

No.

Japan International Cooperation Agency (JICA)
Ministry of Fisheries and Aquaculture,
the Republic of Guinea

STUDY ON ARTISANAL (SMALL-SCALE) FISHERIES DEVELOPMENT

FINAL REPORT (MAIN REPORT)

AUGUST, 2003

**OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.
IC NET LIMITED**

AFF
JR
03-49

Japan International Cooperation Agency (JICA)
Ministry of Fisheries and Aquaculture,
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PREFACE

In response to a request from the Government of the Republic of Guinea, the Government of Japan decided to conduct a development study on artisanal fisheries development and entrusted the study to the Japan International Cooperation Agency (JICA).

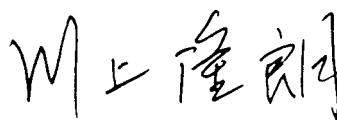
In the 2-year period from March 2000 to June 2003, JICA sent to Guinea three times, a study team lead by Mr. Yasuo Ishimoto from Overseas Agro-Fisheries Consultants Co. Ltd..

The team held discussions with concerned officials from the Government of Guinea, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as a result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of the friendly relationship between our two countries.

I wish to express my sincere appreciation to the concerned officials of the Government of the Republic of Guinea for their close cooperation extended to the teams.

August, 2003

A handwritten signature in black ink, reading '川上隆明' (Takao Kawakami), written in a cursive style. The signature is positioned above a horizontal line.

Takao Kawakami
President
Japan International Cooperation Agency

August, 2003

LETTER OF TRANSMITTAL

Mr. Takao Kawakami
President
Japan International Cooperation Agency

Dear Mr. Kawakami

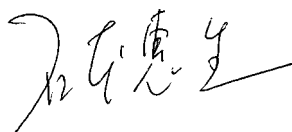
We are pleased to submit to you the Study Report on Artisanal Fisheries Development in the Republic of Guinea.

This study report is a compilation of the study results conducted by the study team, with close relations with the Ministry of Fisheries and Aquaculture of Guinea and concerned organizations during the two-year period from March 2000 to June 2003. It consists of a Master Plan for Artisanal Fisheries Development Study in the Republic of Guinea and Feasibility Studies on 6 priority projects.

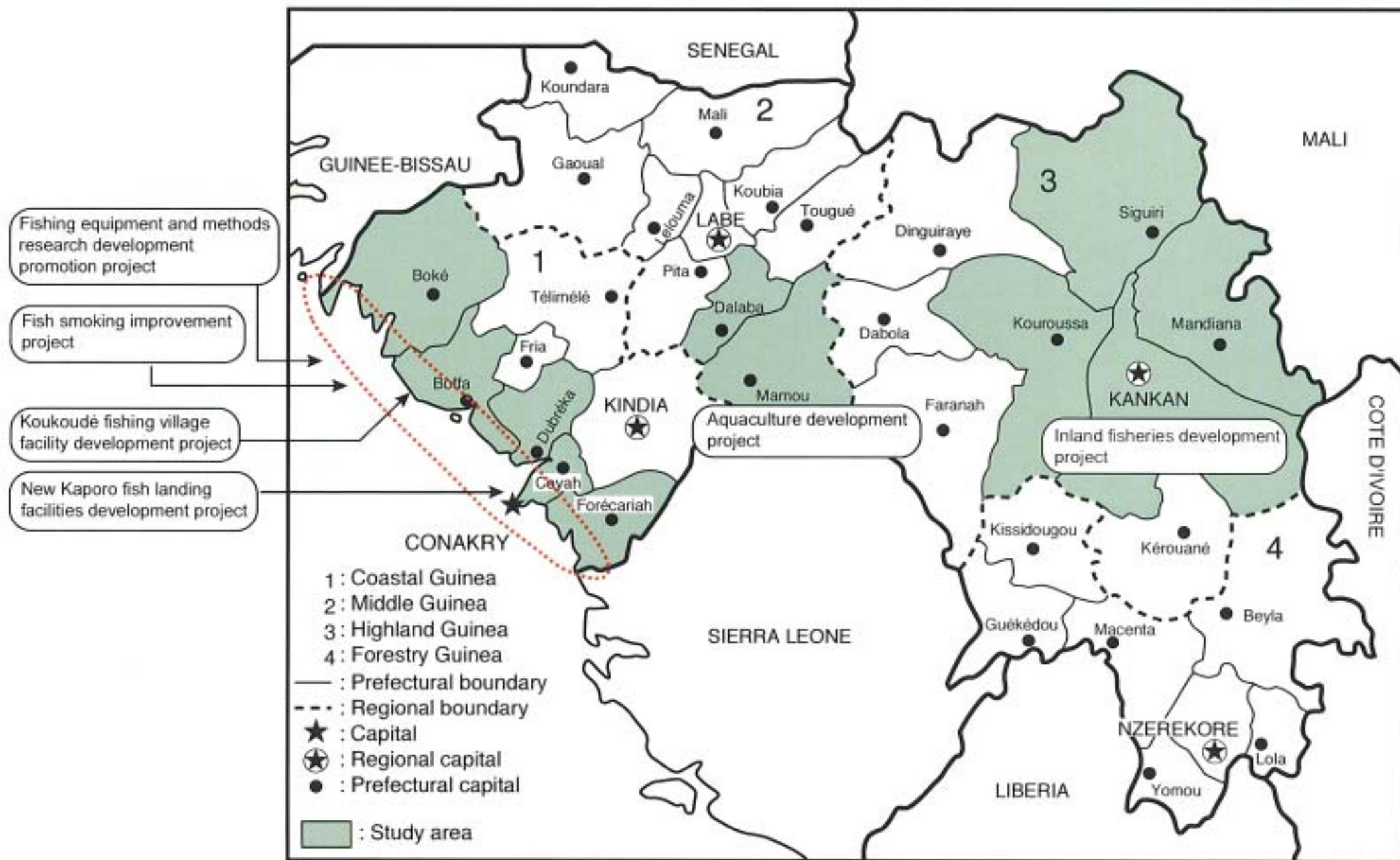
We would like to express our sincere appreciation for the great understanding and cooperation received from concerned officials from the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fisheries as well as from your agency, during the study period. Additionally, as for the Government of the Republic of Guinea, we would like to note the respectful cooperation that we received from their Ministry of Fisheries and Aquaculture and government banks. Finally, we would like to express our gratitude to the personnel of the Japanese Embassy in Guinea for their valuable advice and support.

Finally, we hope that this report will contribute to your further promotion of the project.

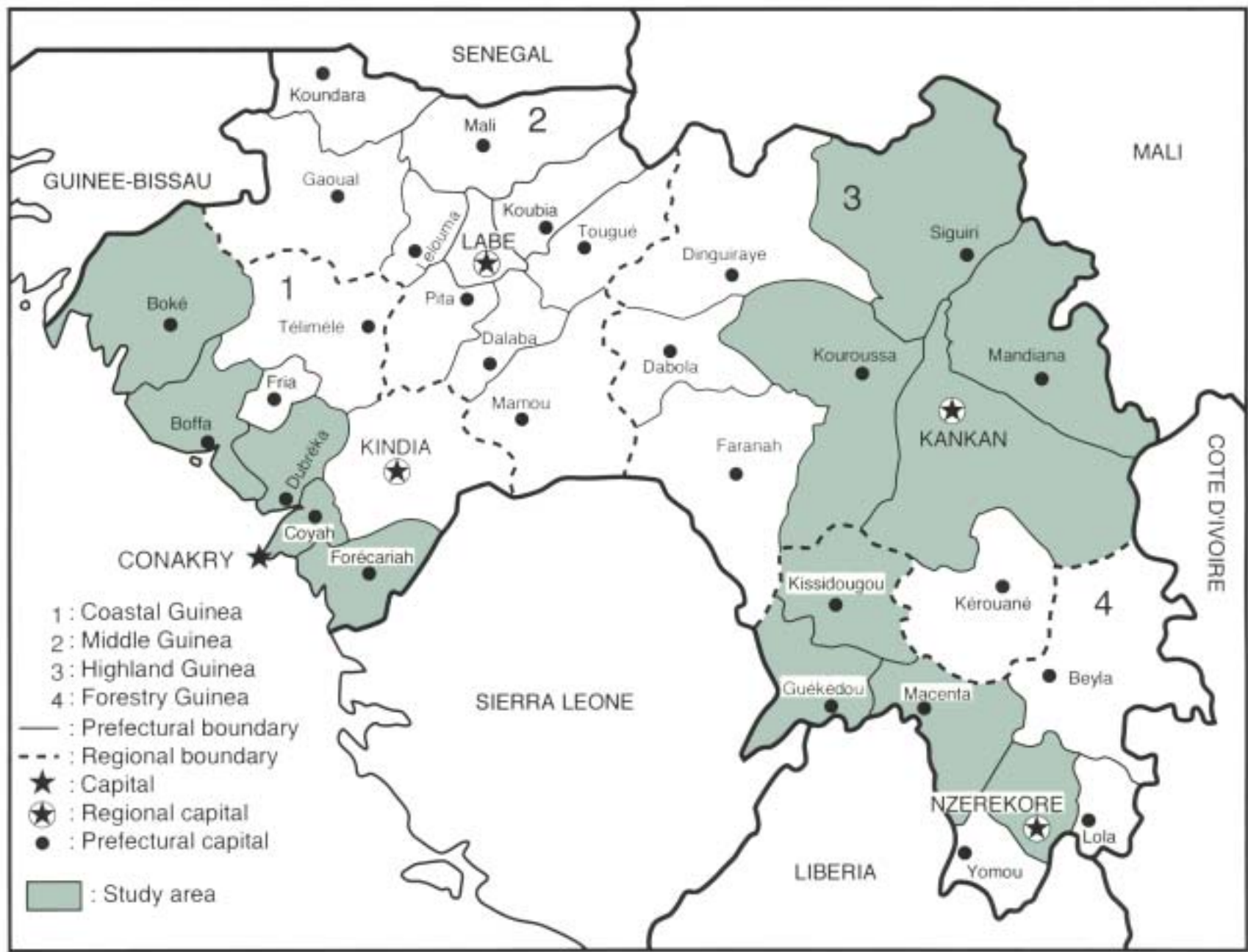
Very truly yours,



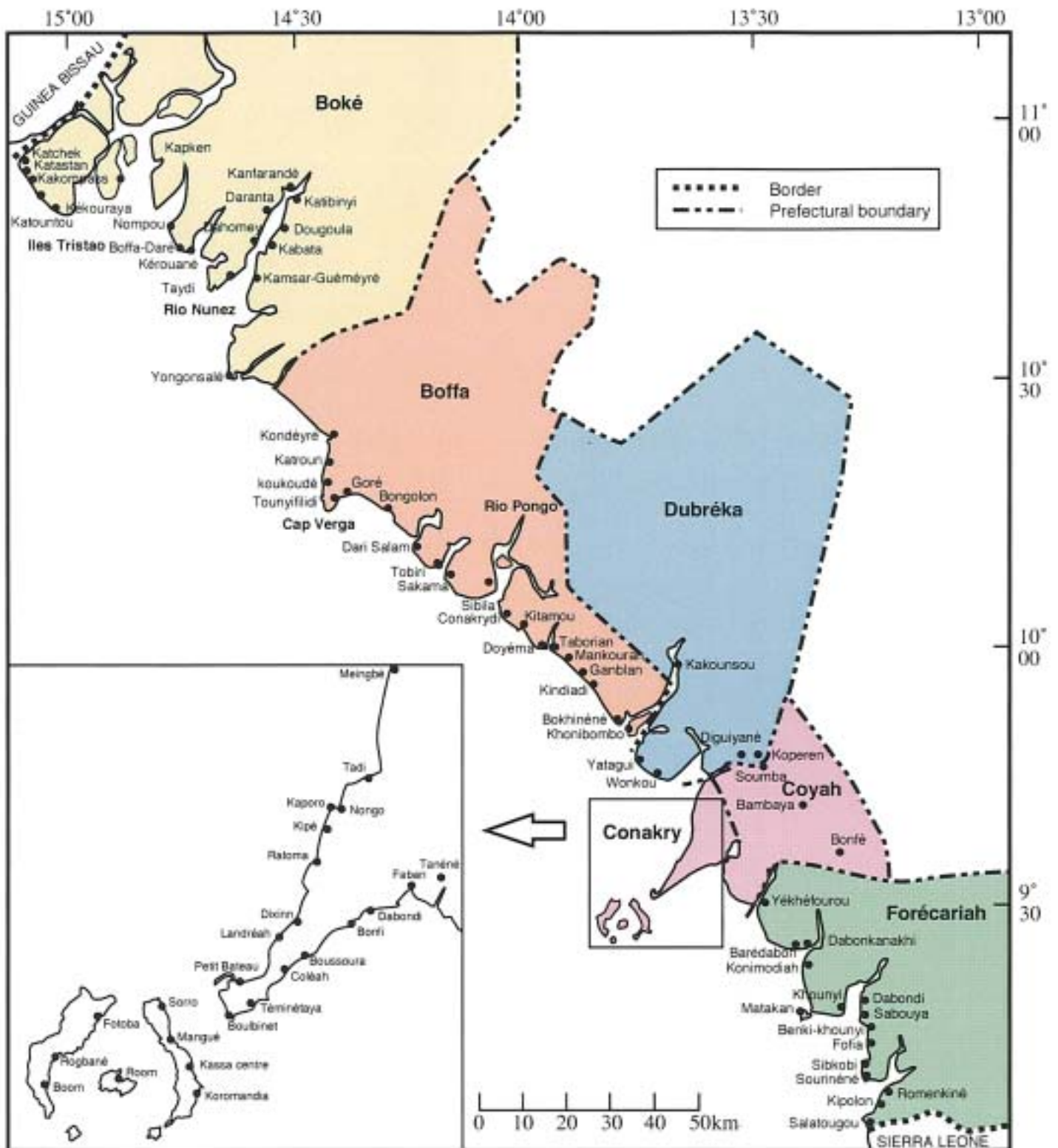
Yasuo Ishimoto
Project Manager,
Study team on Artisanal Fisheries Development
Study in the Republic of Guinea
A joint venture between
Overseas Agro-Fisheries Consultants Co. Ltd. and
IC Net Limited



STUDY AREA (FEASIBILITY STUDY PHASE YEAR 2002~03) AND PRIORITY PROJECTS



STUDY AREA (MASTER PLAN PHASE YEAR 2000)



FISH LANDING PLACES FOR ARTISANAL FISHERY IN COASTAL GUINEA

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ABBREVIATIONS

AFD	: Agence Française de Développement
AfDB	: African Development Bank
AFVP	: Agence Française des Volontaires du Progrès
AVB	: Agent Vulgarisateur de Base
BICIGUI	: Banque Internationale pour la Commerce et de l'Industrie de Guinée
CBG	: Compagnie des Bauxites de Guinée
CDD	: Comité de Développement de Débarcadère
CDG	: Comité de Gestion
CERESCOR	: Centre de Recherche Scientifique de Conakry Rogbabé
CIDA	: Canadian International Development Agency
CNSHB	: Centre National des Sciences Halieutiques de Boussoira
COGIP	: (A Guinean private fishery company)
C/P	: Counter-Part
CPUE	: Capture Par Unit Effort
CRD	: Comité Régionale de Développement
CVS	: Comité de Vigilance de la Sécurité
EEZ	: Exclusive Economic Zone
EU	: European Union
FAO	: Food and Agricultural Organization of the United Nations
FENU	: Fonds d'Equipement des Nations Unies
FG	: Francs Guinée
F/S	: Feasibility Study
GDP	: Gross Domestic Products
GTZ	: Deutsche Gesellschaft fur Technische Zusammenarbeit
IFAD	: International Fund for Agriculture Development
IMF	: International Monetary Fund
INTERTEL	: (A Guinean private telephone company)
IRD	: Institut de Recherche pour le Développement
JICA	: Japan International Cooperation Agency
M/P	: Master Plan
MPE	: Ministère de la Pêche et de l'Elevage
MPFE	: Ministère de la Promotion Feminine et de l'Enfance
NGOs	: Non Governmental Organization
ODEPAG	: Office de Développement de la Pêche Artisanale et Aquaculture en Guinée
OJT	: On the Job Training
ORSTOM	: Institut Française de Recherche Scientifique pour le Développement (the predecessor of IRD)
PCM	: Project Cycle Management
PNUD (UNDP)	: Programme des Nations Unies pour le Développement
SEEG	: Société d'Exploitation des Eaux de Guinée
SNAPE	: Service National d'Aménagement des Points d'Eau
SNPRV	: Service National de Protection et de Vulgarisation
SOGEL	: Société Guinéenne d'Electricité
SOGUIPAH	: Société Guinéenne de Palmier à huile et d'hévéa
SONIT	: (A Guinean private fishery company)
SOTELGUI	: Société des Telecommunications de Guinée

SPACETEL : Spacetel Guinée
S/W : Scope of Work
TVA : Taxe sur la Valeur ajoutée
UCOPAD : Union Cooperatives Pêcheurs Artisanales de Douprou
UCOPAK : Union Cooperatives Pêcheurs Artisanales de Kamsar
UNICEF : United Nations Children's Fund
WHO : World Health Organisation

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SUMMARY

SUMMARY

1. Background

The fisheries are one of the Republic of Guinea's main economic sectors, generating 9,000 jobs directly (fishermen) and 200,000 indirectly (processing and distribution). According to statistics (1997), fishery production was 98,000t and is an essential food resource, contributing to 75% of the total animal protein consumed by the inhabitants. However, per capita fish consumption is limited to about 13kg, which is low compared to other neighboring countries (27.8kg/person for Senegal and 19.8kg/person for Côte d'Ivoire).

For 10 years, the Guinean government has prioritized the fisheries sector for economic development from the viewpoint of food security, increased personal incomes, national revenue, and employment creation. The following eight strategies were established by the Ministry of Fisheries and Aquaculture (formerly Ministry of Fisheries and Aquaculture) in "Guinea, Vision 2010", a medium and long-term plan introduced by the Guinean government in August 1997:

- Rational resources management;
- Support and development of artisanal fisheries;
- Promotion of maritime artisanal fisheries for export;
- Promotion of fresh water aquaculture;
- Multi-dimensional management of inland water fisheries;
- Development of shrimp culture;
- Development of industrial fisheries;
- Strengthening of fishery institutions.

However, due to a lack of information on resources and processing techniques, the absence of an assistance program for fishermen, inadequate facilities and organizations, etc. for promoting distribution, processing and sales, poor access to fishing communities and an inadequate social infrastructure, a concrete action plan has not yet been formulated. The Guinean government has requested the Japanese government to compile a master plan for the artisanal fisheries segment out of this long- and medium-term plan and a recommendation for Priority Projects.

2. Objectives of the Study

Objectives of the Study are to cope with food demands of the Guinean population, which are expected to increase with a high rate (2.8% per annum) for the medium- and long-term, to compile a master plan for targeting to improve productivity in the artisanal fisheries, promote distribution and processing industries, reinforce fisheries organizations, develop inland water fisheries and aquaculture with a view to create job opportunities and promote regional development through sustainable development of artisanal the fisheries sector under the non-binding target specified in the Poverty Reduction Strategy Paper (PRSP) compiled in 2002 as well as to plan Priority Projects based on the Master Plan and to conduct a feasibility

study. Furthermore, the Study in its process is intended to transfer the know-how of study methods and planning.

3. Background of the Study

The Study consists of two phases, i.e., the Master Plan Study (phase 1) implemented from March to June 2000 and the Feasibility Study (phase 2) implemented from October 2002 to January 2003. The reason why the second phase of the Study started more than two years after the first Study was that the Study was temporarily suspended due to a border dispute that raged in September 2000 between the rebel forces of Liberia and Sierra Leone and the Guinean army. Although the border dispute was not completely settled, the situations had calmed and it was judged that no security problems were likely to occur except in the border area. Thus, negotiations to resume the Study started in July 2002 and the second phase was resumed in October 2002.

The Master Plan Study designated targeted regions as follows : Boké in Guinée Maritimes (Guinea Coastal Region), 5 prefectures including Boffa, Dubréka, Coyha (including the capital region of Conakry) and Forécariah, 4 prefectures in Haute Guinée (Guinea Highland Region), i.e. Kankan, Kouroussa, Shiguiri, Mandiana and 4 prefectures in Guinée Forestière (Guinea Forest Region), i.e. N'Zérékoré, Macenta, Guékédou and Kissidougou. The Study was conducted based on the site survey with the counterpart and included sub menus such as RRA in representative fishery communities, workshops on consumption of fishery products, PCM workshops for staff members of the Ministry of Fisheries and smoking processing women, landing statistical survey, fish farmers management survey by book keeping. After repeated negotiations with the counterpart based on the information obtained through these surveys, we have come to present the Master Plan. With respect to especially important policies of the Master Plan, we are proposing 6 specific project plans for the Feasibility Study.

Under the Feasibility Study, detailed surveys were to be conducted for the following six Priority Projects. At the same time, small-scale experimental tests and workshops incidental to these projects were implemented with a focus on the realization of technology transfer.

- Fishing Equipment and Methods Research and Development Project
- Koukoudé Fishing Community Facility Development Project
- New Kaporo Fish Landing Facility Development Project
- Project for Development of Inland Water Aquaculture
- Project for Development of Inland Water Fisheries
- Project for Improving Smoking Methods

At the stage of the Master Plan Study, the Project for Establishment of Fishery Development Fund was recognized as important. However, the Study revealed similar projects had already been commenced and the existing financial institutions had already been granting loans to the fisheries industry. Furthermore, as it was judged possible loan amounts cover funding needs, it was decided not to propose this project at this time.

4. Present Situations of Artisanal Fisheries Sector

4-1. Outline

The fisheries industry in Guinea is roughly categorized into Marine Artisanal Fishery, Marine Industrial Fishery and Inland Water Fishery. These sub-sectors have production volumes of 52,000 tons, 23,000 tons and 5,000 tons respectively. The Coastal fisheries have the main fishing ground in the continental shelf and the shelf is the largest among the neighboring coastal countries with a width of as much as 87 miles in the south and 104 miles in the north. A sea area with the depth of 200m or less stretches over an area of 43,000km² and 70% of the area is extremely shallow with a depth of 40m or less. Marine Artisanal Fishery involves the use of motorboats, outboard motorboats, wooden pirogues (dugouts) without engines (7 - 15 m), gill nets, purse seine nets, haul seine nets, trawl nets and angling. Catches include pelagic fish such as sardines, allache (locally called bonga), mackerel, scombres, etc. and benthic fish such as plate, sea bream and mérrou. According to 1996 statistics, 2,400 dugouts are confirmed, approximately half of which are equipped with outboard motors. Industrial Fishery involves the use of large licensed ships and men within Guinea's 200-mile territorial waters. In 1999, 236 ships were granted fishing licenses but only 149 are currently in operation. These ships are mostly of foreign nationality and are mainly engaged in trawl fishing and round haul net fishing. The fishing zone begins 10 miles offshore, but many vessels are unaware of this regulation and fish closer to shore, creating conflicts with artisanal fishermen. Inland Water Fishery is mainly conducted in the river system of the Niger River of Highland Guinea and there are said to be 2,500 fishermen altogether including permanent and part time fishermen. They employ pirogues (dugouts) without engines of 5 to 10 meters and gill nets, casting nets, bow nets and trawl lines to catch fishes of the carp family, tilapias and pout (catfish). It has been pointed out that Forest Guinea, with constant rainfalls throughout the year, has the largest development potential for Inland Water Aquaculture and private firms have already started aquaculture of tilapias but on an extremely small scale.

Fish catches of Marine Fishery are landed at landing sites and fishing villages in various regions and are mostly (about 96%) consumed domestically, providing a precious source of protein for the people. Fish catches are mostly processed as durable smoked fish by women of the landing sites and supplied throughout the country. At the same time, parts of the Conakry and coastal regions are engaged in distribution of refrigerated fresh fish and they are partially exported to European markets. In areas where functional infrastructures such as refrigeration facilities are not yet developed and are far inland from the coastlines, private Guinean firms are engaged in sales of frozen marine fish such as Japanese horse mackerel and chub mackerel at low prices and smoked fish is imported from the south of Senegal in large volume at low cost to make up for a shortage of domestic product.

Guinea is originally an agricultural country and lacks fisheries tradition. Villagers used to establish villages a little away from the coastlines to engage in agriculture and cattle breeding. But the arrival of fishermen from Sierra Leone led to the establishment of a campman (seasonal settlement during fisheries seasons) and Guineans interested in fisheries gradually started moving to live in the campman and became independent after learning fisheries techniques from fishermen from Sierra Leone. In this way the campman gradually became the permanent dwelling place for the Guinean fishermen, transforming to a fisheries village. The same is true with the inland area. The Malinké group, who used to engage in farming, gradually learned fisheries techniques from fishermen of Mali, « Bozo » who used to come up

streams in pursuit of fish and encountered them and eventually became independent. In the sub-sectors of the Inland Water Fishery, still now nearly 70% of fishermen are concurrently engaged in farming because the river fisheries alone do not support them financially.

4-2 Challenges Facing Artisanal Fisheries

Challenges each sub-sector is facing are summarized as in the following table:

Sub-sector	Challenges
Marine Fishery	<ul style="list-style-type: none"> • Commercial fishing boats are repeatedly engaged in illegal fishing operations within 10 miles of the coast, exclusive artisanal fishing areas, not only causing damage to human lives and fishing equipment but also ravaging fishing grounds. • Outboard motors and fishing equipment are so expensive that fishermen are unable to afford them easily. • Development of landing facilities is being delayed, causing losses in post-fish catches and deteriorating quality of products. • Fishing equipment and methods employed are imported and do not match the fishing environment of Guinea. • While fish catches of riverbed resources are increasingly developed, fisheries of pelagic fish may be developed more • Smoking ovens are mostly inefficient, causing risks of fire, increased cost of smoking materials and larger a labor burden on women and great environmental burden due to looting of mangroves.
Inland Water Fishery	<ul style="list-style-type: none"> • Income of fishermen is unstable. • Transmigration of fishermen makes it difficult to develop distribution networks. • Sand is accumulating in rivers for fishing grounds. • The status of river fisheries resources is not well analyzed. (Insufficient statistical system)
Inland Water Aquaculture	<ul style="list-style-type: none"> • Training of technicians is delayed. • Development of Bas-fonde and collaboration with a farming sector
Society of Fishing Communities	<ul style="list-style-type: none"> • Social infrastructure (roads, electricity supply, wells, schools, clinics, etc.) is not developed yet. • Literacy rate is low. (Children of fishermen do not go to schools.)
Fisheries Administration	<ul style="list-style-type: none"> • Allocation of staff members of the central and local governments is not balanced. • Insufficient budget for local (site) activities • Projects are not well arranged. • Insufficient number of young staff members (risking a generation gap in the future).

5. Master Plan

Of the Mid-Term Plan for Fisheries Integrated Development to be proposed in the "Guinea Vision 2010", the sub-sectors of the marine as well as the inland water artisanal fishery and the inland water aquaculture together with the social development aspects have been distilled down to this Master Plan. Objectives of the Plan follows those of the "Guinea Vision 2010" and additional objectives of RPSP, namely, Poverty Reduction, Stable Food supply, Sustainable Economic Development. Specific plans and measures to achieve these objectives are described as follows: (Refer to the attached figures). By implementing this Master Plan, balanced fisheries development within the country will be realized with due consideration to regional economic gaps. In other words, each region will undergo appropriate development measures to make the most of its unique characteristics and social as well as economic effects will be brought about such as increased food production and job opportunities on a local basis and settlement of village population. These measures are compatible with basic policies promoted by the central government such as the decentralization policy and regional development. Fisheries industry activated in each region will, together with the reinforced distribution systems on a nation-wide scale, reinforce consumption of fisheries products at the consumer level. On the other hand, at the producer level, further fisheries production will be called for in line with expanding consumptive demands, thereby improving producers' prices based on supply-demand relations more than the present levels and greatly contributing to enhanced living standards of fishermen as well as independent renewal of fisheries resources. However, as unilateral production-oriented development is likely to negatively impact fisheries resources and the surrounding environment, each plan should be implemented fully taking into consideration harmony with the environment. Following are the major challenges to consider in implementing specific measures for the above scenario.

To allow easy procurement of fisheries gear and equipment

For the maintenance and expansion of fisheries production, procurement of fishing equipment as a means of production is the minimum requirement. Production sites of each region are facing difficulties in procuring equipment and such situations must be first improved. As private financial institutions have in recent years gradually started operating loan systems in Guinea, support systems including financial systems, etc. to accommodate the funding needs of fishermen must be further developed based on the existing systems. By doing so, fishermen will be able to realize independence in the field of procurement of resources and equipment. This is the first point.

To consider reserve capacity resources development

Enhancement of fish catch capability and promotion of production presume the existence of necessary volumes. According to previous reports on fisheries resources, coastal seabed fish had been excessively deployed and, therefore, at this stage it is not appropriate to emphasize their development. However, it is considered that pelagic fish resources are rather abundant. Therefore, the Master Plan considers small-sized pelagic fish resources as the main target for development to provide a large volume of protein to the people at low prices and proposes to reinforce the capacity of fish catches by introducing or transforming effective fisheries methods.

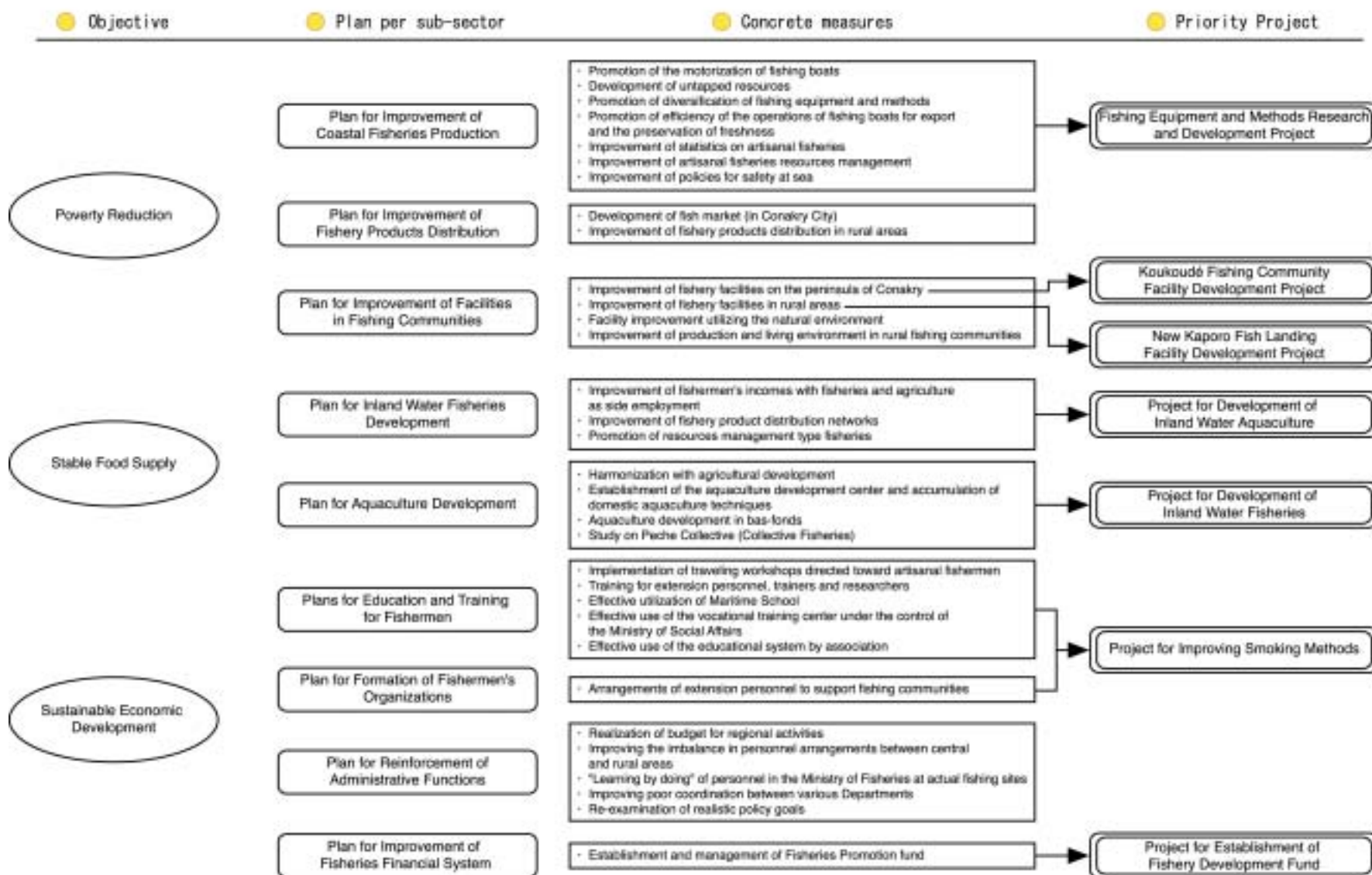
To develop fisheries infrastructures

In parallel with increased fisheries production as well as rational use of resources, investigation will also be conducted on development of landing facilities, fishery markets and furthermore, access roads to fishing villages which have bearing on the processes of distribution of products to consumers. As these matters are beyond the jurisdiction of the Ministry of Fisheries and Aquaculture which is in charge of fisheries industry, long-term development should be implemented in cooperation with neighboring residents, related autonomous bodies and related Ministries and agencies.

To promote inland water fisheries and aquaculture

From the viewpoint of ensuring stable supply of food and job opportunities, it is also important to develop and promote inland water fisheries and aquaculture, which have not been given much development effort because their size is small. Due to their geographical locations, Highland Guinea and the Forest Guinea inland areas are in difficult situations, as with the exception of smoked bonga, they are unable to receive products from the rich coastal fisheries. Annual per capita fish consumption is limited to about 4 kg, meaning an overwhelming shortage of supply against huge fisheries demands. This Master Plan proposes measures to satisfy food demands by promoting production of local cultured fish and distribution of fresh fish. At the same time, it goes without saying that fisheries promotion should always be in harmony with the environment because inland water areas are extremely small in comparison to coastal areas and they are susceptible to natural environmental changes and impact from industrial activities.

Artisanal Fisheries Development Master Plan Overview



6. Priority Projects

Priority Projects are selected from the Master Plan with a main focus on fields requiring higher priority and special urgency, highly practical and effective fields involving a wider range of benefits to people as sub programs or as new plans. There are six projects and consideration was given to thoroughly include target areas with different natural environments and socio-economic environments.

6.1 Fishing Equipment and Methods Research and Development Project

Background:

The history of artisanal fisheries in Guinea is short and fishing equipment and methods used in the coastal region of this country are mostly brought by migrating fishermen visiting from neighboring countries. In other words, they are not developed and are employed based on the country's coastal oceanographic conditions, characteristics of fish species, common practices of fishermen, etc. For these reasons, their fish catch efficiency is not necessarily high and this is one of the reasons why fish catches have not been increased. At the same time, the Ministry of Fisheries and Aquaculture of Guinea does not have organizations for development and promotion of artisanal fisheries technology. This, together with the lack of personnel knowledgeable of artisanal fisheries, is responsible for delayed development of artisanal fisheries.

Experimental tests during the Study period employed comparatively simple techniques such as fish attraction lamps and fish aggregating devices and proved fish-gathering effects. Introduction of new fisheries methods such as purse seine nets and octopus traps and improved gill nets, etc. and line fishing is expected to diversify fisheries as well. With these situations in mind, this Plan established organizations mainly targeting technological development with a view to develop fishing equipment and methods as well as to promote developed technology to a wide range of fishermen.

Objectives:

To improve productivity of artisanal fisheries by improving and developing fishing equipment and methods and to ultimately contribute to increase the income of fishermen.

Beneficiaries:

Direct beneficiaries will be all coastal artisanal fishermen.

Contents:

This Plan consists of three stages; 1) establishment of the Artisanal Fisheries Technology Development and Promotion Center as well as staff training, 2) reception of overseas technological cooperation and technological development and 3) promotion operations. Personnel, resources and equipment are to be ready domestically by the end of the third stage and outside assistance will be decreased to ensure independent development afterwards.

Implementing organization:

Artisanal Fisheries Technology Development and Promotion Center (tentative name)

Ministry of Fisheries and Aquaculture's Boussoura Motorization Center /The National Boussoura Center for Fisheries Science (Centre National des Sciences Halieuitques de Boussoura)

Period:

Preparatory period: 2 years, Plan implementing period: 4 years

6.2 Koukoudé Fishing Community Facility Development Project

Background:

Koukoudé village in Boffa Prefecture is geographically blessed being situated near good fishing grounds however it suffers from tardy development of social infrastructures and insufficient development. Recently development of access roads and the sale of high quality fish have started, accommodating conditions for fisheries development.

Objectives:

To realize stable supply of high quality fresh fish and processed fisheries products and at the same time to develop living bases for villagers and to improve labor environment for fishermen as well as for women engaged in smoking.

Beneficiaries:

About 430 fishermen of the village and 3,600 villagers including about 730 persons engaged in smoking will be direct beneficiaries.

Contents:

The following fisheries related facilities and social infrastructures of the village will be developed.

Category	Type of Facilities
Fisheries related facilities	Aids to navigation, sloped pier, ramp, landing place, fishing gear storage, outboard motor repair place, fishing nets repair place
Goods disposal, distribution, fisheries processing facilities	Goods disposal place, markets, smoking houses, goods storage
Support facilities	Access road, parking lot, rainwater drainage, gas filling station, water supply facility, drainage disposal facility, ice maker, icehouse, refrigerator, power generation
Welfare facilities	Worship place, child care center, aid station, restroom and shower, garbage disposal facility
Administrative facilities	Management office, fence
Local infrastructures	Public square, green space, children's park, primary school, health care center, assembly hall, water station, garbage disposal facility, fire prevention water tank

Implementing organization:

The committee to be organized centered on the Koukoudé Landing Place Development Committee (CDD) under the assistance of the Ministry of Fisheries will be in charge of management and administration of the above-mentioned facilities.

Period:

Designing and construction are expected to take five years.

6.3 New Kaporo Fish Landing Facility Development Project

Background:

Drastic increase in population in Conakry City, especially the eastern area where Kaporo is located, is raising demands for realization of fisheries products supply to satisfy expanding consumption demands. Kaporo has a well-organized fishermen's cooperative and fishermen's awareness for development needs is high but the landing site has only an outboard motor repair house, a fishing gear repair house, etc. and fisheries facilities are not sufficiently developed to satisfy needs.

Objectives:

To stably supply fisheries products to the east part of Conakry City as well as to the neighboring cities. Also, to develop local infrastructures of densely populated backland cities and improve the labor environment for fishermen and women engaged in smoking processing.

Beneficiaries:

28,000 local residents including about 500 fishermen, 300 persons engaged in smoking, 600 brokers in Kaporo and Nongo areas will be direct beneficiaries.

Contents:

The following fisheries related facilities and social infrastructures of the village will be developed.

Category	Type of Facilities
Fisheries related facilities	Aids to navigation, sloped pier, pier/mooring pier, ramp, landing place, fishing gear storage, outboard motor repair place, fishing boats repair place, fishing nets repair place
Goods disposal, distribution, fisheries processing facilities	Goods disposal place, markets, smoking houses, goods storage
Support facilities	Access road, parking lot, rainwater drainage, gas filling station, water supply facility, drainage disposal facility, ice maker, icehouse, refrigerator
Welfare facilities	Prayer space, child care center, aid station, restroom and shower, garbage disposal facility
Administrative facilities	Management office, fishermen's association and each union offices, guard station, fence
Local infrastructures	Public square, green space, children's park, primary school, health care center, assembly hall, water station, garbage disposal facility, etc.

Implementing organization:

The committee to be established around the landing place development committee (CDD) in Kaporo and Nongo with the assistance of the Ministry of Fisheries will be in charge of management and administration of the above-mentioned facilities.

Period:

Designing and construction are expected to take three years.

6.4 Project for Development of Inland Water Aquaculture

Background:

Forest Guinea has the highest potential for inland water aquaculture in Guinea and Central Guinea is considered to follow thanks to the distribution of bas-fond, areas suitable for inland aquaculture, the number of farmhouses and climatic conditions. At present, the only Guinean government aquaculture center exists in Tolo-Bafing, Mamou prefecture. Since its establishment in 1994 the center has not been properly operated due to a lack of funds and technicians. The government is currently trying to find out how to use this facility.

Objectives:

To aim at stable production and supply of fisheries products by activating the Tolo-Bafing Aquaculture Center and promoting aquaculture projects throughout the Central Guinea region.

Beneficiaries:

Direct beneficiaries will be staff members of the Tolo-Bafing Aquaculture Center as well as the Division of Inland Water Fisheries and Aquaculture, under jurisdiction of the Center. In the long-term perspective, 1,645,000 residents of the entire central Guinea are considered to be indirect beneficiaries.

Contents:

To develop facilities of the current Tolo-Bafing Aquaculture Center and realize technological development and human resource cultivation in the aquaculture field.

Development contents for the Aquaculture Center

- Indoor farming facility (1 ton tank x 6)
- Improvement of 2 spawning ponds (100m² 2 each)
- Improvement of 5 experimental production ponds (2,000m² 2 each)
- Staff housing wing, power generator, research equipment, etc.

Technology transfer will be conducted for 4 technical staff to be newly hired by the Center after multiple dispatches of short-term professionals. Beginning the 5th year, the Guinean government will hire 10 promotion members to promote the technology established at the Center throughout central Guinea.

Implementing organization:

Tolo-Bafing Aquaculture Center

Period:

11 years including a technology promotion period

6.5 Project for Development of Inland Water Fisheries

Background:

Inland water fisheries are economic activities that are generally susceptible to natural and social environments. Many river fishermen are concurrently engaged in farming and they have characteristics of seasonal fishermen who leave their villages during the dry seasons to operate camping fishing. According to previous surveys, the relevant sector has concerns about 1) difficult procurement of fishing gears, 2) management of fishery resources and 3) sedimentation of sand on riverbeds and etc.

Objectives:

To improve the living condition for artisanal fishermen by sustainable deployment of inland water fishery resources.

Beneficiaries:

About 2,000 fishermen of inland water fisheries in 4 prefectures of Highland Guinea will be direct beneficiaries.

Contents:

As diversified factors are inter-related within the inland water fisheries sector, integrated development of inland water fisheries will be developed by integrating small-scale projects corresponding to each factor. More specifically, the following 4 components are proposed.

1) Fresh Fish Distribution Promotion

Establish a solar generation type of refrigerator in two main fishing communities in Kankan Prefecture.

2) Measures Against Riverbed Sedimentation

Remove clay blocks traders that dig the riverbank surface soil and regenerate the riverbank.

3) Management of River Bank Fisheries Resources by Fishermen

Establish fisheries statistical systems, compile resources management manuals based at a community level targeted mainly to fishermen and at the river system level and implement resources management.

4) Micro Finance

Financing for procurement of fishing and agricultural equipment.

Implementing organization:

Ministry of Fisheries' office of Strategy and Development Section, Division of inland water fisheries and aquaculture and Chiefs of prefectural branch bureaus under the Division.

Period:

5 years

6.6 Project for Improving Smoking Methods

Background:

Smoking ovens used in Guinea includes a traditional type of Banda and a drum type but their smoking efficiency is low and they consume a large volume of firewood. They pose many problems such as risk of fire. Improved Bandas are becoming widely used in recent years and are a good means of overcoming these problems. The Ministry of Fisheries and Aquaculture has decided to further promote improved Bandas.

Objectives:

To improve living conditions of women engaged in smoking by increasing profitability through enhanced working environments for smoking. To also decrease the volume of firewood to be used for smoking.

Beneficiaries: Cumulatively 1,500 to 2,400 persons engaged in smoking in 5 to 8 main coastal fishery communities will be the direct beneficiaries.

Contents:

This Project is a comprehensive project combining construction of smoking facilities and technical assistance. Specifically, the project provides educational training to villagers engaged in smoking in reading, accounting and calculation, organizational management, health care, hygiene, etc. and establishes a basis for efficient utilization of smoking facilities, after their completion, by strengthening the organizational function of a smokers' association. After that, establish improved smoking ovens with the participation of beneficiaries and funded by beneficiaries or the recipient country's government. Construction of improved smoking houses will take place in 6 coastal fishing communities. At the same time, construction of a small-sized improved smoking house and improvement of smoking ovens will take place in all communities to establish a joint shipment system and a joint management system.

Implementing organization:

Aid organizations, the government's Ministry of Fisheries and Aquaculture, communities and implementing teams composed of national as well as international consultants will be the implementing organizations.

Period:

5 years

7. Project Cost

Name of Priority Projects	Guinea Francs	Conversion to Yen
Fishing Equipment and Methods Research and Development Project	5,512,600,000	330,756,000
Koukoudé Fishing Community Facility Development Project	15,385,286,000	923,117,160
New Kaporó Fish Landing Facility Development Project	8,460,536,000	507,632,160
Project for Development of Inland Water Aquaculture	5,471,709,000	328,302,540
Project for Development of Inland Water Fisheries	1,887,550,000	113,253,000
Project for Improving Smoking Methods	4,614,600,000	276,876,000
Total	41,332,281,000	2,479,936,860

1 Guinea franc=0.06 yen (1U.S. dollar=2,000 Guinea francs, 1U.S. dollar=120 yen)

8. Assessment

8.1 Economic and Financial Assessment

Financial assessment of projects is to evaluate financial appropriateness of projects from the standpoint of the main implementing body of projects. Projects involving profit will be investigated into their appropriateness in terms of balance of payments, pricing, etc. to evaluate the profitability of projects. Projects not involving profit will also be investigated in terms of their financing plans, etc. On the other hand the economic assessment of projects is designed to judge and choose projects that realize optimum distribution of resources from a national viewpoint. For this reason, economic and financial assessment is a means of calculating the necessary cost for the implementation of projects and benefits they will bring to the national economy and evaluating the appropriateness of implementing projects from the viewpoint of national economy by comparing benefits and costs. In other words, it is a method of evaluating the efficiency of public projects. In conducting economic assessment, estimates were limited to quantifiable benefits and those unable to quantify were evaluated qualitatively. The results of economic and financial assessment of Priority Projects are as follows:

Priority Projects	Economic Internal Rate of Return	Financial Internal Rate of Return	Predicted Qualitative Benefits
Fishing Equipment and Methods Research and Development Project	-	-	<ul style="list-style-type: none"> • Increase in income from fisheries • Decrease in operating cost • Preservation of environment • Acquisition of foreign currencies
Koukoudé Fishing Community Facility Development Project	1.9%	Incalculable	Benefits from development of social infrastructure <ul style="list-style-type: none"> • Decrease in morbidity • Improvement of living conditions
New Kaporo Fish Landing Facility Development Project	0.8%	Incalculable	Benefits from development of social infrastructure <ul style="list-style-type: none"> • Decrease in morbidity • Improvement of living conditions
Project for Development of Inland Water Aquaculture	5.3%	Incalculable	
Project for Development of Inland Water Fisheries Improvement of fresh fish distribution only	Sabadou-Baranama 17% Sansanbaya 7%	Both incalculable	Benefits from other components include prevention of future decrease in fish catches
Project for Improving Smoking Methods	-	-	<ul style="list-style-type: none"> • Decrease in fire • Saving of smoking fuel cost • Improvement of smoking operations environment • Increase in income from smoking • Reduction of environmental burden

8.2 Environmental Impact Assessment

Environmental impact assessment was conducted on Priority Projects based on the Guinean Environmental Protection Law and the "Environment-Conscious Guidelines for Fisheries Development Survey (Japan International Cooperation Agency, March 1994)" The results are shown in the following table. Judgment is made at 4 levels from A to D. A has large impact on the environment and D has small impact.

