows shall be adopted. It is necessary to consider ways to prevent cats or birds from entering these windows.
- In light of strength and life expectancy, use of passivation processed expanded metal or welded wire fabric is ideal but if it is difficult, wooden or bamboo grills can be used instead.

Outdoor working space

- : In order to conduct smoking related work while avoiding rain and sunlight, establish a pent-roof covered space under the eaves of the main building. Smoking related work includes preparation before smoking such as the washing and pre-smoking processing of fresh fish, packing smoked fish into panniers, etc., and loading onto transportation vehicles.
- Additionally, this space can be used to store personal belongings that would otherwise become infused with the smell of smoke if stored indoors, storage for items that cannot be placed inside a smoking house, or as a space for snacks or rests to be taken between work activity.
- Though dependent on the size of the facility, a space with a width of more than 2.5m width is preferable.

-1 Floor height of outdoor working space

- : Floor height shall be set high enough to prevent rainwater and high tides from entering. If the resulting gap between the floor of the outdoor working space and the ground is too large, establish a slope or shallow steps in consideration of workability.

-2 Fresh fish processing table

- : Used for pre-processing such as the washing, gutting and filleting of fresh fish to be smoked.
- Same as the case for Improved Banda in the Attached Paper, size of the tables shall be decided by through study of traditional work and taking sufficient consideration for ergonomics.

-3 Semi-outdoor storage cabinet

- : Used for storage of personal belongings, equipment, etc.

Entrance

- : If the entrance employs a sliding type door, workability around the entrance is increased. It is desirable that the door be made of a material that allows good airflow.

Width of passage

- : Ensure sufficient working space.
- If there are workers on the both sides of the passage, more than 1m of width is required for the passage to ensure that workers do not interfere with each other. If there are people passing, it will be desirable to ensure a passage width of 1.5m so that they avoid interfering with workers engaged in smoking work.

Improved Banda (refer to Attached Paper)

- : Width, length, height, etc. shall be decided with consideration for workers' body size and workability.
- By providing a system in which air supply and ventilation volume is easy to adjust, and taking airtightness and the heat retaining property of furnaces into account, the waste of smoking chips can be eliminated.
- As with the roof construction, it is preferable to educate and make available to everyone beforehand a recommended improved Banda manual, a material supplier list, etc.

-1 Clusters of improved bands

- : In light of workability, it is preferable that they are not clustered too much in one spot.

Upper working table and Lower shelf for storing finished products and equipment

- : Storage shelf shall be lockable so that safe storage is available.

Use of space above the passage

- : If there is usable space above the passage, establish a hanging shelf for storage of panniers or large equipment.

Benches

- : Smoking work requires long hours and constant supervision so it is important to install benches that can be used for resting near windows where there is a lower quantity of smoke.