Priority Projects	Predicted Incidents	Judgment	Counter Measures
Fishing Equipment and Methods Research and Development Project	Almost none.	C	
Koukoudé Fishing Community Facility Development Project	• Prevent birth of malaria mosquitoes	Plus	Counter measures against sediment discharge Monitoring of water depth changes
	• Abruption of surface soil at quarry	A	
	• Changes in coastal landform	B	
	• Outflow of dredged soil	C	
New Kaporo Fish Landing Facility Development Project	• Impact of landfill on fishery resources and mangroves	B	Counter measures against sediment discharge Counter measures against sediment discharge Monitoring of water depth changes
	• Abruption of surface soil at quarry	A	
	• Changes in coastal landform	B	
	• Outflow of dredged soil	C	
Project for Development of Inland Water Aquaculture	• Impact of aquaculture water drainage	D	Monitoring of water quality Soliciting judgment of specialized agencies Monitoring of water depth Thorough environmental impact assessment is necessary.
	• Changes in eco-system by introduction of foreign species	B	
	• Impact of drainage from laboratories	D	
	• Impact of enlarged breeding ponds	A	
Project for Development of Inland Water Fisheries	• Reduction of fossil fuel by use of solar energy generation	Plus	Appropriate disposal of waste materials Appropriate disposal of waste materials
	• Increased drainage of hazardous waste materials (batteries)	B	
	• Reduction of sedimentation of riverbed sand	Plus	
	• Preservation of fishery resources	Plus	
	• Increase in dumped fishing nets	B	
Project for Improving Smoking Methods	Decrease in logging of mangroves	Plus	

9. Recommendations

With a view to implement the Master Plan and proposed Priority Projects, the Ministry of Fisheries' office of Strategy Development Section will, as at present, play a leading role in proceeding with projects in collaboration with related departments and agencies. Specific measures (draft) for Priority Projects are shown in the following table.

Priority Projects	Specific Measures (draft)
Fishing Equipment and Methods Research and Development Project	Aim at technical cooperation in the project system of JICA but first, make arrangements with related organizations through short-term dispatch of experts. Specific cooperation with the Overseas Fishery Cooperation Foundation is eyed as well.
Koukoudé Fishing Community Facility Development Project	Aim at implementing the projects in the form of grant aid but firstly, clear additional necessary surveys and operations.
New Kaporo Fish Landing Facility Development Project	Aim at implementing the projects in the form of grant aid but first, clear additional necessary surveys and operations.
Project for Development of Inland Water Aquaculture	Aim at technical cooperation in the project system of JICA but first, make arrangements with related organizations through short-term dispatch of experts. Investigate chances of involving non-Japanese aid countries and organizations (Ex. China).
Project for Development of Inland Water Fisheries	Composed of small-scale components. Cope with them by collaborating with grassroots grant aid by the Embassy, collateral funds of the recipient country's government and dispatch of individual experts by JICA.
Project for Improving Smoking Methods	Aim at implementing the projects in collaboration with international organizations (especially FAO), dispatch of individual experts of JICA and with participation of the Guinean government and residents.

Regarding the implementation order of the projects, projects that differ in scheme can be conducted simultaneously; however, for projects implemented with grant aid, such as Koukoudé and Kaporo, it is necessary to consider the implementation order.

If they were to be judged by the results of economic financial analysis, the development project for Koukoudé should be implemented before Kaporo. However Kaporo is close to the consumption location and it benefits from more basic conditions such as a developed social infrastructure, etc. that will lead the project to its success. Also, compared to regional areas where only a small number of personnel of the Ministry of Fisheries are stationed, urban areas are better positioned for minute supervision of implementation. Therefore after comprehensive consideration, the Study Team proposes that the Kaporo project be implemented first.

10. Technology Transfer

This Study undertook practical surveys such as seminars and experimental tests on top of local surveys and interviews with persons engaged in each sector. While performing these operations technology transfer was provided to the counterpart. The following table shows contents of operations and expected technology transfer.

Operations	Sub-sector	Contents	Expected effects
Experimental tests on fisheries using fish-gathering lamp	Coastal Fishery	Gathered pelagic fish by night fish-gathering lamp and efficiently conducted experimental fish catch operations.	Acquire new technology
Fish aggregating devices experimental tests	Coastal Fishery	Manufactured fish aggregating device with locally available materials and confirmed fish-gathering effects.	Acquire new technology
Survey of fish farmers	Marine Fishery	Asked model fishery communities to keep records of operation cost and profit.	Acquire survey methods by keeping books
Experimental tests on change of fishing methods	Coastal Fishery	Confirmed improved economic efficiency of shifting from gill net to encircling gill net.	Acquire survey methods by keeping books
Piscicultural test (No. 1)	Inland Water Aquaculture	Compared growth of fish under different breeding conditions by using ponds of private fish farmers.	Acquire general techniques for aquaculture management and pond water quality monitoring techniques
Piscicultural test (No. 2)	Inland Water Aquaculture	Confirmed breeding results in central Guinea by using the Tolo-Bafing Aquaculture Center's pond.	Acquire general techniques for aquaculture management and establish domestic personnel utilization methods
Experimental installation of fuel oil type refrigerator	Inland Water Fishery	Installed a fuel oil type refrigerator in fishing communities to improve the distribution rate of fresh fish.	Learn measuring habits and keeping records of fish catches
Fisheries statistics seminar	Inland Water Fishery	Unified different systems of fisheries statistics of respective prefectures through consultations at seminars.	Establish a unified system for fisheries statistics
Survey trip to Bamako	Inland Water Fishery	Exchanged opinions with the Mali Inland Water Fisheries administrative authority and surveyed actual situations of river fisheries of Mali.	Activate technological exchanges with neighboring countries
Fisheries products consumption survey	Distribution · processing	Surveyed consumption of housewives in the form of workshops.	Acquire survey methods in the form of workshops
PCM workshop	Fisheries Administration	Conducted problem analysis workshops among staff members of the Ministry of Fisheries and women engaged in smoking.	Acquire survey methods in the form of workshops
Training of counterparts (In Japan)	Fisheries Administration, Inland Water Fishery	Inspected actual sites of fisheries administration, activities of fisheries unions in Japan.	Upgrade level of experience
Compilation of report (In Japan)	Planning	Compiled survey reports and drafted plans.	Acquire planning methods

CHAPTER 1

INTRODUCTORY REMARKS

CHAPTER 1

INTRODUCTORY REMARKS

1-1 Background of the Study

The Republic of Guinea located in the western part of Western Africa has a territory of 245,857 km² (similar in area to Honshu in the Japanese archipelago) and 8.274 million inhabitants (2001 estimate). Despite a coastline of some 300km, Atlantic continental shelf of Guinea stretches 43,000 km² and is the largest of all western African countries, generating a maritime environment with major fisheries development potential.

The fisheries are one of Guinea's main economic sectors, generating 9,000 jobs directly (fishermen) and 200,000 indirectly (processing and distribution). According to statistics (1997), fishery production was 98,000t and is an essential food resource, contributing to 75% of the total animal protein consumed by the inhabitants. However, per capita fish consumption is limited to about 13kg, which is low compared to other neighboring countries (27.8kg/person for Senegal and 19.8kg/person for Côte d'Ivoire).

For the past 10 years, the Guinean government has prioritized the fisheries sector for economic development from the viewpoint of food security, increased personal incomes, national revenue, and employment creation. The following eight strategies were established by the Ministry of Fisheries and Aquaculture (formerly Ministry of Fisheries and Animal husbandary) in "Guinea, Vision 2010", a medium and long-term plan introduced by the Guinean government in August 1997:

- (i) Rational resources management;
- (ii) Support and development of artisanal fisheries;
- (iii) Promotion of maritime artisanal fisheries for export;
- (iv) Promotion of fresh water aquaculture;
- (v) Multi-dimensional management of inland water fisheries;
- (vi) Development of shrimp culture;
- (vii) Development of industrial fisheries;
- (viii) Strengthening of fishery institutions.

However, due to a lack of information on resources and processing techniques, the absence of an assistance program for fishermen, inadequate facilities and organizations for promoting distribution, processing as well as sales, poor access to fishing communities and an inadequate social infrastructure, a concrete action plan has not yet been formulated.

Consequently, the Guinean government has requested that a Master Plan (M/P) and Feasibility Study (F/S) be prepared in the fisheries sector based on the above-mentioned medium and long-term vision. At this request, the Government of Japan dispatched a preparatory Study Team (S/W discussion) in August 1999 and signed a Scope of Work (S/W) on September 9 to implement the M/P and F/S studies of artisanal fisheries that predominate Guinea's fisheries.

1-2 Objectives of the Study

The objective of the current Study is to satisfy the food demands of a growing Guinean population anticipating a high increase ratio (2.8% annual) over the medium and long-term, in conformity with the “Guinea, Vision 2010” strategy. The strategy is aimed at sustainable development in the fisheries sector that is anticipated to continue to play an essential future role in employment creation and regional development. The master plan is primarily focusing on improving production of artisanal fisheries, support for distribution and processing industries, encouraging the formation of fishermen’s organizations and development of inland water fisheries and aquaculture. Based on the plan, priority development projects (5 cases) and market improvement projects were formulated and feasibility projects were implemented.

In addition, knowledge and techniques for formulation of the plan were transferred to counterpart staff during the Study.

1-3 Implementing Conditions of the Study

The study is consisted of two (2) phases, the master plan study (first phase) which was carried out from March to June of 2000 and the feasibility study (second phase) which was carried out from October 2002 to January 2003. The reason why there is a gap of two (2) years between two phases is that the study was interrupted because of the invasion of both Liberian rebel and Sierra Leon rebel into the Guinean territory started in September 2000. The conflict was calmed down for the moment, although this problem is not solved completely. It was judged that no direct risk of insecurity is concerned except boundary zone. Upon this decision, the special meeting was held in July 2002 to restart the study. And based on the decision of this meeting, the second phase was started from October 2002.

1-3-1 Master Plan Study (phase 1)

The Study targeted the 5 prefectures of the Guinea Coastal Region; Boké, Boffa, Dubréka, Coyha (including metropolitan Conakry) and Forècariah, 4 prefectures of Guinea Hiland Region; Kankan, Kouroussa, Shiguiri and Mandiana, and 4 prefectures of Guinea Forest Region N’Zérékoré, Macenta, Guékédou and Kissidougou, as project sites (refer to maps at the beginning).

Preparatory Work in Japan	February 2000
Phase 1 Field Work	March 6 to June 18, 2000
Work in Japan	June to July 2000

The members of the Japanese Study Team and Counterpart Team are as follows.

Japanese Consultants Team

Chief Consultant/Fishing Community Development:	Yasuo ISHIMOTO	Overseas Agro-Fisheries Consultants Co. Ltd.
Assistant Chief Consultant/Fishing Economics:	Hiroaki YONESAKA	IC Net Limited
Coastal Fisheries/Distribution & Processing:	Kazumi IIDA	Overseas Agro-Fisheries Consultants Co., Ltd.
Inland Water Fisheries/Distribution & Processing:	Masashi SATO	Overseas Agro-Fisheries Consultants Co., Ltd.
Artisanal Fisheries Infrastructure:	Masami TSUCHIYA	Overseas Agro-Fisheries Consultants Co., Ltd.
Fishing Community/Gender Analysis I:	Sachiko OGATA	Overseas Agro-Fisheries Consultants Co., Ltd.
Fishing Community/Gender Analysis II:	Hiroko MIMURA	IC Net Limited
Inshore/River Fishing Technology:	Kazuo UDAGAWA	IC Net Limited
Inland Water Aquaculture Technology:	Kiyoshi MASUDA	Overseas Agro-Fisheries Consultants Co., Ltd.
Environmental Impact:	Tsuyoshi ITO	IC Net Limited
Economic/Financial Analysis:	Kazuyuki NAGAO	IC Net Limited
Interpreter I:	Masahiko HASHIZUME	Sasaki Agency Co., Ltd.
Interpreter II:	Masahiro KITAGUCHI	Sasaki Agency Co., Ltd.
Work Coordinator: (<u>borne</u> by IC Net Ltd.):	Sayoko UESU	IC Net Limited

Guinean Counterpart Team (Ministry of Fisheries and Aquaculture)

Team Leader	Thierno Aliou DIALLO	Development Strategy Office
Marine Fisheries	Soriba CAMARA	Marine Fisheries Department
Coastal Fisheries	Mody Hady DIALLO	Coastal Fisheries & Aquaculture Bureau
Social Economy of Fishing Community	Mamadou Oury DIALLO	Centre National des Sciences Halieutiques de Boussoura (National Boussoura Center for Fisheries Science: CNHSB)

1-3-2 Interruption of the Study and Discussion to Restart

As mentioned above, because of the military conflict between Guinean force and rebels of two neighboring countries, the study was interrupted for 2 years. But both parties, Guinean government and JICA held the meeting to restart the study and agreed on the modification of SOW (Scope of Work) of said study, such as study area and priority projects.

- 1) Forestry Guinea is excluded from the study area because that the security is not restored completely. Project for development of inland water aquaculture which was proposed in said zone is abandoned and restudied in Central Guinea instead.
- 2) Because of the fact that one of the priority projects proposed in the previous phase, Kénien fish market construction project is being implemented with Japan's grant aid, there is no more meaning to continue studying its feasibility. Consequently in stead of this project, as an alternative, the project for construction of fish landing facility is examined at two places, one in Conakry and the other in coastal rural village, that is Kaporo in Conakry and Koukoudé in Boffa prefecture.

1-3-3 Feasibility Study (phase 2)

Based on the minutes of meeting for restart of the study, the Japanese study team rearranges its members and carried out the task in following schedule with Guinean counter-part team.

Preparatory work in Japan	September 2002
Second field survey	October 15, 2002 ~February 2, 2003
Document work in Japan	February 2003

The members of the Japanese Study Team and Counterpart Team are as follows.

Japanese Consultants Team

Chief Consultant/Fishing Community Development:	Yasuo ISHIMOTO	Overseas Agro-Fisheries Consultants Co. Ltd.
Coastal Fisheries/Distribution & Processing:	Kazuo UDAGAWA	IC Net Limited
Inland Water Fisheries/Distribution & Processing:	Masashi SATO	Overseas Agro-Fisheries Consultants Co., Ltd.
Artisanal Fisheries Infrastructure:	Wataru IWASAKI	Overseas Agro-Fisheries Consultants Co., Ltd.
Marne civil engineering	Hiromasa INOUE	Overseas Agro-Fisheries Consultants Co., Ltd.
Fishing Community/Gender Analysis	Lena WESTLUND	Overseas Agro-Fisheries Consultants Co., Ltd.
Coastal Fishing Technology:	Kazunori UWATOKO	Overseas Agro-Fisheries Consultants Co., Ltd.
Inland Water Aquaculture Technology:	Katsumasa SOMA	Overseas Agro-Fisheries Consultants Co., Ltd.
Environmental Impact:	Yuji HATAKEYAMA	IC Net Limited
Economic/Financial Analysis:	Hideo KOBAYASHI	IC Net Limited
Interpreter I:	Masahiko HASHIZUME	Sasaki Agency Co., Ltd.
Interpreter II:	Masahiro SEO	Sasaki Agency Co., Ltd.
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Guinean Counterpart Team (Ministry of Fisheries and Aquaculture)

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Fisheries infrastructure	Thierno Souleymane DIALLO	Development Strategy Office
Social Economy of Fishing Community	Hadja Aissatou BARRY	Marine Fisheries Department
Inland water aquaculture	Oua BILIVOGUI	Division of Inland Water Fisheries and Aquaculture
Environmental impact	Alpha Ousmane BARRY	Development Strategy Office
Economy and micro-finance	Soriba CAMARA	Marine Fisheries Department

1-4 Country Profile

The Republic of Guinea, located in the western part of Western Africa, borders the Republic of Guinea Bissau, the Republic of Senegal and Republic of Mali to the north, the Republic of Côte d'Ivoire to the East, and Sierra Leone and Liberia to the South. It has a territory of 245,857 km² and the length of its coastline is approximately 300km. The continental shelf extends into the Atlantic Ocean covering 43,000 km² and is the largest in Western Africa.

According to statistics (estimated in 2001), Guinea has 8.274 million inhabitants and a male/female ratio of 49:51. Conakry, the capital, has a population of 1.13 million, which is 15% of the national total. The interior is also equally populated with Kankan prefecture having 1.01 million inhabitants and Nzérékoré prefecture with 1.35 million inhabitants. The ethnic composition is: Peuls (40%), Malinké (30%), Sousous (20%) and others (10%). Eighty-five percent (85%) of the population is Moslem.

The country is subdivided into four regions according to geographic and climatic conditions: Guinée Maritime (Guinea Coastal Region), Moyenne Guinée (Central Guinea), Haute Guinée (Guinea Highland Region) and the Guinée Forestière (Guinea Forest Region). Guinée Maritime (Guinea Coastal Region) is generally hot and humid and tropical; whereas the amount of precipitation tends to decrease as you move from Haute Guinée (Guinea Highland Region) to Moyenne Guinée (Central Guinea), changing to savanna-like conditions. In Guinée Forestière (Guinea Forest Region) higher precipitation again creates a landscape of never-ending forests.

After its independence from France in 1958, the Republic of Guinea's first President Sékou Touré continued a policy of modernization and industrialization under State control and the nation grew rapidly similar to the USSR and Cuba. However, as with the collapse of the USSR and other communist block countries, it was soon obvious the Guinean economy would also suffer the same fate. After the death of the president in 1985, General Lansana Conté took control and amended the left-leaning policies of the preceding president and moved the nation towards a market economy through policies more closely akin to that of Western countries, in particular France.

Despite eighty percent (80%) of the Guinean labor force being employed in the agricultural sector, accounting 24% of total GDP and formerly an exporter, Guinea now is an importer of food products. In addition, reflecting the preceding government's policy of industrialization, mining products (bauxite in particular), accounted for 75% of all exports and the industrial sector accounted for 31% of total GDP. However, to escape an economic structure dependent on bauxite and to ensure diversification, the government has recently adopted a policy of further development of agriculture and processed agricultural products.

Although social conditions are stable under the reins of President Lansana Conte, due to its geography Guinea remains vulnerable as an instrument of negotiation in the political unrest of politically unstable neighbors such as Sierra Leone, Liberia and Guinea Bissau. Since September 2002, there has been a large inflow of refugees from neighboring Republic of the Ivory Coast due to its unstable political condition.

Social and Economic Overview of the Republic of Guinea

Area	245,857 km ²	Ministry of Foreign Affairs' HP
Capital	Conakry	World's Present State (Sekai Gensei) 2001 (Heibonsha Ltd.)
Population	8.274 million (2001 est.)	World's Present State (Sekai Gensei) 2001 (Heibonsha Ltd.)
Life expectancy	Male: 46.0 years, Female: 47.0 years	World's Present State (Sekai Gensei) 2001 (Heibonsha Ltd.)
Ethnic groups	Peuhl 40%, Malinke 30%, Soussou 20%, smaller ethnic groups 10%	The World Fact Book 2002
Religions	Muslim 75%, Christian 4%, indigenous beliefs 9%	Ministry of Foreign Affairs' HP
Languages	French (official), Malinke, Soussou, Peuhl, languages of smaller ethnic groups	Ministry of Foreign Affairs' HP
Literacy of adults	Male: 49.9%, Female: 21.9% (1995 est.)	The World Fact Book 2002
Independence	1958 (from France)	The World Fact Book 2002
Government type	Republic	Ministry of Foreign Affairs' HP
Chief of state	President Lansana CONTE	Ministry of Foreign Affairs' HP
Legislative body	People's National Assembly (Assemblée Nationale Populaire, unicameral)	Ministry of Foreign Affairs' HP
Head of government:	Prime Minister Lamine SIDIME	Ministry of Foreign Affairs' HP
Gross national income (GNI)	US\$3.3 billion (2000)	Ministry of Foreign Affairs' HP
Major industries	Rice, cassava (tapioca), coffee, bauxite, alumina, diamonds	Ministry of Foreign Affairs' HP
Growth rate	2.0% (2000)	Ministry of Foreign Affairs' HP
Inflation rate	8.4% (2000)	Ministry of Foreign Affairs' HP
GNI - per capita	US\$ 450 (2000)	Ministry of Foreign Affairs' HP
Currency	Guinean franc (GNF) US\$1.00 = 1,746.9 GNF (2000)	Ministry of Foreign Affairs' HP
Main assisting countries	US (25.7), Japan (19.1), France (17.4) *unit: 1 million US\$	Ministry of Foreign Affairs' HP
Results of assistance from Japan	(1) Loan assistance (till '99, E/N base) 160.10 (2) Grant aid (till '99, E/N base) 293.69 (3) Technical assistance (till '99, JICA base) 40.10 *unit: 100 million JPY	Ministry of Foreign Affairs' HP

CHAPTER 2

OVERVIEW OF THE FISHERIES SECTOR

CHAPTER 2 OVERVIEW OF THE FISHERIES SECTOR

2-1 Summary

(1) Fisheries

The fisheries are a significant economic sector in Guinea generating 9,000 jobs (fishermen) directly and 200,000 indirectly (processing, wholesale fish merchants and retailers). In addition, 98,000t have been generated through "Guinea, Vision 2010 (1997)", which is an indication that the fisheries are a significant food resource, providing 75% of the animal protein of the inhabitants. Fish consumption per capita is currently limited to 13kg, which is low compared to neighboring countries.

In Guinea, the fisheries can be subdivided roughly into three areas: artisanal fisheries, industrial fisheries and inland water fisheries. The table below shows the annual production for each category.

Table 2-1 Breakdown of Fisheries Products Supply

Category of Fisheries	Supply Volume
Maritime artisanal fisheries	52,000
Maritime industrial Fisheries	23,000
inland water fisheries	5,000
Imports	18,000
Total	98,000

Source: "Guinea, Vision 2010 (1997)" Ministry of Fisheries and Aquaculture

Unit: tons

Artisanal fishing involves small wooden boats (pirogues; length 7-15m) with or without outboard engines, that use gill nets, encircling gill nets, surrounding nets, long lines, and angling. Catches include pelagic fish such as sardines, allache (local called bonga), mackerel, scombres, etc. and benthic fish such as sole, sea bream and grouper. According to 1996 statistics, 2,400 boats are confirmed, approximately half of which are equipped with outboard motors.

Industrial fishing involves large vessels with fishing license operating within Guinea's 200-mile territorial waters. In 1999, 236 ships were granted fishing licenses but only 149 are currently in operation. By flag, there are 22 Chinese ships, 67 ships from the E.U., 19 ships from neighboring countries, 39 ships from other countries, and 2 from Guinea. By fishery type, 37 ships trawl for *Cephalopoda* (squid, octopus), 16 ships trawl for shrimp, 33 ships trawl for benthic fish, and 31 fish for tuna with purse seine nets. The fishing

zone begins 10 miles offshore, but many vessels are ignoring this regulation and fish closer to shore, creating conflicts with artisanal fishermen.

The inland water fisheries catch is estimated to be 5,000 tons. However, since a national system of statistics does not exist, the total national catch is only estimated by experiments. Small *pirogues* without engines (approx. 6m) are generally used for fishing, mainly with the use of gill nets, long lines or bow nets. The primary catches are tilapias and pout (catfish), especially during the dry season when the river levels are low.

Comparing the above-mentioned conditions, total volume of allowable fishing potential is estimated in the table below.

Table 2-2 Allowable Fisheries Potential in the Guinean Maritime Region

Category of fish	Allowable fisheries potential
Small pelagic fish	50,000 to 200,000
Benthic (bottom-dwelling) fish	35,000 to 40,000
Shrimp	1,000 to 2,000
<i>Cephalopoda</i> (cuttlefish, octopus)	5,000 to 10,000

Source: Ministry of Fisheries and Aquaculture 1997

Unit: tons

Potential resources of small pelagic fish vary, which make a comparison of current catch difficult. However, if we consider that industrial fishing mainly demersal fish, shrimp and *Cephalopoda*, the current catch of 23,000 tons is low compared to the total allowable volume. Therefore, from a resource point of view, increases in catches are possible.

Table 2-3 shows the marine fisheries supply trend during 1997 and 2000. The total annual supply of marine fisheries products is approximately 100,000 tons in the past 3 years.

Table 2-3 Supply Trend of the Marine Fisheries Product by Category

(unit: ton)								
	Artisanal	Industrial	Catch total	Inport by sea and air	Inport by land	Inport total	Export total	Total supply
1997	48544	10297	58841	3197	2064	5261		64102
1998	47081	18682	65763	5192	1448	6640		72403
1999	54916	23056	77972	21974	na	21974	695	99251
2000	59579	27934	87513	14109	na	14109	2524	99098

Source : CNSHB Annual fisheries statistics 1997~2000

(2) Distribution and Processing

Processed fishery products distributed in Guinea are roughly divided as fresh fish, frozen fish, smoked fish (short-term and extended preserving), and dried fish. Of those, distribution of frozen fish is carried out by two large firms in Conakry, COGIP and SONIT, which have a distribution network and monopoly throughout the country. Smoked fish, mainly cheap *bonga* (95% of the catch is smoked) is mainly smoked along the beaches near unloading sites and is distributed throughout the interior of the country and in nearby countries. Short-term preserving of smoked fish takes only 6 hours; however the preservation period is short and distribution area too limited. On the other hand, extended preserving takes more than 24 hours providing approximately 6 months preservation in room temperature, thus increasing the distribution area. There are 4 fish distribution routes for short-term preserving:

- (i) Kamsar – Boké
- (ii) Fishing communities close to Cape Verga – Fria Pref. and Boffa
- (iii) Conakry – Coya and Kindia
- (iv) Fishing communities in south Conakry – Coya and Forécariah

Most of the distribution takes place within nearby prefectures-in other words, within 50km or so. On the other hand, fish with extended preserving are distributed from Kamsar-- Cape Verga -- Conakry-- Kindia-- Kankan-- Kissidougou -- Nzérékoré-- and the Guinea Forest Region. Thus they are distributed from fishing villages via the principal cities into the interior. In addition, fish with extended preservation from nearby countries such as Senegal arrive by land also use the same routes for distribution throughout the interior of the country.

Regarding the export of fisheries products in 2002, frozen fish for European market amounted 1,445 t, followed by Asian market (mainly Korea; 636 t) and African market (143 t) was shipped from the port of Conakry. The main species were sea breams and sole for the European market, small croaker (bobo) for Asia and salted sea bass and croakers for the African market. Fisheries products exported by air in 2002 consisted of fresh fish for Europe, smoked fish for America (89 t; mainly sea catfish and barracuda) shark fin for Hong Kong (25 t) and aquarium fish for Japan (100,000 fish). The total of export in 2002 was 2,338 t. There are at least 2 Korean Exporters in Conakry. In order to secure the supply of the fish, they have their own artisanal fishing fleet as well as patronizing artisanal fishermen by providing fishing gears.

(3) Aquaculture

Aquaculture has only just begun in Guinea, so there is no coherent policy. However, several projects have been implemented. The shrimp culture facilities in Koba with French technical co-operation as well as aquaculture facilities through financing of the African Development Bank in the prefecture of Mamou are two examples. These projects are not in full operation because they do not reflect the social needs and technical capabilities of the inhabitants. However, a surge of refugees from Liberia and Sierra Leone to the Guinea Forest Region has created problems in the procurement of food products. And recently, taking into account the stable precipitation and available surface area for aquaculture in the Guinea Forestry has attracted a lot of interest. With French technical co-operation, two projects have been implemented, the results of which will

follow. Principal fish species for aquaculture with food supply and fertilizing operations include tilapias and catfish.

2-2 Industrial Fisheries

Within the framework of industrial fishing in Guinea, large vessels fish for pelagic fish, trawl for demarsal fish and shrimp, and fish for tuna with purse seine nets. Few vessels of Guinean registry exist, and practically all active ships in Guinea's 200-mile exclusive economic zone (EEZ) are foreign vessels with fishing licenses. The breakdown of the fishing vessels in 1999 was as follows.

Table 2-4 Breakdown of Industrial Fishing Vessels

	Guinea ships	EU vessels	Chinese vessels	Foreign vessels based in Guinea	Other foreign vessels	Total
Pelagic fishing (mid-water trawlers)	0	0	0	3	0	3
Demarsal fish trawlers	0	4	0	14	21	39
<i>Cephalopod</i> trawlers	0	7	22	0	3	32
Shrimp trawlers	1	6	0	2	7	16
Tuna purse seine net fishing	0	33	0	0	0	33
Tuna long-liner fishing	0	7	0	0	0	7
Tuna pole and line fishing	0	10	0	0	0	10
Collection ships	1	0	0	0	8	9
Total (vessels)	2	67	22	19	39	149

Source: *Centre National de Surveillance* (National Monitoring Center)

Growth in the number of fishing licenses indicated below shows an increase over time.

Table 2-5 Number of Fishing Licenses Granted

	1975	1980	1985	1990	1995	2000
Pelagic fishing (mid-water trawlers)					2	8
Bottom trawlers	6*	58*	23*	49*	43	55
<i>Cephalopod</i> trawlers	0	5	14	31	34	42
Shrimp trawlers	1	10	11	13	6	42
Tuna round haul net fishing	0	6	37	34	23	30
Tuna long-liner fishing	0	3	8	7	3	3
Other	0	0	0	0	0	9
Total	7	76	93	134	111	189

The number of bottom trawlers until (*) = 1990 includes pelagic fishing (mid-water trawlers).

Source: *Centre National de Surveillance* (National Monitoring Center)

Fishing licenses are defined in accordance with “Fisheries plan” formulated annually by the Ministry of Fisheries and Aquaculture. The “Fisheries Plan” defines the conditions for granting fishing licenses with the view that it contributes to food security for public through the environmental conservation of resources, promotion of sustainable utilization of resources, and contributes by generating employment and national income. For these reasons, the allowable catch, tonnage of vessels, authorized fishing zones, restrictions on net mesh size, taxes on fisheries, taxes for fisheries monitoring, taxes for observation programs, markings on the ship hulls, etc. are defined as prerequisites for obtaining a license. The tonnage of fishing vessels is fixed at less than 1,000t for trawlers fishing for demersal fish, and a maximum tonnage of 2,000t for ships fishing for pelagic fish. Guinean fishing vessels are required to unload all catches in Guinea (not a question of limitation of exports), and foreign ships based in Guinea must unload 50% of their catch in Guinea for domestic consumption.

Guinea has its own trawlers catching demersal fish. Ten (10) ice-refrigerated trawl boats were imported from Brazil, called semi-industry trawler and 9 of them are still operating in Guinea.

Only the port of Conakry, with its harbor facilities, including a fishing quay (approx. 150m), cold storage, and ice plants, etc. is useful as a homeport for industrial fishing vessels.

Vessels that have obtained a fishing license are required to report their catch. Fishing vessel reports are jointly compiled into Annual Fisheries Statistics Bulletin by the National Surveillance Center and the Boussouira National Center for Fisheries Science. The annual catch of industrial fishing vessels is between 25,000 and 50,000 tons. Approximately 10,000t of pelagic fishes such as sardines and mackerel are caught by mid-water trawlers. Approximately 10,000 to 27,000 tons of demersal fishes such as croaker, atlantic croaker, sole and sea catfish, and approximately 10,000t of *cephalopod* (squid, octopuses) are caught by bottom trawlers.

Table 2-6 Catches by Industrial Fisheries

	(Unit : tons)			
	1995	1996	1997	1998
Total catch	23,230	29,808	50,822	39,971
(Pelagic fish)	3,366	11,290	10,598	13,340
(Benthic fish)	8,608	8,028	27,309	14,260
(<i>Cephalopod</i>)	10,115	9,181	9,685	11,005
(Shrimp)	566	867	2,125	1,243
(Trawl line refrigerator)	575	442	1,105	123

Source: *Centre National des Sciences Halieutiques de Boussouira* (Boussouira National Center for Fisheries Science)

10,000 to 20,000 tons of the catch is unloaded at the port of Conakry for domestic consumption, including mackerel, sardines and other species. Except for trawlers with ice-refrigeration, most of the fish is frozen onboard and unloaded frozen. The unloaded fish is temporarily stored in cold rooms or directly placed in refrigerated vans and shipped to various national markets through distributors.

The National Surveillance Center for Fisheries was established in 1992 to oversee the activities of fishing vessels, and to control fisheries with the aim of effective and sustainable use of resources. Six surveillance stations with speedboats were established at principal landing sites. Onboard observer system was also introduced to monitor the activities of foreign vessels. However, since the means and capacity of surveillance is insufficient, oversights, and illegal fishing is common.

2-3 Coastal Artisanal Fisheries

The coastal fisheries consists of a few large and 100 small landing ports and fishing communities, dispersed along the coastal areas of Conakry and the prefectures of Boké, Boffa, Dubréka, Coya and Forécariah situated on the Atlantic Ocean. Some 9,000 fishermen, both professional and part-time, are active in fishing. If the processing and distribution of fish catches are included, approximately 200,000 people work in this sector. Ethnic groups such as the *Sousous* and *Bagas* who live along the coastal areas are farmers by tradition and have not developed fisheries. During the mid-1990s, fishermen from Ghana and Sierra Leone came to the coastal areas of Guinea to fish. Guineans learned to use advanced fishing techniques from the visiting fishermen and began fishing professionally themselves. Today, the majority of boats owners are Guinean, but captains and crew come from other countries such as Sierra Leone.

Wooden boats are locally manufactured and some 2,300 are in operation. Sizes vary, from a boat for 1 to 2 fishermen to large boats for 20 to 25 fishermen. However, boats made for 2 to 3 fishermen are most numerous. Motorization of the boats began in the 1980s with the introduction of outboard motors. With the increase in the number of motorized boats came an increase in catches. There are approximately 1,050 motorized boats now in use, a little more than 40% of the total number of the boats. The principal fishing methods are encircling gill nets and drift gill nets that have been developed for small pelagic fish like bonga (*Ethmalosa fimbriata*), bonga-seri (*Sardinella maderensis*). Encircling gill nets are also used to catch boboe (atlantic croaker). Long lines are used to catch catfish and anglings are for sea bream and grouper.

Annual production by coastal artisanal fisheries is approximately 47,000 to 50,000 tons. Of the catches, the percentage of small pelagic fish such as bonga is most significant, at 30,000 tons, accounting for approximately 65% of the total catch by coastal artisanal fishermen. By area, Conakry, the most densely populated area in Guinea (1.1 million, or 15% of the national total) has the most landingsites, fishing communities and fishing vessels, 31% of all landings in the country and 38% of all fishing vessels. In Conakry motorized boats are common, and the catches are high too. The prefectures of Boffa and Boké are ranked 2nd and 3rd respectively. In the metropolitan Conakry area, with its large consumption markets and various needs of fish, a baritety of fish species are landed. The demand for fresh demarsal fish for exports is greater than in other areas.

Table 2-7 Landings by Area (1998)

	Boké	Boffa	Dubrêka/ Coya	Conakry	Forécariah	Total	
Number of landing ports/fishing communities	21	26	9	31	13	100	
Number of fishing vessels in operation (boats)	390	671	160	901	239	2,361	
Ratio of motorized boats (%)	25	32	12	61	35	41	
Catch	Small pelagic fish	5,297	13,232	877	9,669	1,567	30,642
	<i>Croakers (Sciaenidae)</i>	850	1,560	14	2,417	510	5,351
	Sea bream (<i>Spaeidae</i>)	64	0	0	2,827	0	2,891
	Pout (catfish)	444	801	0	833	513	2,591
	Mullet	4	379	84	984	83	1,534
	Others	696	506	162	2,273	426	4,072
Total (tons)	7,355	16,478	1,146	19,003	3,099	47,081	

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

Nearly all fish landed (96%) in the various fishing communities are intended for domestic consumption and constitute a significant source of protein. At the landing sites, most of the unloaded fish is preserved through smoking by women, and supplied to the interior cities using principal roads from coastal areas. Despite a lack of transport and difficulties in obtaining ice, fresh fish preserved in ice is distributed in the Conakry region and some areas along the coast. Moreover, some demersal fish like sea bream, grouper, etc. are purchased by exporters from Conakry and exported to European markets preserved in ice. Approximately 2,000 tons are exported annually. Due to the limited number of fish species and severe standards for freshness and quality control, special boats used for fishing expensive demersal fish are based primarily in the Conakry area close to a supply of ice.

The coast of Guinea is a shoal that ebbs very wide at low tide. And at the landing sites along the rocky coast near Conakry, the coming and going of fishing boats and unloading of catches is a particular problem. Rural landing beaches and fishing communities are far from principal roads and unpaved roads are often impractical, especially during the rainy season. Many fishing communities located on islands are inaccessible from the mainland. And support facilities for the fisheries and infrastructure base have not been established. Furthermore, many fishermen have difficulty obtaining fishing gear such as outboard motors, parts, materials for fishing gear, etc. In particular, outboard motors are expensive and are outside the means of most fishermen. Necessary support measures should be taken to supply fishing gear, through a credit system for fishermen, for example. There are problems with industrial fishing vessels such as damaging fishing gears and collisions. The cost of repair of nets is very high, which has a considerable impact on fish farmers. Such accidents should be prevented in order to protect artisanal fisheries.

2-4 Inland Water Fisheries and Aquaculture

Inland Water Fisheries

Rivers systems in Guinea can be divided into several groups: the Konkouré River and other river groups whose sources are in the highlands of Fouta Djalon of the Central Guinea Region, crossing the Guinea to the Atlantic Ocean; the Niger system of rivers whose source is the same highlands flowing from the Guinea Highland Region towards Mali; and rivers such as the Diani between the Guinea Forest and Guinea Highland Regions, passing through Sierra Leone and Liberia until it reaches the Atlantic Ocean. The overall length of the principal rivers is some 6,500 km, of which the Niger River runs for 2,500 km (FAO, 1997).

Currently, there is no statistics data available on the inland water fisheries of the entire country, and precise figures cannot be obtained. However, according to the FAO master plan (1997), in Guinea a total of 2,500 fishermen are engaged in fishing of which 80% or 2,000 are concentrated on the Niger River system in the Guinea Highland Region. Approximately half of the 2,000 fishermen are fulltime fishermen, and the rest spend half of their time farming. The annual production of fish by full time fishermen and parttime fishermen are therefore estimated to be 2,500t and 1,600t respectively, and the total is 4,350t.

Although it is impossible to estimate the allowable fishing volume of fishery resources of the principal rivers, if we apply the value 50 kg/ha for the flood plain of the central Niger River delta in the Republic of Mali to all of Guinea, taking into account a flood plain surface area of 100,000 ha (FAO, 1997) during the rainy season, we estimate 5,000t annually. If we compare this value with the above-mentioned production volume, since the utilization ratio of resources is slightly lower than 90%, a catch volume to maintain current conditions is considered appropriate.

All fulltime fishermen belong to a group of people called "*Somono*", "fisherermen" in the Malinké language. The Malinké are farmers traditionally, but the *Somonos* came from the Republic of Mali along the Niger River 100 to 200 years ago and settled in the Guinea Highland Region where they began to fish. *Somonos* use 6 to 10m long wooden boat (*pirogues*) to fish with gill nets, driftgill nets, surrounding nets, cast nets, long lines and traps. The peak fishing time is the dry season when river levels drop (January to June), while the poor fishing season is the season of high waters or floods (July to October). During the peak fishing time, *Somonos* leave their villages to fish, living at camping sites called campman on river beds. *Somonos* also travel up the river systems or go further into the Guinea Forest Region in search of fish. In July, at the beginning of the rainy season, fishermen leave their camps and return to the villages where they continue fishing, while those with arable land struggle through agriculture for local consumption. During the rainy season, the waters of rivers become turbid and it is difficult to fish using *pirogues* without engines or durable fishing gears.

If campsites are generally close to markets, fish catches are usually shipped fresh to market. However, for purchases by wholesale fish merchants, if weight exceeds transport capacity, or if campsites are very far, preserving is the only solution because there are no places to store fish on route to market. It is true that the inhabitants traditionally enjoy smoked fish; but fresh fish is usually of greater interest. However, the volume of fresh and smoked fish from rivers is not enough to satisfy the needs of the inhabitants, who are only satisfied by the sale of frozen

fish imported by COGIP and SONIT, and smoked *bonga*. Smoked *bongas* arrive from Kamsar and Joal in Senegal, two major sites of production. However, over the past few years, due to their low price Senegalese *bongas* have become more numerous. The following table shows the volume of distribution in the four prefectures of the Guinea Highland Region for the purpose of the current study, and the figure 2-1 shows the share of consumption of fishery products for the two prefectures, Kankan and Siguiri.

Table 2-8 Volume of Fishery Products Distribution by Form in 4 Prefectures in Guinea Highland Region

Prefecture name	Number of fulltime fishermen	Number of pirogues	Fresh water fresh fish	Fresh water smoked fish	Imported frozen fish	Smoked bongas	Total	Prefectural population	Consumption per capita
Kankan	219	145	51,375	43,575	1,060,800	318,240	1,473,990	262,547	5.6
Siguiri	288	149	189,958	96,560	352,300	300,030	938,848	271,594	3.5
Mandiana	168	70	2,427	1,059	1,710	3,800	8,996	170,881	0.1
Kouroussa	213	110	62,971			304,464	367,435	149,325	2.5
Total	888	474	306,731	141,194	1,414,810	926,534	2,789,269		

Unit: kg

Population data is based on the 1996 Census.

Source: Direction Nationale de la Pêche Continentale et de l’Aquaculture (Division of Inland Water Fisheries and Aquaculture), 1999

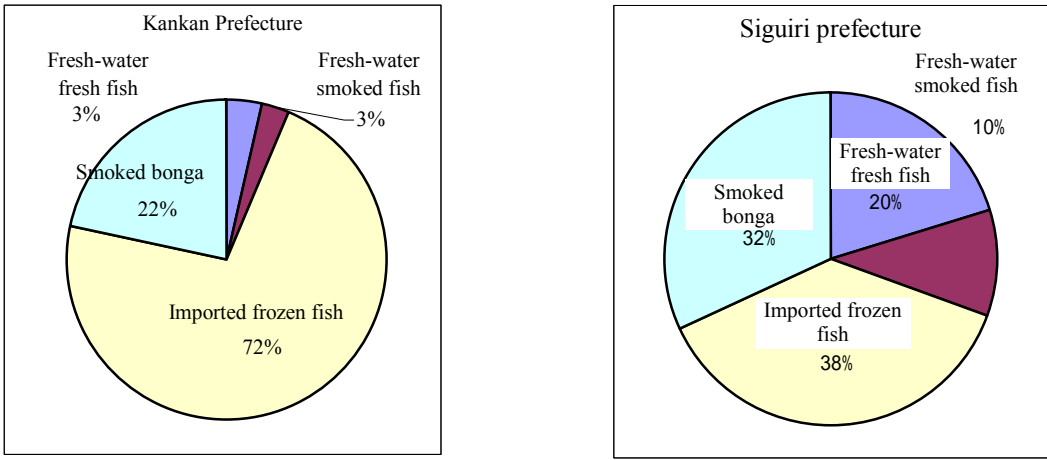


Figure 2-1 Ratio of Consumption of Fishery Products by Form

The annual consumption of fish products per capita is 5.6kg in the prefecture of Kankan and 3.5kg in Siguiri, which is considerably lower than the national average of 13kg. However, fish captured in ponds located throughout the flood plain called *mare* are not included in these figures.

Inland Water Aquaculture

The hot, wet climate and annual precipitation of 1,000 to 3,000mm in all areas of Guinea offers many possibilities for aquaculture across various types of geographical features. For example, aquaculture on the fertile rice plantations of the coastal delta region, shrimp culture

in the brackish waters of the mangroves, aquaculture using floating cages in the many natural and manmade lakes and ponds of the Fouta Djallon area, aquaculture in the ponds of the seasonally dry flood plain of the Niger River, aquaculture on the ponds and reservoirs of the wetlands of the Guinea Forest Region, lead us to say that, from a natural point of view, Guinea has great potential for the development of aquaculture.

The Aquaculture Department of the Inland Water Fisheries and Aquaculture at the Ministry of Fisheries and Aquaculture is responsible for the development of Guinean aquaculture. Since the department was just established, posts at the Marine Aquaculture Division have not yet been filled and is presently run by one director and three staff from the Inland Aquaculture Division, a practical example of the central government for an aquaculture development system. None of the staff are specialized in aquaculture as an applied science, and there is no educational institution with a curriculum on the practice of aquaculture. An effort is being made to strengthen the human resources of the organization. For example, two personnel have been dispatched to China to study aquaculture. However, the governmental functions of aquaculture development to support and direct the initiatives of private sector fish farmers have not yet been reinforced, so it is taking time for a blessed natural environment to connect with actual aquaculture production.

As for governmental aquaculture facilities and ponds have been built at Koba close to Conakry, and shrimp culture facilities and seed production plants on the island of Tamara were constructed with loan of \$25 million US. However, after the departure of French technicians operations became difficult, and currently a new assistant manager is being sought in order to ensure the maintenance of installations (<http://www.fis-net.com/guinea/koba.html>). Two governmental aquaculture facilities were built in the marsh area of Fouta Djallon in the late 1980s but have been abandoned or out of use due to a shortage of facilities and disruptions in construction.

Based on the fact that aquaculture facilities built by the government have not begun actual production, Guinea has adopted a policy of aquaculture development with a priority on extensive fresh water aquaculture in the Guinea Forest Region, limiting itself to areas and techniques and the diversified potential of aquaculture. The natural conditions of the Guinea Forest Region are appropriate for aquaculture. Since fish in this region is expensive due to the high cost of transportation for smoked and frozen fish considering its distance from the coast, the demand for fresh fish has become depressed. Conditions are suitable for aquaculture exploitation and tilapia aquaculture on private ponds with the aim of developing new markets. (Currently 82 aquaculture establishments have been confirmed in the Guinea Forest Region.) The government is promoting two French aid programs for the development of aquaculture in the said region. Since 1994, extensive aquaculture in the Guinea Forest Region continues in Diéké, the prefecture of Yomou in the eastern part of the country with the cooperation of the IRD (Institute de Recherche pour de Developpement: Institute of Research for Development). In addition, since December 1999 a pilot project to disseminate commercial aquaculture based in Nzérékoré in the Guinea Forest Region has been underway with the collaboration of the AFVP (Associations Française des Volontaires du Progres: Associations French of the Volunteers of Progress). However, the Ministry of Fisheries and Aquaculture, which still does not have an aquaculture center, assigned only one zone coordinator to a region covering six prefectures, an indication that the development of aquaculture has only just begun in the Guinea Forest Region.

CHAPTER 3

CURRENT STATE OF ARTISANAL FISHERIES

CHAPTER 3 CURRENT STATE OF ARTISANAL FISHERIES

3-1 Coastal Fisheries

3-1-1 Fishery Environment and Resources

The continental shelf of Guinea is the largest among the neighboring coastal countries stretching 87 miles south and reached 104 miles north along the coastal maritime region at a depth of less than 200m. Seventy percent (30,000km²) of its area of 43,000 km² is very shallow at less than 40m (Table 3-1). Due to its large area and shallowness, the swells and currents of the deep ocean are distorted creating many days of relative calmness in the coastal area. However, downpours accompanied by violent winds are frequent during the rainy season (June to November). The 300km east coastline is inundated with the mouths of many rivers and immense areas of mangroves. The maritime coastal area around Conakry and Cape Verga is made up of exposed rocky reefs. But elsewhere the coast is mainly comprised of shallow sandstone waters and a silt or sandy seabed. As the difference between low tide and high tide is more than 3m, the coming and going of fishing boats is limited during low tide.

Table 3-1 Depth and the Area of the Waters of Guinean EEZ

Depth (m)	0~10	10~20	20~40	40~100	100~200	Total
Area (km ²)	5339	6498	18134	10679	2267	42919
Percentage (%)	12	15	42	25	5	100

Source : Accès à l'espace et à la ressource: Compétitions et conflits entre la pêche artisanale et la pêche industrielle dans la ZEE guinéenne. Document Scientifique. Center National Des Sciences Halieutiques de Bousura. 2002 submitted.

In the coastal area, small pelagic species of bonga (*Ethmalosa fimbriata*) and bonga sardines (*Sardinella maderensis*), the principal targets of artisanal fisheries, are caught throughout the year and make up 65% to 67% of the total catch (47,000 with 50,000t). The principal demersal fish along coast are croaker (*Sciaenidae*), catfish (*Ariidae*), emperors (*Lethrinidae*), and sole (*Cynoglossidae*), etc. which live mainly at the mouths of the rivers and in areas of littoral deposits of 15 to 20m in depth. These are fished by artisanal and industrial fishermen (bottom trawling).

Sea bream (*Sapridae*) and the emperor (*Lutjanidae*) which live in sandy and rocky bottom at a depth of between 15 and 80m are fished near the center of the continental shelf. These resources, though not very abundant, are largely distributed beyond the areas of coastal demersal fish mentioned in the preceding paragraph. Few are caught by the trawlers and according to the statements of industrial fishing vessels, account for only 7% of their total catch. As for the dugouts of artisanal fishermen (with icing and angling), these sea bream species constitute a significant target catch and sale for export.

Cephalopodes and shrimps are only fished by the trawlers of industrial fisheries. According to the report from the industrial boats, they represent approximately 25% of the total catch, the principal target being the cuttlefish, which accounts for 19%. Squid and octopus account for

approximately 4% and 2% respectively. *Cephalopode* are captured at depths of between 20 and 40m along the coastal area, mainly in the northwestern region of the continental shelf. Shrimp caught along the coastal area are fished by trawlers, an annual production of approximately 1,000t.

An evaluation of the current utilization of principal fishery resources was made based on a recent study by Chavance and Diallo, researchers from the Boussoura National Center for Fisheries Sciences/ORSTOM in 1997. (Master Plan FAO, 1997)

- There is general tendency toward over fishing of demersal fish up to 20m of depth along the coast.
- *Cephalopode* and shrimp are well utilized within the capacity of resources.
- Utilization of demersal resources of the continental shelf at more than 20m of depth is weak, and there exists a potential for fisheries development for export-oriented fishery.
- The utilization factor of small pelagic species is weak, and development will prove to be interesting from the viewpoint of increased food production.

3-1-2 Fishing Equipment and Methods

(1) Fishing Vessels

Fishing vessels are manufactured by boat carpenters at principal landing sites. There are two types of boats: boats with a frame and external plates attached to a keel and a framework, and dugouts from tree trunks. The fishing vessels are classified into the categories listed below based on their structure and size. Of the total 2,700 boats, including 2,361 currently in operation (1998), the majority are *salans* and *gbankenysis* accounting for 60% and 33 % respectively.

- *Salan* : Boat with a frame from 6 to 12m in length, and 1 to 1.5m wide. Approximately 1,600 boats, accounting for 60% of all coastal fishing boats, bearing the main coastal fishing production, Motorization ratio = 60%
- *Flimbote* : Boat with a frame from 16 to 25m in length, and 2m wide. Large fishing vessel driven by 15 to 40 horsepower outboard motor; crew of 15 to 25. Almost exclusively fishing with a surrounding net (FT: *filet tournant*). Their number is small: 83 or 3% of the total. Motorization ratio = 100%
- *Gbankenyi* : Dugout made from a tree trunk 6m in length, but some reaching 12m; crew of 2 or 3. None are equipped with outboard motors; operated by a simple sail and paddle. Approximately 900 have been confirmed, accounting for 33% of the total.
- *Kourou* : Dugout made from a tree trunk which resembles a *gbankenysis* but smaller. Average length is 5m. Operated only with a paddle; 47 have been confirmed, accounting for 2% of the total.
- *Yoli* : Dugout adapted from the Senegalese dugout strengthened with boards on one side and a keel; 56 have been confirmed or 2% of the total.

(The above numbers are based on 1998 data of fishing vessels compiled by the Boussoura National Center for Fisheries Sciences.)

Distribution of these boats varies according to the prefecture. Conakry and the prefectures of Boffa and Boké make up 80% of total number of boats. Motorized *salans* are particularly common in Conakry.

(2) Motorization of Fishing Boats

Motorization of fishing vessels began in 1978 with the introduction of 300 outboard motors through a Canadian assistance program. In addition, since 1985 three Japanese projects for the motorization of fishing vessels have contributed to the progress of motorization, particular for *salans*. Current motorization ratio is more than 40%, with the total number of motorized boats being 1,050. However, this figure has remained the same in recent years, even a slight downward trend. Many of motorized boats currently in operation have been 4 to 5 years in service, so the considerable number of outboard motors is deemed to be not operated due to difficulty in provision of spare parts.

Table 3-2 Transition in Motorization Rate of Artisanal Fishing Boat over the Year

	Boke		Boffa		Dub/Coyah		Conakry		Forecariah		Nation wide	
	Number of boats	Motorization rate	Number of boats	Motorization rate	Number of boats	Motorization rate	Number of boats	Motorization rate	Number of boats	Motorization rate	Number of boats	Motorization rate
1997	390	36.15	671	31.74	160	16.25	901	62.82	239	46.44	2361	
1998	477	29.56	656	32.47	143	18.18	954	59.33	331	33.53	2561	41.27
1999	390	36.15	671	31.74	160	16.25	901	62.82	239	46.44	2361	44.77
2000	480	29.38	656	32.47	143	18.18	954	59.33	331	33.53	2564	41

Source : Annual Statistics Bulletin, Boussoura National Center for Fisheries Sciences

(3) Fishing Equipment and Methods

The principal fishing methods include the use of gill net, encircling gill net, surrounding net, long lines, angling, as indicated below.

Table 3-3 Major Fishing Methods and their Specifications

Fishing methods	French abbreviation	Local names	Target species	Mesh sizes (mm)	Net height (m)	Net length (m)
Drift net	FMD	Founfounyi	Bonga	60-70	6	400-600
Fixed gill net	FMC	Legotine	Demarsal fish	<200	3-6	600-1200
Fixed gill net	FMC	Kuta yele	Barracuda	100	6	600-1400
Fixed gill net	FMC	Sereki yele	Sharks	300-410	6	40-1000
Encircling gill net	FMEE	Gboya	Bonga	60	9	600-800
Encircling gill net	FMEO	Seki yele	Mullet, Demarsal fish	50	6	600
Encircling gill net	FME	Bonga yele	Bonga	60-70	6	800
Encircling gill net	FME	Fanty	Bonga	60-70	12	1400
Surrounding net	FT	Regae	Bonga, Bonga-seri	50	42	600-1000
Long line	PA	Dalban	Demarsal fish	1200 hooks		1000 - 2000

Source : Chavance P., Bangoura C., Damiano A. et A. Diallo (1994) La peche artisanal maritime guineenne en 1992. :Description. Types d'engins et types de peche

Fishermen using dugouts (*Gbankenyi* type) are flexible choosing their fishing gears such as long lines, or fixed gill nets. However, other fishing boats (larger than dugouts) are usually using particular fishing method. This undoubtedly shows that owners have neither the financial or materials means to acquire several fishing gear, and that ship owners and crew have less ability to conduct various fishing techniques. According to the Boussoura National Center for Fisheries Sciences (Fisheries Statistics Bulletin), the percentages by fishing method of 2,361 fishing vessels in operation in 1998 (= percentage of boats by fishing method) are as follows.

Fishing boats using drift gill nets for bonga (FMDE: operated by 2 or 3 people) are most numerous: 678boats. This corresponds to 30% of the total fishing boats in operation; however, approximately 90% of these dugouts are small without engines, thus catch by boat is lower. Some fishermen of bonga fishing use encircling gill nets (FME: operated by 3 to 10 people) and surrounding net (FT: operated by 15 to 25 people) with motorized boats. Even though they represent 6% and 2.7% of the total fishing boat respectively, their catch makes up 30% of the production of artisanal fishermen, due to the motorization and the large size of the nets compared to other artisanal fishing methods. Fishing boats using long lines account for 19% of the total number of boats. Boats using fixed gill nets accounting for 14%, those using encircling gill nets for croaker accounting for 13%, boats with angling accounting for 10%, and those using encircling gill net for mullet accounting for 6%.

A surrounding net (FT: *filet tournant*) in Guinea differs from that used in Ghana or Senegal; there is no net ring. Consequently, fishing is not accomplished by tightening the bottom of the net. Instead, in the coastal areas and at a depth of 15 to 30m, the net is placed on the seabed to encircle a shoal. It cannot be operated in sea areas with rocky bottoms. Generally speaking, the boats leave in the morning and return to port in the evening, returning in the course of one day, or they leave in the evening and return the following morning. At the landing sites where access is limited during low tides, the boats must wait until the tide begins to rise. Depending on the season, boats move to different landing sites following the fish and practice the same type of fishing.

Angling carried out off the islands of Los around Conakry mainly use boats without outboard motors. On the other hand, motorized boats are used mainly for catching fish for export, and are equipped with iceboxes to go out for 4 to 7 days at a time storing the catch in ice. Angling with icebox is currently practiced only in the Conakry area, in Kamsar and in the prefecture of Boké where supply of ice is available. Of the 230 boats practicing angling, 130 use iceboxes.

Long lines are used mainly by non-motorized boats, but as for angling with icebox, motorized dugouts in the Conakry area, Kamsar and in the prefecture of Boké practice long line with ice. Fishing trips usually last 4 to 5 days.

The following table shows the number of boats practicing various fishing methods, using motorized and non-motorized dugouts. The rate of motorization rate of encircling gill net for bonga surrounding net as well as fishing with ice is practically 100%, which shows that fishing with motorized boats is an effective with these fishing methods.

Table 3-4 Number of Fishing Vessels by Fishing Method

	Motorized vessels	Non-motorized vessels	Total (units)	Ratio of motorized vessels (%)
Fixed gill net	113	203	316	36
Refrigerator & fixed gill net	114	0	114	100
Drifting gill net for bonga	85	678	763	11
Round haul gill net for bonga	163	2	165	99
Round haul gill net for grey mullet	85	93	178	48
Round haul gill net for croaker	278	60	338	82
Purse seine	68	1	69	99
Angling	4	96	100	4
Refrigerator & angling	130	0	130	100
Basic trawl line	44	470	514	9
Refrigerator & basic trawl line	15	0	15	100
Total	1,099	1,603	2,702	41

Source: *Centre National des Sciences Halieutiques de Boussoura* (Boussoura National Center for Fisheries Sciences)

3-1-3 Distribution of Fishing Grounds and Fishing Season

According to existing documents from the Boussoura National Center for Fisheries Sciences and interviews with fishermen, artisanal fishing grounds by fishing methods are generally categorized as follows.

- Drift gill net for bonga : Many small non-motorized boats are used for this type of fishing, usually less than 10 miles of the coast.
- Encircling gill net for bonga : Most common fish sought along the coastal area; found mainly along coast at approximately 15 to 20m deep, up to 20 miles off the coast in the areas of Boffa and Boké.
- Surrounding net : Found mainly along the coast at approximately 15 to 30m deep, to 40 to 50 miles off the coast of Boffa and Boké.
- Angling : Nearly all boats on the islands of Los in Conakry practice this type of fishing
- Angling with ice : This fishing is carried out by fishermen in Conakry (Bonfi, Boulbinet) and near Kamsar and the prefecture of Boké; fishing area stretch 60 to 80 miles from the prefecture of Boké to the border of Guinea Bissau, and 30 to 40 miles from Conakry/Forécariah to Sierra Leone.
- Long line : Fishing carried out along the entire coastal region; the prefectures of Boké and Boffa have significant fishing grounds. Long line boats with iceboxes at Kamsar are fishing off the prefecture of Boké, and 40 to 60 miles from Kamsar.

Fishing season: The Guinean climate is divided into two seasons: the rainy season (between June and October) and the dry season (between November and May), and torrential rains often fall during the rainy season. In addition, winds often exceed 20 to 30m/s at this time, a dangerous situation for the small boats of artisanal fishermen. Furthermore, the period of August and September is the rice-planting season, and fishermen and part-time farmer-fishermen spend much of their time doing agricultural work. This is why the number of fishing trips during the rainy season is slightly lower than during the dry season.

Fishing for small pelagic and demersal fish is carried out throughout the year. However, catches of small pelagic fish decrease in July and August, during the middle of rainy season, then increase from September until December, a period of good fishing. The situation for demersal fish is not as apparent, but catches also decrease during the rainy season (between August and October).

3-1-4 Production

Fishery production in the last few years is estimated to be 47,000 to 50,000t, among which small pelagic fish, mainly bonga, account for approximately 65%. With an increase to promote motorization from the 1980s, fishery production rose from 20,000 to 30,000t in the 1980s to 50,000t in 1995. However, over the past few years this volume has stagnated, or even dropped.

Table 3-5 Recent Artisanal Fisheries Production

Unit (tons)

1997	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Accumulated Fishing days	31311	29001	29108	29759	25702	25301	23675	28133	29551	33481	28715	30035	343772
Catch per day per boat	0.132	0.162	0.155	0.124	0.169	0.132	0.127	0.090	0.139	0.137	0.153	0.174	0.141
Catch of Bonga	2252	3137	3122	1502	2807	1616	1042	1452	2841	3309	2935	3514	29529
Catch of Bobo	316	500	568	624	691	664	539	1043	853	258	282	302	6640
Total catch	4138	4688	4514	3684	4353	3352	3004	2530	4101	4580	4383	5217	48544

1998	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Accumulated Fishing days	27354	27023	27908	21242	24162	25696	22284	20748	27180	31886	32583	53921	341987
Catch per day per boat	0.137	0.126	0.131	0.112	0.120	0.133	0.126	0.115	0.130	0.151	0.178	0.153	0.138
Catch of Bonga	1742	1562	1724	1280	1071	2245	1315	1244	2479	3351	4297	5542	27852
Catch of Bobo	223	450	249	340	397	391	602	488	509	410	348	491	4898
Total catch	3736	3404	3654	2380	2889	3422	2798	2394	3539	4803	5801	8261	47081

1999	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Accumulated Fishing days	39023	32483	34392	26330	34893	34633							
Catch per day per boat	0.112	0.161	0.153	0.153	0.133	0.112							
Catch of Bonga	2751	3444	3349	2314	2621	2411							
Catch of Bobo	251	455	382	245	227	289	363	491	369	254	168	185	3679
Total catch	4387	5216	5253	4035	4644	3881	2800	2400	3500	4800	5800	8200	54916

2000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Accumulated Fishing days	27733	29608	30882	32441	32936	24852	25187	28343	31468	29036	33890	33417	359793
Catch per day per boat	0.192	0.200	0.161	0.170	0.174	0.162	0.141	0.155	0.180	0.134	0.161	0.154	0.166
Catch of Bonga	2236	3059	2256	2035	1991	1723	1558	2817	4146	2095	2543	2557	29016
Catch of Bobo	641	433	577	843	621	885	774	824	908	790	667	859	8822
Total catch	5319	5925	4984	5502	5730	4016	3549	4380	5679	3898	5447	5152	59581

Source: *Centre National des Sciences Halieutiques de Boussoura* (Boussoura National Center for Fisheries Sciences)

3-1-5 Fish Processing

Fishermen sell their catches to wholesale fish merchants at the landing sites. In addition to fresh fish, a large portion is smoked at the landing site allowing for preservation and distribution. Approximately 80 % of the landings mostly bonga are smoked.

Many women are actively involved in the purchasing and processing at landing sites (beaches), the content and range of their activities is distinguished as follows (CNSHB socio-economic study of coastal artisanal fisheries, 1996).

- Fish smokers: They work at the landing sites, purchase and smoke fish, and sell smoked fish in the same area. There are cases that smokers just smoke fish for wholesale fish merchants.
- Wholesale fish merchants: They purchase fresh fish or smoked fish around the landing site, carry it and sell it at the markets away from the landing site.

- Fish smokers/ merchants: Women who combine both the first two activities. They smoke the fish on the landing site, and sell it at regional markets and in the cities. There are also women who sell fresh fish as well as smoked fish.

Smoking is a practical processing and preserving method using local materials and used widely for a long time in Guinea as a good process for processing and distribution. Small pelagic fish such as bonga are placed in an oven for smoking and smoked whole; whereas, large fish like catfish are slit open from the head; for croakers, the guts and scales are removed before smoking.

Smoking can last a few hours to several days. Fish smoked for shorter hours is intended for immediate consumption, and sale is limited to coastal areas. Fish smoked for longer hours can be stored for longer periods, and is even shipped to the Guinea Highland and Guinea Forest Regions.

The simplest ovens for smoking are made of a metal rack that is placed on a mangrove wood base. The fish is spread out on the rack and smoking material is lit (local name: *bandaged*). This type of smoking is usually carried out in the coastal fishing communities. Since the circumference of this smoking type is not closed and smoke escapes to the outside of the wood base, smoking materials are not efficient. Metal cans for oil is also used for smoking, but smoking volume is low due to the small size. Closed ovens (improved *bandaged*) made out of concrete or locally manufactured blocks have been installed on landing sites at Boulbinet, Bonfi, Kamsar, and Taboriah, etc. arranged within the framework of a Project. There are some reports for improving the effectiveness of smoking materials and a request for improving ovens (*bandaged*).

Apart from smoking, sun drying of small fish and small shrimp is carried out, but on a very small scale. There is little salted-dry processing of croaker for exporting to Senegal.

3-1-6 Procurement of Fishing Gear and Equipment

The problem of many fishermen is the difficulty of purchasing outboard motors, parts, and fishing gear. Including products from neighboring countries, it is not necessary that gears and equipment are unavailable, but the price of gears and fishing gear, and in particular outboard motors, is too high and out of the price range of many fishermen. For fishermen who formerly benefited from the distribution of outboard motors and equipment at reduced prices with foreign assistance, the current selling prices are several times higher than at that time making this equipment out-of-reach. The majority of fishermen, without capital or possibility of mortgage, cannot obtain credit at existing financial institutions. Some fishermen purchase from Senegal or Sierra Leone neighbors through intermediary wholesale fish merchants etc, but for the majority the fishermen, adopting this method is financially difficult. With a view of the development of artisanal fisheries, the Guinean government has exempt outboard motors of less than 40 horsepower from import tax (10%) and of the value-added tax (VAT: 18%) in order to facilitate the procuring of outboard motors.

Under such conditions, the private sector to supply fishing gear and equipment are being developed. There are three companies that deal with fishing gear and equipment in Conakry, one of which has imported and sold nets and ropes produced in China since 1994. There are two firms that handle outboard motors, one of which began importing products to Conakry

last year (September 1999). There are also inventories of spare parts for repair. But sale is based on a cash payment basis, so these products are inaccessible for the majority fishermen. The principal purchases are limited to owners of large ships and wholesale fish merchants. A system of credit available to more fishermen is wanted in assisting the provision of fishing gear.

3-1-7 Maritime Safety Measures

(1) Current State of Maritime Safety

One of the greatest concern of artisanal fishermen is accidents at sea, which has been a major problem always pointed out by an interview survey and project cycle management (PCM). Accidents at sea are roughly divided into three types: natural disaster due to bad weather, an accident due to his own responsibility such as a breakdown of outboard motor, overloading the boat, or navigational error, and an accident as a victim, for example, a collision with an industrial fishing vessel, and destruction of nets. Accidents are classified into shipwrecks, collisions, drifting, damage from fishing gear, and fire. Accidents involving trawlers are considered common.

Accident statistics of 1999 according to the Ports Management report 12 accidents at sea and 22 cases of conflict between artisanal fishermen and trawlers. Reasons for conflict include the illegal fishing of trawlers within a closed area, destruction of fishing machinery and nets by trawlers, collisions as a cause of inaccurate timing, and navigation error. According to a report by the Boussoura National Center for Fisheries Sciences, there were 230 accidents at 9 major landing sites (Kamusar, Koukoudé, Taboliah, Doema, Bonfi, Caporo, Conimodia, Makatang, and Kuni) between 1992 and 2000. Most of the accidents occurred during night (73%) and during August to October. The number of the accidents peaked in 1999 and started to decline since then. Majority of the accidents (63%) were damage to fishing gear, followed by the loss of the fishing gear (34%), damage to the boats (2%) and injury of the crew (1%). The amount of economic damage caused by the loss and damage of the fishing gear often exceed 1 million FG, that caused severe set back for artisanal fishermen. Only 4% of the accident was settled and compensated (see Table 3-6).

Table 3-6 Economic Losses of the Artisanal Fishermen
by Accident Caused by Industrial Boats

(Unit FG)

Fishing gear	Loss of fishing gear			Damage of fishing gear		
	Amount of damage (range)	Amount of damage (average)	Sample number	Amount of damage (range)	Amount of damage (average)	Sample number
Encircling gill net	200,000~5,900,000	2,422,500	7	700,000~2,000,000	885,976	21
Fixed gill net	200,000~7,000,000	1,089,031	16	80,000~3,600,000	647,720	41
Drift gill net	350,000~1,700,000	1,008,333	6	50,000~996,000	430,732	28
Long line	150,000~4,500,000	919,605	38	100,000~3,500,000	884,621	38

Source : Accès à l'espace et à la ressource: Compétitions et conflits entre la pêche artisanale et la pêche industrielle dans la ZEE guinéenne. Document Scientifique. Center National Des Sciences Haliéutiques de Bousura. 2002 submitted.

Accident data recorded at 14 landing ports near Conakry and in the prefecture of Boffa during a study implemented between 1992 and 1994 lists 75 accidents and 38 deaths within the 3 years indicated.

Table 3-7 Statistics on Accidents at Sea by Principal Landing Sites between 1992 and 1994

Landing dock	Ship-wreck	Collision	Drift	Damage to fishing gear	Fire	Total deaths	Total injuries	Number of accidents
Boussoura	3	2	-	-	2	2	-	7
Boulbinet	5	2	-	-	5	8	3	12
Bonfi	3	1	2	-	-	3	1	6
Benti	1	-	-	-	-	10	-	1
Bongolon	2	1	-	12	-	2	3	15
Coléah	2	-	1	-	-	-	1	3
Dabondi	2	1	1	-	-	-	-	4
Dubréka	1	-	-	-	-	1	-	1
Dixinn	1	1	-	-	-	3	1	2
Sabane-goré	4	-	-	-	-	-	2	4
Koukoudé	6	-	1	7	-	5	-	14
Dondeyre	-	-	-	1	-	2	-	1
Matakan	-	-	-	1	-	2	-	1
Tounyitilidi	2	-	-	2	-	-	-	4
Total	32	8	5	23	7	38	11	75

Source: *Centre National des Sciences Halieutiques de Boussoura* (Boussoura National Center for Fisheries Sciences)

This study was carried out within the framework of the *Projet de Développement Général de la Pêche en Afrique Occidentale* (Project of General Fisheries Development in Western Africa) (1991 to 1995), and during this project, awareness towards safety with respect to the leaders of fishing communities (ship owners, captains etc), the creation of posters to promote better awareness towards safety, the introduction of compass and life jacket, testing of improved boats, the installation of small light houses and supply of life jackets, etc. were carried out as a pilot project. The Maritime Disaster Safety Committee (CVS: *Comités de Vigilance de la Sécurité en Mer*) was also established in order to strengthen safety measures. The CVS have publicly discussed accidents at sea, provided counseling to fishermen concerning time, assured light house maintenance, and created rescue squads, etc.

(2) Problems in Maritime Safety

As for one problem, organizations that report accidents at sea and receive complaints are not unified, which makes respond measures very difficult. Prefectural bureau of the Ministry of Fisheries, prefectural bureau of the National Monitoring Center, and prefectural bureau of the Maritime Transport Management are the principal organizations to be informed. However, the accident and illegal fishing activity reports are not disseminated. Moreover, it is difficult to confirm the identity of vessels responsible, especially when an accident occurs at night, and measures taken after an accident do not always satisfy the situation. Two organizations, the National Monitoring Center and Ports Management Bureau deal with rescue activities at sea and monitoring; however, the

first organization has only small boats and rubber boats to control illegal fishing, and the latter one does not have any boats. For this reason, the navy or private vessels are sometimes requested to assist with rescues, which often take time to initiate. Situations in which artisanal fishermen have no means of reporting accidents often lead to fatalities.

3-1-8 Education and Training for Artisanal Fishermen

(1) Current State of Education and Training for Artisanal Fishermen

The Ministry of Fisheries and Aquaculture in Guinea became independent of the Ministry for Agriculture and Animal husbandry in 1995. It has an overall staff of about 700, and most of their specialties involve the study of agriculture and stockbreeding at the university level. These personnel have opportunities to receive various short-term technical training courses thanks to foreign technical cooperation, Japan included. Some have also studied abroad, obtained fisheries-related degrees, and therefore have ample knowledge of the fisheries. However, one will be able to say that there is no one in general staff who experienced fisheries, apart from those that were on boats as an observer, and their experience in the field is extremely limited. .

Concerning the fishing gear and fishing methods used by Guinean artisanal fishermen, bonga fishing is most developed and the skills in encircling gill net and surrounding gill net operation is well advanced. Many are experienced in constructing and repairing of fishing nets, judging by some of the activities observed on the beaches.

Training courses for artisanal fishermen have been provided up to now on a single shot basis through the projects of international assistance organizations; but a permanent training program for artisanal and technical fishermen does not exist.

(2) Problems with Education and Training for Artisanal Fisheries

Although fishermen have sufficient fishing experience using some nets and angling, little development has taken place in fishing techniques for future generations. For example, shrimp fishing using gill nets, fishing for crustaceans with traps, fishing octopus with traps, and fishing for cuttlefish are still unknown, and no studies on the development of the artisanal resources have been made.

Most of the processing of fishery products in Guinea is smoking. But traditional smoking requires a lot of wood and there is always a risk of fire. Improved ovens, of which the effectiveness of wood combustion was proven through studies of FAO, etc., have been developed. However, diffusion is limited because they require construction cost and are not suitable for processing bonga. Other processing techniques such as fish paste products are promising, but the human resources for development and diffusion are non-existent.

The *Centre de Formation Professionnelle Maritime* (Center for Maritime Vocational Training), founded in Guinea in 1966, established three professional courses: navigator of a fishing vessel, mechanic, and ship carpenter over 3 years after regular studies. Teaching consists of practical study with the aim of training crews for industrial fishing vessels; but the majority of students who leave the center are unable to work in the fisheries; this means the center is not fulfilling its original objectives.

3-2 Inland Water Fisheries

(1) Natural Environment

Four prefectures in the Guinea Highland Region (Kankan, Siguiri, Mandiana and Kouroussa) and four in the Guinea Forest Region (Nzérékoré, Macenta, Guékédou and Kissidougou) belong to the climatic areas of savanna and tropical forest respectively. Annual precipitation in two cities representative of these areas, Kankan and Nzérékoré, is 1,353mm and 1,793mm (ten-year average between 1986 and 1995), which is slightly higher than the 1,405mm for Tokyo (30-year average between 1961 and 1990). In the Guinea Forest Region, precipitation is relatively uniform 9 to 10 months of the year. Whereas in the Guinea Highlands rainfall is concentrated between 3 to 4 months of the year with practically no rain falling outside this period, which shows a clear differentiation between seasons.

The interior of Guinea is often referred to as the "water tower of Western Africa" because it is the source of Africa's third largest river, the Niger. At an overall length of 4,200km, the Niger River begins in the Fouta Djallon highlands, and as it flows it picks up water and runoff from various prefectures in the Guinea Highland, passing by the Republic of Mali, the Republic of Niger and into the Atlantic Ocean in Rivah province in the Republic of Nigeria. Within Guinean territory, in addition to the Niger and its runoff, other principal rivers that cross the prefectures of the Guinea Highland include the Milo, Tinkisso, Niandan, and the Sankarani. The following table shows the length and basin area of these principal rivers.

Table 3-8 Length and Basin Area of Principal Rivers

Name of river	River length(km)	Basin area(km ²)
Niger	570	18,600
Milo	335	13,500
Tinkisso	395	19,800
Niandan	285	12,700
Sankarani	720	35,500

Source: - *Monographie hydrologique du fleuve Niger*, ORSTOM, Paris, 1986
- *Mission d'évaluation de la pêche continentale et de l'aquaculture*, FAO, Rome, 1993

After a steep drop at its source, the Niger River flattens out at the town of Kouroussa in the prefecture of Kouroussa, and then takes on a slope of 10 - 12 cm/km. It continues at this slope through most of Siguiri prefecture and passes the Republic of Mali. The Niandan, Milo, and Tinkisso rivers in order join the main stream (refer to Figure 3-1). The slope of the runoff gradually leveling off at 6cm/km, the river begins to meander extensively. The Sankarani River, the final runoff, joins the Niger below the Sélingué Dam in the Republic of Mali. These rivers have elevated banks of 5 to 6m and green belts that protect the banks against erosion.

In the Guinea Forest Region, the prefecture of Kissidougou is the only prefecture affected by the Niger. Other prefectures fall within the influence of smaller rivers like the Oulé, Diani, Boya, Ouao and Mafissia, which flow to the Atlantic Ocean after crossed the Republic of Sierra Leone or the Republic of Liberia (Figure 3-2).

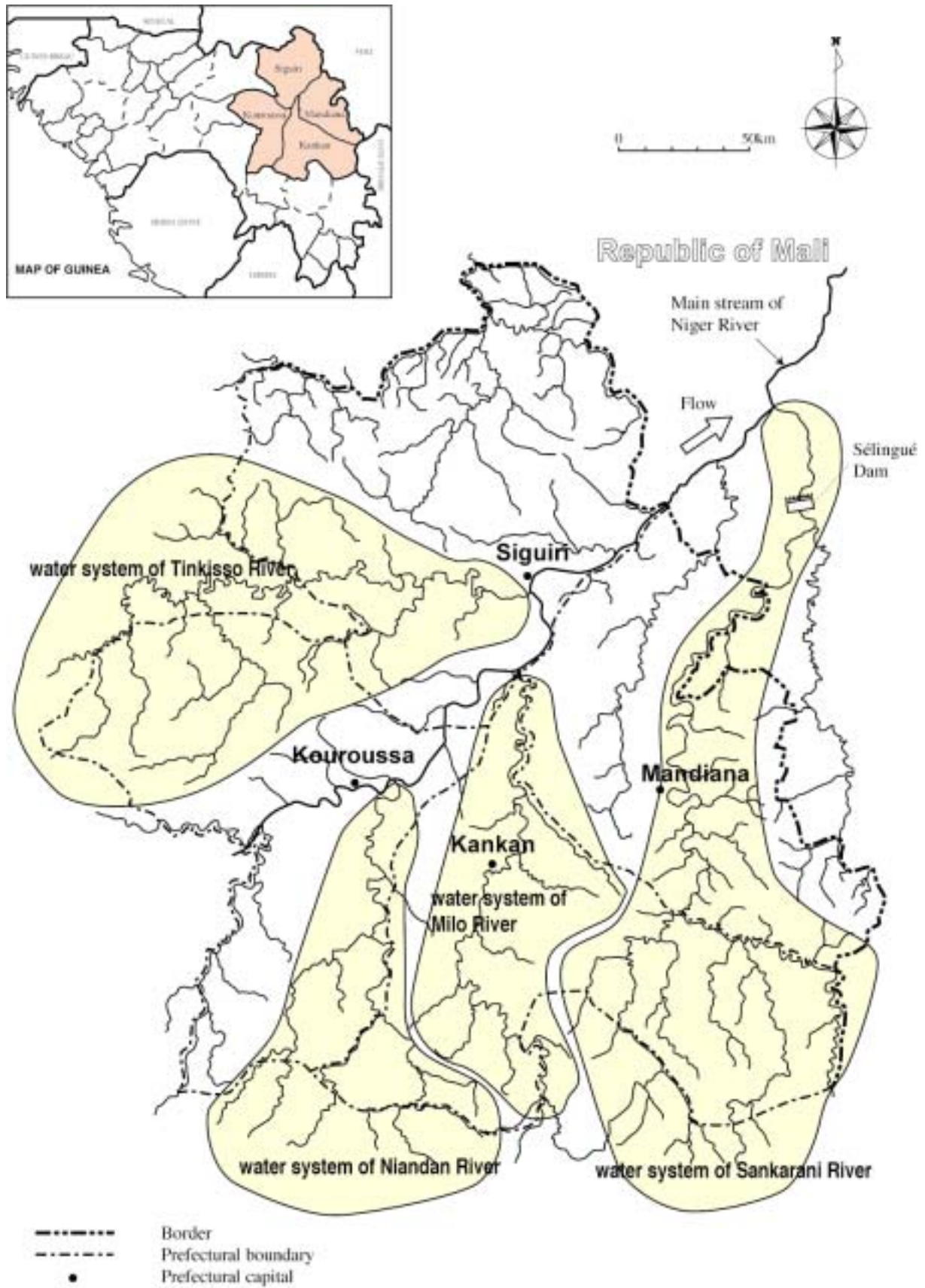


Figure 3-1 Niger River System in Guinea Highland Region

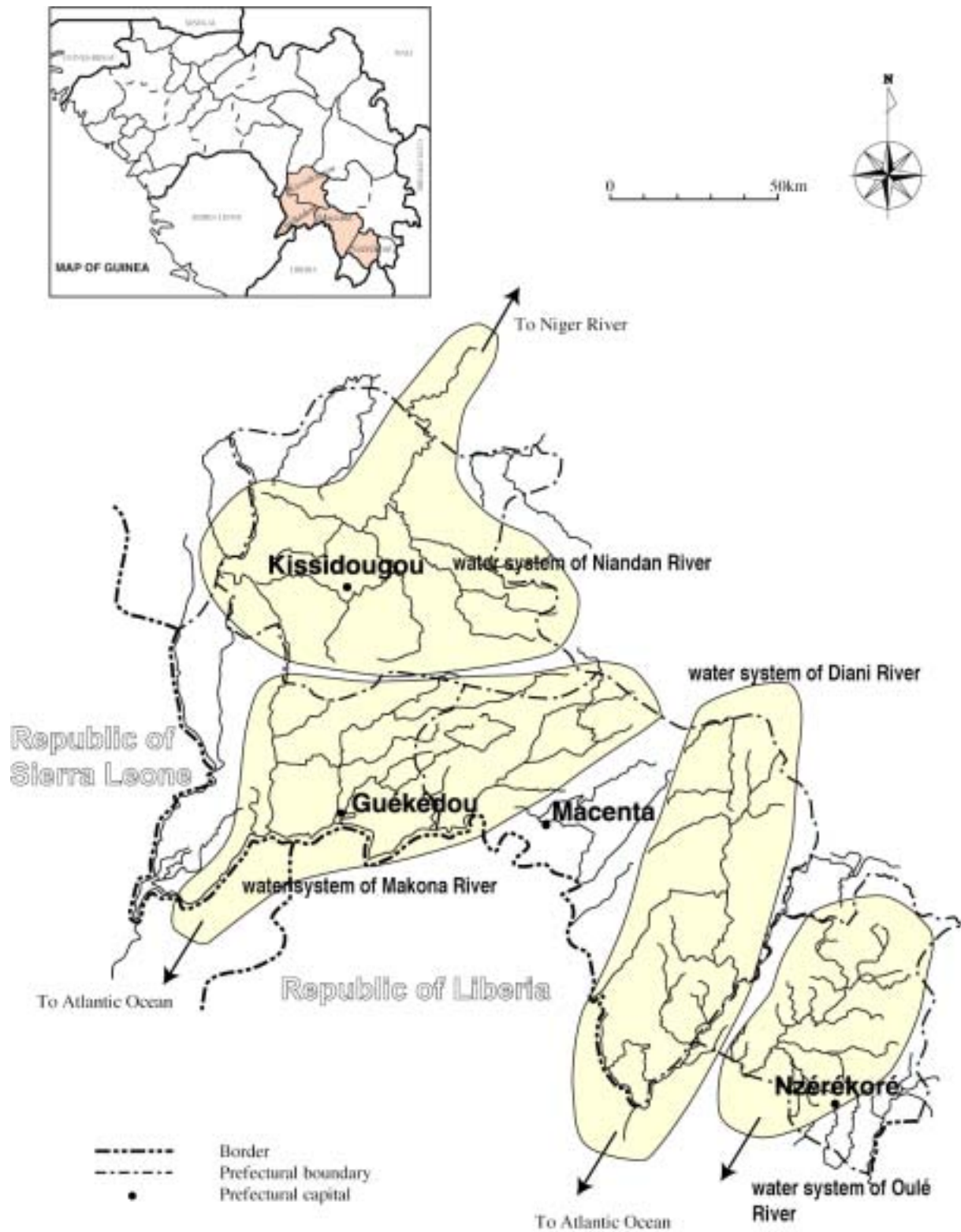


Figure 3-2 Principal River Systems in Guinea Forest Region

The water level of rivers which affect the Guinea Highland Region and the Guinea Forest Region vary considerably between the rainy and dry seasons. The monthly variation of the Milo and Diani rivers representing in these two areas are shown in the Figure 3-3. The difference in levels between the rainy and dry seasons is approximately 2m for the Diani River because rains fall uniformly all year-round and the river's length is short. On the other hand, the difference in water level of the Milo River in the Guinea Highland Region between the rainy and dry seasons is almost 6m because annual precipitation is clearly different and the river is long. Rivers of the Guinea Highland Region, the water levels of which exceed 6m from the riverbed, overflow their banks and replenish the plains by flooding the backcountry. The maximum width of the flood plain of 2km is reached and the surface area of the flood plain in the Guinea Highland Region reaches 100,000 ha (FAO, 1997). On the other hand, in the Guinea Forest Region, flood plain formation is rare.

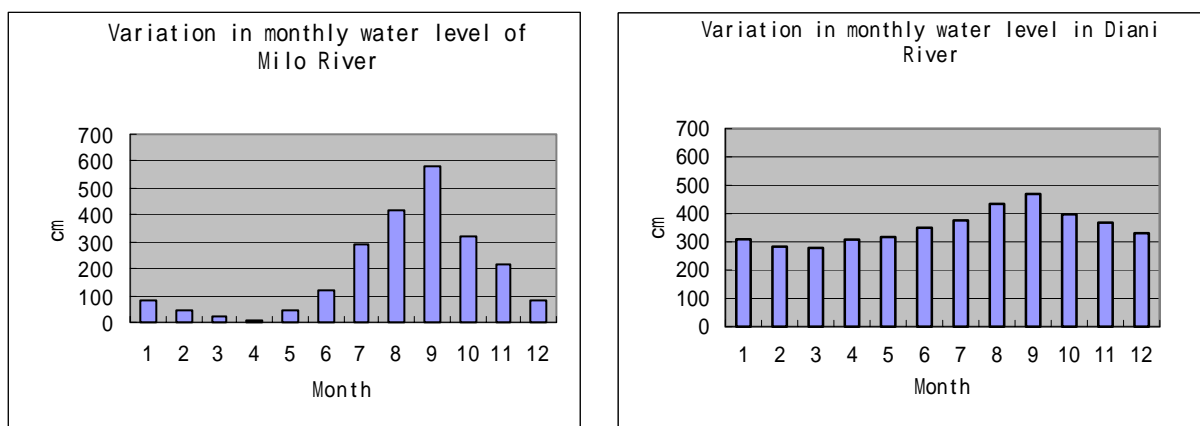


Figure 3-3 Variations in Water Level of Milo and Diani Rivers

The flood plain is essential, not only because it transforms the earth into arable land, but also provides an environment for the reproduction of aquatic animals. In the Central Niger River Delta at Mopti in the Republic of Mali, the flood plain is one of the most productive at 50kg annual/ha (Welcome, 1979). Assuming similar productivity on the flood plain of the Guinea Highland Region, potential production for this area is estimated to be 5,000t annually. At the end of the rainy season, once the waters have subsided, pools or ponds (called *mares*) are left behind where there are depressions in the earth. Some ponds are permanent and others dry up during the dry season, but in all cases, they retain fish that were unable to return the rivers, providing for impromptu fishermen such as women and children who enjoy fishing. According to annual reports by the management of each prefecture, four prefectures in the Guinea Highland Region have a total of 151 ponds (*mares*), including permanent and ponds that dry up during dry season.

(2) Fishermen

Traditional fishermen called "*Somonos*" live in the Guinea Highland Region. *Somono* means "fishermen" in the Malinké language, or "full time fishermen". Ethnic Malinké live in a vast area extending from the Guinea Highland Region to the Republic of Mali. A name "*Somono Bambara*" similar to Guinea *Somono* can be found in Mali, and among Malian fishermen, in addition to *Somono Bambara*, another non-Malinké ethnic group of fishermen called "*Bozo*" also exists. Within Guinean territory, *Somono* live in a broad

area centered in the prefecture of Siguiiri in the Guinea Highland Region and part of the Guinea Forest Region. However, *Bozos* live only in an area of the Sankarani River bordering Mali and reservoirs near the Sélingué River.

For the indigenous peoples of the Guinea Forest Region who have no fishing tradition, fishing in the rivers has been practically non-existent. The *Somono*, who have grown in numbers overpopulating the Guinea Highland Region, migrate seasonally to the Guinea Forest Region to fish, which is a significant feature of inland water fishery in Guinea. The seasonal period of migration runs from January to June, a period during which the water level drops and it is possible to camp on the riverbanks. Women and children also accompany fishermen during the migration. With the rainy season comes a rise in river levels, and so fishermen return to their villages where they continue to fish in the rivers and flood plains higher up, or practice agriculture. Migration varies slightly according to prefecture'. An on-the-spot study has revealed that fishermen from Siguiiri prefecture were the most mobile, and moved as far as the Tinkisso River, which has a higher rate of exchange than the Niandan River, smaller rivers apart from those of the Niger system in the Guinea Forest Region. Fishermen in Kankan prefecture also fish extensively in the Milo River, but limit themselves to the Milo River; whereas fishermen from the village of Diélibakoro who utilize the Niger also move to the Guinea Forest Region. In addition, fishermen of Mandiana prefecture along the Sankarani River and people from Kouroussa prefecture on the Niger River only move upstream on these rivers and do not exceed their hydrological systems. Some fishermen camp on the river plain at a distance allowing delivery of daily newspapers, and campsites during the fishing season are considered not only to be financially motivated, but also traditional. In the event of displacing over the river system, the fishermen leave by taxi temporarily until a place is provided carrying with them only kitchen utensils and fishing gear, and often are provided with wood to build a boat. At the end of the fishing season, they entrust their boats (*pirogues*) to local villagers and go home to their villages, returning once again the following fishing season.

Statistically speaking, *Somonos* are classified as fishing professions; but in reality, the majority of them practice agriculture for family consumption. Fishing alone does not prove enough income for the fishermen, so they grow just enough to ensure family subsistence. *Somonos* fishermen subject to the study have on average 2 to 3ha of agricultural land. They are not the owners; they rent the land from Malinkés and local villagers, playing an important role in agricultural guidance. Consequently, arable land cannot be guaranteed in areas where Malinkés do not have sufficient ground or where the relationship with the Malinkés is not good. In Kouroussa prefecture, one of the 4 prefectures of the Guinea Highland Region, *Somonos* fishermen were unable to rent enough land from the Malinkés. Furthermore, it is obvious that Malinkés farmers have begun to practice fishing themselves. In Kouroussa prefecture, Malinkés are gradually acquiring boats and fishing gear while maintaining a stable source of investment - their agricultural income - and their fishing practices have surprised even *Somonos* fishermen. Consequently, the cumulative tendency towards agriculture by *Somonos* fishermen and the cumulative tendency towards fishing by Malinkés farmers are evolving simultaneously, thus the definition of *Somono* is becoming more ambiguous. Apart from agriculture, increasing activities by the *Somonos* fishermen as the part-time form, gold mining (Mandiana prefecture), stream silt removal, which are temporary sources of income invaluable towards supplementing low-income fishing.

(3) Fishing Equipment and Methods

Wooden boats (*pirogues*) are used for river fishing. Their average size varies depending on the environment in which they are used, but in the Guinea Forest Region where the rivers are narrow they are approximately 6m in length; on the broad Niger River 6 to 8m boats are used, and on the Sélingué Dam of the Sankarani River, 8 to 10m. When the water is calm, dugouts (*pirogues*) with a simple structure and no keel or frame are used. Dugouts (*pirogues*) 6m in length have double rounded cone-shaped ends, are 0.8 m wide and 0.2m deep, and are made from hard redwood (local name is *bois rouge*). On average they last for 3 to 5 years. The cost to manufacture a dugout (*pirogue*) on average is of 5,000FG in the Guinea Forest Region where wood materials are relatively easy to obtain. However, in the Guinea Highland Region where materials are more difficult to obtain the average price is 15,000FG. According to state law, authorization from the *Ministere des Eaux et Forêts* (Ministry of National Forestry) is necessary in order to cut down trees of a certain size in The Guinea Highland Region for the production of boards. Dugouts (*pirogues*) are seldom motorized and are operated only by pole and paddle. Depending on the area and fishing method, two fishermen operate a dugout, one at the front and one at the back.

The principal fishing methods include the use of gill nets, drift gill nets, surrounding net, cast net, long lines and traps. The following table shows the specifications, utilizing method and applicable fish by each fishing method.

Table 3-9 Details on Principal Fishing Methods

Fishing method	Gear specifications	Utilizing method	Target fish
Gill net	Nylon monofilament : 0.20 to 0.30mm Nylon multifilament : 210d/2 to 6 Mesh size : 50mm to 100mm Length : 20 to 30m (Guinea Forest) 50 to 100m (Guinea Highland)	With low waters, placement transversely, and in high waters, balances some on flow along the bank. In general, placement the evening and withdrawal the morning.	Benthic fish such as catfish
Drift gill net	Characteristics and dimension of the net identical to those of the gill net. Difference is the presence or not of leads.	Derives on 500m with 1km on flow from river. Operations practically only harms, but sometimes the day.	Mid-water fish such as tilapia and labeo
Surrounding net	Nylon multifilament : 210d /12 to 60 Mesh size : 50mm to 100mm Length : 50 to 200m (according to the width of river)	According to the size of the net, the net is drawn to 5 people if it is small, to 10 if it is large. If the dugouts are small, two dugouts are used for the collection of fish.	Mainly for high-grade fish such as Nile tilapia.
Cast net	Cone-shaped fishing gear of nylon multifilament Length : approximately 5m	Regardless of day and night, operations are carried out. Operations are often conducted while waiting for gill nets.	Surface and mid-water fish in general
Long line	Trawl line principal Line multifilament : 20 to 100m Secondary line multifilament : 0.5m Line interval : 1m	Same as gill nets, small fish are used for bait.	Benthic fish such as catfish.
Trap	Half-sphere bow net approximately 50cm in diameter obtained by attaching net on a framework made from a climbing plant. 2 to 3 10cm openings.	Left in water permanently, check and put bait once a day. The food is residues of cereal cooked and put in ball. (Sélingué Dam)	Mid-water vegetarian fish in general.