Concept for Improved Banda

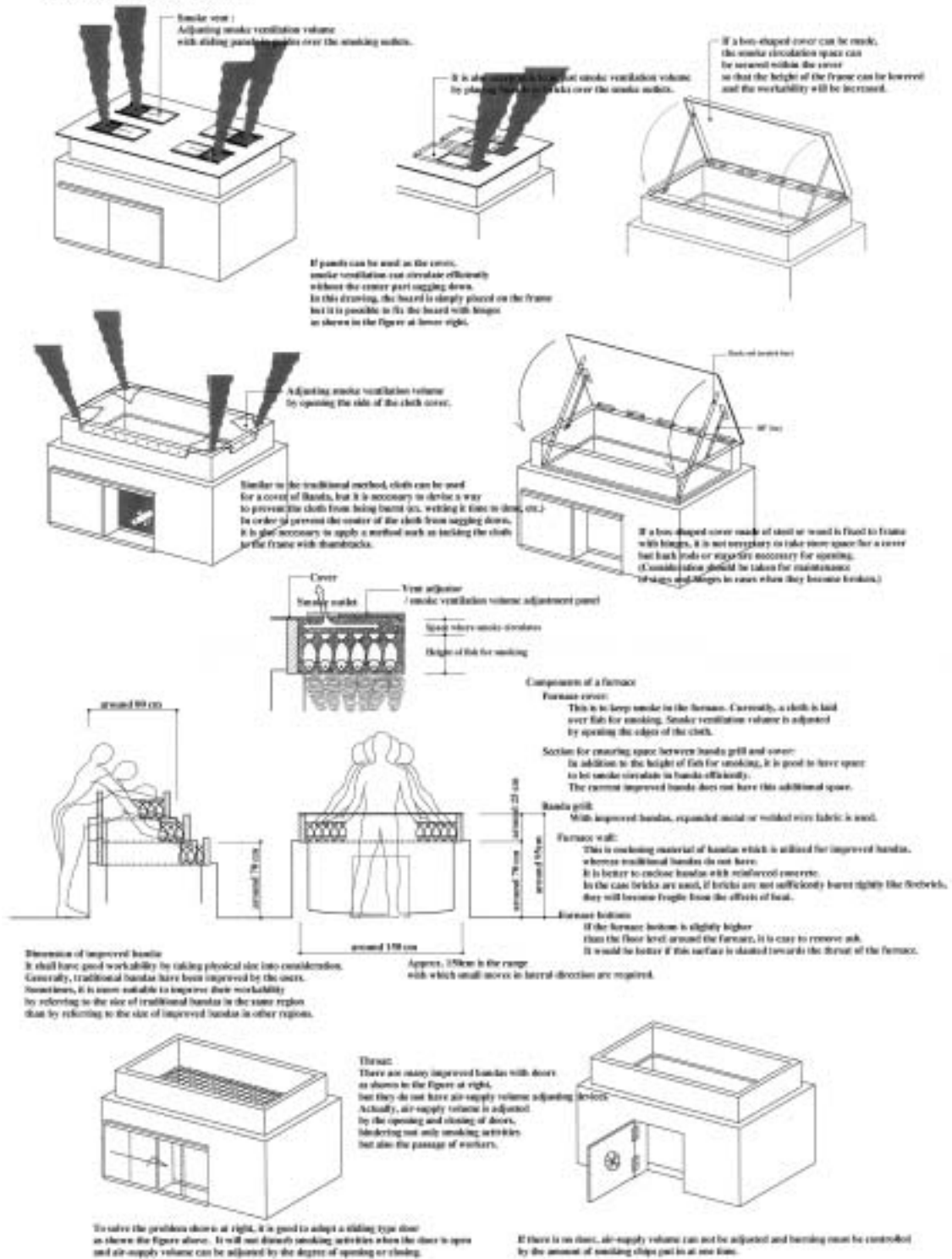


Figure 5-36 Concept for Improved Banda

**ANALYSIS OF ESTABLISHMENT
OF FISHERY DEVELOPMENT FUND**

5-9 Analysis of Establishment of Fishery Development Fund

(1) Background and Details of F/S

In the study conducted in 2000, the Project for Establishment of Fishery Development Fund was proposed in Master Plan (4-3-9) to activate the fishing industry, especially artisanal fisheries operating in coastal and inland water areas, in which performances have been sluggish or on the decline. The background of this project is as follows.

One of the problems many fishermen have is the difficulty in purchasing outboard motors, spare parts, and fishing equipment. It does not mean that no materials and equipment are available in the country or in neighboring countries. However, fishing materials and equipment, especially outboard motors, are expensive. Because they do not have enough financial strength and collateral to obtain financing from the existing financial institutions, most fishermen can not afford this equipment. Therefore, it is necessary to establish a new financing system for fishermen to support the purchase of their necessary materials and equipment and to activate the fishing industry.

The details of the Project for the Establishment of Fishery Development Fund are as follows.

- To provide new materials and equipment with grant aid to sell in markets
- To establish a Fishery Development Fund financed by the proceeds from the sales of above.
- To provide a revolving fund with the Development Fund for financial institutions to finance artisanal fisheries
- To support fishermen to purchase fishing equipment with funds financed by financial institutions

This F/S aims to conduct the survey to implement this project and to design an implementation scheme. The following tasks are required.

- Selection of materials and equipment to sell
- Sales and collection of bills of fishing materials and equipment and arrangement of the management system
- Selection of partner financial institutions
- Establishment of a monitoring system

(2) Future Demands and Services for Financing for Artisanal Fisheries

Table 5-85 The Prediction on Financing for Artisanal Fisheries
by Each Branch Office of Credit Rural de Guinée (2003)

(FG thousand)

Branch name	Engine		Fishing equipment		Brokerage		Others		Total	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Douprou	22	70,400			70	42,000	1	1,500	93	113,900
Kamsar	10	37,400			30	18,000			40	55,400
Koba					10	6,000			10	6,000
Maférénya	21	69,400			60	36,000			81	105,400
Faranah									0	
Conakry	115	520,000	64	100,000					179	620,000
Total	168	697,200	64	100,000	170	102,000	1	1,500	403	900,700

Source: Crédit Rural de Guinée, CRG

The demand for financing for artisanal fisheries is expected to increase. Table 5-85 shows the prediction on financing for artisanal fisheries by each branch office of Credit Rural of Guinea. The total amount of financing is expected to be FG 900.7 million, which includes loans for 168 outboard motors (FG 697.2 million), 64 loans for fishing equipment (FG 100 million), 170 loans for brokerage (FG 102 million), and FG 1.5 million of loans for others. Yete Mali also expects such strong demands intending to further increase the amount of loans. However, as previously mentioned, the existing system is reaching the limit of its surplus fund and can not finance fisheries further without financial support from outside of the country. Therefore, the concrete figures of predicted demands are not shown.