Nets do not come from Conakry and are almost entirely imported from the capital of the Republic of Mali, Bamako, because the distance is closer than Conakry and there are no 100 X 400 yard for nets as standard specifications for inland fisheries. Floats and sinkers are often subsidized by every-day goods. For example, stones, balls made from melted battery terminals, and bicycle wheel axles are used for sinkers. There are two types of nets, nylon monofilament and nylon multifilament. The monotype net is effective for fishing but are expensive and not very durable. The unit prices of multifilament of 210d/2 and monofilament of 0.20mm in Kankan are 100,000FG and 180,000FG respectively. There are three stores that sell fishing gear in the town of Kankan, and 7 merchants (without shops) in Siguiri prefecture, one in Kankan and one in Kouroussa. Taxis and motor bikes are used to make purchases in Bamako, and a return Kankan-Bamako ticket by taxi is 50,000MF, which is not cheap. Since taxes (decree D/97/205/PRG/SGG) are imposed on fishing gear by Customs of the national boundaries, which reflect on the price.

(4) Fisheries Administration

The Inland Water Fisheries Department of the Inland Water Fisheries and Aquaculture Bureau, Ministry of Fisheries and Aquaculture is responsible for inland water fisheries administration. Apart from its seat in Conakry, it has local offices in the six prefectures of the Guinea Highland Region (Kankan, Siguiri, Mandiana, Kouroussa, Dabola and Faranah) and 3 prefectures of the Guinea Forest Region (Nzérékoré, Guékédou and Kissidougou). The local offices of each prefecture collect catch and distribution data, collect fishing license fees, and give instructions to fishermen. However, due to miss-management and lack of personnel, it is insufficient. The administration of the relevant sector is carried out in accordance with the Inland Water Fisheries Law (Law L/96/007/AN).

Collection and analysis of data, which are indicated in detail in an annual report, are important activities of local offices of each prefecture. However the methods of collection and analysis of data are not carried out in accordance with common rules, so the data from each prefecture cannot be directly compared. For example, in the prefecture of Kankan, the total volume of catches of the entire prefecture is obtained by multiplying the number of fishing gear into CPUE (Catch per Unit Effort) by each major fishing gear accumulated for a long period of time. In the prefecture of Mandiana, the director of the local office simply adds the data randomly collected from village fishermen or markets, and does not determine an estimate through deductive reasoning. For this reason, it is undeniable that statistical figures on the whole tend to be under evaluated. In addition, in Siguiri prefecture, 10 fishermen who are able to read and write were selected for each of the three largest rivers crossing the prefecture and asked to record their catches. The monthly average of these 30 fishermen from the three rivers was obtained, calculated, and multiplied by the total number of inland water fishermen in the prefecture in order to obtain the catch for the inland water fisheries.

A system of fishing license was enforced from 1998; and Guinean pay 10,000FG annually per boat (*pirogue*) to the prefectural office; while foreigners pay 15,000FG. Distribution and the utilization of fishing license fees are defined by the prefecture. For example, in the case of Kankan prefecture, in accordance with the decree 011/PKK/99, 25% is used by the Rural Development Committee (*Comité Rural de Développement*:

CRD), 35% by the prefecture, and the remaining of 40% by the Ministry of Fisheries and Aquaculture.

Fishermen's associations (*Groupement*) have been formed in many fishing communities under instructions of the Ministry of Fisheries and Aquaculture, so that administration of the fisheries has indeed penetrated to the grass-roots level. In some groups, concrete activities such as purchases of fishing gear to be shared by fishermen were carried out, but the majority of groups exist only in name with no proper aim or goal.

(5) Project

As the development of artisanal fisheries in Guinea up to now has concentrated on the coastal area, there are few projects for the development of inland water fisheries. Here are some projects carried out to date and currently underway.

(i) River Fishery Promotion Project (Projet Micro-réalisation de pêche fluviale)

This project was carried out between 1988 and April 1993 with financing from the European Development Fund. The project included Phase I (between 1988 and 1992) during which fishing gear were provided to 500 fishermen through 19 fishermen's associations, and Phase II (between 1990 and 1993) activities for the diffusion of improved smoking techniques, for example, the use of 30 *Chokor*-type ovens, experimentation with portable ovens for non-sedentary fishermen, and the construction of two warehouses for fish smoking (villages of Niani and Kyinieroba in the prefecture of Mandiana), and Phase III (between 1992 and 1993) for pilot use of micro credit for wholesale fish merchants and women fish smokers.

(ii) Small-scale Fishery Promotion Project

This project was carried out by the Japanese government in 1984, 1990 and 1996, for the construction of facilities and provision of materials and equipment to support motorization in the coastal area. However, within the framework of the third project, a vehicle and a set of tools for engine repair and maintenance were provided to the Kankan prefectural management office.

(iii) National Park Project for the Upper Niger River

An area including the prefectures of Kouroussa and Faranah in the Upper Niger River was designated as a national park, and the management of fish resources and harmonization with the natural environment was put into practice by limiting the total number of fishermen in operation, fishing equipment and methods, fishing grounds and fishing periods in the park. This project, which began in 1996 through the financing of the European Development Fund, has not only monitored by setting up rules, but also carried out the sale of low-priced fishing gear for a total amount equivalent to 7 million FG to the fishermen of these prefectures. Currently, Phase I of the project has been completed, and Phase II (agreement on financing already reached) will start soon.

3-3 Inland Water Aquaculture

Inland water aquaculture is relatively new in Guinea. A center for aquaculture was built near Mamou during the colonial times, but was abandoned due to urban sewerage water influxes into the river source resulting from the urban development at Mamou. A new substitute center of aquaculture was set up near Mamou within the framework of *Project for the Development of Artisan Fisheries in Guinea (Projet de Développement de la Pêche Artisanale en Guinée: ODEPAG)*, but is not fully functioning. In this context, during a surge of refugees from Sierra Leone and Liberia, development of aquaculture in the Guinea Forest Region finally began to attract attention from the viewpoint of obtaining food security in recent years.

As for aquaculture practiced in the Guinea Forest Region, two types can be viewed: "individual aquaculture enterprises" which is semi-intensive clearly aimed at fish shipping to urban markets, and "extensive aquaculture through using farm pond for sale, but where a portion is intended for family consumption by producers. The former utilizes several small ponds (*éang*: 100 to 500m² each, for total of approximately 1,000m² per enterprise). Each pond is used effectively by thoroughly managing activities, which allows production of 4 to 5 t/ha. Feeding and fertilization take place periodically, and through a pond rotation method, harvesting is accomplished over a relatively short period of 3 to 6 months. Many employers conduct animal husbandry in the towns or neighborhoods in a semi-commercial way in parallel with the aquaculture. On the other hand, the later one is carried out in more rural areas and typically operated by typical group communities. Ponds (*Barrange*) are large from 1,000 to 5,000m² and the number of ponds is normally only one in one area. The dike of pond is 5 to 10m wide and a basic height of 1 to 2m, and concrete valves are installed for the drainage of water. Feeding and fertilizing are not carried out periodically as frequently as individual aquaculture enterprises, and quantities are limited.

Both types of aquaculture are carried out in "*Bas-fond*" (hollows) ponds which utilize wetlands (Figure 3-4) serving as a source for valley-forming rivers. Since the *Bas-fond* (follows) becomes fertile after drainage of the wetlands, it is a natural relief in which significant investment have been made, such as sites for agricultural development, in relation to restructuring carried out under the leadership of the World Bank /IMF since the 1980s. Until now, information on approximately 6,000 existing *Bas-fond* (follows) in the Guinea Forest Region has been collected, of which half - approximately 3,000 - of a total surface of 3,300 ha are the subject to agricultural development based on the assistance of international organizations or bilateral assistance (Table 3-10). Through irrigation, these lands are often used for rice cultivation, and many ponds owned by individual aquaculture firms are located in some rice plantation areas after improving *Bas-fond* (follows). Many ponds for aquaculture are often constructed by damming up the exit of *Bas-fond* (follows). The sources of water for the *Bas-fond* (follows) do not dry up throughout the year, and there is no flooding because the area of water collection is narrow and that there is no channel of flow, which constitutes a hydraulic environment adaptable to aquaculture. The Guinea Forest Region has countless number of *Bas-fond* (follows) (example: approximately 73 to 100km² in the area of Guékédou where there are much wetlands) and a great number of grounds adaptable to aquaculture.



Figure 3-4 *Bas-fond* (follows) Observed at Macenta. Conceptual diagram is shown on right. This *Bas-fond* (follow) is 125m long and 30 to 50m wide. The total area is wet and it does not have a clear water net channel.

Table 3-10 *Bas-fond* (follow) Agricultural Development in Guinea Forest Region

Period	Development organization	Development area
1982 to 1985	Opération Riz de Guéckédou (ORG)	Total 653 ha
1986 to 1991	Projet Agricole de Guéckédou (PAG)	Total 2,163 ha
1992 to 1997	Projet National des Infrastructures Rurales (PINA)	7 ha
"	United Nations High Commissioner For Refugees (HCR)	180 ha
"	Projet Agricole de Guéckédou (PAG)	242 ha
1998	None	0 ha
1999	Agence Française de Développement (AFD)	53 ha
Total:		3,298 ha

Source: The table is based on interviews at the PAG Bureau at Guéckédou.

The principal fish species targeted with aquaculture included the Nile-Tilapia (*Oreochromis niloticus*). The eggs and juvenile fish are bought at the beginning for aquaculture, but spawning is carried out naturally in the ponds and alevins, juvenile fish are collected at the time of harvest for the second generation. Some heterobranchus (*Heterobranchus isopterus*)¹ and hemicromis (*Hemicromis fasciatus*)² are high in aquaculture water deductions to reduce spawning for the purpose of controlling the density of tilapia. With other ponds, some heterotis (*Heterotis niloticus*)³ are raised simultaneously. The heterobranchus and hemicromis are fish with sprabrachchial organ that can breathe air, are sold live in the markets, and whose live price is higher (example sale at the center of aquaculture of Nzérékoré: tilapia

1 Heterobranchus: Type of cat fish. Originating in Western Africa. Carnivorous fish. The same techniques of aquaculture can be implemented for *Clarias*, largely high in Southeast Asia and Africa. It has sprabrachchial organ and can breathe air. Moreover, it crawls onto the ground during the rainy season.

2 Hemicromis: Type of cichlids. Originating in Central and Western Africa. Fish eater, combative, very conscious of the territories. Raised in small numbers to control the natural spawning of tilapias. The adult fish protect fertilized eggs, and they multiply too much in the ponds. Cut adult: less than 20cm.

3 Heterotis: Type of *Osteogrosse*, family *Osteogrosse*. Originating in Western Africa. Omnivores eat even pelet (artificial feed). At the beginning of the rainy season, collects plants floating on the pond to build nests and to lay eggs. The parents protect eggs and juvenile fish. Natural spawning is possible in large ponds. Having sprabrachchial organ, it can breathe air of the swim bladder. Arowana, an expensive aquaculture fish belonging to the same family.

1,000FG/kg and heterobranchus 2,500FG/kg). The above-mentioned four fish species all have a strong resistance to slightly acid water, which facilitates the management water quality for aquaculture of *Bas-fond* (hollows) easy since quick water change is difficult when a deterioration of water quality occurs. They are species adapted to aquaculture and selected by gradually phasing out many fresh water fish of Western Africa.

Fish feed is mainly rice bran, and some aquaculture household use dried bongacramps, termites, leaves of manioc and sweet potato. These ingredients are made into powder or shredded and spread over the pond or added to form moisture feed. Food in the form of kneaded pellets is available for trade but is not used at all (Figure 3-5). Rice bran is readily available in large quantities in the rice-producing areas of the Guinea Forest Region, where rice is the basic food. The feed conversion efficiency is estimated to be 1:8 (Marquet, 1996) and is weak, but the cost is very low (15 FG/kg, approximately 1/100 of the price of produced fish), and even in great quantities, food expenses should not exceed 25% of the cost of the total operation. Dried bonga crumbs are inedible, such as the bones and skin, and appear during the distribution process of smoked products sold for human consumption. It is a highly nutritional feed source in protein and fats⁴. It is a product whose production, processing and consumption are carried out in the country, available at all markets, and with quantities available enough to satisfy current demand in aquaculture. It is a material that can be diffused as feed for aquaculture. Termites are readily available everywhere, of high food value, but difficult to obtain in large quantities, and as live feed, they are well appreciated.

The quality of water used for aquaculture in the Guinea Forest Region is a soft neutral water slightly acidic (pH 4.5 to 8.5, mean 7.0, with conductivity lower than 50 μ S/cm in almost all ponds) and with allow capacity for amortization of tributary water or biochemical adjustments. The Guinean tendency is to apply great quantities of rice bran that is not efficient food, and it is very possible that the quality of water is degraded at the moment of the fertilization, with poultry excrement for example, or during periods of bad weather. Since the aquaculture households obtain eggs and juvenile fish through natural spawning, it becomes very difficult to manage the number of fish, and in return, water quality control becomes even more difficult. Water analyses carried out in the period of the field study made it possible to measure a residual oxygen content of 0.2 mg/l minimum in the bottom of aquaculture ponds undertaken in the towns of Nzérékoré and Kissidougou. At the same time, the surface layers of some ponds were supersaturated (13.3 mg/l max.) thus causing stratification. A yellow green shade of water indicated also a strong nutritive wealth in the ponds, and a dangerous condition of absence of oxygen was noted at night. But mass mortalities are rare, only one case having been reported out of 24 aquaculture establishments questioned following the deterioration of water quality (death of large fish shortly after the application of poultry excrement). Although water quality is strongly deteriorated, there were no serious accidents, as indicated earlier, because the four fish species currently used in Guinea for aquaculture are all resistant to polluted water with low oxygen content. But technical improvements are desirable because a loss of appetite in fish can result in diseases. The problem of water quality must be considered in relation to the management of the number of fish and the volume of food, and methods employed and changes in climate in order to facilitate a resolution of

4 Analysis of the remainder of dried bonga cramps at the Center of Experimentation and Management of the Quality of Food Products of the Ministry for the Trade and the Industry of Conakry showed the content of protein at 73%, content of fats of 12%, and a positive result for staphylococci, salmonella and aflatoxine. The same analysis for termites gave a content of proteins of 41% and fat content of 27%. Analysis of rice gave a content of proteins of from 4.5 to 7.5% and a fat content of 5.3 to 5.89%. These figures defer largely to the analysis of the Japanese rice table of standard foods in Japan: content of proteins of 14.5% and fat content of 17.3%, which is explained by a strong content of grain due to a difference in the rice-polishing process

problems in the management of water quality. One will certainly need much time to eliminate this complex problem facing Guinean aquaculture where there is no research center or specialized human resources.



Figure 3-5 Application of rice bran feed in a pond used for aquaculture. Usually, aquaculture households purchase the feed at nearby rice-polishing machines (higher insert). Aquaculture households make various arrangements, for example application of poultry excrement and feed (insert of right-hand side, rice bran is white and poultry excrement is gray), mixture of boiled cow blood obtained from slaughterhouses (middle insert in water-bottle container).

Calculating the financial state of aquaculture – based on several on-the-spot interviews for the study, sales of typical individual aquaculture enterprise with ponds of a total surface area of 1,000m² is 900,000 FG compared to 228,000 FG for annual expenditures, which is equivalent to 50 to 90% sales of a revenue (Figure 3-6). The initial investment is 1.7 millionFG, and if one supposes an investment over 10 years, the internal rate of return (IRR) is high: from 30 with 42%.

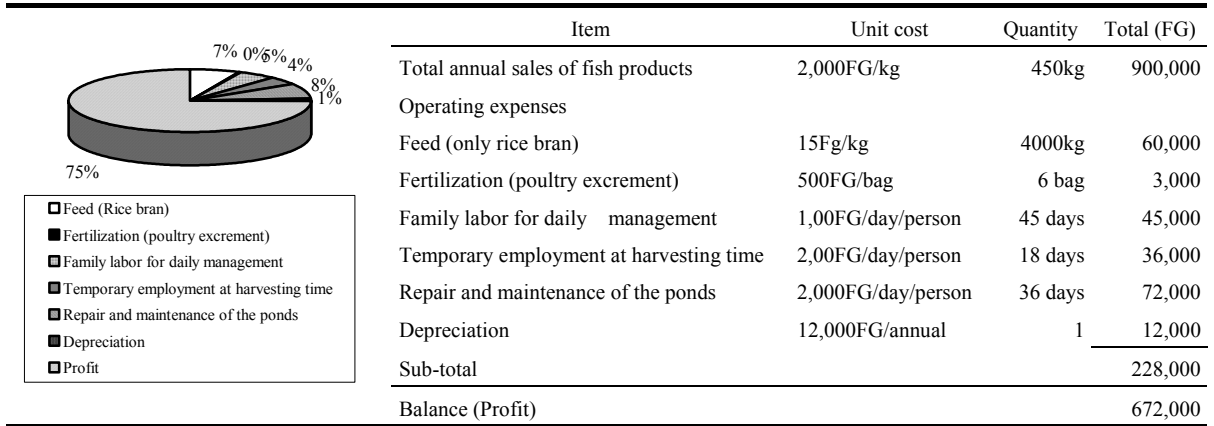


Figure 3-6 Breakdown of expenses and profits in the selling price of fish cultivated by individual aquaculture enterprises in the Guinea Forest Region (calculation assuming aquaculture households with a total surface pond area of 1,000m², based on several on-the-spot interviews for the study)

Aquaculture in more extensive ponds requires a significant initial investment to stop water on the slopes of the entire *Bas-fond* (follow) and in concrete outlet valves. Since it usually exceeds the financial capacity of individuals or rural consortia, the ponds are often used for retention until financial assistance from a draft aid program to safeguard forests, food for refugees, or the construction of a road becomes available.

Areas Among the natural ponds, there are some areas where, with the drop in the water level during the dry season it would be very easy to fish, even with a scoop net when many people enter the water together. Traditional fishing using this type of water level collection is called *Pêche Collective*, and is practiced not only in the Guinea Forest Region, but also largely throughout Guinea (Figure 3-7). In executing this type of fishing, a manager of water body is usually assigned according to hereditary, which makes it easy to understand the inhabitants' prohibition to fish on days other than the fishing day (generally 1 day). One might say that fish collection is a practice of stock management based on traditional fishing. Aquaculture adopts various forms. Forms similar to corporate aquaculture, including feed and fertilization on relatively small ponds (1,000 to 2,000m²), to stock management by restricting fishing to collective fishing. In the example of Diéké in Yomou prefecture, aquaculture using a reservoir with fertilization and rice bran feed allows for a production of 800 kg/ha, in other words, 8 times more than natural fisheries by damming, thus ensuring a profit. (Hem et. al., 1998).



Figure 3-7 *Pêche collective*, Baro collecting in Kankan prefecture.
Simple fishing tools used are shown in the inserts.

A pilot project for the diffusion of continental aquaculture began in December 1999 with the assistance of the *Agence Française des Volontaires du Progrès* (AFVP), a voluntary organization of the French government. The project, centered in Nzérékoré, aims to create over a three-year period 80 autonomous aquaculture establishments near Nzérékoré and of Guékédou. No other organization is currently involved with the diffusion of aquaculture in this area. There are 258 agricultural extension staff assigned to the Guinea Forest Region, but since supervision is under a different ministry the diffusion of aquaculture information is not included in these activities. Many farmers would like to engage in aquaculture, and there appear to be no obstacles in the diffusion of knowledge by agricultural promoters in collaboration with the Ministry of Fisheries and Aquaculture.

Currently, the only research project on extensive aquaculture is conducted by SOGUIPAH⁵ in Diéké in the prefecture of Yomou, which produces tilapia eggs and juvenile fish. This site is in the extreme interior of the country, and the transporting of large tilapia and juvenile fish requires much water and makes transportation expensive. The cost is high for some aquaculture establishments, while others have built aquaculture ponds, but cannot buy them. Since aquaculture establishments produce their own eggs and juvenile fish, once aquaculture is underway purchasing them becomes unnecessary. But in reality, there are many cases of total loss or confiscation of eggs and juvenile fish from the second generation, which is a hindrance to aquaculture. Depending on the location, certain *Bas-fond* (follows) dried up during the dry season, and aquaculture establishments obtain eggs and juvenile fish every year by contracting local fishermen. There is a significant need among individual aquaculture firms for *Heterobranchus* juvenile fish. The fish earn a high price and which can be shipped live. However, the supply of the juvenile are currently not available, so aquaculture establishments obtain *Heterobranchus* for aquaculture from nearby fishermen who capture them in the natural rivers. Consequently, a demand for tilapia and *Heterobranchus* does exist but except for Diéké the supply of juveniles are insufficient.

Private aquaculture establishments appear naturally in this area where conditions are favorable; for example, natural advantageous climatic conditions with long periods of annual rains and weak evaporation, the hydrological relief of *Bas-fond* (hollows), economic conditions where rice bran is cheap and available in great quantities, where and various other materials used as developable food exist, and where fish is expensive and the inhabitants enjoy fish, and the management of traditional resources known as *Pêche Collective* is implemented. But an introduction of a support system for diffusion and technical management by the government has been delayed, and the production is thus currently limited to 20 tons. Eighty-two establishments have been confirmed in the Guinea Forest Region, and with the potential for development being raised, it is a promising sector for future industrial development if the instructions and support of the government move in the same direction as the needs of the private sector.

3-4 Fishery Products Distribution and Processing

(1) Summary

In Guinea, the distribution of smoked fish from artisanal fishermen and the distribution of frozen fish, imported products or catches of industrial fisheries coexist. In addition, the distribution of fresh fish is limited to on-the-spot sale near landing sites and fish for consumers in the fishing communities; thus, it is estimated that 80% of the volume of the catches of artisanal fishermen is smoked.

On a geographical level, there is a principal route of distribution (Kamsar - Conakry - Kindia - Kissidougou - Nzérékoré) with wholesale fish merchants, having relatively significant quantities of funds and large quantities of fishery products, and a distribution area where small scale delivery has priority, for example hawking (area of 100 - 150km

5 SOGUIPAH (*Cociété guinéenne de plumier à huile et d'hévéa*) is a joint venture financed by the multinational Belgian SOFINCO and the Guinean government, which mainly manages plantations of palm trees for oil and hévéa in an area of 22,000 ha near Diéké. Apart from the land directly managed by the project, it buys products from farmers. It is an investment project of regional agricultural development, centered on the multinationals, employing 1,700 Guineans directly, and where 3,000 families from 35 villages are associated with production. Apart from palm trees and rubber, rice and bananas are also included in production, and aquaculture, also included as a new activity, is at the study stage. A draft study on extensive aquaculture implemented since 1994 by a delegation of specialists in the IRD contributes largely to development of aquaculture in the Guinea Forest Region.

along the coast), and an area of distribution where smoked fish from Senegal is common (Central Guinea and Guinea Highland). The supply from river fishing is small, and within the inland area the distribution of sea fish, frozen or smoked is the principal component.

Since smoked fish is easily accessible to the informal sector of society as an income generator, many people are attracted to these small profits along the coastal area as well as in the cities of the interior. Depending on the location, they not only handle the forwarding but the smoking of the fish themselves, and even control the procurement of products to fishing villages from the cities. A characteristic of Guinean wholesale fish merchants is their lack of financial resources. Only credit among wholesale fish merchants is available and it is impossible to compensate for this insufficiency of working capital. Consequently, the credit of wholesale fish merchants to the fishermen is also weak. But the first step towards “vertical estimation” has been made by whole sale fish merchants through owning bandaged (smoking facility) in fishing communities, or by becoming ship owners in order to obtain fish, etc.

Taking into account the rate of unemployment in Guinea, one might think that the number of wholesale fish merchants with small funds would increase further in the future. However, in the end, the number of fish will decrease compared to the number of wholesale fish merchants, which will eventually lead to bankruptcy or shift to subcontractors or small contractors, with the appearance of a small number of wholesale fish merchants with large capital.

(2) Basic Structure of Fishery Products Distribution and Artisanal Fisheries

The distribution of fishery products in Guinea includes two principal elements: distribution of smoked products of artisanal fishermen and that of frozen fish imported or caught by industrial fisheries. Smoking facilities are associated with principal regional landing sites, and one can easily see the smoke when they are in operation. The degree of smoking varies according to the distribution network and period of conservation, and is generally divided into a long or short preservation. The provision of frozen fish from a chain of the private firm centered by the COGIP and SONIT, etc. compete with the smoked fish products produced in artisanal fishing communities. These firms have cold rooms in most local towns and they mainly transport imported fish from Conakry and resell it at commercial markets in the cities.

The distribution of fresh fish is limited to the area around fishing villages, considering the small quantity of ice available. Distribution of fresh fish caught by artisanal fishermen is limited to direct sale near the landing sites, and for the fishermen’s own consumption, with the forwarding of high value fish to exporters or to hawkers with refrigerators (only on the landing docks where ice is available, like Kamsar, Taboriah, etc.) and does not extend to the entire country. Considering this, the distribution of fresh fish is thus limited to 20% to artisanal fishermen with the remainder 80% for smoked fish products. Although it is difficult to check these figures, we are able to observe that the volume of fresh fish distributed is not significant. But in the future, the distribution of fresh fish and frozen fish should increase with the construction of small ice factories and ice warehouses with electric power.

Except for Conakry, the principal places of production for artisanal fishermen are Kamsar, where great quantities of fish smoked as well as Katchek Island, and Koudoudé around which they have favorable fishing grounds. Conakry, which has landing sites at various places throughout the city, is an excellent production site for smoked fish, as well as a good site for consumption all year-round, with the exception of November-December, when fish is brought in.

Concerning places of consumption, Kindia is the main center of distribution of smoked Guinean fish. In central Guinea it is centered in Labé and in the Guinea Highland Region in Kankan. Guinean smoked fish cannot compete with imported products from Senegal from a view of price, and its share of the market is weak. In particular, at Labé 1,000t of dried fish, nearly 4,000t in wet weight are imported from Senegal by local conveyors. If the fish for cities like Pita is added the figure can double in central Guinea. On average, Guinean smoked fish are sold as “high class products”. In the Guinea Forest Region, for example Nzérékoré, Senegalese and Guinean smoked fish compete.

Part of the catch of artisanal fishermen is exported from Guinea in the form of fresh or frozen fish. Thus, there are 6 to 7 small and medium enterprises (SMEs) in Conakry, between artisanal fisheries and industrial fisheries. They have boats (*pirogues*), employ fishermen and fish for prime fish (sea bream and sole, etc.) with lines off the islands. The fish are preserved in ice and transported to France and Italy by air. Fish preserved in ice having lost its freshness and deemed non-exportable are placed on the interior distribution network. In addition, an association with Korean shippers in all areas, including Conakry, Kamsar, Taboriah, Sakama, Kondeyre, Konimodiah, etc., ship croaker year-round to South Korea. Moreover, though not confirmed, it appears that foreign ships frequently buy their fresh fish from artisanal fishermen.

In regard to smoked fish, apart from exports to neighboring countries, *barracuda* (barracuda) and Spanish mackerel are exported to the United States from the Bonfi port of Conakry as luxury smoked fish. In addition, artisanal fishing communities along the northern coast export to Senegal small quantities of fish preserved in salt. Therefore, artisanal fisheries distribution is not only limited to Guinea. However, since domestic demand is enormous, the share of exports remains negligible.

Since volume of fish provided by fisheries in inland rivers is limited, marine fish are shipped to the interior from the coastal areas are either smoked or frozen. In particular, fish sold by private firms such as COGIP and SONIT play a significant role by holding down the price of fishery products for the inhabitants of the interior.

(3) Distribution Channels of Artisanal Fisheries

A comprehensive survey carried out by Mr. Kope Solie and others of the Boussara National Center for Fisheries Sciences had nearly 240 people surveyed who are associated with the national distribution of smoked fish. The survey pointed out the following overall network. The basic form of distribution is by artisanal fishermen, which is the most common distribution network.

Artisanal fishermen/firms → Female fish processors → Local shippers (mainly men) → wholesale merchants at consumption area (mainly men) → Retailers (mainly women) → Consumers

Here is a conversation with a local collector of smoked fish from Kamsar confirming distribution. “I buy fish (bonga and shark) from the villages bordering Guinea-Bissau, like Katchek. Several small wholesale fish merchants go as far as Guinea-Bissau making collections, and I sometimes buy fish from them in Kamsar. The fish from Katchek is low in fat, and is noticed, so it is of better quality when smoked. To compensate for a lack of funds, we work in groups of six or seven shippers. Once volume for one truck is reached, it is shipped to various cities in the interior (private individuals in the Guinea Forest Region). Currently, we dispatch one truck a week. We have 100 retailers in all of Guinea. We do not export.”

The second distribution channel demonstrated below is slightly different from the first channel. It is common at fishing communities on remote islands like Katchek and it is also observed in Koukoudé. This distribution network does not pass by the intermediate shippers having relatively significant funds like that of Kamsar; small-scale distribution is created while competing with them.

Artisanal fishermen → Local shipper & fish processor (manly men) → (Intermediate shippers) → Wholesale merchants at consumption area (mainly men) → Retailers (mainly women) → Consumers

On the other hand, in areas where hawking from the place of production is possible, female peddlers carry out distribution by themselves. In areas where ice is available, women also handle the distribution of fresh fish by peddling. For river fishing, after the smoking of fish is carried out by fishermen’s wives, they are sold by peddling. This is the third distribution network. For fresh fish, the hawkers cover Kamsar to Boké in a radius of 100km starting from the small villages near Sangaredi. Some cover even a radius of 200km until Gadual, and a beach of 100 to 200km is regarded to be an area of competition between private frozen fish organizations, dry-salted fish from Senegal, and fresh or smoked fish brought by peddlers. The town of Téliimélé, 4 hours by car from Conakry, has these characteristics.

Artisanal fishermen → Processors & peddlers (women) → Consumers

Frozen fish products are handled mainly by two private firms (COGIP and SONIT). Located in Conakry, they both have cold warehouses throughout the country, and sell fish of inferior quality captured by industrial fishing vessels and frozen imported fish. The COGIP is currently handling approximately 700t per month, of which two-thirds are for domestic markets and one-third in exports. The operation of SONIT is similar, except that it does not export. Both play a very significant role, since they provide fishery products to the local population. There are also individual wholesalers who buy fish from industrial fisheries. Frozen products landed at Conakry by industrial fishing vessels utilize the network below. The master plan of the FAO already lists details on the development of this sector.

Foreign vessels → Guinean & partnership firms → Wholesale merchants (men & women) → Retailers & peddlers (women) → Consumers

These types of frozen fish are unloaded at commercial ports in the form of frozen products packed in cartons; the majority are stored temporarily in large cold rooms at the port, and then transported by refrigerated van or isothermal to the large market in Madina, where they are sold to wholesale fish merchants. They are then carried by wholesale fish merchants to various markets around the city by taxi, etc. and sold to retailers.

(4) Distribution Situation in the Interior of the Country

The distribution networks in the Guinea Highland Region and the Guinea Forest Region are not very extensive. If camps in the prefectures of Mandiana and Siguiri or in the Guinea Forest Region are close to a market, fishermen's wives or wholesale fish merchants carry catches to the markets to sell to consumers. Since the time it takes to transport products to consumers is also short, the smoking of catches is unnecessary. In addition, if camps are far from a market, transportation requires much time, and the fish is then smoked to prevent the risk of spoiling. Figure 3-8 shows the distribution network for each area.

The river fishermen move while camping, so they are unable to use stationary ovens, and therefore resort to a very elaborate method: they dig a hollow in a bank, place a metal net in it and burn materials below for smoking. One exception: Malian fishermen's wives called "Bosso" are centered at the Sélinqué Dam on the Sankarani River and use a fixed Chokor type oven.

The practice of measure and sale in kilograms is not yet entrenched in the world of fishermen and wholesale fish merchants. The purchase price to campers is converted into 600 to 1,000 FG/kg and then after passing between the hands of wholesale fish merchants or fisher-women; the retail price at eastern markets is 1,500 to 2,000 FG/kg for fresh fish and 2,000 to 3,000 FG/kg for smoked fish. Although the retail price is practically identical for all fish species, fish size or the relationship between supply and demand become rather decisive elements in establishing price. There are differences between the prefectures; for example, in the prefectures of Siguiri and Mandiana where mining is common, the purchasing power of the inhabitants is relatively high and so the market price is also higher.

The means of transport for products of these campers at markets vary: by foot, bicycle, motorcycle, etc. depending on access conditions. In the Guinea Highland Region, transport is usually carried out by bicycle carrier - or in one case, by motorbike on containers made by climbing plants or raffia (standard palm tree). By slightly sprinkling water on the raffia fibers that surround the fish, one can avoid draining, making it possible to maintain a lower temperature. Since there is no ice factory in the Guinea Highland Region and the Guinea Forest Region, ice is not used for storage and the transportation of fish. The internal organs are removed to minimize spoilage, but the gills and blood remain. Removal of the internal organs is not done when catches are small or the fish are small.

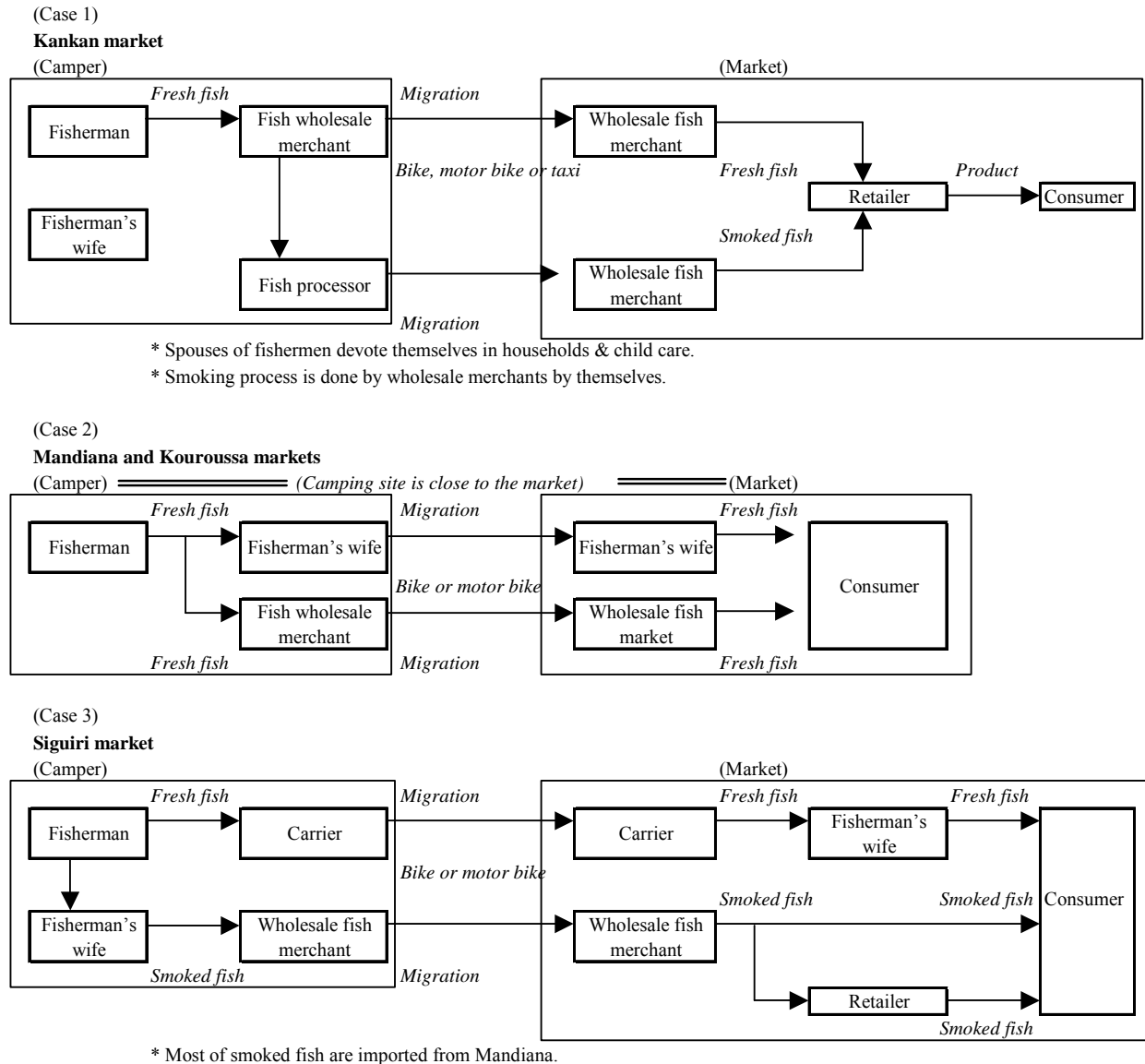


Figure 3-8 Distribution Channels of Catches in Guinea Highland Region

(5) Distribution as an Informal Sector

For the potentially unemployed in agricultural areas, participation in the distribution of artisanal fisheries becomes an informal sector with relatively easy access, and many people gather in search of a small profit. Among the 300,000 people associated with the fisheries sector in Guinea, many deal with distribution - wholesale fish merchants for example. In fact, there are many wholesale fish merchants in the fishing villages. For example, one report states that in addition there are 150 boat owners, 2,850 fishermen, 900 wholesale fish merchants, 200 fish smokers, boat repairers, ship carpenters, carriers who transport fish, etc. who work at the Boulbinet port in Conakry. And when we arrived at the beach at Katchek, 60 people (almost all men) gathered from curiosity, and when I asked them about their profession, 20 answered fishing, 20 wholesale fish merchants, 6 retailers, 2 civil servants, 2 fish smokers, 2 carriers and 1 machine mechanic. Considering this, wholesale fish merchants seem extremely numerous.

Of course, wholesale fish merchants meet all along the coastal area, but they also come from many cities in the interior. Depending on the location, they not only handle the collection, but also the smoking which is labor intensive work, in return for sales of fishery products as well as products for their fishing communities, which is why wholesale fish merchants are numerous. At the current rate of unemployment, if the economic recovery in Guinea continues and personal incomes increase, the number of wholesale fish merchants and their limited purchasing power should increase further. But even if the number of wholesale fish merchants increases, the amount of available fish for purchase will decrease compared to the number of wholesale fish merchants and small contractors could go bankrupt or subcontracting taking place. The number of wholesale fish merchants and peddlers with limited incomes is viciously decreasing, and soon only wholesale fish merchants with funds will remain.

Different employment for men and women exist to a certain extent in distribution. Women have monopolized retail positions at markets and localized peddling, while it is often the men who work as wholesale fish merchants, leaving for several days to places of production. At Koukoudé, there are many male wholesale fish merchants considering the number of purchases. But depending on the location, women also work as wholesale fish merchants moving periodically within the fishing communities and places of consumption in the interior.

A lack of funds is a notable problem for wholesale fish merchants working with artisanal fishermen. Only a small proportion of wholesale fish merchants compensate their insufficient working capital. This is why the credit rating of wholesale fish merchants by fishermen is weak. At some places, wholesale fish merchants buy from fishermen on credit. However, wholesale fish merchants own *bandaged* at fishing villages, thus transforming themselves into ship owners to ensure their supply of fish, an indication of the development of “vertical estimation” by wholesale fish merchants.

Many women sell small quantities of fish at established markets and weekly throughout the country. Many obtain only minimal benefit, which is a typical informal sector. The difference between the wholesale price and retail price is estimated to be approximately 10% for fresh fish and approximately 30% for smoked fish. Regardless of fresh or smoked fish, generally speaking, retailers’ payment to the wholesale fish merchants is after the sales of the products.

(6) Consumption of Fishery Products

The development of fishery market has also brought on an increase in frozen fish imports and smoked fish. The consumption of fishery products is certain to increase with the increase in personal incomes. A study made in the small town of Daraba in the Guinea Highland Region shows that beef costs 2,000 FG/kg and horse mackerel at COGIP is 1,400 FG/kg. The small female retailer who sells 150 kg of defrosted fish per day says that sales drop when the price approaches the price of beef. At the current level, price competitiveness is sufficient.

As mentioned above, it is said that 80% of the catches of artisanal fishermen is smoked. However, along the coastal area as well as in the interior of the country, demand for fresh fish is strong at market, and the development of fresh fish consumption is certain to be

one of the principal topics in the development of artisanal fisheries. By observing the markets in the interior of the country, one notices that more women sell whole-frozen mackerel and skip jacks than smoked fish. Although dried fish is produced near Kamsar, the size of the market is quite limited. Near Pita in Central Guinea, consumers prefer strongly salted Senegalese fish; but this is an exceptional case in Guinea.

(7) Estimate of Distributed Volume

The report from FAO indicates that 30kg of pelagic fish and benthic fish become 9 to 10kg and 10 to 12kg of smoked fish (long duration) and 15 to 20kg smoked (short duration) respectively. Based on this report, if one estimates the consumption - for example, in Géckédou in the interior of the country through correspondence - it is much higher than that currently considered. In addition, fishery products which are 20% to 30% less expensive than beef, are an invaluable source of animal protein for ordinary people. For them, smoked bonga has importance for people as it is used as seasoning.

3-5 Fisheries and the Social Infrastructure

(1) Improvement of Landing Ports

1) Conakry Area

In the area of Conakry, adjustments to the social infrastructure such as the supply of electricity and water and roads are most advanced. On the other hand, often buildings are often built along the coastline to suit the inhabitants and functions of a large city. Moreover, since Conakry has a rocky coastline at many of the landing dock sites, at low tide, the seabed drains and the rocky reefs are exposed. This is why the coming and going of dugout boats is limited at low tide, and the landing of catches requires a large staff effort. The principal dock ports include facilities at Bonfi, Dixinn, Teminetaye and Boulbinet, and include approach facilities, freezer manufacturers and cold rooms, fishing machine gear repair facilities and stores, workshops, smoking rooms and offices. The facilities at the landing docks port of Bonfi, Dixinn and Teminetaye were established through a series of projects in the 1980s with financial assistance from the African Development Bank. Ice factories and cold storage are leased to private firms and utilized and maintained by those private firms. The facilities at the landing dock port of Boulbinet were built within the framework of the grant aid of Japan and were opened in June 2000.

Landing operations, sale and smoking, etc. of catches are actively realized at these facilities, but each of the docks port has problems for reasons mentioned above, such as natural conditions or funding for operations, etc.

- Bonfi : Impossible approach at low tide, handling space handling badly arranged, inefficient operation of ice factory
- Dixinn : Impossible approach at low tide, space handling space badly arranged, inefficient operation of ice factory
- Téminétaye : Impossible approach at low tide and normal level, rocky reefs in the channel, space handling space badly arranged, inefficient operation of ice factory
- Boulbinet : Impossible approach at low tide

Facilities have not yet been improved at other landing docks ports in Conakry, and landing is carried out on the natural coastline. In many cases, there is not enough open space on the landing docks, space for repairing of nets or forwarding of catches. And since smoking rooms for catch processing are still not installed, smoking is an individual responsibility. Furthermore, medical management hygiene, and the processing of waste, etc. on the landing docks is not well implemented.

Table 3-11 Improvement in Principal Landing Ports in the Area of Conakry

Name of landing port	Facility contents	Utilization conditions of facilities	Donner	Other
Teminetaye	Ice makers: 10t/month (ice cube) Refrigerators: 100m ² (±0°C) Fishing gear storage: (16 rooms, @8m ²) Fresh fish markets: (18 spaces) Fishing nets repair space: (66m ²) Workshop: (74m ²) Smoking cabin: (33 smoking rooms, 360m ²) External smoking rooms: (110 ovens) Gasoline station: (1 set) Approach facilities: (1 set) Administration office:(132m ²)	Ice machines and refrigerators are rented from a private organization (assembly contract 500,000 FG/annual since 1992). Fishermen of Boulbinet move temporarily for to use the facilities. Capacities of manufacture of ice and refrigerators have dropped considerably.	Loan by AfDB, total amount of budget (¥1.35 billion), other CIDA	Reef just in front of the channel is dangerous. Landing: Their catches are ranges by the head by men going in water. Accosting impossible at low tide.
Bonfi	Ice makers: 10t/day (ice cube) Refrigerators: 100m ² (±0°C) Fishing gear storage (16 rooms,@8m ²) Fresh fish market: (24 spaces) Fish net repair space:(66m ²) Workshop: (74m ²) Smoking cabin: (33 smoking rooms, 360m ²) External smoking rooms: (15 ovens) Gasoline station: (1 set) Approach facilities: (1 set) Administration office: (132m ²)	The ice machines, refrigerators and lots, etc. are rented with an Italian society (assembly contract 500.000 FG/annual since 1992).	Loan by AfDB, total amount of budget (¥848 million), FAO, etc.	The approach of fishing vessels is possible only at high tide. Italian firms are currently building one shipyard on part of lot (details unknown).
Dixinn	Ice makers: 10t/day (ice cube) Refrigerators: 100m ² (±0°C) Fishing gear storage (8 rooms,@8m ²) Fresh fish market: (24 spaces) Workshop: (74m ²) Smoking cabin: (40 smoking rooms, 450m ²) External smoking rooms: (20 ovens) Gasoline station: (1 set) Approach facilities: (1 set) Administration office: (132m ²) Shipbuilding yard: (250m ²)	The ice machines and refrigerators, etc are rented at a private society (assembly contract 500.000 FG/annual since 1992). Capacities of manufacture of ice and cold room have dropped considerably. The smoking cabin of was built in 1999.	Loan by AfDB, total amount of budget (¥717 million)	The approach of fishing vessels is possible only at high tide.
Bulbinet	Ice makers: 10t/day (flake) Refrigerators: 4 t (-10°C) Fishing gear storage (16 rooms,@9m ²) Fresh fish market: (10 spaces) Workshop: (90m ²) Smoking cabin: (52 smoking rooms, 576m ²) Approach facilities: (1 set) Administration office: (300m ²) Tiltedjetty(110m)	Operation started from June, 2000	JICA (¥870 million) Toilets for women by CIDA	The approach of fishing vessels is impossible at low tide.

2) Rural Coastal Areas

Apart from Conakry, there is a shoreline with exposed rocky reefs near Cape Verga. However it is generally softly inclined shallow waters and comprised of sand and mud with mangroves. In rural coastal areas the social infrastructures, such as electricity and water, are not established, except for Kamsar. The landing sites and fishing communities are set apart from the principal roads, and many are located on islands in mangrove areas, inaccessible from the mainland. The majority of landing sites have no facilities; the natural coastline is used as it is. However, facilities mentioned below have been developed on some principal landing sites.

There are two landing sites at Kamsar, one old and one new. Construction and improvement of the new dock began in 1996 by the Guinean Government with the assistance of UNDP and the FENU and were completed in 1999. The landing, sale and smoking of catches from fishing boats are all done at the new landing dock. Since electricity and water are both supplied by the bauxite association of Kamsar, ice (3t/day) is provided to the boats. Table 3-12 shows the other facilities.

The old landing site, only used for landing of smoked fish coming from fishing communities on islands like Katchek, and the forwarding to the islands of produce for everyday life, plays a significant role in supporting production and everyday life for the islands, but facilities have not yet been improved. Landing operations are made by taking advantage of the quay rock relatively flat of the old landing dock, at low tide with large containers are unloaded and carried by many warehousemen who raise the packages. This method of handling is not easy on the new landing dock, which has unstable muddy areas.

Table 3-12 Improvement of New Landing Port at Kamsar

	Facility contents	Utilization conditions of facilities	Donor	Other
New landing port at Kamsar	Ice maker: 3t/day (flake) Wholesaler storage (10 rooms, @ 15m ²) Workshop: (40m ²) Smoking cabin: (54 rooms) Administration office: (60m ²) Toilets(18m ²) Sloped landing jetty:(200m)	Operations started in 1999 Water and electricity under annual contract with CBG (6,500,000 FG). Area of handling smoked products is being constructed outside.	FAO (US\$3,405,000) National budget (smoking cabin)	The inclined corridor for landing covers the side, so the approach of fishing boats is inconvenient.

The facilities at Koukoudé, which is one of most important influential fishing port and community in the country, were installed during the 1980s through financing of the African Development Bank. The facilities are indicated in the following table. The ice factory and shared ice warehouse have been out-of-service for a few years following the breakdown of the freezer. But when it was in service, Koukoudé was used as a base for fishing with ice, with many fishing boats coming from Conakry. If this facility can be put back into service, since the fishing grounds are close by, many boats will start to come from Conakry again and will make Koukoudé the base of their activities.

Taboriah has a warehouse with containers and an area for smoking. It was set up in 1988 with Italian assistance. It is a property of the Ministry for the Fisheries, but the ice maker (flake ice, 2-3 t/day) is leased to a private organization (DJOLIBA FISHERIES, Conakry) and used for the purchase of fish for export by the organization. The ice is not sold to the public. Wholesale women fish merchants buy fresh fish at Taboriah and carry it to the market in Fria, but they purchase ice themselves in Fria.

Table 3-13 Improvement of Principal Landing Ports in Rural Fishing Communities

Area name	Facility contents	Utilization conditions of facility	Donor	Other
Koukoudé	Ice makers: 10t/day (ice cubes) Refrigerators: 100m ² (±0°C) Fishing gear storage (8 rooms,@8m ²) Fresh fish market: (24 spaces) Workshop: (74m ²) Service station: (1 set) Lodging facilities (1) Administration office: (132m ²) Access road to the village: (1 set)	The ice machine and refrigerator, etc were rented to the private sector (assembling contract 500.000 FG/annual since 1992), but currently the f ice machine and refrigerator do not function.	AfDB loan, total amount of budget (¥660 million) CIDA, NGOs, etc.	
Taboriah	Warehouse with containers, ice maker facilities & smoking oven, Smoking facilities	The ice maker is rented by the private sector, is exclusively used for activities of collection of fish. Activities of improvement of the statute of women by a German NGO.	Italy	

In addition, the following problems have been confirmed based on the above-mentioned situation.

- Coming and going of boats

As mentioned earlier, there are fishing grounds of exposed rocky reefs near Conakry and Cape Verga (Koukoudé and Tounfilydi). There are also exposed rocky reefs near Matakan at the southern end of the island of Kabak in the southern prefecture of Forécariah. The channel flow towards the landing sites requires caution due to the risk of capsizing from cross- currents when circumventing these reefs. And the channel movement is difficult to confirm in the evening or at night.

Moreover, the northern part of Conakry is directly perpendicular to dominant waves, and in the villages of the western coast facing the open sea, boats have difficulty leaving due to the waves breaking.

- Access to the principal road

The landing sites (fishing communities) facing the coastal mangroves sit low to the water. The clay soil and mud can be flooded during the rainy season because of bad drainage and low proximity to the ground, which is why access by vehicles during the rainy season cannot always be guaranteed. And even if the villages are inland, there are no bridges making passage possible because the level of small rivers and streams increases during the rainy season.

- Securing drinking water

The difficulty of obtaining drinking water is a problem faced by many inhabitants of the fishing communities. Many obtain their water from wells dug in or around the communities. However, there are not many sources, and wells located near the sea tend to mix with seawater, particularly during the dry season. Wells located on low ground become submerged during the rainy season and are not very hygienic. The water becomes contaminated, which is sometimes harmful to the inhabitants. During the dry season or when the volume used increases, supply becomes insufficient. The inhabitants consume much time and energy, for example, by traversing several kilometers to carry water. In villages of the remote islands, transporting of drinking water is often accomplished with portable plastic cans obtained from the mainland. Fishermen from Taydi and Dahomey in the prefecture of Boké send their boats and pay for water at Kamsar. Those isolated islands of Sakama and others in Boffa prefecture also send boats to purchase drinking water from Boffa.

- Smoking facilities

There are various methods of smoking; a primitive method by fixing a metal net on wooden piles, another simple method using half of an oil drum, and a method using blocks of laterite for a oven, etc. However, the two first methods are the ones mainly used. The efficiency of materials for smoking is low; sparks tend to jump, which can easily cause a fire, which is why conversion to oven type blocks of laterite is necessary. If possible, it would be preferable to introduce Chorkor-type smoking rooms with racks allowing for several levels in order to increase the effectiveness of smoking materials. Some Guineans have also developed a very effective oven coated with galvanized iron sheet.

- Public facilities

Quite often, primary schools are located in a nearby village or at a distance accessible on foot. However, access during the rainy season becomes difficult and children cannot go to school. In certain cases, there are examples where facilities have not been built even though the local population has become sedentary. At the secondary school level, children must often need to stay in dormitories at a considerable cost to families.

As for hospitals, often there is a simple dispensary at a distance accessible by foot, but in remote island villages almost always it is necessary to use a boat. In addition, even if a communications system exists, a support system from there is not in place and patients are sometimes abandoned.

As for sanitation facilities, there are no toilets in the villages, and the inhabitants relieve themselves in the thickets or on the surrounding beaches. Low-lying villages are flooded during the rainy season, and sanitation facilities are degraded, which provides places for various kinds of diseases. And if there are wells in the village, deterioration in the quality of water is also a major concern.

(2) Basic Facilities for Distribution

1) State of Retail Sale of Fish in the Town of Conakry

As the means of transport are limited, the inhabitants usually buy fishery products at the local market. It depends on size, but markets usually carry products for general consumption, where not only fish but also various other foodstuffs are sold. There are many markets of this type in Conakry (Table 3-14 and Figure 3-9). They open from 8 in the morning to approximately 6 in the afternoon.

In the case of the fresh fish⁶, fishery products are sold via the large market at Madina, the other markets start to sell from 8 o'clock. There is no ice at the consumer market and the stalls are unsanitary. Often the stalls are placed at ground level. After a while, the products lose their freshness as they become less available. For this reason, it is necessary to go to the market early in the morning, to buy fish of good quality. It is possible to store unsold goods at a nearby storage facility. However, considering the cost for storage, retailers wish to sell all their products even with discounted prices. Sales of the smoked products do not have this severe time restriction.

If there is no fishery product available at the local market, it is possible to go to one of the large produce markets at Madina, Bonfi, Matoto, etc. A public bus or taxi must be used, but a bus is only 150 FG and a taxi 1,000 FG within 2 to 3km radius. Crowds are large, particularly at the market in Madina, and there is a risk of purse snatching or theft while young women avoid to going to the Medina market altogether.

Table 3-14 State of Fish Markets in Conakry and Other Cities

Name	Number of fish stands (fresh fish)	Market type	Problems, etc.
Madina	400 (240)	Zoned, on passage	*Apart from retail sale, sale in large; confusion
Kenyen	50 (10)	On the Street, Zoned	Almost entirely without shelters
Taouya	100 (50)	Zoned	*
Belle vue	20 (10)	Zoned	There is a sale stand financed by the African Bank of Development, but it is not used.
Bonfi	50 (10)	Zoned	Galvanized roof is low.
Gbessia	60 (30)	Zoned	*Close to garbage dump
Aviation	30 (15)	Zoned	
Inbaya	20 (10)	Zoned	
Matoto	80 (30)	Zoned	
Niger	20 (10)	Zoned	Without roof
Boke	40 (15)	Zoned	Large roof, fresh fish partially without roof
Kindia	70 (30)	Zoned	Large roof, galvanized roof

* Indicates cooling facilities managed by small private sector. The volume of fresh fish sold varies: from 20 to 50 kg. Vegetables, meat and other foodstuffs are also sold, and markets tend to be regrouped by type.

6 Here, the fresh fish means fish not smoked; it is almost completely about frozen fish of the boats of industrial fisheries.



Figure 3-9 Principal Fish Markets in the Conakry Peninsula

2) Rural Retail Markets

The management of regional consumer markets is entrusted to local governments. The director of the market and a person in charge of managing the market is appointed by local governments. A management board chaired by the director of market is created, and members are selected from various retailer associations using the market. Retailers intending to work at the market must obtain the approval of the associations concerned.

The cost to use the market is 100 FG/day for maintenance and 50 FG/day for a utilization fee. Maintenance fees are used for cleaning the market, and utilization fees are used for the personnel costs of the market director and payment of national taxes.

In a recent policy, certain activities such as market management have been entrusted to the private sector. Specific activities that cannot to be managed by the private sector are realized under the direct supervision of a responsible government body.

3) Problems with Fish Retail Markets in Conakry

Problems of fish markets in Conakry can be generally summarized as follows:

- (i) Parking space is limited;
- (ii) Absence of roofs and storage facilities causes the fish to lose its freshness quickly;
- (iii) Sanitary control is lacking due to poor facilities at markets and in the neighborhoods;
- (iv) Water drainage is a problem during the rainy season and measures against rain penetration are inadequate.

Many of the problems are caused by inadequate and underdeveloped facilities and equipment at the markets, and improvements are needed in the area of deterioration and insufficient sanitary control at the distribution stage of catches. Moreover, a distribution network for supplying catches to cities north of Conakry, where the population has increased, need to be created. The facilities and management of markets are supervised by the town of Conakry, but there are difficulties in providing facilities for markets associated with the concessions of wholesale fish merchants.

(3) Social Infrastructure

1) Condition of Drinking Water Supply

Condition of urban water supply

SEEG (Water development authority), under the supervision of the Ministry of Hydraulics and Energy, deals with the supply of water to areas of concentrated population in Guinea, such as Conakry, Kankan, Boké, Boffa and others. But it does not serve Kamsar, Fria, Sangaredi, which fall under direct supervision of the mining authority.

Table 3-15 Results of Water Supply Project at Concentrated Population of the Coastal Areas

Area name	Contents of improvement	Volume of water supplied	Year of improvement implemented and service start
Kindia	Hydrant of river, purification equipment	100m ³ /h	1975 to 1987
Coyah	Hydrant of well, simple sterilization equipment	112m ³ /h	1997
Dubrêka	Hydrant of well, simple sterilization equipment	50m ³ /h	1997
Forecariah	Hydrant of well, simple sterilization equipment	70m ³ /h	1985 to 1987
Boffa	Hydrant of river	30m ³ /h	1999
Fria	Hydrant of river, purification equipment	400m ³ /h	1975
Boké	Hydrant of river, purification equipment	30m ³ /h	1991

In the case of Conakry, the capital, water taken from a reservoir near Kindia in the interior of the country is filtered and purified in the suburbs of Coyah, then sent by two pipes - one 800mm and the other 1,100mm. Hydrants from the river at Boffa on the coast are plugged and not functioning at the moment; however, they are under repair.

In general, river water stored in reservoirs is used. Tax on water is uniform throughout the country according to the volume as follows.

$$0 - 20M^3: 680FG/M^3, 20 - 40M^3: 850FG/M^3, 60M^3>: 926FG/M^3$$

Condition of rural water supply

In the rural areas from 1980, the supply water from drillings began under the management of SNAPE (Water resource development department) under the supervision of the Ministry of Agriculture and Animal husbandry, to improve the

efficiency of the concentrated water supply method. Currently, approximately 10,000 drillings have been constructed. Pumping is mainly carried out by human power using pedal pumps. Where there is ample sunlight, pumping is also accomplished using a solar power generating system. The drilling construction has been realized with the assistance of various countries: GTZ (Germany) in the area of Fouta Djalon, AFD (France) along the coast, and UNICEF and JICA throughout the country.

2) Condition of Road Improvement

Trunk and principal roads

The building of trunk roads and principal regional roads is the responsibility of the Ministry of Public Works. There are two types of trunk roads, one 6.5m wide in areas where traffic is heavy, and one 5.0m wide where it is light. The road surface material also depends on the volume of traffic. Areas where road construction is expected are: Kouroussa in the Guinea Highland Region to Bamako in Mali, Labé in Central Guinea to Kedougou in Senegal, Gaoual in the Guinea Highland Region to Senegal, Lola in the Guinea Forest Region to Danéné in Côte d' Ivoire. A section from Boké to Kébo in eastern Guinea-Bissau is being studied, but is impossible as long as the political situation in Guinea-Bissau remains unstable.

Rural and farming roads

In 1991, the installation of regional roads and roads for agriculture passed from the Ministry of Public Works to the Ministry of Agriculture and Animal husbandry and is currently under the supervision of GENIE-RURAL (Rural Civil Engineering Department). Most of these roads are not surfaced.

A master plan for the construction of village roads was entrusted to one French consultant in the late 1980s, and installation is based on this plan. The master plan provides for the adjustment of approximately 2,500km of roads throughout the country, and approximately 2,000km (\$100 million) was financed by the World Bank over 5 years beginning in 1991. After financing by the World Bank ended, simple maintenance of village roads became only activity. A 4-year project to repair some 2,000km of roads will begin this year, and a project for a total 17,000km of village roads over 12 years is currently being studied through a second round of financing from the World Bank.

GENIE-RURAL has local offices called the Guinea Technical Bureau of Agriculture (BTAG: *Bureau Technic Agriculture of Guinea*) in all prefectures, which carry out studies on the maintenance and management of village roads. In addition, in Mamou there is a training center that has equipment and machinery for village public works, where technicians and operators have been assigned. The training courses relate to the planning and management of completed civilian work, and the directives for operations utilizing construction machinery.

3) Conditions of Telecommunications

Conditions of urban and inter-urban telecommunications

The telephone is generally managed by SOTELGUI, whose activities are centered in Conakry. There are also subscribers at Kankan and Kamsar, and public telephones are also being installed. However, the number of lines being few, communication is difficult to obtain. Recently, public telephones have started to be installed, especially in Conakry, and partial utilization has begun. In addition, this company has also installed cellular phones on piles called GSM in non-electrified areas and where the installation of fixed lines is difficult, however communication is still very limited.

Cellular phones are managed by three firms: SOTELGUI, SPACETEL and INTERTEL. They have a similar range as regular telephones in Conakry, and therefore communication with various organizations remains difficult with in the country.

The Ministry for the Fisheries effectively uses the SSB communications network of the Ministry of Agriculture for periodic contacts with Kamsar and regional management of the interior of the country.

Table 3-16 Telephones in Guinea

Telephone type	Company name	Subscription	Remarks
Ordinary	SOTELGUI	250,000FG for subscription, charge by area, discount at night	22,882 subscribers
Semi-fixed	SOTELGUI	250,000FG for subscription, charge by area, discount at night	8,706 subscribers
Cellular	SOTELGUI	Almost same contents as SPACETEL	13,163 subscribers
”	SPACETEL	250,000FG for subscription, rental is possible	About 10,000 subscribers
”	INTERTEL	Almost same contents as SPACETEL	22,882 subscribers

4) Electricity

Improvements in urban electrification

SOGEL (Electricity Supply Authority) shareholders are primarily foreign, for example, E.D.F. (French Electricity Authority) and Hydro Quebec, which are responsible for electrification. Electricity is produced by damming of rivers near Kinkon (Central Guinea), Tinkisso (Guinea Highland Region), Samou (Central Guinea), Konkouré (Coastal Guinea), and a thermal power station at Tombo in Conakry. The area of supply is centered on Conakry, but others large cities close to hydroelectric power stations are also supplied. In order to receive a supply from SOGEL, a deposit must first be placed. For example, for one single-phase current supply 220V, 20A, one will need 348,742FG. Based on a fixed monthly rate of 1,322FG, a system of payment is spread out according to consumption: currently, 90FG for 1 to 129kWh, 232FG for 121 to 600kWh and 265FG for more than

600kWh. There are 52,000 subscribers, which include joint reception that enables the payment of the deposit.

5) Energy Related Matters

Use of firewood and charcoal in urban areas

Downtown, the lower economic groups use charcoal to cook because propane gas is expensive and fire woods causes a lot of smoke. The consumption of charcoal for a family of four is one bag for two weeks (approximately 15kg), and sources of charcoal are numerous in Boffa, Kindia and around Conakry.

Firewood is mainly used in rural areas, but a biogas plant utilizing cow dung is in operation on a pilot basis under Chinese guidance. It is used for gas lighting at night and for cooking, and the by-product is used as fertilizer. It is possible where cattle are available, and considered an effective method at sites where supplying of energy is difficult.

Table 3-17 Trend in Consumption of Wood and Charcoal

Zone	Firewood			Charcoal		
	Urban area	Rural area	Sub-total	Urban area	Rural area	Sub-total
Conakry	23,101		23,101	92,959		92,959
Coastal Guinea	132,192	949,053	1,081,245	30,228	15,194	45,421
Central Guinea	147,074	863,410	1,010,484	5,418	721	6,139
Guinea highland	196,479	882,899	1,052,378	6,958	1,289	8,246
Guinea Forest	99,645	869,380	969,024	26,274	12,362	38,636
Total	571,491	3,564,742	4,136,233	161,836	29,566	191,401

Source: CERESCOR

Unit: tons (1996)

6) Sanitation and Medical Services

Urban conditions

The Ministry for Health has taken measures for the construction of hospitals and improving hygiene. Two state university hospitals and other private hospitals in Conakry are fighting disease. From the point of view of preventive medicine, the installation of centers of hygiene, health stations, dispensaries and pharmacies on a national scale are being implemented with private support. However, since most projects are in the process of being built, quite often there is no pharmacy within walking distance for rural fishing communities, and often passage becomes impossible when the roads are flooded during the rainy season.

In Conakry, 5,978 people are qualified in the field of health include doctors, nurses, midwives, public health technicians, and hygiene agents. Considering that the population is approximately 7.5 million, it is obvious that staff training has fallen well behind.

Malaria is the main cause of death in the population and is about 15%. Tuberculosis due to malnutrition, parasites in small children, diarrhea from lack of safe water, and

the weakening of pregnant women before or after childbirth are other causes of death.

Table 3-18 Health and Sanitation-Related Indexes

Natural growth rate of population	2.8%
Birth rate	4.5%
Mortality rate	2.1%
Infant mortality rate	13.6%
Juvenile mortality rate	10.8%
Mortality rate before and after the delivery	6.7%
Maternal mortality rate	0.626%
Number of children delivered	5.7 children/person
Life expectancy at birth	47 years

3-6 Fishing Communities and Gender

Inhabitants of low-lying areas, including coastal Guinea, belong to two ethnic farming groups called Bagas and Sousous, though many of those who practice fishing are migrants from other areas. Compared to others areas of the country, many coastal villages in Guinea are multinational with a highly transient population, among who are fishermen or wholesale fish merchants. In addition to the variation in numbers, variation in structure, such as part-time fisherman part-time farmer, and the sedentary behavior among migrants, etc. are also observed, which leads us to believe that the fishing communities along the Guinea coast have always been in transformation.

3-6-1 Population of the Fishery Sector

(1) Population of the Fishery Sector

The population of the fisheries sector by each activity below is estimated to be scattered between a few 100 landing sites in the six prefectures of Coastal Guinea.

Table 3-19 Number of Persons Engaged in the Fisheries by Activity

Prefecture	Landing port	Ship owner	Fishermen	Fish smokers *	Wholesalers*	Fish smokers - Wholesalers *
Boké	21	450	1389	139	243	331
Boffa	23	604	2059	0	0	587
Dubrêka/Coyah	10	135	203	30	30	87
Conakry	29	773	4061	490	767	973
Forecariah	14	324	490	172	152	344
Total	97	2286	8202	831	1192	2322

Source: Résultats de l'enquête cadre suivie d'une étude socio-économique de la pêche artisanale guinéenne (Results of survey tallies followed by a socio-economic study of artisanal fisheries) (CNSHB, 1997)

* The fish smokers are people who smoke fresh fish and sell it on the spot, the wholesalers buy on landing sites the fresh or smoked fish to resell it elsewhere. The fish smoker-wholesaler carries out two activities.

(2) Attributes of Persons Engaged in Fishing

1) Nationalities, Ethnic Groups and Religions

Among workers of this sector, 87% are Guineans, 12% Sierra Leonean, 1% Senegalese, with some Malians and Ghanans. If we limit to fishermen, Sierra Leone account for more than 20%. From an ethnic perspective, Sousous are by far the largest group (69%), with Peuls (6%) and Teminés (more than 5%, Sierra Leone) and Bagas (4%). Ninety-five (95)% are Moslem, and the rest Christian.

2) Household Size and Matrimonial Relationship

The average size of a family working in the fisheries sector is 12, double the national average of 6. The families of boat owners are too large on average with 15 members. Polygamy is practiced by 72% of the boat owners and 11% of fishermen.

3) Social Background

Of all workers in this sector, regardless of the number of years, only 19% went to school, which supposes an illiteracy rate of 80%. Thirty-six percent of all workers in the sector belong to a mutual aid group such as *Tonchin* (mutual financial association) or other public organization centered on principal landing sites. However, the organization rate of fishermen is weakest at 12%, and that of wholesale fish merchants high at 52%.

4) Economic Background

Before working in the fisheries sector, 26% of all boat owners were farmers, 31% tradesmen, plasterers, tailors, and the remaining 43% inherited dugouts from their father or manufactured their own. On the other hand, 86% of the fishermen do not have any work experience other than fishing. Thirty-two percent of all workers in the sector practice an ancillary activity, mainly trade and agriculture during the rainy season. Approximately half of all boat owners and 1/4 of all fishermen have their own home, and approximately 20% of ship owners also own land, including arable land.

3-6-2 Overview of Fishing Communities

Village communities, including villages where fisheries workers (hereinafter simply referred to as “fishermen”) reside near landing sites and in the surrounding area, as well as aboriginal communities that manage these lands are defined as a “fishing community”⁷.

(1) Process of Formation of Fishermen and Fishing Communities

The aborigines of the Bagas and Sousous ethnic groups along the coastal area are farmers in theory, and there were practically no professional fishermen in Guinea until the second half of the 20th century. They are the migrant fishermen of countries with advanced fisheries like Ghana, Senegal and Sierra Leone, which exploited fishery resources, and through their daily contact the inhabitants of the coastal areas of Guinea learned the

⁷ In the case of Conakry and Kamsar, workers in the fisheries sector are dispersed far from the landing docks and the territorial relationship is weak. For this reason, there are no fishing communities, only landing docks.

fishing techniques. The degree of concentration of inhabitants along the coast to fishing activities was proportionately opposite to their access to the lands, which represented resource production for farmers. The lands were managed by the aborigines and were distributed to migrants from other areas. However, pressure from the coastal population strengthened itself, and the access to the lands became difficult for the migrants. Migrants without lands were forced to exploit fishery resources that do not have owners, becoming professional fishermen themselves and then created the hamlets near landing sites. Thus, the reclamation of the grounds began with the interior and moved towards the coast, and generally speaking, villages near the coast are not as old. Landing sites in new hamlets where professional fishermen and agricultural specialists reside often have migrants from Guinea and other countries with experience from the hamlets of aborigine farmers. But today, the split is shifting and young aborigines are looking to the fisheries and decreasing their dependence on agriculture in order to diversify their income, increase their frequency, and in certain cases, have moved to the hamlets of fishermen.

(2) Constituent Members of Fishing Communities and Social Groups

In the fishing communities, aborigines divide the land, and migrants to whom arable land and housing lot are allotted, between which usually exists a master-servant relationship (tutor relationship⁸) less severe than the licensing of residency and transfer of grounds. The senior of the family of village founders, called “wise”, is the traditional head, and manages the village lands with the assistance of elder aborigines. On the other hand, the first comers of each ethnic group of migrants represents its ethnic group, and function as intermediary between the newcomers and the wise, with the resolution of the litigations and with the adjustment among the other groups. Thus, the function of regulation by ethnic group is visible in the villages and includes several ethnic groups. Among the migrants, there are foreigners from Sierra Leone (ethnic Teminé and Creoles). Since their fishing gear and fishing styles are different, there have been no clashes with Guinean fishermen. However, confrontations between them are very possible in the future. Considering their very weak position in the fishing communities, their solidarity and unity is very strong.

As described in (1), the following splits have generally taken place: (i) professional fishermen are a large majority of migrants (ethnic groups Sousous, Teminés, Peuls, etc.), (ii) both aborigines and migrants are part-time farmers and fishermen, (iii) the majority of professional farmers are aborigines (ethnic groups Bagas, Sousous, Narus). The population of each occupational class indicated in category 1 (village of fishing professionals)"Landing Site Category and Fishing Villages" for villages in Chapter 4,(The master plan) (i) is more than 50% because outboard motor ownership is rising and fishing is possible throughout the year, followed by (ii) and (iii). In the villages of category 2 (village of part-time fishermen and farmers), outboard motor ownership dropped, and agriculture is the principal activity during the rainy season and (ii) becomes majority. In addition, in the villages of professional fishermen, there also exist (iv) groups of professional tradesmen (wholesale fish merchants for smoked fish, sales of utensils for everyday use, migrants of ethnic groups Sousous, Peuls, Malinké etc.) and (v) civil servants such as representative organizations of the Navy and the Ministry of Fisheries. (vi) fish smokers (sometimes wholesale fish merchants) are often family women (i) and (ii), but there are also men specialized in the processing of fish. There are

⁸ Migrants feel obliged with respect to the indigenous family (tutor family) which provides them the grounds (residential or agricultural land), and spontaneously help them in the event of marriage or death, or of any problem

also cooperatives and mutual aid organizations for these activities, and considering only the activities of fishermen, there is always an organization of professional fishermen. In general, the advantages of organization are not clear enough to justify and organized village fishermen appear to be small in number. However, organization members are generally considered as leaders with opinions or spokesmen by outsiders.

The *tonchins* (mutual financial associations) organized by each gender are worth notice in traditional groups of the villages, which play an informal financial role from many of the aspects of everyday life and production activities. The *tonchins* are also useful in building confidence between inhabitants. Seasonal mutual aid organizations, during planting and harvesting, for example, exist among part-time fishermen and farmers who practice rice growing. Since a traditional cooperative spirit was rooted in Guinean society, be its extension repair of access roads periodically conducted by the present sector unit is also to.

In fishing communities of multinational and multi-ethnic fishermen, including various occupational classes, the Islamic religion guides the community, assists in promoting community spirit, and at the same time participates in the migrant Moslem community (including foreigners). The Islamic community spirit is expressed through the construction of mosques and the creation and utilization of Islamic schools by the people. Furthermore, the Imam is the teacher of Islamic religion and moral support of the villagers. The existence of a common language Sousou along the coast also facilitates communication between different ethnic groups and contributes partially to the transmission of information and helping to build good relationships between the villagers.

(3) Decision Making Mechanism

At the sub-prefecture⁹ level, there is the CRD (Rural Committee of Development), a rural organization financially independent of administration power, which is in charge of regional development. The CRD have a characteristic budget for activities¹⁰, and deal with the planning and implementation of small developmental projects at the sub-prefecture level, such as construction of public medical facilities or schools, repairing of roads etc. A representative from each district and secretary are assigned to the CRD by the central government. In each district, a committee is created by the “wise ones” who are senior members of the indigenous people, imam. First, members are selected by the inhabitants, of which two are also members of the CRD representing the district. Secondly, a traditional decision-making organization is used as an advisory body in agricultural villages where common law and modern laws coexist. Each sector has a head appointed by the district committee, and provides arbitration during disputes between villagers, as well as taking care of the collection of taxes. The “wise ones” are at the center of decision-making at the village level, and notable people, such as the elderly of the indigenous families, heads of sector and the imam, etc. primarily take part. Public meetings are organized, but often it is not a place for discussion, but rather a place of presenting of decisions already made by prominent people in the village.

9 Administrative divisions in Guinea: area, prefecture, sub-prefecture, district and sector; fishing communities are comprised of one or more sectors.

10 Seventy five (75) % of taxes (2,000 FG/adult/annual) and various taxes collected through markets, slaughterhouses, etc. constitute the financial resources.

The fishermen, although a majority, are mainly migrant, and are set apart from the traditional mechanism of decision-making of the village. Moreover, the fishing communities themselves are new compared to farming villages in the vicinity, and despite their large size, cannot send delegates to the CRD, the regional decision-making¹¹ organization. Consequently, the wishes of the fishermen or fishing communities and their needs are inadequately reflected in decision-making at the village or local level, which translates into construction delays for publicly owned establishments in fishing villages and prolonged road construction.

Questions concerning the activities of fishermen are decided mainly by the director of the fishing port elected by the fishermen and approved by the Ministry for Fisheries. The director of the fishing port manages the landing site, and a management group CDD comprised of representatives from occupational classes, such as fishermen and fish processors, and the director of the fishing port, is created where facilities have been built by the government or through private donations. But if the expropriation of "grounds", for example for the construction of facilities related to the fisheries, is necessary, it is impossible to come to a decision concerning the grounds without taking into consideration the opinions of the wise ones and influential indigenous people, who manage the grounds.

3-6-3 Migration of Fishermen

(1) Types of Migration and Settlement

Three types of migration with the objectives below were observed on the Guinean coast.

- (i) Fishing cycle : Standard fishing cycle: They move in an annual or monthly cycle in search of good fishing grounds, sale network, but do not change homeport.
- (ii) Migration : The objectives are the same as for (i), but they change homeport. Fishermen without boats migrate to search for the best working conditions, and consider entering the labor market at landing docks based on personal experience and techniques. In addition, some fishermen migrate when their labor cannot lead to enrich their lives due to high dependency on territorial relationship or blood relatives in order to cut off such relations.
- (iii) Camping : The homeport remains fixed, but the fisherman goes to live with a member of his family at provisional housing near the landing site during the fishing season. During the low season (rainy season), he returns to the village where he does secondary work such as agriculture, etc.

The migration of fishermen from Sierra Leone was originally cyclic in nature with regard to Guinea, but with the degradation of the political situation in their country, more displacement has been the result. Type 3 is largely practiced by part-time farmer/fishermen. Migration of Types 2 and 3 are associated with the sedentary nature of

¹¹ In the prefecture of Boffa where the fisheries are flourishing the most in three coastal sub-prefectures, there is only one represented fishing community in a 10-member CRD in only one sub-prefecture.

the fishermen. The fishermen of these two types are not regarded as members of indigenous communities and are sedentary fishermen. However, if they are many, there are problems at the organizational level of the inhabitants or granting credit.

Here are the details regarding migration of Type 1 fishermen.

(2) Movement of Artisanal Fishing Boats

As Table 3-20 shows, according to a study report of the entire coastal area by the Boussoura National Center of Fisheries Sciences, 1/4 of all artisan boats move at least once a year with a certain objective. The objective of the move is “fishing” for more than 80% of the cases, and “sale of fish” for more than 10% of the cases. More than 60% of the boats moved were for fishing in search of migrating bonga. Migration is carried out mainly during the dry season; frequency is several times a year in 50% of the cases, and several times per month for the rest. The period of migration is from one to three weeks for most of fishermen and more than one month for the rest. If one compares the data on frequency and period, one can clearly see that two models are more frequent: seasonal migration per month for an annual cycle (approximately 32% of the total) and monthly migration per week in relation to the tides for a monthly cycle (approximately 32%). By coastal prefecture, one will observe that the fishermen of Boffa prefecture move the most, and that migration in the prefectures of Boké and Boffa are carried out within the limits of these two prefectures. Generally speaking, they move northward - in other words, fishermen from southern prefectures move towards northern prefectures, and within the prefectures many move towards northern landing sites.

Migration in order to sell catches happens mostly in the prefectures of Boké and Conakry. In the case of Boké, since there is no land access and many rundown landing sites, particularly during the dry season, which is fishing season, they move towards Kamsar, the principal landing site in the prefecture, to sell their catches. In addition, at Conakry, which is the fishing center of Guinea and major center of consumption, migration for the sale of fish is observed throughout the year.

Table 3-20 Number of Artisanal Fishing Boats in Migration by Prefecture

Prefecture	Boké	Boffa	Dubrêka	Conakry	Coyah	Forecariah	Total	%
Total number of boats in service	369	540	96	966	59	276	2306	100
Number of boats in migration	98	246	5	165	2	63	579	25
Ratio of boats in migration	27	46	5	17	3	23	25	-

Source: La pêche artisanale maritime guinéenne en 1992 (Guinean Maritime Artisanal Fisheries in 1992 (CNSHB, 1994)

3-6-4 Economy of Fish Farmers

(1) Types of Fish Farmer Management

The types of management of fish farmer activities are defined to a certain extent by the type of boat and fishing gear used. As shown in Table 3-21, there are four types: 1) family management type, 3) capitalist type, 2) between 1 and 3, and 4) a new type cumulating motorization techniques and knowledge. In case 1, the boat owner is usually the fisherman; in case 3, the boat owner does not go fishing, but rather act as a manager or investor. From 1 to 3, specialization in activities of the crewmembers create professional categories and differences in allocation of profit between the boat owner and crew and between crewmembers increase. Specialization in activities is carried out through the operation of outboard motor and nets, watcher, land operations (preparation for exit and watchman of boat: those specialized in such operations are called “*Légoman*”). The crew hierarchy is the captain - *Légoman* - fisherman - apprentice. The captain takes total responsibility for navigation, the placement of the nets, recruitment of crewmembers, and negotiations with ship owner, etc. The boat owner generally handles the sale of catches. For Type 4, each crewmember is responsible for his own line and work. Therefore, even though a boat owner is present, he has no specialization in activities or any hierarchy.

Table 3-21 Types of Fish Farmer Management

		Type 1		Type 2		Type 3		Type 4	
Type of fishing boat, fishing gear & method		<i>Pirogu</i> , non-motorized <i>salan</i> Various fishing gear are utilized according to a case		Medium-sized motorized boat FME, FMC, PA		<i>Flimbote</i> FME, FT		Large-sized <i>salan</i> (pampa) LIG	
Crew		Boat owner & (i) his family & (ii) friend Fixed (1 to 2 persons)		(i) Boat owner's family, (ii) employment Not fixed (around 3 persons)		Fixed through employment (multi-ethnic groups or only Sierra-Léonais, 8 to 30 persons)		Usually family or friends (5 to 10 persons)	
Specialization of activities, professional category		None		Person responsible for outboard and net		Professional category headed by boat owner		Partial role and shift of operation on board	
Principal landing dock or fishing community		Landing sites in categories 2 & 3		Entire coastal area		Landing sites in category 1		Mainly in Conakry	
Tendency of profit sharing		(i) No distribution (ii) Boat owner : crew = 1:1, 2:1		(i) No distribution (ii) Always boat owner > crew		Boat owner > crew Difference according to professional category of crew		Boat owner : crew = 1:1 + miscellaneous fish, equally distributed to crew,	
Initial investment	Fishing expenses	Small	Small	Medium (Pa) to large	Medium	Maximum	Large	Medium	Maximum
Processing & sales		Processed by female family members		Processed by female family members or selling to other processors or wholesale fish merchants				Purchased by traders for exports	
Side business		Agriculture or other side business exists		Boat owner has a side business in some cases.		Boat owner is a full-time employer or an entrepreneur of other job classification		Boat owner is a fisherman or rents his boat by charging a rent.	
Extent of operation		Near & narrow						▶ Remote & broad	

For Type 1, the ship owner and crewmembers distribute the risk by applying secondary work, for example agriculture, or by changing equipment or fishing method. For Types 2 to 4, the boat owner may have secondary work, but many of the crewmembers are only fishing professionals. In other words, the boat owner can distribute the risk by applying secondary work, or by having several boats use different equipment or fishing method. But for the crewmembers, this is high-risk management. Motorization and exploitation of new types of fish and fish species are necessary to reduce the risks of fishing activities. For this reason, type 4, currently the latest fisheries in Guinea (however, utilizing the oldest types of fishing equipment and methods) has attracted attention. However, two conditions must be filled for this type of operations: “ice” on landing sites and “good purchasers (= the industry of exporters)”.

(2) Profit Sharing

Profit sharing varies depending on the landing site and the boat owners, and here we will limit the discussion to general trends.

In the case of family management, the ship owner is usually the head of family, and the profits are not shared. If the crewmembers are not part of a family, the ship owner's percentage: crewmember = 1-2: 1 is normal for Type 1 and Type 2 long line fishermen. For Type 4 of the angling with ice, the aim of which is prime fish such as sea bream, and the profits are divided evenly between the ship owner and crew, all the by-catch go to the crew. The profits are divided equally between crewmembers; however the captain receives a larger share. Distribution varies in the case of nets, but the general rule is “the size of boat and net and boat owner's share are proportional”. Distribution for crewmembers is carried out in accordance with the above-mentioned hierarchy. It should be noted that the frequency of remuneration for crewmembers falls under 2 types: (i) by each fishing day, or (ii) only for the “day of the crew”. In the case of (ii), all catches between 3 and 6 days belong to the boat owner, and the catch of the following day is for the crew, which makes remuneration once every 4 to 7 days for the crew. But sometimes, even on the “boat owner's day”, in order to motivate the crew, “cigarette money” and “fish dinner” are provided. On the “crew's day”, fishing costs such as gasoline expenses become the responsibility of the crew. The method of payment 2) was not observed in Conakry. Elsewhere, payment of the crew is done generally by cash at Conakry whereas, it is paid in kind at rural areas.

(3) Economy of Fish Farmers

A fact-finding study on the current operations and management of fishing activities is currently underway, and the findings¹² of a similar study carried out by the Boussoura Center are summarized as follows (also refer to Table 3-21).

- 1) The highest initial investment is needed for the surrounding net (FT) (12.8 million FG) which is 7.5 times more than the lowest cost non-motorized drift gill nets for bonga (FMDE), and 1.5 times more than a fixed gill nets (FMC) with large mesh size. Annual depreciation (boat and outboard motor boats only) is 1.2 to 1.4 million FG for FMC and FT, more than twice as much than for other boats, and the

12 A one-year follow-up study was carried out on 24 boats using 7 different types of fishing equipment and methods different at the Boulbinetport, the central port of Conakry. These 7 types are FMDE non-motorized, FMDE with outboard motors, large FMC with large mesh size, FMC very large mesh size, FT, LIG and PA.

maintenance costs, including repair costs for nets, are high for FMC, FT with large nets. Whatever the fishing method, maintenance costs correspond to approximately half the gross income of the ship owner. Operation cost is highest, 143,000 FG, for the angling with ice (LIG) which leave for several days (ice and food count for more than 40% of the total expenses). Fuel expenses are highest of the operation costs: 60 to 70% for FMC, FMDE and FT, 45% for LIG and long line (PA).

- 2) Whatever the fishing method, the division of catches is large, which suggests significant “risks” for the activities of fisheries. The maximum monthly net profit of a boat owner for FMC is 275,000 FG, followed FT (194,000 FG); Pa and LIG are practically identical (110,000 FG), and weaker for FMDE at 38,000 FG for a motorized boat and 4,000 FG for a non-motorized dugout. The maximum income of crew members is 228,000 FG for PA, followed by FMC (104,000 FG), LIG (88,000 FG), FMDE and FT being less than 50,000 FG. For FMDE and PA, the income of crew members exceeds the estimated profit of the boat owner after deductions for amortization, maintenance costs and taxes. On the other hand, for FT, boat owner: crew members = 10:1, the difference of distribution of income is significant.
- 3) The yield on investment, which exceeds 40% for PA, LIG and FMC, is an indication of the good profitability of these fisheries. The aim of these types of fishing is prime demersal fish, like sea bream, whose selling price is high. On the other hand, the output rate on investment of FT and FMDE, the aim of which is ordinary pelagic fish, is weak at 18% and 10% respectively.

3-6-5 Fishing Communities from a Gender Point of View

(1) Current State and Problems of Rural Women

Documents accumulated by the Ministry of Social Affairs and a survey by interview carried out by the central management and the prefectural management of the same Ministry make it possible to indicate the current situation of women in close connection with the formulation of projects among those which represent aspects marking. In the analysis of causes stated on the provided documents and by questioning people, problems are considered due to the difference in volume of information and income between men and women.

- (i) Social infrastructure such as medical care, teaching, information, etc. is insufficient because of poor access to the road network and the lack of human resources. Moreover, women’s access is limited, basic human rights such as medical care and education, are not as available as compared to men. For example, in accessing medical establishments many women must go to medical centers while men go to the hospitals.
- (ii) Work opportunities are limited and income varies according to external factors that are difficult to control, making life difficult for women.
- (iii) The sharing of tasks by gender in accordance with traditions and religion, for example, the right of decision-making, is much stricter in rural communities than in the cities. For this reason, women's rights are difficult to exercise. For example, the choices of woman are not fully accepted in decision of marriage.

- (iv) There are few opportunities for women to express their views, and quite often decisions on subjects common to the inhabitants are discussed only by the men, or where they are an absolute majority. Consequently, in undertaking new actions, it is necessary to give women and young people the opportunity to express themselves while adhering to the existing village guidelines.

(2) Current State and Problems for Women in Coastal Fishing Communities

The current situation brought to light documents established by the Ministry of Fisheries and Aquaculture and a study through interview with the inhabitants of coastal villages where landing sites are situated. Elements closely related to the formulation of projects are indicated here.

(i) Separations and Polygamy are Numerous

It is extremely likely fishermen who move, who leave their families in the search of good fishing, seeking temporary living quarters to have a second or third wife. As indicated in the preceding paragraph (iii), task sharing between the gender is relatively clear, thus facilitating multiple marriages. Moreover, the general view from men is that fishermen who migrate are somewhat freer than farmers, it seems to request multiple marriage due to daily income.

On the other hand, the following situation became clear from the viewpoint of women who work in distribution and processing. Accordingly, there are women who leave their husbands to work for long periods at good fishing villages like Koukoudé or Kamsar. Inevitably, she is separated, which can also lead to multiple marriages by her husband. Moreover, the possibility of local fishermen loaning their wives or having a mistress is very high. It was impossible to estimate a number of these women working elsewhere because many of them live by going and returning between the fishing communities and their husband's dwellings. However, even small distances from landing sites on an island such as Sakama, one can meet women who come from Conakry. Moreover, at the time of a socio-economic study (1997) implemented by the Boussoura Center through interviews of almost 2,322 agents distributors and transformers, the number of women who come to work in Koukoudé and Kamsar was very high.

(ii) The Adverse Effects of Polygamy

Habitually, women take care of the expenses of everyday life, in particular, the education expenses for the children. Even if the wages are low, women will search for jobs. There are even families where the income of several wives supports the family. Since the framework of working women is not as organized as that of the men, one could say that women carry a disproportionate load, considering the extra care of children¹³.

In the case of fishermen, husbands have wives at several places and their family is dispersed. And even in the event of separation, more often than not the mother must

13 Difference women/men for the number of desired children (average number of children, for women: 6.2 children: men: 7.9 children; married women not wishing more children: 14%, men: 7%), difference women/men for knowledge and practice of contraception (knowledge: women 28%: men: 55%) (women using a contraceptive: 1%, men 3%). MPFE (national report on situation of women in Republic of Guinea) 1995, p.28

raise the children and the financial burden of that woman is very heavy. However, the framework of work for women remains hard. Situations of separation can easily violate the Moslem principles of equity (Koran, Chapter 4, Verse 3¹⁴). Polygamy is neither desirable nor unusual.

Moreover, in the case of a large fishing family, family members tend to look at woman as suppliers of work or producers of children who will be the labor force of future generation¹⁵. It is advantageous for a manager who is a husband to have many women and children. But often women as a family worker or successors are at disadvantage compared to a monogamy relationship at the time of distribution of property.

(iii) Less Knowledge and Volume of Information Compared to Farming Communities

Agricultural villages profit from stimulation measures for villages and from extension staff, providing a source of information for even the illiterate. However, there are neither sources of information nor instructors in fishing villages. In particular, information for the illiterate is limited everywhere, and the elimination of adult illiteracy is not as developed as in the agricultural villages. According to list prepared by the National Management of Elimination of Illiteracy of the Ministry of Education, classes to eliminate illiteracy in fishing communities are few.

(iv) Unusual Lifestyle of Female Fish Smokers and Wholesale Fish Merchants

Working hours (economic activities and work household) per one day and one week are fixed according to the day, schedule and volumes of landings, so it is impossible to establish ones own program, and the physical and moral effects are a major concern. In particular, smokers are in the following dilemma; if purchases are inconsistent one gets nothing in return, but if purchases are plentiful, long hours of hard work smoking are necessary, which is bad for health. Moreover, during the year it is necessary to perform two activities: curing during the tourist season and agriculture during the slow season or further migration will undoubtedly become necessary to find new fishing sites.

(v) Unstable Income

Women are influenced by external factors that are often unexpected, such as low volumes of fish catches by men, uncertain arrivals of large catches by purchasing companies, etc. making it difficult to forecast income compared to agricultural villages, and low earning stability. In other words, one could say that higher management capability is needed. But actually, as shown in (iii), knowledge and the volume of information are low and access is limited.

14 Do you think you will be able to correctly occupy you of the orphan, it is better to take a woman you like good that you wives a woman, two women, three women or four women with your taste. But if you cannot treat them equitably (because they are numerous), you should limit women to only one. Or you satisfy with what has your right hand (summary of the contents)

15 Posérappe already showed that the number of women and children worked hard for economic reasons due to polygamy. [Role of Woman in Economic Development], Chapter 1, 2, Economic Science of Polygamy, 1970.

(vi) Gender Role in Fishing Activities

Although men can become smokers or wholesale fish merchants¹⁶, women are not allowed to become fishermen (except for manual operations in shallow waters). In the case of a boat owner who does not go fishing directly, if a woman has economic means gender-related limitations do not exist, so we have met many active women wanting to become boat owners. But in reality only 2% of boat owners are women compared with male boat owners they lack the sea experience which gives rise to disagreements with employed fishermen leading to unfavorable situations.

3-7 Fishery Producers Organizations

The Guinean agricultural sector is comprised of 6,440 groups of farmers (under the supervision of the Ministry for Agriculture [Ministère de L'Agriculture], different from co-operatives under the supervision of the Ministry for Regionalization [Ministère de la Régionalisation]), to which 167,000 farmers belong. In general, 10 to 30 farmers make a group. It is an organization of farmers defined by Decree 05 of the Ministry for Agriculture. These groups are formed voluntarily by farmers, and not by force, in order to learn from the failure of organizing farming groups under the socialist regime that was in control from 1958 to 1984. For this reason the number of affiliated farmers is still very small, and information on groups of farmers is still not reaching them sufficiently. Among the various groups of farmers, there are mixed groups of men and women, groups of women who cultivate vegetables, and groups of men who cultivate cereals and potatoes, etc.

Establishing the objectives of activities and rules of organization are left to the farmers, which is why there are a variety of forms. The advantages of organizations often stated include: (i) smooth systemization of joint farming activities, (ii) access to development programs implemented by assistance organizations, including assistance 2KR by Japan and the NGO, (iii) access to funding from the Crédit Rural (Rural Credit), and (iv) fulfillment of internal financing of mutual aid.

Several groups in an area form a cooperative, and cooperatives congregate to form a federation. The National Service of Rural Promotion and Popularization (SNPRV: Le Service National de Promotion Rurale et Vulgarisation) of the Ministry of Agriculture ensures the diffusion of groups through T&V (Training and Visits), but currently there are no organized activities for diffusion.

On the other hand, along the coastal areas of Guinea, there are some 50 separate organizations of fishery-related producers, fish smoking processors, wholesale fish merchants, boats for transport etc, of which 22 are active today (Page 35 of the Preliminary Study). These organizations are constituents of a Committee of Development of Landing Sites (CDD: Comité de Développement de Débarcadère) by landing site. There are five CDDs in Conakry. And these CDDs have formed the National Federation of Artisanal Fishermen (Fédération Nationale de la pêche artisanale), whose primary function is the contacting of assistance. However, further study is needed to confirm whether or not the National Federation of Artisanal Fisheries represents artisan fishermen all over the country. We visited many

¹⁶ In a study by the Boussoura Center, the percentage of the men among fish processors is 5% for curing (13/288 people) and of 57% for drying (4/7 people) MPE (Results of the survey followed by a socio-economic study of Guinean artisanal fishermen) 1997, p. 46, Table 13.

producers' organizations across the country at the time of the study. Following are the summary of the findings.