Meanwhile, the African Development Bank is planning to provide a credit line for financing artisanal fisheries in a project named "Republic of Guinea: Development Project concerning Artisanal Fisheries and Aquaculture (Phase II)" and making final adjustments with the Guinean government. The summary of the project is as follows.
-Interview of relevant government official, donor agencies' staff and regional organization staff for donor coordination activities.

- Financing Targets : Marine fishery /Inland water fishery and Aquaculture
- Purposes : To Purchase outboard motors, fishing equipment such as nets and fishing boats; To provide operating funds for brokerage, smoke-fish makers, mechanics and boatbuilders Credit Rural de Guinée and Yete Mali
- Executing Institutions : 0.45 million AfDB Units (About USD 0.6 million) (FG 1140 million)
- Available Fund : Each FG 570 million in 2003 and 2004

Concerning this project, the Guinean government and African Development Bank have already signed an agreement in 2000, being ready for its implementation. The project schedule is as follows:

2003/1 Discussion with associated institutions concerning finance schemes and financing conditions

2003/2 Approval by African Development Bank

2003/3 Start of financing

Available funds for artisanal fisheries from 2003 are assumed to be (1) fund from African Development Bank with FG 1140 million of the credit line and (2) repaid cash of the principal of loans for artisanal fisheries by Credit Rural de Guinée and Yete Mali in 2002, which amounts are FG 270 million and FG76.8 million, respectively. Consequently available revolving fund for financing for artisanal fisheries would be FG 1490 million. On the basis of the figure as revolving fund and the following models, possible loans for artisanal fisheries in the next six years could be predicted as shown in Table 5-86 and 5-87.

Table 5-86 Possible Financing Amount

(FG million)

Year	Outboard motor	Fishing equipment, Brokerage	Total
2003	517	342	859
2004	776	684	1460
2005	648	684	1,332
2006	714	684	1,398
2007	683	684	1,367
2008	694	684	1,378
Total	4,032	3,762	7,794

Table 5-87 Number of Possible Loans

(FG million)

Year	Outboard motor	Fishing equipment, Brokerage	Total
2003	162	855	1,017
2004	228	1,710	1,938
2005	185	1,710	1,895
2006	193	1,710	1,903
2007	175	1,710	1,885
2008	170	1,710	1,880
Total	1,113	9,405	10,518

Assumed Financing Models

- Principal repayment of loans by Credit Rural de Guinée and Yete Maliin 2002, about FG 350 million, and 60% of the credit line of African Development Bank (FG 342 million x 2 years) will be used as revolving funds to purchase outboard motors. And the remaining 40% (FG 228 million x 2 years) will be used as revolving funds to purchase fishing equipment and to provide operating funds for brokerage.
- Term of loans for outboard motors will be 2 years, and that for fishing equipment and brokerage will be 1 year.
- The current price of an outboard motor, FG 3.2 million, will continue to increase by 5% annually.
- Average amount of a usual loan by Credit Rural de Guinée for operating funds for fishing equipment and brokerage will be FG 400 thousand.
- The efficiency (the ratio of average balance of loans to the total amount of revolving funds) of operating funds for fishing equipment and brokerage, 456 million, will be 75%. Therefore the total amount of possible loans after 2004 will be approx. FG 684 million, 1.5 times as much as the revolving fund.

According to this estimation, the total amount of possible loans for artisanal fisheries from 2003 to 2008 would be FG 7794 million, with an annual average of approx. FG 1.3 billion.

Among these loans, the total amount of those for outboard motors from 2003 to 2008 would be FG 4032 million, with which 1113 outboard motors would be purchased. Its annual average is FG 672 million, or 186 outboard motors.

Also the amount of loans for running funds for fishing equipment, brokerage and smoked fish makers from 2003 to 2008 would be FG 3762 million. If the average loan per person is assumed to be FG 400 thousand, 9405 persons can obtain financing for running funds during these years, in which the annual average is FG 627 million or 1568 persons.

In the following paragraphs, detailed discussion will be presented concerning services and demands for financing for artisanal fisheries.