Women's Fish Smoking Co-operatives in Conakry

- According to the findings (Appendix) of the study at the PCM workshop, more than half the number of cooperatives deal with appropriations of credits, socio-cultural activities, the nomination of members for elections, or organizational installations such as assigning accounting members, which is an indication of much more intense activity than expected.
- For example, a cooperative created by 40 smokers at the port of Dixinn in Conakry is of this type. They work together in fish smoking with UE assistance and assist each other during difficult times. It should be noted that 3,000 FG a month (currently balance of 40,000 FG) is collected and so far 10 members have requested short-term funds (interest rate of 40% per month). In the future, they intend to purchase fish as raw materials and collectively sell their products. In the organization, the executives of the cooperative are elected, one full-time accountant is appointed, and should a problem arise, it is discussed between members in a democratic manner. At the end of the interview, the question "Are you satisfied with this cooperative?" was asked, to which they answered spontaneously, "Of course", which impressed us very much.

Six Groups Under UCOPAD Supervision

- For 8 years between 1989 and 1997, the CIDA have implemented projects related to materials and human resources in the 6 villages of Goré, Tounifili, Bongolon, Bongolondi, Pougoun and Dali in the prefecture of Boffa, and built gasoline stations, fishing gear stores, outboard motor repair shops, and a community hall of centered in Bongolon. In the mean time, CECICANADA, a Canadian NGO was contracted to work to eliminate illiteracy and central management for fishermen to create a fishermen's cooperative in each of these villages. These cooperatives were united into UCOPAD (Union of Cooperatives of Artisan Fishermen Douprou), that employ five employees manages gasoline stations and fishing gear stores. In February 2000, the Rural Credit provided funding to members of the cooperatives through mediators of various cooperatives guaranteed by UCOPAD (Union Cooperatives Pecheurs Artisanale Douprou).
- These six cooperatives include unique organization in which fishermen, wholesale fish merchants and female fish smokers jointly participate, and one of these cooperatives is the fishermen ' s cooperative of Gorét. The Credit Rural having approved the loan of funds by the members of the cooperatives, with a ceiling of 10 million FG per village, so 11 people have taken out loans, including the leader of the young members, head of the Gorét cooperative. Two of them borrowed 2.5 million FG to buy outboard motors; the others have used their loans as fish trade for smoked fish. To qualify for a loan, one must be a member of the cooperative, resident of the village, and an honest man. The monthly interest rate is 2.5% (annual rate of 30%). Small loans of approximately 500,000 FG are repaid over a 10-month period and large loans of 2.5 million FG over 26 months. At the time of the study in May, three settlements had been completed without difficulty.

CDG at Kamsar (4 cooperatives at the new port of Kamsar and 3 cooperatives at Katchek)

- Based on an experimental project of UCOPAD, the infrastructure of the new landing site (new port) at Kamsar was created with \$US 5 million. At the moment, with technical aid from FAO, the Board of Management (CDG: Committee de Gestion) was organized to mainly manage the new port.
- Structure of the CDG: the CDG was composed of two representatives elected by each of the seven cooperatives forming the UCOPAD, and a general manager and deputy manager were officials elected by these representatives. The seven are cooperatives of fishermen (57 members), wholesale fish merchants (46 members), fish smokers (50 members among 207 members), the transporters from Kamsar, as well as a cooperative of fishermen (120 members), wholesale fish merchants (110 members), and fish smokers (40 members) from Katchek. A Control Committee (Comité de Côntrol: CC) is established separate from the CDG. CC are also established for each cooperative.

Since its entry into activities in 1999, the CDG ensures smooth management of the new port. Since its opening one year ago, it has succeeded in generating a profit of 11 million FG in sales sites at the markets, and sale of ice. Here are some of the strong points of management capacity of the CDG:

- (i) Preparation of a project planning with fishermen's participation and donor assistance;
- (ii) Recruitment of one-year contract for a general manager;
- (iii) Clarification of the management body of ice factory, repair workshop for outboard motors and effective utilization of incentives creating a single "partnership system" integrating the profit sharing;
- (iv) Institutionalization of account auditing and committee for monitoring the project including donors.

Mr. Sory Oulare, general manager, pointed out three problems currently being addressed by the CDG.

- (i) The CDG would like to purchase fishing gears and outboard motor parts, but working capital is insufficient;
- (ii) The CBG, the bauxite firm, which has a refinery in the town of Kamsar, has requested the complete closing of the old port that is on its grounds. However, it is impossible until the new port is fully operational;
- (iii) The demand for ice is considerable, but the CDG does not have the funds needed to invest in facilities

Compared to the performance of the CDG, on the whole the various cooperatives of which it is comprised are not very active in general. Three cooperatives in Katchek exist only nominally, are known to be created to receive assistance, but do not have specific independent activities. The fishermen's cooperative of Kamsar, created in the image of the cooperative of Conakry which received Japanese assistance in 1987, do not have any specific activities. And the fact that members of these cooperatives obtained UNDP or FAO assistance is due only to the formation of the cooperatives, so they are satisfied. Originally, the contribution

(enrollment fee) was 100,000 FG, but it was extended to 200,000 FG. For fishermen came from other places, not knowing the development up to now, it deems that the contribution is 150,000 FG for them. Funds accumulated up to now have been used for guarantees at the time of the purchase of engine parts by members.

Comparatively, the women fish smokers' cooperative of Kamsar is a little more active. A curing (smoking) workshop was built during the new port project, and is mainly used by the members. Even non-members can also use it for a fee. However, the collected fees are not sufficient to ensure maintenance. For a period of two years after 1992, loans were provided to groups of five members within the framework of FAO pilot project, and all members profited from these loan. But despite the project's success, there has been no follow-up since then. Members have clearly expressed the need for credit, but do not know how to obtain it. Elsewhere, the CDG has proposed joint purchases of firewood for curing, but it hasn't been realized.

Fishermen's Cooperative in Koukoudé

- This cooperative was created in 1990 and has approximately 30 members. The organization is an independent entity of artisanal boat owners with less than three boats. There said to be 205 such owners in Koukoudé. To become a member, 10,000 FG must be paid, and 100,000 FG within six months after the affiliation. Originally, payment of 1,000 FG was obligatory at cooperative meetings at the end of the month, but it was suspended. Many non-affiliated boat owners would like to become members.
- Basically, this group is quite characteristic by having obtained engines and nets through grant aid for the fisheries cooperation of Japan. It was created by being heard that "in order to obtain assistance, the conditions are to form a fishermen's cooperative and to prepare a certain accumulated money". Actually, in 1996, in addition to fishing nets through Japanese assistance, they directly obtained five 15-horsepower outboard motors, and other 11 engines from a private firm called "Fishes Guinea" (Pêch Guinée), for total of 16 engines. The amount of the purchase was 1.6 million FG.
- As autonomous activities, there is a credit business of mutual aid to finance funds necessary for the repairing of engines. The monthly interest rate is 7.5% (annual rate 90%), and until now four members have taken out loans. This cooperative gave stimulus to the creation of the fish smoker's cooperative of Koukoudé described below.

Women Smoker's Cooperatives of Koukoudé

- In 1997, 15 spouses of fishermen, wishing to strengthen their own purchasing power without depending on their husbands, met and started by investing 1,000 FG each, for a total of 15,000 FG. Thereafter, their curing (smoking) activities went well on the market, and internally saved funds when by collecting 10,000 FG of additional contribution at the time of gaining incomes. Last year, the cooperative obtained Japanese Grant Assistance for Grassroots Projects (GGP) for the construction of a smoking house and toilets, and during the study group (April 2000), they had dug a well necessary for these facilities using their own capital. To ensure fish smoking materials, the cooperative provides opportunities to become a boat owner for fishing. There are currently 37 members and their capital has increased to 800,000 FG. Funds are deposited with the Rural Credit.

Fishermen's Cooperatives in River Fishing Communities

- In the village of Fodékaria, which is 60km to the north of Kankan, approximately half of the inhabitants, namely 28 people, have created a cooperative of fishermen. Despite that there are many migrant fishermen; they continue to make a monthly contribution of 1,000 FG. The funds collected are used for the travel expenses of members or the six directors (not remunerated), for visitors' meals etc. In the future, the cooperative will provide for the purchase of fishing gears.

Fishermen's Groups in Benti

- In Benti in the prefecture of Forécariah, since last year, stimulated by the creation of 45 farmers' groups, groups of fishermen, wholesale fish merchants and smokers have been organized one after the other. Currently, there are five groups in which approximately 200 people take part. What is interesting is that, each week, after the market at Benti, each member gives 10,000 FG and creates an organization of "financial mutual aid" within the group. The monthly interest rate is 5%, and each borrower is designated by a vote every time. In a group of 48 people including 39 men and 9 female smokers, since its creation in September 1999, four members have already bought an outboard motor at 400,000 to 600,000 FG through the organization of "financial mutual aid". Since the Rural Credit is strict towards financing for fishermen, and without a branch office of the Rural Credit being located in Forécariah, they don't have any relationship with a financial institution such as the Rural Credit.

Cooperatives of Wholesale Fish Merchants

- The organization of wholesale fish merchants in a competitive market environment is not easy because the advantages of the organization are generally unclear. In Conakry, there are 83 cooperatives of wholesale fish merchants to which 1,100 wholesale fish merchants are affiliated. Although these cooperatives do not offer specific services, the members have the right to enter the port of Boulbinet where foreign fishing vessels are present, so one might say that the organization is made up with by the grant of monopolistic rights. During the present study implemented at this time, the cooperative of wholesale fish merchants at Kamsar was the only one with clear objectives. To solve the problem of the transport capacity of smoked fish of from Katchek, they were studying the possibility of jointly purchasing a larger size boat than that in use now.

3-8 Fisheries Statistics, Regulations and Monitoring System

3-8-1 Current State of Statistics on Artisanal Fisheries

For the purpose of acquiring data on maritime artisanal fisheries, the Boussoura National Center of Fisheries Sciences has implemented autonomous studies on 21 landing docksites, for Besides, a total of 24 landing docksites, including 19 landing docksites of the 5 communal management of the town of Conakry and 4 among the 5 coastal prefectures are under the supervision of the Management Department of National of the Maritime Fisheries, and 4 among the 5 coastal prefectures. In the similar manner, the quality control department delivering the authorization for exported fishery products totalizes the data on exported volumes resulting from artisanal fisheries. The Center National of Monitoring Center has set

up a system of observers on boats, which enables the control of operations of foreign fishing vessels and to obtains information on catches

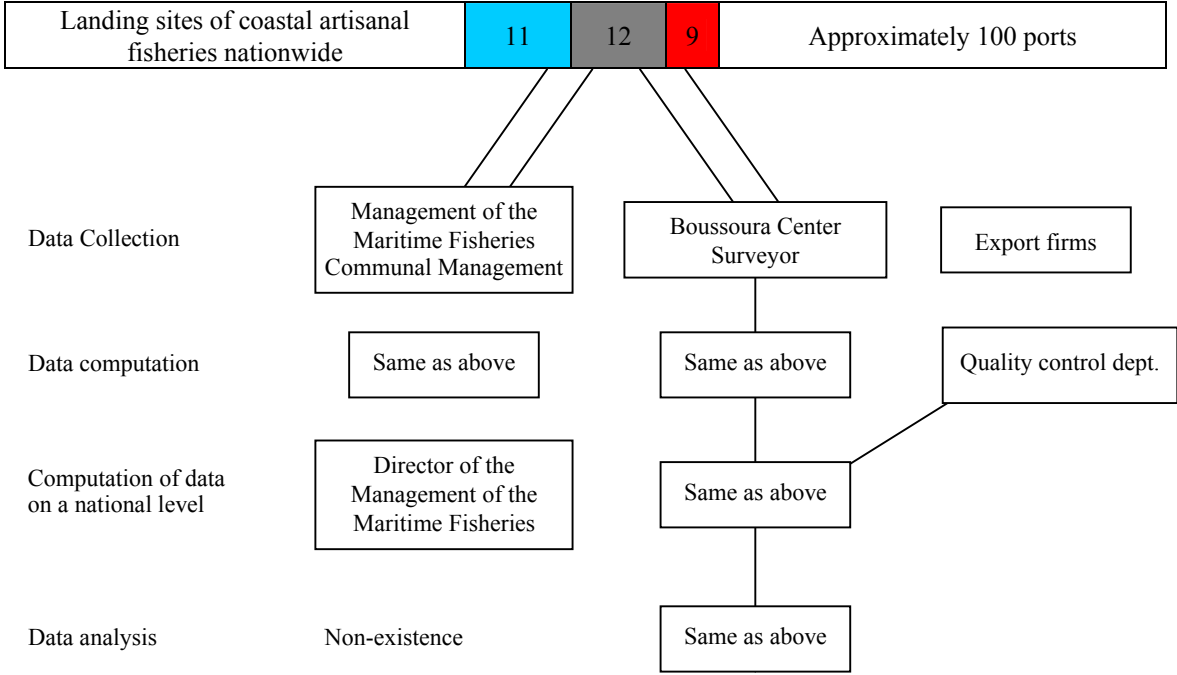


Figure 3-10 Guinean Fisheries Statistics System

Each year the Boussoura National Center of Fisheries Sciences completes a statistical report on the fisheries, including statistical data by prefecture, by fish species and by fishing methods used by artisanal fishermen. It uses seven of its own investigators to collect the data on artisanal fisheries at 21 landing dockssites. To estimate the total volume of catches for more than 100 landing dockssites nationwide, it gathers as much data as possible in a rational and logical way.

For the data gathering of statistics used in the Center, the artisanal fisheries department at the Center dispatches a survey team every year in advance to update data on the types and numbers of dugoutsboats, fishing methods at landing dockssites across the country, and thus fills the prerequisites in calculating the latest total volume of catches.

The surveyor for each landing dock site follows a technical training course in the collection of statistics for one month before being sent. In general, the surveyors are recruited among local fishermen. Since recruitment began in 1996 no surveyor has left his position.

Each investigator is assigned three landing dockssites, and on a 10-day cycle, confirms the landing of dugouts boats and records discharged volume. There are three types of recordings: (i) name of the dugout boat using the landing dock site during the period (or name of the captain) and confirmation of fisherman professional or not, type of dugoutboat, motorized or not, fishing methods, (ii) the number of dugouts boats leaving each day by fishing method, (iii) the number of departures obtained by interview detailed from approximately 20 dugouts boats samples, fisheries, and a study of the volume of catches.

The raw data collected each month are sent to the Boussoura National Center of Fisheries Sciences. Persons in charge at the Center perform all calculations and analyses. Moreover, researchers of the Boussoura National Center of Fisheries Sciences will sometimes implement on the spot survey and provide guidance.

The state of landing of dugouts boat samples by fishing method for each landing dock site is confirmed starting with the collected data, and the total volume of catches is calculated by employing the number of dugouts boats per type of each area. In other words, after the calculation of catches per unit effort by (CPUE) is done for each area, it is tallied by fishing method in order to consider the total volume of catches. Thirteen types of fishing methods, types and the loading of using ice are not including, are defined and which can be used like standard CPUE.

Table 3-22 Current Collection Method of Fisheries Data

Collected information	Method taken by the Boussoura Center	Method taken by the Department of the Maritime Fisheries
Boat name Boat owner's name Name of captain Number of crew members Type of fishing boat Size Horsepower of outboard Fishing gear name & size Fishing days Name of fishing site	Study of a landing site 10 days a month. Seven surveyors and assistants recruited conduct the study on 21 landing sites of the country by interview. It is a sample survey; representatives are selected by fishing method. The number of sample landing sites by prefecture is of 12 and 9 sites for communes. The study of the boats used on the landing sites takes place once a year nationwide.	Surveyors and technical extension personnel are posted at regional offices. At Regional offices of Commune at Conakry, there is at least a surveyor of each site, who works from 9: 00a.m. to 5:00p.m. He seizes the aspects of the fisheries mainly through daily discussion with principal boat owners, but data are not standardized and much is incomplete. The Ministry for the Fisheries does not have the system of booking of artisanal fishing boats; this is the role of the Department of the Ports of the Ministry for Transport.
Fish species & total weight Size by fish species Maturity rate by fish species	Approximate calculation by eye and measurement on a small spring scale. In Conakry, a weighing container is used. For fish size, one seeks the mean weight of the number of batch samples and total weight.	Random collection of the data at landing sites during the hours of work. Method of compilation of data is not standardized between regional offices. The weight is estimated by using a weighing container. There is no biological study.

The Communal Management offices of the Management Department of Maritime Fisheries records data of landings each day by means of its agent statisticians. Prefectural management office has supervision over several landing dock sites, and since only one agent statistician s are influenced by managementis on location, data gathering by each landing dock site is not carried out. , and Tthe agent is already overburdened by approximating information obtained on the only one landing docksite. Fish are placed in plastic cases containers for weighing (for 20 kg, 50 kg) and an estimate of unloaded volume is made by counting the number of containers used. However, in some cases none containers is available arrive. The regional management compiles data monthly and submits a report to the Ministry of Maritime Fisheries. This is unrelated to the data of the Boussoura Center.

The Quality Control Department of the Management of Maritime Fisheries collects data on requests for export applications in accordance with the guidelines of Boussoura Center. For the industrial fisheries, an inspector of the National of Monitoring Center goes to the boats and records information such as volume captured and fish after received guidance from the Boussoura Center. These this consistent data are compiled at the Boussoura Center.

3-8-2 Problems of Statistics on Artisanal Fisheries

The communal and prefectural managements offices collect data, but there are no rules or insistence to the contents and methods of data gathering. The regional management office director compiles the data monthly by fish species and total weight only once every 3 months. There is a difference between the distribution of agents,; and relatively significance of communal management; whereas only one agent is affected on the whole by the prefectural management, which gives place to a qualitative and quantitative gap in the data. Consequently, there would appear to be little value to this data. Data are reported to the Director of the Management Department of Maritime Fisheries, but not to the section on statistics in this management, which does not ensure control.

Everywhere in the world, Nnumerous problems exist with data collection at the landing dockssites of artisanal fisheries, as the majority of which have been relocated, on islands, or sites difficult to access from principal roads. Moreover, considering the number of dugoutsboats, there are not always many catches at landing dockssites, and in order to assign a permanent agent statistician data collectors (or personnel from the Ministry of Fisheries and Aquaculture), support within the framework of everyday life is necessary, which is difficult from an economic standpoint. Moreover, since the hours and places of landing vary depending on the season, fishing method and tide level, it is impossible to carry out all measures within the framework of an ordinary work schedule. It is also difficult to cover landings on off-days and holidays. Measuring is estimated using cases containers as a measure, or small spring scales; the absence of a means to correct weighing by eye also contributes to lower accuracy of data.

Although The method of data collection by the Boussoura National Center of Fisheries Sciences is well though and complete systemlimited, and there are some areas of improvements are necessary in the accuracy of data collecting of total catches because the amount of data at each landing dock ssite sample is limited., Further, monitoring the work of surveyors (data collectors) is difficult, and Katchek, an important base located on a remote island is not among the landing dockssites samples. Moreover, 12 places of data gathering are identical to those of the Management Department of the Maritime Fisheries, which is of no use.

Nonetheless, eEven if there are roads, access to landing dockssites is dependent on the season, which means the landing dock is often inaccessible by means of and transport such as aby motor bike (bicycle) is often unavailable. In addition, collection of data on maritime fisheries is carried out by only three Departments in the Ministry of Fisheries, which causes duplication of data collected as well as missing information.regional managements for artisanal data and fisheries sector, and by covering up any omissions, worthless data are compiled. Moreover, there is no electricity even at regional management offices in the community of Conakry, making effective data processing impossible. We need to consider

steps to eliminate the problems of personnel assignment, finance and infrastructure and to strengthen the capacity of implementation.

3-8-3 Regulations and Resources Management System

Guinea has an annual fisheries plan every year (January 1 to December 31) which is based on a study on of catches and resources of from the previous year. The fisheries plan defines prohibited fishing methods, areas of controlled catches, the control of size and number of fishing vessels, and total volume of catches by fish species. These figures are mainly defined obtained through the direct study of resources by a research boat entrusted by France. based on catches of the previous year. Efforts are also being made to eliminate problems such as the violation of prohibited fishing zones by industrial fishing boats, collisions with the dugouts boats of artisanal fisheries, and destruction fishing gears. The fisheries plan also refers to the fishing licenses, fishing taxes and tax system related to fisheries. In addition, the amount of tax for observer program observers is also fixed. and there is an obligation to checking the Foreign boats have to indicate the communication frequency number located on the hull, in accordance with international law. Allowable volumes of capture catch per fish species and actual fishing methods are indicated below. Fishing zones are also divided according to the type and method of fishing.

Table 3-23 Total Allowable Catch and Ratio of Incidental Catches by Fishing Method and Fish Species

Fishing method/ type of fish species	Allowable catch of fish (t)	Allowable catch of <i>Cephalopoda</i> (t)	Allowable catch of shrimp (t)
Ratio of incidental catch by fish trawling	28,644	2,578 9%	2,005 7%
Ratio of incidental catch by <i>Cephalopoda</i> trawling	864 7.5%	11,523	864 7.5%
Ratio of incidental catch by shrimp trawling	537 12.5%	644 15%	4,295.
Total allowable catch	30,000	15,000	7,164

Source : Fisheries Plan 2003

Table 3-24 Authorized Fishing Zones by Fishery Type and Fishing Method

Fishery type, fishing method	Authorized fishing zone
Artisanal fisheries in general	All zones
Boat with Ice refrigerator (trawler with less than 15m in length)	Beyond 10 miles of the low-water line
Industrial trawler with freezer	Beyond 10 miles of the low-water line
Industrial pelagic vessel	Beyond 50 miles of the low-water line

Source: Fisheries Plan 2003

Fisheries Monitoring Center (CNSP) has established 5 regional centers in major fishing villages in order to strengthen its ability to enforce the fisheries regulations. According to the Annual Report 2002, there were 212 days of surveillance activities on the ocean in total, checking 351 vessels of which 22 vessels were investigated on board. Seven vessels out of the 22 were confirmed operating in the prohibited area (less than 10 miles from the shore). Surveillance with airplane was conducted 9 times totaling 34 hours. During the survey, 231 vessels were observed and 49 vessels were confirmed unlicensed, 15 were not showing the registration number, and 2 vessels were operating prohibited fishing area.

Besides ocean and air surveillance, there were 141 vessels that had inspections of on board observers. Problem occurs when those observers want to contact the CNSP Head quarters as they depend on the radio communication set belong to the vessel, which is not comfortable for both the captains and the observers.

CNSP is hoping further strengthening its ability by installing 3 radar base to monitor the vessels and also will test the transponder (Algos system) to monitor the foreign fishing vessel activities. Limiting it to artisanal fisheries, there are no usually traditional customs for stock management, and access is completely free. When we discussed stock management with fishermen, they said that the only controls were on mesh size of gill nets and conservation of turtles, which were introduced by the government.

Although there are still no special regulations on artisanal fisheries, it is clear the catch effectiveness of artisanal fisheries is increasing and that unlimited development will eventually lead to the exhaustion of coastal resources. It is necessary to take swift steps for stock management in order to ensure the sustainable development of artisanal fisheries; recently a common bill concerning artisanal fisheries was drafted, and discussion in the National Assembly scheduled to register.

The above mentioned bill contains many regulations such as an obligation to register fishing vessels and the definition of equipment and prohibited fishing methods, the installation of a council for artisanal fishermen and a development committee for landing sites, quality maintenance, etc. In addition, the bill is extremely holistic and aims at stock management of fisheries resources stock in a preventive and community-oriented manner, and improvement from the aspect of social welfare for artisanal fishermen and safety at sea. The following regulations are proposed for sustainable utilization of coastal resources for artisanal fishermen.

Fishing regulations for artisanal fishermen (draft)

- Prohibition of beach seine net and trawling closer than 10 miles from the coast
- Prohibition of *reggae* nets, *bembé* nets, and of all nets with a mesh size of less than 25mm
- Prohibition of the use of explosives and poisons
- Prohibition of the contribution, transport of explosives and poisons without the authorization of Director of Regional office
- Prohibition of abandonment at sea (fresh water including) of captured fish
- The net size for demersal fish must be more than 30mm
- Prohibition of the capture of marine mammals, crocodile and turtles

3-8-4 Issues Regarding the Management of Artisanal Fishery Resources

For effective and sustainable use of coastal resources, we need to pay attention to the fishing operations of industrial fishing vessels in prohibited maritime areas (particularly trawlers) which is currently a major problem. Unlawful operations will lead to the exhaustion of coastal resources, and major damage to artisanal fisheries. It is necessary to take measures to reinforce the supervising and monitoring system. Although active introduction of ice refrigerators on small trawlers is being considered to a degree, a serious examination should be made. Hasty development influences great pressure on resources but also lead to destruction of the fishing grounds for artisanal fisheries. Without relying on the trawl, there are various options for fishing equipment and methods to capture coastal resources.

The “common bill for regulations concerning artisanal fisheries” is holistic and ambitious, so its quick adoption is desirable. However, since it is very inclusive and extends over several governmental agencies concerned, there are bound to be objections. The controversial points will have to be well studied and it will be necessary to provide convincing explanations.

In particular, the bill mentions the creation of a consultative committee by the prefecture and commune of Conakry centered on the Director of the Regional Management of Fisheries, and the installation of landing dock development committee (CDD) at landing sites where more than 20 fishermen work. Their roles are essential but very diverse and collaboration with the Management of the Maritime Fisheries is expected. However, it should be sufficient enough to take into account the opinions of representatives of cooperatives of fishermen. The establishment of a national committee of representative consultative committees in the prefectures and communes will include members, and a larger committee that includes representatives of industrial fisheries will also have to be studied.

3-9 Environmental Conservation

3-9-1 Coastal Areas

3-9-1-1 Mangroves

(1) Value of the Mangrove Forest Ecosystem

Data concerning the mangrove areas at the national level in Guinea has been compiled in the Master Plan (MP) established in 1990; the area of mangroves is approximately 385,000ha, including 270,000ha where natural vegetation is preserved (1988). The coasts having a total length of approximately 300km, and the mangroves tend to be concentrated at the mouths of principal rivers, namely the Nunez River (Boké Prefecture), the Pongo River (Boffa Prefecture), the Konkouré River (Dubréka Prefecture), the Sombouya River (Forécariah Prefecture), and the Forécariah River (Forécariah Prefecture). Mangrove forests are not only in coastal areas where the salinity is high, but up to 20 or 30km inland up these rivers. Therefore, the mangrove area is classified into 3 types; (i) mangroves along the coast, (ii) mangroves along elevated coastal areas, and (iii) mangroves along the rivers of the interior.

The mangroves of Guinea are comprised mainly of the following species: Rhizophora (Rhizophora 3 species) and Avicenia (Avicenia africana), and Laguncularia (Laguncularia racemosa) racemosa.

The biomass of the mangroves in each area has also been estimated: 27 t/ha for Nunez River, 46 t/ha for the Pongo River, 35 t/ha for the Konkouré River, 25 t/ha for the Tabounso River, and 36 t/ha for the Forécariah River, which is a slightly lower than other areas of Western Africa, such as Nigeria and Senegal. Even the diversification of animal species in these mangroves stretching from Gambia to Guinea is low compared to other areas, symptomatic of a weak ecosystem even for mangroves. But in Coastal Guinea, a nutritive salt supply originating in the sea from flows of cold currents and upwellings is low and dependence on nutritive salts from the land is considered to be strong, so mangroves of the coastal area and of the lower exchange rate of rivers are considered to be significant sources of these nutritive salts. Accumulating sand sediment occurring annually in an area stretching from Guinea to Sierra Leone is estimated to be 10 to 20 million tons (Bertrand 1993).

Data from the Mangrove Project implemented with the EU assistance shows that annual production of mangrove biomass in the area of Dubréka to be $2.4\text{m}^3/\text{ha}$. Of the 54,200ha project area, 37.5% of forests have high productivity, 34.1% of mangroves, 22.9% of forests have low productivity, 2.8% rice plantations and surrounding saline marshes, and 2.4% of degraded land. And if we apply this proportion of land use to the entire country, approximately 100,000ha of 270,000ha of mangrove forests in Guinea ($270,000\text{ha} \times 37.5\%$) are likely to be productive forest. Existing data indicates that the volume of wood of these highly productive mangrove forests is $53.6\text{m}^3/\text{ha}$, with an annual growth of $2.4\text{m}^3/\text{ha}$; if we apply this to the entire country, we obtain approximately $240,000\text{m}^3$ ($100,000\text{ha} \times 2.4\text{m}^3/\text{ha}$) for the current durable volume of mangrove forests of 5.36 million m^3 ($100,000\text{ha} \times 53.6\text{m}^3/\text{ha}$).

(2) Current Utilization of Mangrove Forests along the Guinean Coast

There are two types of uses for forests: felling to use the areas of forests for other objectives, and felling wood for use in general. Mangrove forests are also used in these two manners. Conversion into rice plantations is the principal objective of conversion of mangrove forests in Guinea. Wood is cut mainly for smoking, the production of salt, construction and fuel. According to the findings of the mangrove project, in Dubréka, 73% of the wood cut is used for sales, 1% for smoking and 18% for the manufacture of salt.

The report of the Master Plan for the management of mangroves of 1990 indicates that 36% of the wood is used for the production of salt, 22% for smoking, 22% for household fuel in the town of Conakry, and 20% for household fuel in rural areas.

(3) Conversion into Rice Paddies

Conversion to rice plantations is a major goal for mangrove forests in Guinea.

Rice Production in eastern Guinea is approximately 877,000 tons (1996). Rice production in mangrove areas is estimated to be 58,340t of the total national production of 532,000t (1994), or approximately 11%.

Of the 385,000ha of mangroves in Guinea mentioned above, 140,000ha (approx. 36.4%) have already been converted to rice paddies.

Conversion into rice paddies is one major cause of the reduction in the mangrove forests, but even a more significant problem is the abandonment of rice plantations after lower production, which occurs especially along the coastal areas and upstream. Among the 140,000 above-mentioned hectares, only 78,000ha are actually used as rice plantations, 62,000 remaining hectares (approximately 44.3% of all rice paddies) are abandoned rice plantations. In Rio Soumba, approximately 80% of the rice plantations have been abandoned.

This fall in production is due to three elements: (i) the accumulation of sulphates, (ii) destruction of cultivated land and slopes by burrowing crabs, and (iii) the penetration of plants very resistant to salt. Cause (i) applies to approximately 56.5% (35,000ha) of surrendered rice plantations, and the production life of rice plantations is estimated to be 7 to 10 years if management is not assured. Currently, the majority of rice plantations have been left just as they are from the end of harvest to the end May (end of the dry season), which has resulted in the above-mentioned problem. These problems could be significantly prevented through an adapted design for cultivated land and their management during the dry season.

On the other hand, the production of rice is carried out on a large scale in Koba (area where *Avicenia* prevail and with a weak accumulation of sulphates), and in the Kapatchez River plain (flood phases of the river are significant and allow renewal of the land) where the influence of oxidation in the land is less.

(4) Conversion into Salt Fields

The total volume of salt produced on the salt-water marshes (salt fields) of the East coast is estimated to be 23,000 to 30,000 tons. The production of salt is concentrated from February to May, period of increase in the salinity of the brackish water area; it is generally a seasonal work. Effectiveness of production being estimated at 1.5 kg/m² / times (50 days of work), if two productions are supposed, that makes a total surface of marsh saline from 800 to 1.000 ha.

(5) Fuel for Smoking

In Guinea, 70 % to 90% of known fish are preserved through smoking, although these are not precise figures. The fuel for smoking is almost entirely mangrove and mainly *Rhizophora*.

There are three types of ovens for smoking: (i) traditional ovens, (ii) drum-can (barrel) type ovens, (iii) and improved ovens. The study made at this time at Khatibini and Dubréka showed that the types of smoking used in the coastal area were: traditional ovens 4:6, barrel ovens, with the diffusion of improved ovens still being weak.

The report from the Dubréka project showed that the quantity of wood used per kg of fish was 2.4kg (short smoking) – 3.8kg (long smoking) for traditional ovens, and of 2.1kg (short smoking) – 3.6kg (long smoking) for barrel ovens. The introduction of improved

ovens gave this result: 0.5 kg (short smoking) – 1.8 kg (long smoking), and the average time for short smoking was improved at 1h25 min., and 3h44 min for long smoking.

The survey by interview carried out at Kamsar and Khatibini during the study at this time gave 2.5kg for barrel ovens (average time 2.5 hours of smoking) and 1.05kg for improved ovens (average time 2.33 hours for short smoking). The fish smokers' cooperative of Bonfi that uses improved ovens employs 1.1kg per kg of fresh fish for short smoking and 4.3kg for long smoking.

The annual catch of artisanal fishermen is 47,000 tons (1998 Statistics of the Boussoura Center). Of the 80% of fresh fish processed by smoking, 40% are by traditional oven and 60% by barrel oven, and 50% of smoked fish are by short smoking and 50% by long smoking. If we consider the number of improved ovens introduced without influencing the unit, the volume of wood used annually as fuel is estimated to be approximately 110,000t (Table 3-25).

Table 3-25 Estimate of Wood Used for Fuel for Smoking Type of Smoking Oven

	Smoking type	Volume of fresh fish to be smoked (t)	Volume of nit firewood used (kg of firewood/kg of fresh fish)	Total volume of firewood (t)
Traditional smoking oven (40%)	Short-term smoking (50%)	7,520 (40% \times 50%=20%)	2.4	18,048
	Long-term smoking (50%)	7,520 (40% \times 50%=20%)	3.8	28,576
Drum can type oven (60%)	Short-term smoking (50)	11,280 (60% \times 50% = 30%)	2.1	23,688
	Long-term smoking (50)	11,280 (60% \times 50% = 30%)	3.6	40,608
Total		37,600 (80% of the total landings)		110,920
If all ovens are improved:	Short-term smoking (50%)	18,800	0.88 (0.5+1.05+1.1)/3	16,544
	Long-term smoking (50%)	18,800	3.05 (1.8+4.3)/2	57,340
			Total	73,884

(6) Fuel for Salt Manufacture

The traditional method of production of salt is very labor intensive. Brackish water and seawater in an area of cut mangroves is allowed to dry. Then the accumulated salt is collected from the surface. The salt is placed in a funnel approximately 1m in diameter onto sheets of palm leaves etc. and similar to extracting coffee, water is poured over to extract a very salty liquid. This liquid is then boiled in large pots and evaporated until fine salt is produced.

The inhabitants who manufacture salt can be divided into two groups. One is comprised of landowners who manufacture salt in the farmer's slack season, but do not produce salt

when their agricultural income is sufficient. The other group is comprised of migrants (with no land), who obtain permission to use the mangroves from landowners and produce salt. They also practice artisanal fishing, but income of salt production is a significant part of their family income. The price of salt is 100FG per kg during the dry season, but the price increases during the rainy season due to a drop in supply.

In order to produce 1kg of salt, it seems that 3 to 4kg of wood is necessary (Mangrove Project). Accordingly, if the annual salt production (2,300t) is calculated, it can be estimated the volume of mangrove wood utilize for manufacturing salt across the country will be 69,000 to 92,000t.

(7) Fuel for Cooking

According to a study made by FAO in 1987, the volume of wood used for fuel in Conakry (population 900,000) was 387,000t of logs and 50,000t of charcoal, which makes a total of 900,000 cubes, which is the equivalent of 6,000ha of mangroves and 8,000ha of savanna forest. According to the study, the population in 2000 was estimated to reach 1.5 million, which is the equivalent of 2.8 million cubes, or perhaps 22,400ha. A census implemented in 1996 recorded a population of 1,094,075 inhabitants for Conakry, which is virtually identical to the prediction. If we apply the above data, the volume of wood from mangrove forests used is approximately 520,000t, which is the equivalent of 18,600ha (79.7m³/ha).

(8) Regional Disparity in Mangrove Forest Utilization

Although the model of mangrove resources utilization is indicated as described earlier, regional differences exist, as shown in Table 3-26.

Table 3-26 Utilization Characteristics of Mangrove Resources by Area

Area	Characteristics
Northern Boké	The felling of surrounding mangrove forests has advanced considerably to ensure the largest production of smoked fish in Guinea, and currently resources are often brought in from Guinea-Bissau.
Conakry Area	At the South end of the peninsula, because of the excessive felling until now, only small logs of poor combustibility remain, which has caused a drop in felling. For this reason, the demand for fuel at Conakry depends on felling in nearby prefectures (Boké, Boffa and Forécariah), and approximately 30% of felling in mangrove forests of Dubréka are used for fuel in Conakry.
Principal coastal cities	The situation is similar to that near Conakry. In coastal areas, the surroundings of cities are used as a source of demand for local wood and for the cities.
Forécariah Prefecture	The situation is more complex because many refugees have arrived from neighboring Sierra Leone. Considering the traditional system of land use in Guinea, one could say that refugees live in camps; however, many also live in Guinean villages where they practice agriculture after obtaining land.

(9) Social and Cultural Factors in Mangrove Forest Utilization

Officially, grounds along coastline are state-owned. But in reality, they are not managed at all by the State. Traditionally, the founding family of a village owned the entire village grounds, including areas of mangroves, and gave the right of land use to migrants. However, the cutting of mangrove forests for fuel has not been well managed.

The fisheries are a recent activity in Guinea, compared to neighboring countries, only a few decades or so. Almost all ethnic groups along the coastal area were originally farmers, and the villagers used land far from the coast for terraced fields, and are accustomed to giving the right of use close to the coast to the migrants. Consequently, traditional managers of the lands tend to be indifferent towards the depletion of mangrove resources.

(10) Current State and Problems with Mangrove Management in Guinea

The Master Plan for management of the mangroves was published in the form of a report in 1990. On this occasion, a study of resources was carried out nationwide, but no study has been made since then. Management of the mangrove forests has been placed under the supervision of the National Forestry Commission, Department of Forestry and Water, which has an office only in Dubréka, and is not structured to ensure management at the national level.

Specific problems of mangrove resources utilization are regulated mainly by the NGOs. As Table 3-27 shows, measures are taken in a small scale and local manner, and the coordination between the various activities is insufficient. These activities are mainly carried out within the framework of foreign cooperation since the Guinean government does not prepare an assistance system.

Table 3-27 Measures for Mangrove Resources Conservation

Issue	Measures	Problems
Rice paddy field	Improvement of productivity by cultivating fields, improving hydraulic systems and introducing improves varieties, rehabilitation of abandoned rice paddy fields & recovery of forest land through forestation.	Extension (diffusion) system is insufficient.
Smoking	Diffusion of improved ovens	Fundraising for ovens, insufficient extension system.
Salt production	Diffusion of techniques to produce salt by drying in the sun on vinyl sheets.	The vinyl sheets are not manufactured in Guinea. Insufficient extension system. Since many of the salt producers rely on income from the dry season, even if drying techniques using the sun are introduced, they will be carried out in parallel with traditional techniques.
Fuel	In the project of Dubréka, by limiting the areas of felling of wood for fuel, the felling of wood for fuel for urban areas is controlled through an agreement concluded between loggers and residents.	Mediators in discussions between villagers and loggers do not exist. Organizations for residents are essential.

3-9-1-2 Other Environmental Issues in the Coastal Area

(1) Marine Animals

Aquatic animals like the manatees, pigmy hippopotamus, gray pelicans, pink pelicans and pink flamingos belong to the class of Protection A (prohibition of capture other than study), crocodiles and hippopotamuses belong to the class of Protection B (prohibition of capture without authorization). There have been practically no studies in Guinea on the ecosystems of animal species and vegetation. Their habitat is not even accurately known. Conflicts between some animal species (manatees, elephants, etc.) and the inhabitants following damage in farmland areas have been reported.

(2) Other Environmental Issues in the Coastal Area

The deterioration of water quality is feared due to the direct discharging of wastewater and general waste from urban areas such as Conakry. The effects of dust from mines and water from factories along the coast and the lower exchange rate of rivers is also a major concern, for example, the effects of dust from the bauxite mines at Kamsar.

3-9-2 Principal Rivers of the Interior and their Tributaries

3-9-2-1 Influx of Surface Soil into Rivers

In the Guinea Highland Region, there are mainly two types of agriculture: rice paddy fields on the flood plains and slash-and-burn cultivation on the terraces above rivers. Rice paddy fields on the flood plains extend to the river banks, in addition, the reclamation of fields are extremely insufficient, so surface run-off is rampant along the rivers. Slash-and-burn cultivation on the terraces is done by rotation in units of several hectares because influential families from the villages have a lot of land. However, the inhabitants who settled later have only small plots (approximately 1ha), so slash-and burn cultivation is done uninterruptedly every year, and soil run-off from these small fields and their effluent is a major concern. Although the water level of the Niger River has tended to drop over the past few years, the volume of water entering the flood plain during the rainy season has been increasing, indicating that the soil has been accumulating on the riverbeds, thus intensifying the damage due to flooding of rice plantations close to the river.

3-9-2-2 Insecticides as a Measure against Onchocercose, River Blindness, a Parasitic Disease

In 1974 a program to fight onchocercose was introduced in Mid-Western Africa (Burkina Faso, Côte d'Ivoire, part of Mali, Togo, Benin, and Ghana). It was carried out on an experimental basis in the West, Guinea included, in 1985, and in all areas from 1988. This program, which is more than 15 years old, will be completed by 2002. The measures against onchocercose include the control of vector (intermediate host) and care of the disease. Control of the vector was achieved by air insecticide spraying. The spray products are certified nontoxic to the environment under the supervision of WHO (WHO) in 1977, that each country be selected according to the local situation. Guinea began air spraying in 1988, and initially used *taméophose* (phosphoric chemical) and *abanto*; but the appearance of a vector resistant to these products has lead to the adoption of three other products: *piracrollefosse*,

foxine (phosphoric) and *palmétorine*. Theoretically, spraying is carried out once a week, with the confirmed number of onchocercose being used as principal host through sampling of contaminated areas, which has made it possible to apply sprayings to areas slightly affected by-weekly.

A study has been made periodically since 1987 to control the effects of these chemicals on the river ecosystems of Guinea, and the following elements were measured in fish and invertebrates at three sites as a sampling point. The first sampling of fish took place in February, and invertebrates once a month between November and April, during the dry season. An annual report of the results is compiled.

Table 3-28 Monitoring of the Impact of OCP (Onchocercose Control Program)

Monitoring target	Monitoring items	Monitoring site
Fishes	Index of diversity of fish species Productivity CPUE (catch per unit of effort)	Baranaba (Dion River) Maadiana Bac (Sankarani River)
Invertebrates	Population	Tele (Dion River) Sansanbaya (Niahdan River)

According to these reports, there were three cases of dead fish between 1996 and 1998 for phosphoric chemicals. In all cases, the dead fish were found within a radius of 1km. Two reasons were given for these accidents: (i) mistake of a sprayer: the wrong spray products were used, (ii) miscalculation of the concentration of chemicals: actual water level at the time (or at the place of spraying) was lower than at the time (or at the place of spraying) of calculation, and the relative concentration of the sprayed product was strong. Since 1999, no cases of fish dying due to spraying were reported in the onchocercose program. There were several cases of dead fish, but they were considered due to other chemicals (unlawful fishing with poison, etc.)

3-9-2-3 Drainage from the Mines

The mines of the interior, which are mainly gold and diamonds, are of various sizes and energy, from large ventures managed by foreign capital to small artisanal exploitation. An evaluation of the environmental impact is obligatory for industrial-scale mine development, and a provisional report must be submitted, but there is no monitoring. Obligatory monitoring of statements related to the influence of wastewater from mines on the environment and periodical administrative inspection is necessary. Regulations should be made for artisanal mine exploitation.

3-10 Financial Market and Current State of Financing for Artisanal Fishermen in Guinea

3-10-1 Profile of Domestic Financial Market

The domestic financial market has not been developed due to the small scale of the economy, late transition to a money economy, and weak credibility in currency of the country, the tendency of low saving and underdeveloped financial services system. Seven commercial banks such as BICIGUI (Guinean International Commercial Bank), General Society (*Société Générale*), Eco-Bank, International Bank, 4 non-life insurance firms and 2 life insurance firms have activities as of the end of 2001. Seven commercial banks provide financial services through 27 branches in total; however, other than BICIGUI that has the largest share with nine local branches, and their banking services are concentrated at the metropolitan area of Conakry. The reasons that commercial banks hesitate to develop their banking activities in local areas are: land ownership which becomes a security in financing is distinct, legislation to force repayment falls behind, the literacy ratio of the general public is low, and financial statements which are basic for bank loans cannot be submitted.

The balance of loans of commercial banks as of the end of 2001 was 213.8 billion FG, and its breakdown is 59.7% in the commercial sector, 9.2% in the service industry, 8.1% in the construction industry, 7.2% in the manufacturing industry, 6.9% in the agricultural and textile industries, 2.8% in the transportation industry and 6.1% in other industries. The financing terms mainly includes short-term loans of less than 1 year, which account for 87% of the total¹⁷.

Since regulations of the Central Bank of Guinea for deposits and loan interest rates were abolished in 1993, banks can freely establish interest rates in due consideration of the rates of bonds of the Ministry for Finance issued by the government. In recent years, the interest rates for deposits and loans were as follows.

Table 3-29 Interest Rates List

	1996	1997	1998	1999	2000
Bank interest rate	18.0	15.0	12.0	14.0	11.5
Bond of the Ministry of Finance (3 months)	12.0	9.0	9.0	11.0	n/a
Minimum deposit interest rate	9.0	5.5	6.4	5.7	7.5
Commercial bank loan Interest rate	21.0	20.0	19.6	19.9	19.4

Source: IMF, IFS

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3-10-2 Informal Financing

In general, in countries where the financial market has not yet developed or where residents cannot access the formal financial market, the informal sector fills the gap and satisfies the needs for financing to a certain extent. This double structure of the financial system is observed practically in most developing countries, so Guinea is no exception. Small-scale commercial and industrial traders or farmers and fishermen in Guinea cannot access the formal sector for reasons that they cannot provide security such as land or buildings; the literacy rate is low so that they are unable to prepare documentation for loans, or the branch of a financial institution does not exist in neighboring areas. Consequently, they have traditionally relied on the informal sector for the provision of necessary funds.

The suppliers of funds in informal finance vary significantly: relatives, friends and acquaintances, landlords, ship owners, wholesale fish merchants, pawnbrokers and lenders at high interest rates. However, the financial suppliers for economic activities are often landlords, boat owners, wholesale fish merchants or wholesale traders involved in some form. For example, in order to ensure the supply of products, a wholesale fish merchant or broker will sometimes provide loans to a producer.

In the case of relying on the informal sector for economic activities, the request for loans on the borrower's side is often for working capital. Small-scale commercial and industrial traders and farmers procure funds to purchase raw materials or goods and seedlings or fertilizers respectively, and fishermen procure funds for food, gasoline and feed in general.

The period of loan is determined by the relevant economic activities; in fisheries, it is settled by an ordinary payment method per fishing, in agriculture, the period is until the time of the following harvest. The lending money is refunded in cash; however, settlement in kind with the lender of the loan amount and the interest by part of agricultural or fishery products is widespread. Informal financing is extensively used because the conditions and terms for loans are relatively flexible and procedures for lending are simple.

Interest rates vary widely and are regarded to be 50 to 300% annually. The reasons for the relatively high rates compared to those of domestic interest rate level are explained as follows: (i) borrowers do not have the means to acquire financing; (ii) security is often not taken, and (iii) lenders take great risks while anticipating the possibility of a bad harvest or poor fishing. However, in order to ensure a stable supply, in rare cases working capital is provided without imposing interest rates.

In such a manner, although informal financing is an effective means of the financing for artisanal traders, if the degree of dependence on this increases, the power of suppliers of funds becomes stronger, so it is concerned they will be placed under fish trader's control.

Under such circumstances, associations of mutual financial assistance called "*tonchins*" are well developed not only in Guinea, but in all Western Africa. *Tonchins* are organized in various types of social classes in Guinea; an overview is as follows.

- Many women are members to take part in the *tonchins*, and funds are normally used for ceremonial occasions and funerals, supplementation for household expenses, preparation for a significant expenditure or leisure expenses;
- In general, they include approximately 10 persons, who deposit a certain amount every day, week or month (in farming communities they bring rice);
- Since the associations' operations are based on verbal commitments, mutual trust between members is essential;
- When a certain amount of money is saved, one of the members receives the total amount and uses it. Deposits continue and another member receives the next time. The order of receiving is determined through discussion;
- After the last member receives, the *tonchin* is dissolved.

Example of Mr. Yakouba at Koukoudé village

Mr. Yakouba carries on the processing and sales of smoked products on a large scale. He sells long-term smoked fish such as bonga and bonga-seri landed at Koukoudé through 6 of his own smoking ovens and brings them to N'Zerekore, Guekedou and Kindia every 3 months to local traders. One-time sales total approximately 5t of smoked products and profit is 10 to 15 million FG. Mr. Yakouba constantly carries out pre-financing to three fishing vessels (one owner who resides in Koukoudé). Mr. Yakouba provides gasoline and food, etc. and in return he purchases a reasonable amount of fish from the boat owner. For instance, when the price of 5 fish is 500FG, he purchases 6 fish under a condition of 500FG. This kind of arrangement is common in Guinean artisanal fisheries.

Furthermore, Mr. Yakouba obtains working capital by organizing the *tonchin* together with 11 other fish smokers and fish merchants who live at Koukoudé village. Each member deposits 25,000 FG every month; 300,000FG is collected, so that each member receives funds in order. Based on this *tonchin*, fish smokers and wholesale merchants' associations were established in 2002 and under the guarantee of this association, he started to receive loans for working funds amounting 4.8 million FG (400,000 FG/member) from the Guinean Rural Credit (CRG: Crédit Rural de Guinée). In addition, according to Mr. Yakouba, even when purchasing fishing nets, fishermen gather together and collect funds by effectively utilizing the *tonchin*.

The example of Mr. Yakouba was a good model for great success; however, the scale of the *tonchin* was small so it didn't do well at Koukoudé village in some cases. Mr. Mayéni, the president of the women's fish smoking association, carries out small-scale sales of smoked products. According to Mr. Mayéni, although the working capital was essential to the continuation of business, the *toncin* implemented many times as before was dissolved halfway, which resulted in a loss to him. So he said that he was no longer interested in *tonchin*.

3-10-3 Micro Financing

Up to the end of the 1980s, the institutionalized financial program for the agriculture and fisheries sector was extremely limited. In late 1982, assistance to introduce a financial system through micro financing commenced. The Rural Credit of Guinea (*Crédit Rural de Guinée*: CRG) and the Mutual Credit of Guinea (*Crédit Mutual de Guinée*: CMG) were created in 1988 as micro financing projects in Guinea. These two projects have expanded their activities through the support of the African Development Bank (AfDB), the International Fund for

Agricultural Development (IFAD) and the Food and Agriculture Organization (FAO). Afterwards, several micro financing organizations were established; at the present time, approximately 10 micro financing organizations are active in Guinea. The Rural Credit of Guinea, the Yete Mali and the 3A Enterprises are typical organizations. However the Mutual Credit of Guinea, the largest micro financing institution in Guinea, went bankrupt and closed in March 2001.

These micro financing organizations cover the entire country of Guinea and provide services to rural areas, where banks do not. Such organizations are used by persons engaged in agriculture, the poor, artisanal firms in the cities, women's groups and artisanal businessmen, etc. who cannot obtain financial services because they cannot provide security and they are poor or illiterate. As of the end of 2001, micro financing had accumulated deposits of 4.7 billion FG from 110,000 clients at 107 branches and provided funds of 10 billion FG¹⁸.

Services and operations of micro financing organizations vary considerably according to each organization. For example, 3A Enterprises and the Pride Finance of Guinea only provide loans without deposits. In addition, the interest rate of 3A Enterprises is 15% per annual; whereas, that of the Pride Finance of Guinea is 30% per annual.

The Central Bank of Guinea set up a micro financing office in 2000 aiming at sustainable development of the micro financing organizations. Its functions are as follows:

- Preparation of legislation concerning operations (such as licensing, management index and management competency) of micro financing organizations;
- Monitoring concerning management conditions of micro financing organizations.

Presently legislation concerning micro financing organizations has been prepared aiming at enforcement from December 2003.

(1) Micro Financing Bodies

Of approximately 10 micro financing organizations, the study targets the Rural Credit of Guinea, the Pride Finance of Guinea, and the Yete Mali as having the volume to handle financing and experience with the fisheries sector.

Activities of each micro financing body and results of financing for artisanal fisheries are summarized in Table 3-30.

Rural Credit of Guinea

The Rural Credit of Guinea was established in 1988 as a Guinea micro financing project. The objectives are to provide financial services such as savings and loans for the poor who reside in rural areas and to establish a rural banking system. The Credit was created as a pilot project for a model of the Gramin Bank (GB) in Guinean rural areas, under the backup of the Ministry for Agriculture. It has been operated by IRAM and SIDI, French NGOs. The Credit has received financial support from the France Development Bank (*Caisse Francaise de Developpement*), the European Development Fund, the Africa

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Development Bank and the US Agency for International Development (USAID). In November 2001, The Credit became independent as a joint stock company with capital of 47 million FG. The constitution of shareholders is 40% for association members of the Rural Credit of Guinea (beneficiaries), 34% for staff, 15% for the Guinean government, 8% for SIDI and 2% for IRAM.

Up to now, the Rural Credit of Guinea has carried out activities mainly in farming communities. Its organization is comprised of a head office, 10 regional offices and 92 branches; the number of branches is currently increasing. Since each branch has been established as a credit saving association¹⁹, they have independent management meetings made by representative association members who decide on basic management policies, and thus each branch is operated independently. The actual businesses of each branch are carried out mainly by an agent (1 to 2 persons) dispatched from the head office. The principal business of the head office and regional offices is to give instructions and to monitor management conditions.

In the case of lending, since joint and several liabilities on guarantee is the general principle, users organize a group consisting of five persons and assume joint and several responsibilities for repayment. If the repayment term is not observed, all members receive the same punishment, such as suspension of future loans, a penalty, or judicial measures.

Pride Finance of Guinea

The Pride Finance of Guinea, an NGO, commenced activities in Guinea in 1991 with assistance of USAID. It was created for the purpose of reducing poverty in Guinea by supporting small-scale and artisanal enterprises in the Guinean private sector. Pride was divided into the Pride Information, which conducts training activities, and Pride Finance of Guinea whose goal is financially independent micro financing organizations.

The Pride Finance of Guinea does not carry out operations mainly for credit saving associations adopted by other micro finance implementing organizations in Guinea, their operations are conducted as a bank through 14 direct branches. For someone intending to borrow money, guarantee money equivalent to 3% of the amount of loans is requested. There are two types of loans.

Short-time micro financing

In principle, joint and several guarantee is required for loans to be provided; each group is composed of 3 to 5 persons who intend to apply for loans, and all members of the group receive financing. The lending scale is 50,000 to 500,000 FG with a repayment term of 6 to 12 months every 2 weeks to a month. The interest rate is 2.5%/month indiscriminately.

¹⁹ Since both banks and credit saving associations are financial institutions, they receive deposits and provide financing. The difference between these institutions is the base legislation for incorporation. In many cases, it is resorted by the Banking Law for banks, the Mutual Association Law, or the Credit Saving Association Law for credit saving associations. In concrete terms, banks provide services for the general public; whereas, credit savings associations provide services for association members. Moreover, a bank is a juridical person including the head office and branches; whereas, an individual branch of many credit saving associations has legality, so its head office functions as a comprehensive organization, such as a federation.

Medium-term financing (PMT)

It is designed for personal loans financed through a real security or human guarantee. It aims at supporting small-scale and artisanal enterprises intending to expand facility investment or their business such as agricultural products or handicraft goods. The financing scale is 500,000 to 5 million FG with a repayment term of 12 to 24 months. The interest rate is 2.5%/month indiscriminately.

Yete Mali

The Yete Mali was established in June 1997. This is a micro financing organization for credit saving associations operated by the *Développement International Desjardins*, a Canadian NGO, through the assistance of the Canadian International Development Agency (CIDA).

The Yete Mali was created for the purpose of providing reasonable financial services and goods for residents of Conakry. In other words, by encouraging savings, based on this, association members are able to increase economic profit in order to refund loans. Since their activities are currently limited to within Conakry, they have 13 branches in 5 districts in Conakry. The activities are conducted by 65 staff. The Yete Mali has promoted the localization, of businesses; accordingly, its current operations by Canadians will be replaced by Guineans from April 2003.

Characteristically, businesses are made up of many women with an emphasis on saving. The ratio of women in lending is 80% for number of accounts, and 53% for balances. Since lending resources are determined by total deposits, 50% of deposits are saved in commercial banks as a precaution.

Financing is implemented for an individual or a group. The interest rate is 2%/month. Depending on the type and amount of loan, a security deposit is necessary within a scope of 10% and 50%.

- General financing: Loans applied to a registered individual. (1 million to 1.5 million FG.);
- Micro credit for a group: Micro credit for a women's group (100,000 to 150,000 FG);
- General group financing: Loans for an association member in the same sector (200,000 to 600,000 FG);
- Obtaining an advance in salary: Only applicable to persons with an account to which salaries are transferred.

Table 3-30 Comparison of Micro Financing Organizations

	Rural Credit of Guinea December 2001	Pride Finance of Guinea September 2002	Yete Mali August 2002
Principal users	Farmers and poor in farming communities	Artisanal traders	Informal economic activities of women
Major activity	Farming communities	Mainly for principal cities	Metropolitan Conakry
Organization type	Joint stock company	NGO	NGO
Business owner	40% for association members, 35% for staff, 15% for the Guinean government, 10% for donors	PRIDE	Yete Mali
Business type	Credit saving association	Bank	Credit saving association
Business contents	Accept also savings mainly for loans	Only financing	Mainly saving, and financing
Degree of diffusion of services			
Number of branches	92	14	13
(Number of branches in Conakry)	(1)	(3)	(13)
Number of members	88,592	13,814	14,434
Number of financing accounts	88,592	13,814	1,955
Balance of loans	7.6161 billion FG	4.1414 billion FG	651.94 million FG
Average loan balance per capita	860,000 FG	300,000 FG	330,000 FG
Number of saving accounts	22,265	-	14,434
Balance of savings	3.91326 billion FG	-	1.98183 billion FG
Average saving balance per capita	176,000 FG	-	140,000 FG
Repayment conditions			
Amount in arrears/balance of loans	6.6%	-	-
Amount of bad debts/balance of loans	-	8.0%	5.0%
Financial independence			
Operating revenue/operating expenses	80%	100.0%	-
Financing results for the fisheries	Financing amount was 55.96 million FG by implementing 262 cases including 96 outboard motors (of those, 40 units in Conakry), fishing nets or working capital via 5 branches between 2000 & 2002.	There were results in Kamusar and Conakry (Details were indistinct.)	Already supplied 24 outboard motors via 6 fishermen's cooperatives in 2002.
Future measures for the fisheries	It plans to finance about 100 & 50 outboard motors in Conakry and rural areas respectively in 2002. Moreover, the request for fishing nets or financing to wholesale fish merchants, so it plans to finance about 9100 million FG in total. In addition to providing loans through self-funds, it is expected to be financed by the AfDB.	Although there are not many results up to now, the demand for funds for fishing is enormous, and a financing mechanism is being established, so it plans to take positive steps if financing resources can be provided in the future.	After 2002, they intend to finance the fisheries, but the following problems exist: (i) the Yete Mali carry out financing based on the savings of association members; (ii) 50% of savings collected from association members must be deposited in a bank in accordance with private rules. Accordingly, if there is no outside assistance for financing resources, it will be difficult to increase fishery loans significantly.

(2) Mechanism of Micro Financing for Artisanal Fisheries

The financing mechanism for the artisanal fisheries through micro financing normally adopted by the Rural Credit of Guinea and the Yete Mali is based on associations such as fishermen's cooperatives, fish smokers' associations and wholesale fish merchants associations organized in each village. In the case of the Rural Credit of Guinea, demands for loans are compiled in an association, and following an examination, they apply for loans to a branch of the Rural Credit of Guinea. At that time, an application for loans is not made by a member, but is made under the name of the association. By mutual consent of the association and the Rural Credit of Guinea, under determined financing conditions and terms, the financing is provided by the Rural Credit of Guinea to the association then the association finances each association member. Consequently, the association is obligated to refund the Rural Credit of Guinea, and accordingly, the association attaches a guarantee to each individual member. If an association member fails to repay, new loans for all members are frozen until the completion of the refund.

Since association members reside in the same village and engage in the same occupation, they all possess ample knowledge of fishing activities, lifestyle and credibility. Consequently, under the framework of the above-mentioned joint and several liabilities, it appears that members with no refunding problems are selected as applicable persons. In the case of a member who fails to repay, other members are expected to pay.

Artisanal fisheries financing is categorized into 2 types: outboard motors and working capital, and the application of both differ. A comparison between both types is summarized in the following Table 3-31.

Table 3-31 Comparison of Fisheries Financing (Rural Credit of Guinea)

	<u>Outboard motors</u>	<u>Working capital</u>
Financing method	Lease	Loan
To be provided to a client	In kind	Cash
Term	24 months	12 months
Interest rate	20% per annum	27% per annum

The financing for outboard motors is common. The Rural Credit of Guinea purchases outboard motors themselves and provides them through an association instead of providing funds. At that time, outboard ownership is not transferred to a purchaser; the Rural Credit of Guinea remains the owner until all payments are completed. This helps to encourage repayment; in addition, it meets the present conditions in Guinea where improvement in legislation has fallen behind. In the case of arrearages for a lease, an association takes the outboard from the relevant association member and then leases it to another member, or the Rural Credit of Guinea obtains it from the association and leases it to another association, so it is possible to continue repayment.

A debtor should deposit money of 3% to 20% of the financing amount as a security.

Financing model of the fisheries of the Douprou branch of the Rural Credit of Guinea

The Douprou branch of the Rural Credit of Guinea provides financing to fishermen in 7 villages in this area. Of those, 6 villages (Goret, Tournifilidi, Bongolon, Bongolondi, Poukhoun and Dari) have established the Federation of Artisanal Fisheries Associations of Douprou, and through this federation, financing is provided to individual associations and individual association members. The remaining village has not joined the Federation of Artisanal Fisheries Associations of Douprou; this association receives financing directly from the Douprou branch and then finances association members.

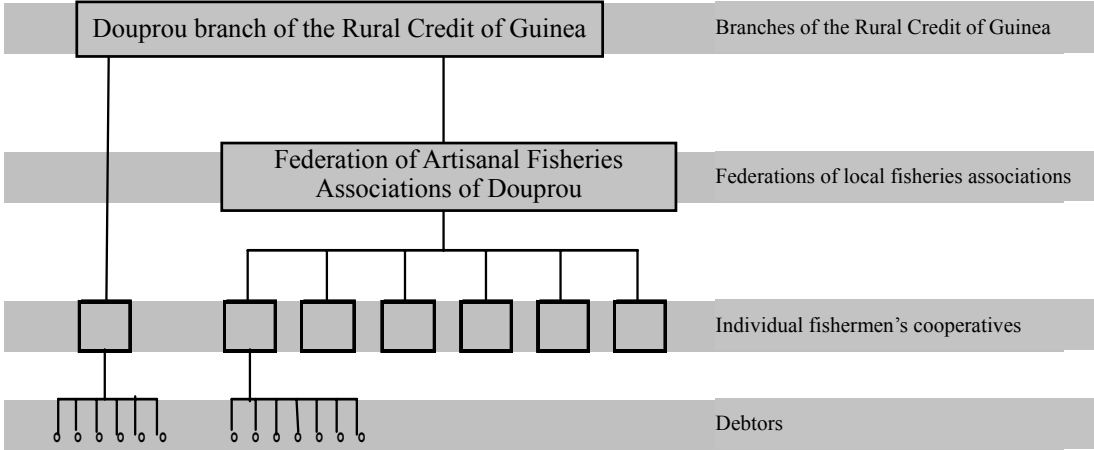


Figure 3-11 Financing Mechanism of Fisheries at the Douprou Branch

Loans for artisanal fisheries financed by the Rural Credit of Guinea in 2000 were the first form of financing of the Federation of Artisanal Fisheries Associations of Douprou and can be regarded as a pilot project. Financing implemented through the Federation of Artisanal Fisheries Associations of Douprou for 2 years between 2000 and 2001 provides for 12 outboard motors (30 million FG), 105 cases for working capital (52.5 million FG) and 15.5 million FG in total for Federation of Artisanal Fisheries Associations of Douprou to purchase fishing nets or gasoline to sell to associations. During this period, the total amount of financing for artisanal fisheries of the Douprou branch was 216.8 million FG, including 28.8 million FG of financing for Koukoudé fisheries cooperatives. Since then, payments have been progressing, the balance of loans as of the end of September 2002 was 17.11 million FG, of which; 3.69 million FG were in arrears.

Despite the fact that financing for artisanal fisheries at the Douprou branch has some problems from the aspect of repayments, generally speaking, it functions well. Arrearages include working capital for gasoline and fishing nets financed to the Federation of Artisanal Fisheries Associations of Douprou and 2 outboard motors lent to association members. The Federation of Artisanal Fisheries Associations of Douprou collectively purchased gasoline through financing from the Douprou branch and sold it at a reasonable price to each association; however, immediately after the purchase, the price of gasoline dropped by order of the government, so a loss from the difference in estimates arose. Arrearages exist due to damage resulting from a gang robbery, however, they plan to complete repayments in the near future. Regarding outboard motors, there are arrearages from one unit in two villages. In the case of one outboard motor, since the

financing amount was insufficient to purchase a new outboard under the financing conditions and terms, they bought a used one, which became a problem. In the case of the other, it appears that the outboard itself was lost. Therefore, to force them to repay financing through the Federation of Artisanal Fisheries Associations of Douprou, the Douprou branch has suspended financing for working capital to the Federation of Artisanal Fisheries Associations of Douprou. However, when the repayment situation changes, they plan to resume financing from the beginning of 2003.

In Guinea, a mechanism of financing for the artisanal fisheries through ordinary associations functions quite well. We were able to obtain favorable results, not only from the figures of the above-mentioned repayment conditions, but also from interviews. For example, according to the chief of the Bongolon Fishermen's cooperatives; "A member from the cooperative failed to refund the loans financed by the Douprou branch. So the chief refunded it in place of the member and forcibly collected fish landed by the member as arrears". The chief of the Koukoudé fisheries cooperatives stated as follows: "As before, one of our members failed to repay. All our members are fishermen, so when we took a look at his catches, we could see the economically severe situation he was in. So all of us refunded his portion and asked him to return it when he had landings".

(3) Results of Financing for Fisheries

Table 3-32 Results of Financing for Artisanal Fisheries of the Rural Credit of Guinea (2000 -2002 Total)

(1,000 FG)

	Outboard motors		Fishing gear		Wholesale fish merchants		Other		Total	
	Number of cases	Amount	Number of cases	Amount	Number of cases	Amount	Number of cases	Amount	Number of cases	Amount
Douprou	21	58,800	0	0	105	52,500	10	105,500	136	216,800
Kamsar	12	44,460	0	0	33	15,000	1	1,500	46	609,60
Koba	8	27,400	0	0	0	0	0	0	8	27,400
Maférénya	15	49,800	0	0	124	51000	0	0	139	100,800
Farannah	0	0	23	10,680	0	0	0	0	23	10,680
Conakry	40	146,000	0	0	0	0	0	0	40	146,000
Total	96	326,460	23	10,680	286	118,500	11	107,000	392	562,640

Source: Rural Credit of Guinea

The largest financing organization for artisanal fisheries in Guinea is the Rural Credit of Guinea, followed by the Yete Mali. The Rural Credit of Guinea provides financing through 6 branches throughout the coastal area. As shown in Table 3-32, the results of financing for artisanal fisheries by the Rural Credit of Guinea between 2000 and 2002 include 392 cases and the total amount was 562.64 million FG. Its breakdown was 94 outboard motors (326.46 million FG), 23 cases of fishing gear (10.68 million FG), working capital for wholesale fish merchants (actually including financing for fishing nets or equipment) and another 11 cases for gasoline or repair parts (17 million FG). In addition, in 2002 the Yete Mali provided financing for 24 outboard motors (76.8 million FG) for 6 fishermen's cooperatives in Conakry.

A fish smoker interviewed at Koukudé received financing of 4.8 million FG in total from the Rural Credit of Guinea in 2002. However, this was not included in the statistics on financing for artisanal fisheries. Since financing for artisanal fisheries is conducted through registered associations, it appears that loans provided to unregistered groups were treated as commercial financing. A considerable amount of grants for working capital to groups may be excluded from such statistics.

In this case, to what extent did financing for artisanal fisheries influence artisanal fisheries in general? Although we don't have enough information to discuss the artisanal fisheries in general such as fishing gear, nets and working capital for wholesale fish merchants, we were able to collect data on outboard motors to a certain degree. Moreover, even in the interviews of fishermen, the highest demand for financing was always for outboard motors. At Koukoudé or Bongolon, we heard that: "half or one-third (1/3) of outboard motors in the village have broken down or in bad condition; we know we should buy new ones, but they are expensive and it is difficult to buy them without financing". Accordingly, we would like to examine the impact of financing for artisanal fisheries for the purchase of outboard motors.

Table 3-33 shows annual sales results at Yamaha agents in Guinea. Yamaha has a monopoly on outboard motor sales in Guinea. Despite slight errors, these figures can be assumed to be the number of outboard motors sold.

As clarified in Table 3-33, sales of 15-horsepower outboard motors mainly used in artisanal fisheries were 32 units in 2000, 86 units in 2001 and 169 units in 2002, which shows a rapidly increase. The major factor for the rapid increase in demand for outboard motors is that it is about the time to purchase new ones because 5 to 6 years have passed since Japan provided assistance for artisanal fisheries through outboard motors and fishing nets.

Table 3-33 Impact of the Financing for Fisheries to the Sales of Outboard Motors on in Guinea

Engine size	1998	1999	2000	2001	2002
18-horsepower	0	3	14	23	0
15-horsepower	5	28	32	86	169
(Of those, purchase by fisheries loans)			(12)	(36)	(72)
25-horsepower	0	0	0	5	11
40-horsepower	7	30	75	70	75
Total	12	61	121	184	255

Source: Interview with Yamaha Guinea and financing organizations

In the same period, the purchase of outboard motors through the micro financing organizations has steadily increased, for example from 12 units in 2000, 36 units in 2001 to 72 units in 2002. This accounts for 37% of the total provision of 15-horsepower outboard motors in 2000, 42% of the total in 2001 and 43% of the total in 2002. In other words, the rapid demand for outboard motors has been brought on by an expansion in financing by micro financing organizations. However, the purchase of outboard motors through micro financing organizations was approximately half of the total, so we should consider the fact that the remaining half was purchased through fishermen's own resources or through financing by the informal sector.

CHAPTER 4

MASTER PLAN

CHAPTER 4 MASTER PLAN

4-1 General Remarks

The Republic of Guinea obtained its independence suddenly from France in 1958 under the control of Sékou Touré, a leader whose aim was a radical-socialist restoration, and who turned his back on Western capitalist countries, beginning with France, and moved close to the Communism of the East, as a rival force. The USSR (at that time) was interested in the abundant underground resources of Guinea, and made repeated investments with a view toward its development. Two years after independence in 1960, Guinea was called “the Dawn of Africa” and other French-speaking countries also peacefully left the French colonial system and began socio-economic development based on agriculture. But all these old French colonies, except for Guinea, formed a monetary area regionally based on the CFA franc linked by the fixed rate of the French franc, maintaining close ties with France. Guinea continued on its road to original socio-economic development. The system, believing in socialism, saw its term come to an end with the illness and resulting death of President Sékou Touré in 1985. A Second Republic was founded under the leadership of President Lansana Conté who chose a policy of Western capitalist countries as partners for economic development. This change of policy was accelerated with the destruction of the communist bloc starting from the beginning of the 1990s. However, the initiative of the economic development was just replaced from Eastern European countries to Western countries, thus, the basic structure of the economy depending on resources mainly of the mines financed by foreign capital.

Guinea is known for its abundant untapped mining wealth, such as gold and diamonds, and especially its bauxite reserves which classify it as third in the world. However, it is also relatively favored in the field of marine fishery resources. The overall length of its coast is 300km, but the surface of the continental shelf up to a 200m depth is 43,00 km², and is the largest in Western Africa. And the ones who are interested in the development of these abundant fishery resources, ironically, are not Guinean themselves. Shrimp and benthic fish resources of the continental shelf were developed by groups of Russian fishing vessels during the old system, then after passage to the current system, by Western and Chinese fishing vessels. Moreover, the resources of the coastal artisanal fisheries were developed by the Sierra Leonean, Senegalese and Ghanaians, etc, with very advanced fishing techniques. Ethnic groups of the Guinean Coast Region such as the Sousous and Bagas were originally ethnic groups of farmers who practiced little fishing. Through contact with migrant foreign fishermen on the Guinean Coast Region, the Guinean aborigines learned their techniques, and began to practice fishing. Even in the inland area, Guineans are not traditional fishermen. The ethnic group Malinké in the Guinea Highland Region and ethnic minorities of the Guinea Forest Region are all traditional farmers. Professional fishermen called Somonos come to the central delta of the Niger River (currently near Mopti in Mali) to establish and spread river fishing. Today, Guineans play a major role in artisanal fisheries in Guinea, but the difference in fishing techniques to nearby countries is undeniable, and they always depend on such countries for the introduction and acquisition of new fishing equipment and methods.

The full-scale development of the artisanal fisheries sector started in 1978 with financial and technical assistance from Western countries. The problem to solve at that time was "how to

increase the catches " as a protein source for the inhabitants. To this end, the approach adopted for development was the motorization of local fishing boats (pirogues), which made it possible to extend the areas and the hours of fishing, and to procure effective fishing gear adapted to the sea conditions and to the fish species captured. Canada, Italy and Japan, etc. helped the artisanal fisheries based on this approach. What contributed most to solving this question was Japanese provision of equipment, materials, and technical assistance for the training of technicians. Since 1982, Japan has thus assured help for the motorization of boats (pirogues) and procured fishing gear three times, and due to this aid, the ratio of motorization of boats rose from 18 to 42% while the volume in catches rose from 19,000 for 47,000t in 10 years. But the rise in prices of products of importation, following inflation under Sili, the original currency in Guinea, then the collapse of the Guinean franc, blocked the purchase of outboard motors (including parts) and fishing gear, and recently, the provision of this equipment by fishermen, and ratio of motorization of fishing vessels thus causing fishery production to drop. There have been no materials and fishing gear since 1996 because the series of assistances carried out thereafter provided for autonomous goods. However, considering the above situation, fishermen do not have a means of providing equipment themselves. Certain fishermen hope for materials and equipment at lower prices under the framework of assistance, since the purchase of equipment at market priced is expensive.

Since the end of the 1980s, the Office of Development of Artisanal Fisheries and Aquaculture in Guinea (Office de développement de la Pêche Artisanale et Aquaculture en Guinée: ODEPG) established financing through the African Development Bank and was the first to adopt the approach of installations at landing sites to increase catches. In other words, even in the event of motorization of boats and the installation of effective fishing gear, if the suitable landing facilities are not available, landing operations will be ineffective and unhealthy, and will prevent problem-free catches on the distribution network. The ODEPAG arranged landings, including a manufacturer of ice, facilities for market functions, gasoline stations and a water supply on three sites in Conakry and Koukoudé in the prefecture of Boffa.

Based on a series of measures to supplement the motorization of boats and the provision of fishing gear and equipment as well as improvements in landing facilities (which began in the mid 1990s), the central government began an evaluation of fisheries accomplished in the past and discussed future development. As a result, the Ministry of the Fisheries and Aquaculture established "Guinea Vision 2010" as a guideline for medium and long-term development. This vision indicates the guidelines of overall development with a goal of 2010 for all sub-sectors of the fisheries, the coastal artisanal fisheries, the industrial fisheries, the shrimp culture industry, stock management, inland water aquaculture, river fisheries and support for a fisheries system. The "Master Plan Related to Artisanal Fisheries Development" proposed in the "Study on Artisanal Fisheries Development", are basic guidelines suggested by this Vision, except for industrial fisheries and aquaculture. In other words, more concrete and attainable proposals will be made for the higher objectives of the Master Plan; contributing to a stable food supply, and sustainable economic growth.

From the following paragraph, the characteristics and purpose of the Study and of the approaches of drawing development per area favoring these characteristics are explained; in addition, development projects by area are explained by viewing from different dimensions. Figure 4-1 shows the mutual priorities in the projects by sector and area provided for, and their positioning in the Master Plan for the pilot projects described in the last section.

Artisanal Fisheries Development Master Plan Overview

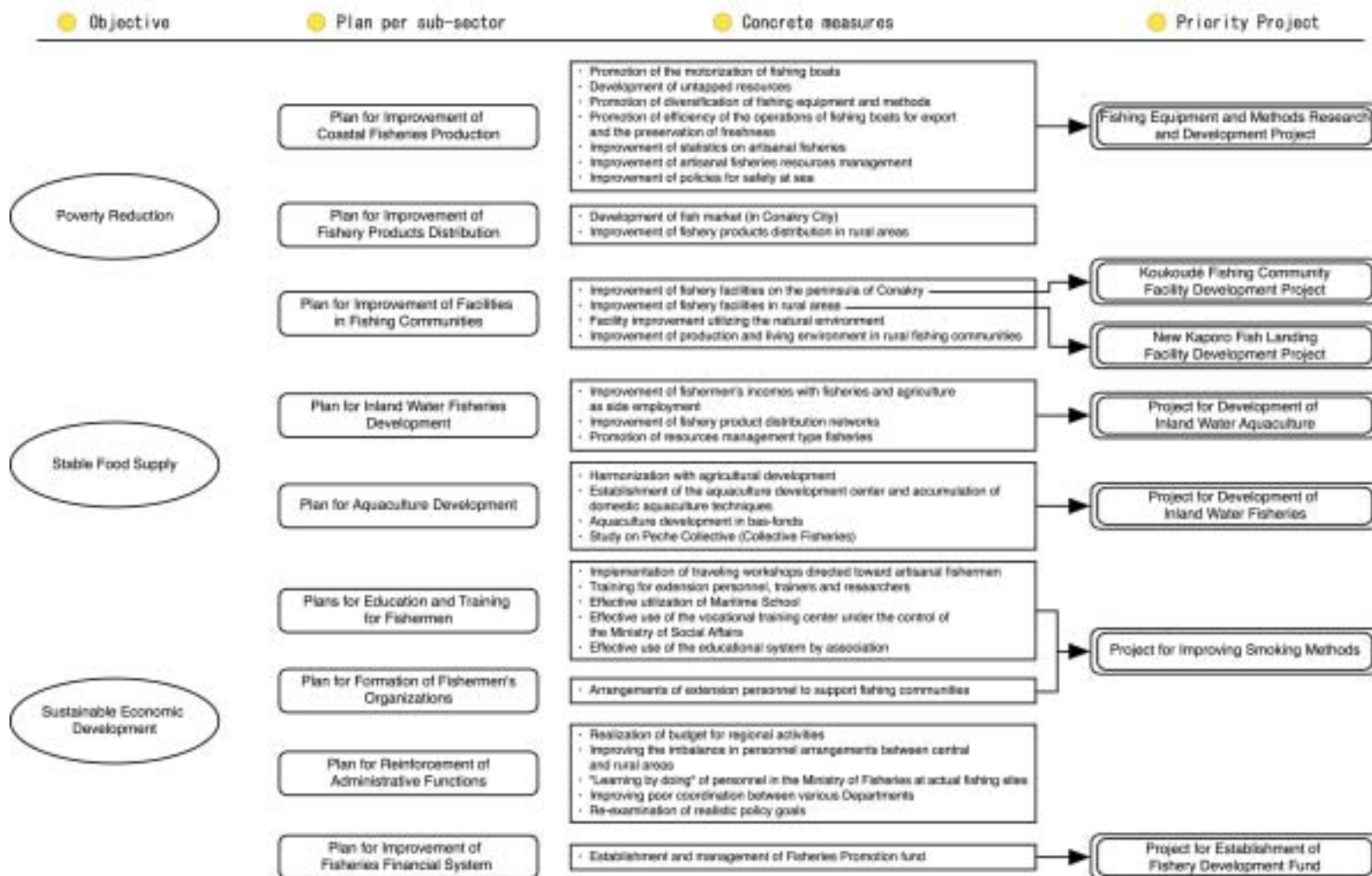


Figure 4-1 Structure of the Master Plan of Artisanal Fisheries Development and Positioning of Pilot Projects

The execution of this Master Plan will provide hope for the development of fisheries across the country, taking into account economic disparities between regions. In other words, the development of each region will draw advantages from its characteristics, and will have socio-economic negotiable instruments such as the increase of the local food production, creation of employment, even settlement of village inhabitants. This corresponds to the basic policy of decentralization and regional development continued by the government. Fisheries stimulated by area, coupled with development of distribution nationwide, will satisfy the consumption of fishery products on all levels of demand. In addition, it will contribute largely to the improvement of standards of living and autonomous renewal of fishing gear of the producers, forced with a more significant production under the demand for larger consumption, for which the price to the producer will be improved in relation to supply and will be increased. However, unilateral development attaching too much importance to the fisheries will have a harmful effect on the fishery resources and their environment; which is why the implementation of each project will have to be done in complete harmony with the environment. Some significant points to take into account for the concretization of the scenario above are as follows.

In order to maintain and develop fishery production, the minimal obligation is the provision of fishing gear, which is the means of production. Lack of equipment creates problems at the places of production in all areas, but this situation must be remediable prioritizing it. A system of agricultural credit already exists in Guinea, and the installation of a policy of support by system of credit, etc. meeting the financial needs of fishermen based on a system is necessary. It will be significant to carry out the autonomy of fishermen, even for a plan of fishing gear.

Increasing capacity of fisheries as well as production needs a solid base of resources. Existing reports on resources state an over-exploitation of coastal demersal fish, whose development could not be practically strengthened. However, there is a considerable margin of small pelagic fish. The Master Plan for this study will focus on the exploitation of small pelagic resources, and propose strengthening the capacity of fisheries through the promotion of motorization of boats as well as the introduction and conversion to more effective fishing methods.

The resources must be taken into account while strengthening fisheries capacity and production. Good fishing grounds exist on the large continental shelf of Guinea, though the state and quantities of resources are not accurately known. Not only the boats of artisanal fisheries, but also many industrial fishing vessels (foreign fishing vessels) operate in this area, and as indicated above, there are reports indicating an over fishing of coastal demersal fish. For the development of fisheries, safeguarding the resources and a sustainable effective utilization are significant topics, and fisheries management based on accurate resources information is essential. For this reason, the study of resources and fisheries management with the creation of further human resources are of essence to tackle.

“Guinea Vision 2010” also indicates the development and the reinforcement of a fisheries monitoring system with the objective of stock management and sustainable effective utilization; whereas friction exists between commercial fishing vessels, for example unlawful fishing of less than 10 miles off the coast, destruction of the fishing gear and collisions. Improvement measures must move in this direction, and also for the safeguard of resources and development of artisanal fisheries; however, this is a question relating mainly to the

commercial fishing. Not only supplying a material such as monitoring equipment, but a policy including the creation of human resources, more effective implementation of the current system of observers, the delivery of fishing licenses, and confiscation of fishing rights should be considered.

A detailed study of the landing facilities which will make it possible to deliver fishery products to consumers, of the markets, even improvement of access roads to fishing communities will be made in parallel with the increase in fishery production and rational use of resources. These fishing operations will surpass the sphere of implementation by the Ministry of Fisheries and Aquaculture, one installation having long-term prospects is necessary in collaboration with local inhabitants, local communities, as well as related ministries and agencies.

From the view point of a stable food supply and the creation of employment, it is necessary to develop not only coastal fishing, but also inland water fisheries and aquaculture on which efforts for development have been limited until now. In the Guinea Highland and Guinea Forest Regions of the interior, it is very difficult to appreciate the benefits of the abundant fishery resources of the coasts, except for smoked bonga, because of the geographical conditions that require long distance transport. The yearly fish consumption per person is merely approximately 4 kg while the provision is insufficient considering the significant demand. This Plan proposes to significantly stimulate the distribution of fishery products between the coastal area and inland country in effect to enlarge the distribution of fishery products nationwide. Within this framework, it proposes to increase fishery production and to improve distribution in the interior by benefiting from a sound natural environment. Concretely, one should expect the promotion of extensive aquaculture and fisheries combined with agriculture in the Guinea Highland. It goes without saying, harmony with nature will always be necessary in the development of fish because in the interior the surface water levels are much smaller than on the coast, which can easily lead to a natural environmental pollution and affect the production activities.

4-2 Design by Region

4-2-1 Coastal Region around Metropolitan Conakry

The metropolitan area of Conakry has the most significant population of the country (1.1 million inhabitants, accounting for 15% of the total) and the largest market of consumption. The social infrastructure is established and adjustment of the fisheries infrastructure is in progress. Therefore, fisheries in the Conakry area are the most important in Guinea by size. Moreover, unlike the landing sites and villages of regional fishermen, consumption needs vary on large markets. Since there is also a request for fish for export, species of fish are varied and the percentage of demersal fish is more significant on the landing sites of this area.

The landing, sale and processing of catches, as well as supply of ice to the boats are ensured in the fishing facilities of principal landing sites such as Téménétaye, Bonfi, Dixinn, and Boulbinet. They were built with the assistance of the African Development Bank and Japan. However, many landing sites will have to be gradually improved in the future nationwide.

The sale of fresh fish is largely practiced, but currently, there are no facilities for refrigerating, no measures are taken for the maintenance of freshness of fish, and distribution and sale take place under unhygienic conditions. Since the place of production is in direct relationship to this great place of consumption, increasing demand for fresh fish is expected in the future, and it is necessary to improve the hygienic conditions of distribution and sale of fresh fish and to provide fish of better quality to consumers.

4-2-2 Rural Coastal Areas

(1) Boké

The coastal area of the prefecture of Boké is an enormous area of mangroves including a great number of islands. Apart from Kamsar and the surroundings villages, the majority of landing sites in fishing communities are scattered on the islands of which access is difficult or impossible from the continent. Many villages are small and relatively new, where many fishing vessels are non-motorized boats. In addition, the northern maritime area is good for bonga and motorized boats are concentrated in the towns of Katchek and Kamsar on the northern coast that has good fishing grounds in close range. Large landing sites and villages are established, and fisheries operations are mainly for bonga with subsequent smoking of catches. Smoked fish produced on the islands are transported by distributors in Kamsar by boat, unloaded, and shipped to markets in the interior of the country. Kamsar, one of the largest towns in Guinea (population of 50,000 inhabitants), is directly connected to main roads, and plays a significant role in the production and distribution of fisheries. Apart from the area near Conakry, Kamsar is the only landing site with an infrastructure, which includes electricity and water, near to the city. Benefiting from these advantages, it is essential for Kamsar to continue to develop based on production and distribution of fisheries, to ensure a supply of smoked fish and fresh fish nationwide, the development of on the spot consumption in Boké, assistance at small fish markets around Kamsar, and promote distribution. Considering its importance as a fisheries base close to the northern maritime region, the improvement of production bases at Katchek on the island of Katorak, which up to now remained behind in development, is also significant.

(2) Boffa

This area is at the center of the coastal area of Guinea, and occupies approximately 1/3 of the length of the coastline. Small and large villages are scattered along the coastline, and the area is classified in the three following categories from a geographical and access point of view.

1) Surroundings of Koukoudé (sub-prefectures of Tougnifili and Douprou)

Groups of fishing communities around Cape Verga are close to fishing grounds stretching from the prefecture of Boke in the north to Cape Verga. The landing site-village of Koukoudé is one of the largest in the country, and largest in the prefecture of Boffa. Road conditions are variable, but access to all the villages is possible by car. It is considered an important area for development. Koukoudé, near the fishing grounds around Cape Verga should be developed as a center of production-distribution, while also helping to promote neighboring villages. Concretely, the ice factory and refrigerating storage at Koukoudé could be repaired, providing a landing site function for the, boats from other places such as Conakry.

2) Downstream from Boffa

Small fishing communities are scattered in the mangrove areas surrounding the mouth (Rio Bongo) downstream from Boffa. And Sakama, a village located on one of islands in the river mouth, is an important place of production as a fishing village. All fishing villages are inaccessible by land, and the sale of products, fuel and foodstuffs are all done in boat via Boffa. For those downstream from Boffa, the fishing village of Sakama could be developed as a marketing center and the sale of products, fuel and foodstuffs from Boffa could receive assistance.

3) Area of Koba (sub-prefecture of Koba)

Fishing communities are scattered along the coast among rice fields, in an area where agriculture is developed. Taboriah in the northern part of this area, is an important place of landing, and is the base of distribution for nearby villages. Some fishing communities have due to the accumulation of sand on the coast of shallow water. The area of Koba, located near Conakry, is situated favorably for distribution to the markets of Conakry. This area will be developed by using Taboriah as a central landing site, and assistance for distribution could be ensured for small local villages.

(3) Dubréka/Koya

The coastline of this area is shortest among the coastal prefectures. Small fishing communities are scattered in the area of mangrove downstream from the Konkouré River in the prefecture of Dubréka. Apart from the village of Soumba and of surrounding hamlets, access by land is impossible. In addition, the prefecture of Koya is not directly on the Atlantic Ocean and fishing is limited. In two agricultural villages of the interior at the edge of the river, some inhabitants practice river fishing during the farmers' slack season, even go out to fish at the river mouth. This area is nearest to the capital and important for its traffic between the coastal area and the interior, and practical for distribution. The fishing villages could receive assistance while using Soumba as a central landing site, and distribution in Conakry and areas in the interior could also be promoted.

(4) Forécariah

This area borders with Sierra Leone. The majority of fishing villages are in the areas of mangrove islands, whose access is impossible from the mainland. On the island of Kabak, roads and other social infrastructure has been developed in relation to the development of agriculture, such as rice plantations and a ferry which allows the transport of vehicles. Two villages (Matakan, Konimodiah), with relatively significant fisheries production in the area of Forécariah, are located here. As travel by road is possible, fishing companies of Conakry also buy products here. In the fishing villages of the island of Kabak, the development of production and distribution could be promoted by utilizing the roads, and fishing communities could be developed based on landing and distribution for fishing communities in the vicinity. In fishing communities other than the island of Kabak, forwarding and sale of fishery products, procurement of products for current use are done from the weekly markets of Gbéréyire and Benti. Markets are opened only weekly, but they function to support everyday life and the activities of the island population. Accordingly, it is important to strengthen these functions.

4-2-3 Guinea Highland

The Niger River basin and its effluent in the Guinea Highland Region covers 170,000km² and is more than 2,500km (river itself and its effluent) in length. During the rainy season, the water level rises, and a flood plain of total surface area of 100,000ha, 2 to 3 km wide, is formed, thus providing wildlife an invaluable wetland for reproduction. In addition, once the water withdraws during the dry season, an uncountable number of ponds remain on the flood plain. Useful aquatic animals remain there, which provides the local inhabitants an opportunity to capture fish during the annual harvest festival; this is referred to as collective fishing. The river environment creates approximately 10,000 jobs, including 2,000 fishermen called Somonos (fishing professionals), fishing farmers who fish in the interval of the agricultural activities, women who only fish for family consumption, “smokers” who smoke the captured fish, wholesale fish merchants who transport the catches to the markets, and retailers who sell fish at the markets.

The Guinea Highland is a vast area that makes up 40% of the country, but a dry period during which there is practically no rain is long compared to other areas, and the backcountry is flooded during the rainy season. Corn, groundnuts, rice, *fonio*, etc. which are relatively resistant to dryness are planted for family consumption, and cotton, in small quantities, is a product convertible to cash. There are gold mines in the prefectures of Siguiri and Mandiana, which are exploited by artisanal firms; but there is no other major industry, and almost all the inhabitants are farmers, except for urban civil servants and tradesmen. The ethnic group Malinké, whose ancestors arrived 1 to 2 centuries ago from Bamako and Mopti in Mali, are most common. Somonos arrived in Guinea Highland following Malinke, and settled in the Malinké villages or at the edge of remote rivers.

All the techniques of river fisheries were brought from Mali. Somono Guineans learned these techniques, however, near the Malian border there are villages where the construction of boat is still done by Malian boat manufacturers. In theory, fishing gears are all imported, and imported products from Mali cover practically all the needs of the river fisheries. This is due to the geographical level; Bamako is closer than Conakry, and all types of fishing gear for river fishing are available in Bamako.

The river fisheries quickly developed in Guinea during the last 20 years. At the beginning of the 1980s, thanks to assistance for artisanal fisheries by aid organizations from countries like Canada, Italy, Japan, and the African Development Bank, the European Development Funds (EDF), it was possible to obtain fishing gears at low cost, and the number of fishermen using them increased dramatically. However, there are insufficient fishing resources in the rivers to provide for the growing number of fishermen, and many have been forced to take steps to economically protect themselves by leaving and fish upstream or in the Guinea Forest, or practicing farming during the rainy season to supplement their income because fishing income could not meet the investment for equipment.

The inhabitants are fond of fresh fish from the rivers and smoked fish, but available quantities are limited, so they depend on imported frozen fish provided by industrial chains like SONIT and COGIP. Even if we include such imported frozen fish, yearly consumption of fish products per person does not exceed 5.6 kg (Kankan) and 3.5 kg (Siguiri), which is far from the national average of 13kg per person.

Considering the above situation, three items are proposed in the Master Plan for development of inland water fisheries in Guinea Highland with a target by the year 2010: (i) diversification of the structure of income of fish farmers through assistance in agriculture and the reduction of those pressures on fisheries, (ii) improvement of facilities to aid the distribution and reinforcement of awareness of quality products, and (iii) promotion of resource management type fisheries in parallel with administrative assistance. The details are given in “4-2-4 Project on Inland Water Fisheries Development”; only a summary will be given here.

1) Diversification of Structure in Fish Farmer Income through Agricultural Support and Reduction in Fishing Pressure

As mentioned above, currently almost all fishing gear is imported from Bamako. The fisheries are flourishing in Kankan and Siguiri, etc. and in relatively large economic towns, there are merchants who sell fishing gear to fishermen for cash or even credit. The range of products offered is limited but fishing gears are available. Despite this, if the majority of fishermen say they can not find fishing gear, it means they do not have enough income to buy fishing gear. Assistance with fishing gear would help to increase the income of fishermen. This will undoubtedly be a temporary measure and at the end of one or two years (life of service of fishing gear) this negotiable instrument will weaken, thus encouraging a strong dependence by fishermen on assistance for equipment constituting a risk of negative effect. For this reason, it would not only help through equipment, but through the diversification of income to supplement unstable fishermen's incomes. In many areas, plurality with agriculture is largely spread, and in the future it will be necessary to encourage plurality between agriculture and fisheries in collaboration with the activities of agricultural promoters. In the result it will be possible to reduce the pressure on fisheries, and should make it possible to direct towards management with even improvement of the fishery resources of rivers. Moreover, even if the income of the fish farmers is stabilized, it is desirable to study and set up a system including credit for fish farmers, in order to ensure a stable supply of fishing gear of better quality.