General Loans for Artisanal Fisheries:

The total amount of loans is determined not by the demands for loans but by the capacity of the financial institution and the financing system. Credit Rural de Guinée, which dominates loans for artisanal fisheries, is now planning to open branch offices in Kankan and Shiguiri in order to improve the financing condition of inland-water fisheries in the Guinea Highland Region. However the scale here would be smaller than those for artisanal fisheries in Conakry and coastal regions and dramatic expansion of financing services by these offices is unlikely to happen. In the existing financing system, concerning loans for outboard motors and operating funds, persons in an association can

not obtain loans until all existing debtors in the same association repay their loans. Under such a system, it is difficult to greatly expand financing services especially after the completion of large scale of financing in Conakry in 2003 that Credit Rural de Guinée and Yete Mali are now planning. The rapid increase of loans is not appropriate for sound development of artisanal fisheries because, with increasing loans, members in an association could not repay money borrowed by other members

Outboard Motors:

The demands for loans for outboard motors are the stronger than those for others. There are about 1,000 outboard motors in Guinea. If about 200 more boats are motorized in the next 5 years and if the useful life of an outboard motor is 5 years, about 240 outboard motors will be required annually. Available loans for outboard motors can cover about 186 outboard motors annually, which will be 78% of the required motors. These figures are considered to be sufficient comparing to the past performance, 72 among 255 loans (28%) for outboard motors in 2002.

Operating Funds for Fishing Equipment and Brokerage:

The total amount of loans for running funds for fishing equipment and brokerage in 2002 was FG 32 million and the number of loans was 99. The annual average of possible loans in this field after 2003 would be FG 627 million and the number of loans would be 1568, 20 times as much as the amount in 2002 and 16 times as many as loans in 2002. Considering the capacity of financial institutions, the applied financing system, and past performance, a sufficient amount of funds is provided for required financing services.

As mentioned above, the amount of possible loans by Credit Rural de Guinée in 2003 would be about FG 900 million. Although that of Yete Mali is not certain, it is expected to be FG 200 million - 300 million considering its scale and possible competition with Credit Rural de Guinée in Conakry. Therefore, the total amount of possible loans in 2003 would be FG 1100 million to 1200 million. On the other hand, if loans from African Development Bank are obtained, the amount of possible loans would be about FG 859 million in 2003, and about FG 1400 million after 2004 with sufficient funds provided. Also because it is unlikely that the amount of loans after 2004 will greatly exceed the level of 2003, it is considered that necessary funds will be provided for required financing services in the next few years.

(3) Suggestions

As the results of the survey mentioned above, it is recommend that the Project for Establishment of Fishery Development Fund should be suspended in this F/S.

The reasons are as follows:

1. The purpose of the Project for Establishment of Fishery Development Fund is to improve the performance of artisanal fisheries by establishing a new finance system that fishermen without financial strength and collateral can use, and by providing funds necessary for financial institutions to finance artisanal fisheries. However as mentioned above, micro finance for artisanal fisheries has developed rapidly since 2000, achieving the purpose mentioned above.

Credit Rural de Guinée and Yete Mali have established their finance systems to provide necessary funds for artisanal fisheries to purchase outboard motors, fishing equipment and running funds. These systems have been properly operated and the both institutions are expanding their financing services with their own funds, granting FG 350 million of loans in 2002. Also, the African Development Bank decided to provide USD 600 thousand (FG 1140 million) of loans in 2003. Therefore if these funds are used as revolving funds, they can finance about FG 1300 million annually. This is sufficient for purchasing about 185 outboard motors and for giving 1600 loans for fishing equipment and running funds annually. Therefore, most financing services required for artisanal fisheries in Guinea could be covered.

2. Under the assumption that the productivity of the fishing industry remains low because artisanal fisheries can not afford fishing nets and expensive outboard motors to motorize their boats, fishing equipment has been provided with aid in order to sell at a lower price than usual in the market. These aids have motorized artisanal fisheries rapidly and greatly contributed to their development. However, other industries necessary for the development of the fishing industry, especially private suppliers of outboard motors, spare parts and fishing equipment, have not developed. With growing financing services for artisanal fisheries, the supply system of fishing equipment through private markets is beginning to function. In such a situation, if a large amount of equipment is provided with aid and sold through the government, it would have a bad influence on the distribution system of fishing equipment through private markets that are beginning to function.
3. In the future, if funds for financial institutions runs short in their ability to provide micro finance, or if special aid is required for the region to activate facilities and projects for which this development project is intending to give support, grassroots grants of Embassies and collateral funds of KR2 are available.

It is necessary for the Ministry of Fisheries to practice notification and guidance to appropriate concerned organizations as needed by evaluating artisanal fishermen's purchase needs for outboard motors, payment status of fishermen, supply and demand predictions, and storage situation of repair parts by continuously monitoring mobilization of finance systems. For this, it is desirable to place a personnel in charge of finance related affairs within the Marine Fisheries Division.