2) Improvement of Distribution-related Facilities and Equipment as well as Awareness of Quality Control

In the Guinea Highland, the consumption of fishery products per capita is low compared to the national average and the inhabitants suffer a chronic insufficiency of animal protein. In the prefectures where chains such as SONIT and COGIP are not established, this tendency is obvious, and it is preferable to provide the markets with limited rivers resources a greater quantity, in a more stable manner and at reduced cost. However, the social infrastructure such as electricity is not established, and considering the tedious character of the inland water fisheries distribution (non-fixed, mobile fishing production sites), it is normal that the development of facilities and improvement of techniques are limited. A proposal has been made to create facilities based on production or fish markets with refrigerated warehouses using gas, cold storage, and storage for smoked fish, ice maker or cold storage by solar generator.

3) Promotion of Resources Management-Type Fisheries in Parallel with Administrative Support

The prefectural office of Division of Inland Water Fisheries and Aquaculture in each prefecture is a small organization of 1 to 3 people, including a director, and considering the financial difficulties of the Ministry, it does not have any funds for its activities. The prefectural offices are expected to keep records, acquire data, and repercussions the policy of the Ministry of Fisheries, but they have been unable to accomplish these tasks.

To continue to utilize fishery resources effectively and sustainably in the rivers in the future, it is necessary to take measures such as regulation of fishing gear, limiting fishing grounds and fishing periods. It will be necessary to create a closer dialogue between administration and fishermen and develop confidence between both groups. It will be necessary for these prefectural offices to consolidate human resources by having adequate personnel skills, knowledge and research, and the improvement of material and vehicles of operations, and equipment for processing data. The Ministry will have to provide necessary material and staff training for prefectural management.

4-2-4 Guinea Forest

A major part of fish consumption in the Guinea Forest relies on imported frozen fish. As it is necessary to count shipping charges from Conakry, the market price of frozen fish is 1,300FG/kg, against 800FG/kg at Conakry, which is more than 60% more expensive. In Guinea Forest, the further one moves away from Conakry, the higher the price. Smoked bonga fished on the coast are more expensive than in other areas. In addition, there are no large rivers like the Niger, and river fishing has generally not developed. This is why the yearly consumption of fish per capita in Guinea Forest is estimated to be 4kg, the lowest nationwide. But consumption of fish is higher than consumption of meat, and fish is the animal protein source of most value to the inhabitants. The low consumption for fishery products in this area, which accounts for approximately 1/4 of the population of the country, has caused a drop in the average level of consumption in the country. It is necessary to increase consumption in Guinea Forest more than in other areas to improve the national average of consumption of fishery products in Guinea.

The fish resources of the rivers are supported by quantities of microorganisms and nutrient salt provided by the floodplain during the rainy season, and generally speaking, theoretically they are proportional to the surface area of the floodplain. In the Niger River, which slopes gradually to a broad floodplain, fish resources are abundant, and the inland water fisheries are developed in Guinea Highland. In comparison, the rivers of Guinea Forest, which are small and origins of rivers which empty directly in the Atlantic Ocean after having crossed nearby countries, have limited fish resources, and offer little in the way of large development of inland water fisheries. The tendency is for professional fishermen to migrate down from the Niger River system towards Guinea Forest because of severe competition between fishermen in Guinea Highland, and one can wonder whether, if this tendency continues, the river systems of Guinea Forest will be able to continue to support the increasing fishing activities. Moreover, even small systems are all international rivers that flow into the Atlantic Ocean after having crossed nearby countries. Many species fish go up the rivers (especially during the rainy season) to spawn in the higher reaches and catches of these fish are not desirable from the point of view of stock management. From the viewpoint of the quantity of resources

in the rivers and stock management, the ensuring of fish consumption in Guinea Forest through the development of inland water fisheries does not seem to be a good policy.

It is possible to improve consumption inside the country while transporting to Guinea Forest cheap fish captured in other areas, such as the coastal areas, by improving the structure of distribution. Both organizations SONIT and COGIP have a monopoly on frozen fish products in the country, and even in the areas most removed such as the prefectures of Nzérékoré, Yomou, Lola, in areas connected to principal roads, fish consumption is prevalent. In the cities, where employees are numerous, and where commercial activities are developed, the demand for frozen and fresh fish is higher, and though production in the area is currently insignificant, the river fisheries catch and fish from inland aquaculture is insufficient. Consequently, it is obvious that if the provisioning of other areas by increasing the installation and modernization of the distribution sector for fishery products, regional consumption will also increase. However, on a retail level, the principle of a market works though on a small scale, and one can observe the balance between consumption and demand. Since total volume currently consumed is limited by the purchasing power, an increase in prices is necessary to develop consumption. It can be considered to create a new network of processing and distribution for freezing catches from the domestic artisanal fisheries or to revitalize the frozen fish market in a monopolistic position by politically encouraging the participation of new freezing firms.

Many smoked fish, obtained after processing from the catches of the artisanal fisheries in coastal villages, are sold in regional markets after their transport throughout the country by very small-scale distributors (of which many are women). There is no monopolistic distribution system like frozen fish that control from production to consumption. Instead, it is an orthodox local industry where the principle competition plays at the market. There are no statistics on consumption in the Guinea Forest, but if we total the current sale of smoked fish in the markets, a volume (converted to wet weight) seems comparable with frozen fish consumption. If one considers the rationalization and modernization of the networks of distribution that causes restructuring of the sector, including the estimation of some distributors, we should take currently operating small businesses (mainly women) into consideration so that they will be able to participating in the move. As governmental guidance for the informal sector is limited, it is recommended that promotion of rationalization should utilize the vital power of small distributors.

Fresh fish sold is approximately 40% more expensive than frozen fish (1,300FG/kg for frozen fish, and 1,765FG/kg for fresh fish: Hem et. al. 1998). Since fresh fish is expensive, juvenile fish of less than 10g can be also sold more expensively (for example, the market at Nzérékoré, more than 1,400FG/kg). The fact that live *Heterobranchus* is expensive, but that its price goes down when it dies, is an indication of the importance of demand for fresh fish in these areas. For frozen fish and the smoked fish, which are the current principal types consumed, an increase in fish consumption in the Guinea Forest through improvements in the distribution of fish is being proposed for immediate application, which should produce expected short-term results. And an increase in the production of fresh fish through the development of inland water aquaculture which has begun through private initiatives, is the measure best adapted to an increase in the long-term production of fish in the Guinea Forest.

There are following advantages for aquaculture promotion in the Guinea Forest. The climate of the Guinea Forest is hot and there are long periods of rains annually. In addition, since

there is weak evaporation and there are many hollows that can be easily converted to aquaculture basin. There are diversified fish species from which an optimal species could be selected for aquaculture. Furthermore, the low supply and significant local consumer demand for fish, and availability of great quantities of rice bran as the principal food for aquaculture, the tradition of the stock management by multiplication called Pêche Collective (collective fisheries), constitute conditions favorable toward the development of aquaculture, and allow the development of aquaculture making profitable a local characteristic.

The government has taken measures to give priority to the development of aquaculture in this area, compared with others, but the activities of diffusion have hardly just begun, and time is needed so that the production of aquaculture will increase because structure of development of regional aquaculture requires major improvements. The adjustment enters the area of consumption of national fishery production per improvement of the distribution and will not be determined by any increase in the national consumption. This is why, in the long-term prospect, the development of aquaculture in the Guinea Forest is desirable. All this can be summarized as follows:

- (1) The consumption of fishery products is lower in the Guinea Forest than in other areas. To increase the consumption in all areas of the country, it is essential to increase this area more than in others.
- (2) The inland water fisheries have limited development potential since their river systems are small and the volume of resources and management are limited.
- (3) It is possible to increase smoked fish and frozen fish consumption, which are currently the principal types being consumed, through improvement and modernization of the distribution structure of fishery products. However, in theory, an increase in regional consumption by adjustment of the distribution of the currently available fishery products does not mean to increase the volume consumed in the country as a whole.
- (4) Like the natural conditions, economic and social condition of this area is favorable to aquaculture development. Aquaculture has begun to appear in the private sector, and improvement of the production of fresh fish is quite possible with support.

Consequently, in the short run it is recommended to increase in frozen and smoked fish consumption by improvement of the distribution of fishery products, and for a long run, an increase in fishery production by development of aquaculture and multiplication, are recommended guidelines for the development of the artisanal fisheries in this area.

4-3 Sub-sector Development Plan

4-3-1 Plan for Improvement of Coastal Fisheries Production

(1) Promotion of Motorization of Fishing Boats

Effort such as the widening of scope of operations, enlarging of the fishing gear, the adoption of more effective fishing methods has been observed following the motorization of boats. Through the improvement, production has been increased. However, over the past few years, the number of motorized boats has not increased, and the volume of catches has stagnated or dropped slightly. Moreover, current engines have largely exceeded the lifetime of regular service, and it is obvious that the rate of operation will continue to drop, so we can foresee a fall in the number of catches. In addition, as there is certain stock of the pelagic resources like bongas and bonga-seri, to maintain the current level of production, and even to increase it, motorization of boats should be promoted through the renewal of out-dated outboard motors and increase in new equipment.

The report on the development study of fisheries by the FAO in 1997 indicates a tendency toward over fishing off the coast of demersal resources to less than 20m in depth; however, the catch of small pelagic fish is low and it has potential to be exploited by artisanal fishermen. Only the artisanal fishermen are currently catching small pelagic fish, and although the total catches have tended to fall over the past few years, the catches the small pelagic fish have remained stable; and since the CPUE (catches per unit effort) also is stable, further development of small pelagic fish is considered possible. Consequently, it is important to promote the motorization of this sector aiming at small pelagic species.

The current vehicle ownership motorization rate of boats is 60% for the *salan* type, the structure of which easily allows the installation of an outboard motor, and 40% of the remainder or approximately 600 boats are without engines. If these boats are equipped with engines, and they can be converted for other fishing methods, for example, from drift gill nets which many *salans* without engines use, to encircling gill net for bongas, thus foreseeing an increase in effectiveness of fisheries and catches themselves. It is true that many fishermen using *salans* without engines would like to use an engine to increase their output and safety at sea.

The motorization of boats up to now has been largely carried out through the introduction of outboard motors within the framework of assistance, however, fishing gear and equipment should be accessed by fishermen themselves, it is needless to say that they should not rely on the assistance indefinitely. However, under the current situation without support measures such as credit for the purchase of equipment by fishermen, these cannot be acquired through their own means. For this reason, outboard motors will be introduced through projects, and a system of credit for fishermen will allow them to buy equipment on their own. As motorization progress, funds will be created from the revenue by the sales of the out board motors. The creation of funds and the improvement of a credit system for fishermen are explained in Section “4-3-9 Plan for Improvement of Fisheries Financial System” and the purchase price of introduced equipment will be similar to the market price in Guinea.

(2) Development of Un-tapped Resources and Diversification of Fishing Equipment and Methods

In Guinea, resource surveys using a bottom trawl boat have been conducted every few years with the assistance of France. In “Fisheries Plan of Guinea 2002”, the resource condition was analyzed with data from resource surveys conducted in 1998 and 2002. This analysis was done in three fishing areas, namely the coastal, middle, and the offshore area. The following results were obtained.

The resources in the coastal area (depth of 5 to 20m) are utilized by artisanal fisheries as well as some trawl fishery. Eighty-six species were caught in this area of which 71 species were fish. The catch with the duration of 30minutes trawling resulted in 175.6kg in 1998 but it declined to 130kg in 2002. The decline of commercially important species is a concern. The catch of Boboe, a species of small croaker (*Pseudotolithus elongatus*), declined from 11.1kg to a mere 0.6kg. In the same manner, Keshikeshi (*Pomadasy jubelini*) declined from 7.4kg to 1.5kg and marine catfish (*Arius latiscutaus*) declined from 6kg to 2.4kg. Boboe is popular in Korea and both artisanal and industrial fisheries are targeting this fish.

On the other hand, the shrimp resource seems to be increasing. Catch of a large pink type shrimp (*Penaeus notialis*) increased from 0.25kg to 0.52kg. Black tiger shrimp (*Penaeus monodon*) was rarely caught in 1998 but it was caught regularly in 2002. In slightly deeper fishing grounds, 0.4kg of a small shrimp (*Parapenaeopsis atlantica*) species was caught per one trawl.

In between the coastal and offshore areas, at the depth of 20 to 50m, African goat fish (rouget: *Pseudupenaeus prayensis*) and sea breams (pageot: *Pagellus bellotii*, pagre: *Sparus coeruleosticus*) are the main target species and are still abundant. Both of the species are considered high value fish. Cuttlefish (*Sepia officianalis*) is abundant and the catches as high as 10kg were observed in good fishing grounds. In the same 40 to 50m depth area of cuttlefish fishing grounds, octopus (*Octopus vulgaris*) was also caught. A large size snail (*Cymbium pepo*), which is popular in Senegal, is abundant but not utilized in Guinea at all.

In the off-shore fishing area (depth 300 to 600m), there is no commercially important fish species available though shrimp resources have potential. Eight shrimp species were caught in the area of which 4 are considered valuable. It is possible to catch 400kg per day with an industrial trawler. Three species of squid were caught in the area. They are *Todarodes sagittatus*, *Illex coindetii*, and *Todaropsis ebalane* and all are commercially important species. A species similar to European lobster (*Galathea sp.*) was also caught in a large quantity (500kg per day).

Considering this resource situation and the illegal trawling activities of industrial fishery and the resulting conflict between industrial and artisanal fisheries as well as the damage to the artisanal boat and fishing gear, the following development strategies are suggested. They are 1) development of untapped resources within 10 nautical miles for artisanal fishery, and 2) proposal of alternative fishing for industrial trawlers by developing untapped resources in the fishing ground further than 10 nautical miles.

1) Development of Untapped Resources within 10 Nautical Miles

As mentioned in above analysis, both artisanal and industrial fisheries use the coastal area and the demersal fish resources are a declining trend. On the other hand, the increase of shrimp resources and cuttlefish as well as octopus resources are both untapped. Pelagic species such as bonga and bonga-seri are abundant and the potential of the increased catch is high. However, there are no human resources as well as equipment that can promote the development of artisanal fishery in Guinea. As artisanal fishermen lack the capacity to develop the new fishery themselves and the number of artisanal fishermen increases, the already resources utilized will face extinction.

Therefore, we propose the establishment of a section responsible for artisanal fishery development and extension in the Ministry of Fisheries and Aquaculture. The section will develop untapped coastal resources with the help of overseas technical assistance.

The section could be established as a reorganization of existing Motorization Center with fishing technology and socio-economic personnel attached. The center will have a small fishing research vessel to develop new fisheries for artisanal fishermen. For implementation, it is necessary to utilize the fishermen's groups and approach the tasks with full understandings of fishermen's needs and problems. The center will utilize the assistance of neighboring and overseas countries' specialists.

2) Development of Untapped Resources in the Fishing Ground further than 10 Nautical Miles

It aims to further develop Guinean fisheries by developing untapped off-shore resources. It will provide an alternative fishery for the illegal industrial trawler operation in the coastal area, which will conserve the coastal resources for a healthy development of artisanal fishery. As a large size fisheries research vessel (195 gross ton) donated by Japanese Government will soon be in service at the Boussoura Center, the survey and extension activities utilizing this vessel is highly anticipated.

As mentioned in the Fishing Plan 2003, there are a number of untapped exportable demersal species in the fishing ground off 10 nautical miles. The research vessel will conduct fishing as well as economic feasibility surveys in the middle and offshore areas. The vessel will conduct trawling aiming at demersal fish, cuttlefish, octopus, shrimps and snails. The catch will be sold through exporters or middlemen. For new species, there needs to be an effort to find markets with the cooperation of exporters. The revenue from the catch will be kept to cover the operational cost of the vessel.

The research will be conducted all year round and the following data is to be collected.

- General data : Date, Weather, Location, Depth, Bottom quality, Fishing gear and its size, Fishing period (Towing time for trawl operation) and speed of the vessel.

- Oceanographic data : Water temperature, Thermo cline, Salinity, Current direction and speed.
- Catch data : Fish species, Amount by species.
- Biological data : Length and weight of individual fish, Sexual maturity
- Economic data : Unit price of the sale by species

3) Transparency of Data and Extension Activities

The result of the activities mentioned in 2) and 3) will be compiled into an annual report that will reveal the dynamics of resources and provide information such as allowable catches, closed areas, closed periods and the economic potential of fisheries.

The result of the survey will not only be published but also be actively released to the fishing companies as timely fishing information. However, a cautious measure should be taken not to allow adding new fishing vessels but converting existing trawlers to either new fishing grounds or species. In other words, the government is directing the fisheries development without increasing the number of trawlers, but by diversifying and lessening the fishing impact to the current utilized fishing resources.

(3) Efficiency of the Operations of Fishing Boats for Export and the Preservation of Freshness

The fishing boats do not currently install navigation instruments. In the fishing grounds close to the coast, they are not absolutely necessary for many boats that are operated within visual distance from the coastline. However, boats practicing angling or long line with ice for exporting fish, operate over several days 30 to 60 miles from the coast. In particular, for angling, fishermen must find exact fishing grounds at sea where there is no sign or object to depend on. If a fisherman can precisely arrive at aimed fishing ground using navigation instruments each time, he can save fuel and time, and is able to carry out effective fishing operations. Recently, it is possible to obtain electricity from outboard motors that enable the use of such equipment on a small fishing boat.

Fish freshness requirements are strict for fish for export, and greater attention must be given to attain them. Frequently, a high percentage of unloaded catches is rejected due to loss in freshness, which is why it is necessary to reduce losses by improving handling on boats after capture and methods of conservation using ice. Boats are equipped with cases for cooling fish, but cooling is insufficient because water penetrates poorly manufactured heat insulators or because the hygiene condition is lacking. Improvement in these cases will strengthen the freshness of catches. Also to maintain a degree of freshness, the introduction of onboard techniques such as “ikishime”(kill the fish immediately after caught) and instructions are necessary.

(4) Plan for Improvement of Statistics on Artisanal Fisheries

There is a lot of information that the Ministry of Fisheries and Aquaculture must know to manage the fisheries and to carry out sustainable development, including catches by species and fishing method, CPUE of fisheries by fishing method, the monthly state of total fishing effort and their development over time. Moreover, distribution of the above-mentioned elements by fishing ground is also a significant element in estimating resources as well as condition of their use. For the principal species, not only weight, but also variations in the size (weight) and the study of sexual maturity, make it possible to know the resource condition in a more precise manner. These types of data and biological study benefit not only the artisanal fisheries but also industrial fisheries, that must be compiled as information for all Guinean fishermen. The elements listed below are used as a basic guideline for the installation of statistics of artisanal fisheries.

1) The CPUE is the basis of all estimation

As indicated earlier, the landing sites of artisanal fisheries are small and located in remote areas making it impossible to carry out a study for all. Consequently, the type of fishing vessel and catches per unit of effort²⁰ by fishing method already used will be employed. Collecting uninterrupted data on the catches per unit of effort for each fishing method will be used as a base. By implementing methods of collecting data and analysis currently employed by the Boussoura Center, the number of samples and data will become more precise statistics.

2) Sample artisanal landing sites to be selected carefully.

In addition to 20 landing sites²¹ representing the town of Conakry, the following landing sites are regarded as candidates considering the importance of the landings and diversity of fishing methods. Prefecture of Boké: Kamsar, Katchek, Katastan, Dahomey, Taydi, Dougla; Prefecture of Boffa: Koukoudé, Taboriah, Kondeyre, Kindiadi, Bongolon, Sakama; , Prefecture of Coyah/Dubrêka: Soumba and Prefecture of Forécariah: Konimodiah, Matakan Many of these landing sites are already included as sites in studies of Boussoura²², and after unification of overlapped areas with studies of the Department of Maritime Fisheries, the number of study items will be increased and quality improved. Moreover, on landing sites where new facilities are to be built, improvement of facilities and sale methods are proposed to correct decision and current methods, and the total weight can be measured at the time of landing, to correct disorderly landings of sale.

3) Those selected landing sites (sample sites) should represent each area and the area catch will be estimated based on the sample data.

As there are regional differences in fishing methods and effectiveness of capture, the summing of data of catches per unit of effort will be made monthly by fishing ground. Fishermen working on the spot will be selected by prefecture or

20 Classification of the fishing methods of the Boussoura Center indicates 12 types described in "3-1-2 Fishing vessels, fishing gear and methods"

21 Bonfi, Boussoura, Dixinn, Landreah, Boulbinet, Fotoba, Small Boat, Robane, Teminetaye, Put center, Dabondi, Faban, Bessial, Bessia, Tenene, Kaporo, Nongo, Sonfonia, Tadi, Room

22 Kamsar, Dougla, Katibinyi, Koukoudé, Kondeyre, Tounifylydi, Sakama, Taboriah, Soumba, Nongo, Kaporo, Landreah, Boulbinet, Bonfi, Dabondi, Faban, Robane, Boom, Konimodiah, Matakan, Khounyi

sub-prefecture. Selection of landing sites by area will include landing sites of various representative sizes.

- 4) The number of samples will be increased within a reasonable limit

The method currently used by the Boussoura Center does not pose any problems, but the full-scale data collection should be possible for the well-equipped fishing ports in the town of Conakry. The number of landing sites will be also increased up to 30% of the total.

- 5) A plan to improve the life and working environment of the data collection person at the sample landing sites and personnel arrangements (including budgetary measures) will be prepared.

It will be decided for each sampling site whether personnel residence or a simple office should be installed. Visits on remote islands like Katchek being difficult, it is recommendable to have both an office and a house. At this type of office, radiotelephones will be installed to allow the close contact with the Ministry of Fisheries. Moreover, the assignment of personnel of prefectural office and premium accounts for such activities will be adequately planned. Work at the frontier zones is done in rotation with agents on central landing sites of prefectural office (many of the residences will be arranged). A premium account will also be planned if motorbikes are needed for the studies for visits. However, they should be individual purchases with a loan system available. The plan provides for an increase of 15 to 20 agents in rotation to carry out permanent data acquisition and awareness activities with the 15 prefectural offices. Existing agents at the Boussoura Center will be employed, and agents may also be selected or created from among ordinary fishermen at the landing sites. This does not mean an increase in personnel for the Ministry of Fisheries and Aquaculture, but the elimination of fictitious employees and displacement from Conakry to the prefectural offices.

By paying attention to work in remote areas, a system of rural living allowance will be established that will allow the settlement of loans for motorbikes for one year. To improve the reliability of data, a comparative study using data every 10 days will be carried out by supervisors, and an evaluation of interviews with fishermen by the Director of the regional office will be routinely implemented. Moreover, in order to obtain landing data of artisanal fishermen who work even on Sundays and holidays and who have irregular landing hours, working hours will also become irregular, deferred significantly from the work model of civil servants. Working time could be made flexible, approximately two hours, and complementary premium accounts could be considered for compensatory vacation and days off.

- 6) Better understanding and cooperation will be obtained from fisherman and fishermen's organizations.

Even with the operation system mentioned above, there are limits on the collection of information. For each landing site, it will be necessary to seek fishermen sympathizers who represent different fishing methods, and to ask them to provide information for days which could not be covered and detailed information such as the fishing economy.

- 7) A supervisor in charge of collecting statistics will be appointed.

A technical person in charge of providing a synthesis of studies made for each landing site will be appointed. It will deal with the tallying and analysis of data, and will visit each landing site more than 2 times annually to ensure technical instructions are being followed by agent statisticians and to keep falsified data to a minimum. A person will be selected by the artisanal fisheries section at the Boussoura Center and of personnel from the Statistics Section of the Department of Maritime Fisheries acting as supervisors. Currently, supervisors are sent every month by the Boussoura Center, but if this activity is transferred to the Department of Maritime Fisheries, budgeting will have to be provided for minimum travel expenses.

- 8) Personnel in charge of collection of statistics will be trained.

An initial technical training course for agent statisticians pertaining to the names of fish species, uniform catches and direction of the data will be carried out by the supervisor.

- 9) Role of the Statistics Section will be clarified.

The role of the Statistics Section of the Department of Maritime Fisheries will be to study the contents of the artisanal fisheries statistics analyzed and provided by the Boussoura Center, the statistics of industrial fisheries and statistics on exports, etc. and to compile them in a usable form for the entire Guinea fishery.

- 10) By accurately grasping the conditions of landing sites, the accuracy of the survey on statistics conducted by the Boussoura Center will be confirmed.

As mentioned earlier, the collection of statistical data will be disseminated by effectively utilizing the existing techniques of the Boussoura Center, however, the accuracy of the Boussoura's data gathering method will be confirmed by clarifying the entire picture of actual landing conditions. A study on landing sites will be implemented in a concentrated manner, in addition to the confirmation and training of capacities of Management staff of the maritime fisheries. The study will be carried out three times: during the rainy and dry season and at the peak season.

- 11) Statistics on inland water fisheries will be compiled through an approach different from that of coastal fisheries

Since the effectiveness of capture depends considerably on the flow of rivers and the seasons, and the fishermen migrate to fish, an approach from the production side for statistics on coastal artisanal fisheries will be difficult to apply for coastal fisheries. For this reason, the data will be mainly collected from producers and retailers at the markets of consumption, and total volume consumed will be brought to light through a study of family consumption in various areas. It should be noted that many people in the communities take part in fish festivals in the basins of the floodplains during dry season, and great quantities of fish are intended for domestic consumption. The Boussoura Center aims to establish a system of analysis of information on the fisheries within the framework of a regional program in collaboration with the EU, and to also prepare statistics on inland fisheries.

Consequently, it seems that it is effective to unify the statistics on inland water fisheries under the initiatives of the Boussoura Center.

12) Partial roles between the Boussoura Center and the Statistics Section of the Department of Maritime Fisheries

It will be necessary for several years to continue the statistical studies under the management of Boussoura Center. It takes time to realize stable data collection in all the sample landing sites of the maritime fisheries. However, the work of the Statistics Section of Department of Maritime Fisheries should be ready to take change. For the Boussoura Center, the study and analysis of resources, the development of unexploited resources etc, for topics of further study should appear.

(5) Plan for Improvement of Artisanal Fisheries Resources Management

With the increased pressure on fishery resources, the need for the limitation of fishing activities will appear in one form or another. Current regulations prohibit trawling and use of nets with mesh size of less than 25mm and to prevent dangerous fishing such as using explosives and poisons, etc. will be sufficient for the time being. Moreover, a strategy of reduction to a degree of dependence on already exploited resources through diversification of fishing methods and stimulation of untapped resources will be implemented.

But if artisanal fisheries develop in the future and become more effective, it will be necessary to limit the total number of fishermen, to set up areas of prohibited fishing areas in order to protect resources. A biological study of fishery resources will soon be realized considering the need for collecting data on the spawning period of principal species, the spawning grounds, and the maturity size and growth models, etc.

The development committee of the landing dock plays an important role in community based resource management. Considering the advantages of the installation of facilities for artisanal fishermen that may eliminate the temporary disadvantages from fishing regulations, it is an opportunity to implement an approach of overall management of resources by groups of fishermen, development committees of landing sites, and the Department of Maritime Fisheries. To realize this, an increase in regional office personnel is urgent. Since the effectiveness will be poor without a budget for activities by the regional offices and management communities, it will be necessary to take budgetary measures to assign to regional offices utilizing the fund from fishing rights of foreign boats and fines paid for the operation of unlawful fishing.

Up to now, foreign fishermen operating in Guinean waters were always more advanced than Guineans in technique and mobility, and avoided competing with them by developing new fishing grounds. But with the maturation of Guinean fishermen and the increase in the fishing population, the acceleration of innovation with assistance, and instability with neighboring countries have started to affect the balance maintained up to now. Henceforth, competition between the Guinean and foreign fishermen will be inevitable and conflicts will increase. From the viewpoint of stock management, the time has come for the Guinean government to establish a one-region policy, based on discussions with neighboring nations.

(6) Proposal for the Improvement of Safety at Sea

Support for fishermen's safety and their equipment must be improved nationwide. With the reinforcement of information dissemination capacity of the Ministry's head office as well as selected landing site by installing equipment such as radiotelephones and light house will be assured; installing navigation lamp for artisanal fishing boats is also considered to be effective. Moreover, fishermen must also take measures, for example, operations with more than two boats make it possible to keep damage to a minimum.

As for measures for the accidents of the artisanal fishing boats, it is essential to prepare lifesaving jackets and SOS buoys in operation at the quite remote fishing grounds from the coast, a navigation lamp should be placed in position raised at the time of the operations at night. Instructions will be given in the case of an accident, and the means of avoiding in advance the accidents, will be obtained by the assistance. Ministry for the Fisheries must take the lead of the other agencies and ministries to avoid them accidents at sea and to improve the measures in the event of accident.

1) Creation of a System for the Transmission of Safety Information

Improvement of weather forecast and increase in frequency to announce; creation of a system for the transmission of information by radio, radiotelephone and fax

2) Providing of Safety Education for Fishermen

Knowledge on safety at sea, navigation techniques, maintenance and repair of outboard motors, formulation of an operation plan, observation of weather, methods to prevent accidents, measures taken in case of an accident should be taught.

3) Cooperation with Related Agencies

A system of collaboration will be created between the Ministry of the Fisheries and Aquaculture, the Ministry of Transport, the Meteorology Agency, radio stations and fishing co-operatives at each landing dock.

4) Required Equipment and Materials

Small lighthouse, navigation guide mark, small radiotelephones, loud speakers, navigation lamps, SOS buoys, lifesaving jackets, compass, etc.

4-3-2 Plan for Improvement of Fishery Products Distribution

(1) Major Issues for the Development of Guinean Artisanal Fisheries Distribution

The most important development issues when considering the improvement of fishery products distribution in Guinea can be summarized as follows:

- 1) The demand for fresh fish is significant, and extension of the distribution of fresh fish will be a principal topic in the development of the artisanal fisheries in the future. It is important to promote the extension of supply ice based on private funds and fishermen's organizations;

- 2) The installation of a system of credit usable by wholesale fish merchants;
- 3) There are limitations with distribution, for example, trucks and the boats are used for transport, but also the absence of access roads to coastal villages;
- 4) Most market facilities in each area are poor and have been expanded without planning.

(2) Basic Improvement Design of Fishery Products Distribution on the Conakry Peninsula

The peninsula of Conakry is itself an excellent place for business with 1.1 million inhabitants, where the needs are diversified: fresh fish, frozen fish, smoked fish, etc. The peninsula of Conakry is also an excellent place for fishery production since there are 16 landing sites on the peninsula and 8 on the island of Loos, which help to satisfy the significant needs of the inhabitants. Fish are bought on these landing sites by wholesale fish merchants, sold on the spot or at 10 markets around the city. Small pelagic fish such as bonga are smoked, and utilize a similar sale network for consumers. On the other hand, frozen fish are unloaded at the landing ports of Conakry by industrial vessels, and arrive at consumers through the same network as fresh fish. However, whether fresh or defrosted frozen fish, there are no cold storage facilities at each stage of sale and the markets are unhealthy. The loss of freshness of fish in the process until it reaches consumers and losses due to damage are significant, something which both retailers and consumers must bear. The installation of facilities at fish markets at an early stage in the distribution network and the discussion of hygienic products are regarded to be significant issues in limiting such losses.

The improvement of market facilities firstly involves the development of facilities such as shelters on the market ground, particularly the construction or repair of shelters, water drains, floors, etc. Secondly, the construction of car parks for users of the market and wholesale fish merchants, including redevelopment of the market surroundings. This will allow more effective delivery of fishery products, and the market will become more accessible to users. However, the right of supervision of installations and the development of markets, goes to the city of Conakry; therefore, to improve each market it will be necessary to hold discussions with authorities at the City of Conakry for coherence in general distribution planning, including the possibilities of land acquisition.

For the concrete improvement plan, the town of Conakry has entrusted a feasibility study of (F/S) to a foreign consultant, and there are number of projects waiting for financing. There is a plan at the large market at Madina for the transfer of the fisheries section on the initiative of the town of Conakry. However, due to ambiguities in the plan and its financing, it has not been implemented. In the future, the Ministry of Fisheries, through technical support, should have to collaborate actively with the town of Conakry to contribute to the improvement of distribution.

(3) Basic Design of the Improvement of Fishery Products Distribution in Rural Areas

In some areas, roads connecting the places of production with markets are in bad condition, and during the rainy season, they are often flooded preventing traffic. As there is no public electricity, ice facilities and cold store is not profitable with the cost of operating generator. There are just some of the problems that limit the improvement of

facilities. Initially, warehouses for smoked fish were intended for the adjustment of distributed volumes and storage during the rainy season, simple buildings not requiring electricity, and installation of refrigeration facilities for fish to improve the distribution of fresh fish at major markets.

In order to improve the conditions, many of female fish processors and wholesale fish merchants need the provision of working capital or transport means including trucks. It is important to promote the financing of funds by organizing wholesale fish merchants' associations and joint utilization of trucks, etc.

4-3-3 Plan for Improvement of Facilities in Fishing Communities

The basic idea of the development of the infrastructure of fishing communities is that, considering the great gap in the cities on the peninsula of Conakry and the regional coastal areas concerning the state of development of the social infrastructure such as electricity, running water, roads, it is necessary to differentiate between the landing sites at major markets such as Conakry and regional landing sites away from such markets.

(1) Basic Design of Improvement of Fishery Facilities on the Peninsula of Conakry

Development as a place of production of the fisheries in direct relation with major markets such as the metropolitan area is required, and improvement of facilities will be made in this direction. Consumer needs are diversified, from popular smoked bongas to fresh fish, and demersal fish intended for export. The facilities to be provided must allow effective and hygienic preparation, landing, sale, distribution and processing..

The social infrastructure such as roads, electricity, running water, ice and information is available in Conakry, and although size and principal equipment at local landing sites are insufficient, they are nevertheless established. In the future, based on refitting, the above-mentioned point of existing landing facilities and the improvement of facilities at landing sites not yet established and markets are to be realized.

Urbanization is taking place around the landing sites, and almost no land adaptable to the creation of landing sites remains along the coastline, and since it is difficult to ensure grounds, large facilities are considered to be difficult. However, considering that (i) inhabitants come of base area in the northern part of the peninsula of Conakry, and the consumption of fresh and smoked fish increases quickly, (ii) many smokers are available near the landing sites of Conakry, which is also a basis for provisioning for the interior of the country, and (iii) As the volume and dealing of fresh fish intended for export is significant, it is not simply providing facilities, but a division of the functions of facilities and an improvement of their level that is needed.

For this reason, it is considered very urgent; (i) to set up landing sites and distribution facilities predicting the provision of fishing products for areas where the population has increased on the peninsula of Conakry, (ii) to strengthen the effectiveness of smoking operations reducing losses due to reduced freshness, and (iii) to introduce effective operations, clean landings and processing taking into account the aspect of hygiene. Concretely, installation of landing sites near markets, development of facilities to protect against the sun and rain, introduction of facilities for efficient smoking, distribution

equipment for iced fish such as refrigerated vans, containers and facilities of hygienic retail sale.

(2) Basic Design of Improvement of Fishery Facilities in Rural Areas

In the rural areas, the aim of development is to develop a landing site as a production center by improving the environment of production and living situation. Around 100 landing site-fishing communities scattered on the coast can be classified in the 3 following categories from the point of view of the activities of fishery production and access by land:

- Category 1 : Landing site-village on the continent, with road allowing access by car, principal landing site for area with excellent production;
- Category 2 : Village of fishermen on the continent, with access road, where shipping and distribution are carried out directly. However, fishing communities with annual landings lower than 100t;
- Category 2 (special) : Landing site-village of fishermen located on an island, but where fish production is significant;
- Category 3 : Small village of fishermen located on an island, where means of transport and distribution are only boats, or very small village of fishermen on the continent, but where the annual landings are lower than 100t.

Table 4-1 Classification of Landing Ports and Fishing Communities

Prefecture	Category 1	Category 2	Category 2 Special	Category 3	
Boké	<u>Kansar</u>	<u>Dougl</u> <u>Katibinyi</u> Kanfrande	<u>Katchek</u> Katastan	Wofiribounyi Boffa Dare Dranta Kagbassa Kapken Kekouraya Nompou Tesken	<u>Kérouané</u> <u>Dahomey</u> <u>Kabata</u> Yongonsale Katountou Khonibenki <u>Taydi</u>
Boffa	<u>Bongolon</u> <u>Kindiadi</u> <u>Koukoudé</u> <u>Kondeyre</u> <u>Taboriah</u>	<u>Katroun</u> Mankouran <u>Sabane-gore</u> <u>Tounfilydi</u>	<u>Sakama</u>	Ganblan Conakrydi Dobire Katamou Marara	Bokinene Darisaram Doyema Poukhoun Tobiri
Conakry	<u>Bonfi</u> <u>Dixinn</u> <u>Boulbinet</u> <u>Dabondi</u>	<u>Boussoura</u> <u>Landreah</u> <u>Teminetaye</u> Faban Bessia 1, 2 Tanene <u>Kaporo</u> <u>Nongo</u> Sonfonia Tadi Petit bateau		Colea Boom Casa centre Mangue Room Enta-Fassa Meingbe	Mayore Fotoba Koromandian Robane Sorro Kipe Ratoma
Duréka & Koyah		<u>Souba</u>		Diguiyane Kakousou Rabanti Wonkou Bonfe	<u>Kope</u> Kissonki Touguissourou Yatagui <u>Bambaua</u>
Forecariah		<u>Kounyi</u> <u>Konimodiah</u> <u>Matakan</u>		Baredabon Yekhefourou Fofia Kipolon Slatougou Sourinene	Dabonkankhi Dabondi Sabouya Romenkine Sibkobi

(*) The underlining indicates the landing sites and fishing communities where the current study took place.

(*) The villages of Khounyi, Konimodiah and Matakan in the prefecture of Forécariah are on the island of Kabak, but as traffic is ensured with the continent by ferry, they are considered to be on the continent, and placed in Category 2.

Here now are guidelines of development proposed for each category.

Category 1:

Kamsar is regarded as the principal landing site of the prefecture of Boké, and Koukoudé and Taboriah are those of the prefecture of Boffa. As a base of fishery production and of distribution in the surrounding area, it leads the fishing activities of the nearby villages and the distribution of products, and also plays a role in displaced boats from other villages. It will be established as base for production and distribution having such functions. Concretely, we would like to propose the following guidelines for development.

Kamsar is directly connected to the city; it is the only landing site of urban type in the rural coastal area to have electricity and running water. It will be established as a base for production and distribution by taking advantage in its privileged site. The enlarging of the ice factory and the installation of refrigerating warehouse will be carried out to increase the capacity of supply ice to refrigerated fishing vessels, to increase the sales of fresh fish bound for local markets and the prefecture of Boké, and to increase the sale and shipping of fresh fish to the purchasers of fishing companies in Conakry. The installation of a market to accelerate the sale of fish, in particular of the route of sale of fresh fish targeting local people who earn income at Kamsar, is also considered to be effective. Moreover, Kamsar plays a significant role as a landing base for remote island communities as well as for loading fuel and products. In addition, a landing site will have to be established in the future to support these functions.

Koukoudé is a major site of fishery production in the country and is close to fishing grounds. Considering this, ice plants and refrigerated warehouse will be arranged to provide ice to boats, to store fishery products until shipping, and to allow shipping with ice. If refrigerated vessels from Conakry are also able to carry out their fishing and shipping at Koukoudé as a base, the distance to fisheries would be decreased by half, and the effectiveness of operations would be greatly improved. Development will thus be carried out as a basis of production and distribution, not only for boats of local fishermen, but also many migrating boats as well.

Taboriah is also a base not only for local boats, but for many migrating boats, and is used as a landing site for distant fishing villages on the islands. A landing site, processing facilities and a market will be built, an ice factory for shipping of fresh fish and cold storage for fish. It will strengthen the distribution of fresh fish between Taboriah and Fria, which already exists, and will encourage fresh fish shipments to Conakry.

Category 2:

These are landing site-fishing communities with an access road, which allows shipping, the sale and supply of goods directly, where the environment of production, distribution and the framework of life will be improved to enlarge these functions. Although there is an access road, the passage is often difficult during the rainy season. There are also fishing communities like Khouyni with only tracks allowing passage on foot, but not by vehicle. The installation of roads is necessary to ensure and improve the distribution of these villages. To improve the activities of smoking, of improved bandaged smoking, a store for the storage of products, a fuel depot will be built, and one system of joint purchases of fuel will be set up. On reefs like Tounyfilidi, Matakan, where exits and returns are difficult at night, the installation of beacons will make it possible to support fishery operations. In many villages wells are not very deep, and they have difficulty supplying drinking water, especially during the dry season, and the installation of wells will also be necessary to ensure the stable provisioning of drinking water to improve the quality of life of the inhabitants and to support production activities. If ice plants on the above mentioned landing sites are built or increased, and if fishing co-operatives, etc. were able to manage distribution, cases with cooling fish could be affected, for example, Dougla, Khatibini around Kamsar, Kondeyre Katroun, Tounyfilidi, Sabenogoré near

Koukoudé, Kindiadi near Taboriah, serving as satellite landing sites for these core landing sites.

Category 3:

The landing site-villages of the islands depend on the core landing sites in their area and on the weekly markets for distribution of products, and procurement of products for everyday use such as fuel and drinking water. It is essential to support fishery production and everyday life to ensure the good course of these operations. Initially, we will assist with the distribution of products, goods out of water, fuel, foodstuffs, various items, etc. by the means of the landing sites. For the improvement of production and distribution, the shipping of fresh fish is impossible; so as a makeshift plan, a store for storage of products and a fuel depot will be built, and a system of joint purchases of fuel will be set up.

(3) Facility Improvement Benefiting from the Natural Environment

Villages along the coast and in the interior of the country coexist with their environment, and benefiting from this, the fisheries carry out production activities such as curing using mangrove wood, etc. from the vicinity within the framework of a difficult life. Their current way of life is closely related with their environment, a type of circulation without waste; it is a structure which does not exert great charge on nature, a short cut to improving the present self-supporting living conditions, with sustainable activities and autonomy.

In some areas, there are communities that are equipped with the infrastructure of private or public organizations, but it is also necessary to take into account the harmful influence of an excessive concentration of people. Moreover, even if large and/or modern facilities are introduced, there will undoubtedly be too many cases where, from the viewpoint of effectiveness and profitability, assuming that the inhabitants will ensure their maintenance, that will be considered not very realistic. For this reason, under the current situation, it is desirable to give the priority to the improvement of facilities within the field of a framework of life, by methods that do not exert a major change on the natural environment. Concretely, it is appropriate to effectively use natural energies such as solar energy, wind, and hydraulics, based on adapted techniques.

(4) Improvement of Production and Living Environment in Rural Fishing Communities

In the rural areas, the improvement of the social infrastructure has been generally delayed. Now, we describe problems and a method of the improvement mainly on factors hindering smooth development in particular with fishery production and processing-distribution.

1) Drinking Water

Many fishing communities of the coast have problems with their supply of drinking water. There are several wells in these villages, but all are not very deep, from 3 to 5m, so the volume of water provided is low, and especially during the dry season, salty water is a problem. There are sites where the quality of water is so bad that it is turbid; inhabitants knowingly drink it, or will seek water at long distances. The quality of water is bad because of the wells, which sometimes become a source of

disease. The drinking water supply is a significant issue for improvement within the framework of life of the fishing communities, and even a problem which prevents the development of production, counter measures are required.

Even if wells are built along the coastal region, considering the proximity to the sea, it is very possible that water will become brackish, and it is necessary to seek sites a little further inland. However, in such cases, wells will be far away from the villages and transporting of water will be necessary. To solve this problem, well water is generally pumped to a water tower and distributed through gravitation, which would appear to be the best method. Currently, the SNAPE builds wells, and construction is concentrated inland at sites where conditions are relatively good. Moreover, pumping is often done by pedal pump and presupposes the use at population centers. We propose a system of provisioning on a large scale, like the water tower system, to ensure drinking water in the fishing villages along the coast.

2) Security of Non-drinking Water for Daily Use

For the washing of fish to be smoked and water for everyday life, detergent etc. people mainly use water from brackish water wells, unsuited for consumption, and surface water. In the future, with the development of production and improved living conditions, the volume of this water used will increase, and it will be necessary to arrange a system of gradual provisioning.

In the interior of the country, from the point of view of the land use, rivers bank areas constitute the centers of production and dwellings, and it is significant to stretch the use of the slopes and plains near the rivers. In reality, since it is difficult to obtain water for agriculture during the dry season, the land is not sufficiently used. If topographic conditions are met, technically, there are areas where water pumping is possible. And to reduce soil erosion, it is desirable to promote irrigation on the slopes and plains and to use them for cultivation. Technically, it is possible to introduce electric pumps by electrification for large-scale irrigation, or manual hydraulic pumps for small-scale irrigation.

3) Road Improvement

For the development of the fisheries, marketing of the products is the significant issue, and roads to support these activities are essential. Even in the fishing communities in the inland area, there are sites where the passage of vehicles is impossible, and others where circulation becomes difficult during the rainy season. An installation of roads is necessary to ensure improvement in distribution. Speaking of installation of roads, agricultural roads which are the principal roads in the villages, although not covered, are generally provided; the installation of village roads along the coast for fishing villages to major farming village would help accessibility of the fishing villages.

The layout of a road system for the coastal fishing communities presents two problems: the administrative agency to handle the installation is not clearly defined, and the construction of bridges is necessary. For agricultural roads, the Ministry of Agriculture often ensures installation for remote inland agricultural communities. However, roads to fishing villages, which are not under its jurisdiction, are not

sufficiently arranged. The coastal area being topographically flat, without hard ground, the construction of non-surfaced roads should be relatively cheap to construct using simple equipment such as bulldozers, shovels and rollers on wheels. For this reason, it seems more realistic under the current framework that the Ministry of Agriculture take the initiative to extend the roads to the coast. However, the wetlands near small rivers and the mangroves overlap in a complex manner along the coast, and passage is impossible without the construction of bridge, the construction of which is difficult, taking into account the cost and local technical level. Nevertheless, the construction of simple bridges, at relatively low cost, should be possible based on one design and standard execution and standardized steel materials.

4) Electricity

Currently, there is no public electricity in practically any of fishing communities along the coast. On the landing site at Koukoudé, a generator is used to turn on illumination light during the landing and sale of the catches at night, but that does not exist on any other landing docks.

Navigation lights are also necessary for marking the channel for entries and exits at night. In the future, small-sized power supplies will also be necessary to improve the work environment, for example during entries and exits at night and landing operations. The installation of small-sized power generating units is possible, but it is necessary to solve the problems of operating and maintenance cost. In using solar energy or wind, even for charging batteries, LED lamps can be used to limit maintenance cost, making it possible to provide a relatively inexpensive system. One could also introduce co-generation using biomass common to agricultural villages in the backcountry.

5) Toilets

There are many villages of the coast without toilets, and the inhabitants generally take care of their needs at sites adapted to the coast. One might think that in small fishing communities it could be done on the beach and nature would take care of such matters. But fish are landed on the same beaches; and one should consider penetration in well water, which is undesirable from a hygiene point of view. To improve the situation, it is necessary to study the construction of public toilets on suitable sites. Accordingly, it will be essential to establish a system of management, cleaning and pumping of the public toilets by the inhabitants.

(5) Points to Consider in the Execution of a Social Infrastructure Plan for Fishing Communities

1) Commitment of Aborigines toward the Project

In the fishing communities, the elders of the ethnic groups, which are “administrators of the land”, are a traditional "authority". In the villages where various ethnic peoples coexist, the existence of "authority" (frequently not from fishing community) must be evaluated positively, even just to prevent anarchy. During the establishment and execution of the project, their interest and participation are essential. In particular for projects requiring the expropriation of land, the first

partners in discussions are these notable aborigines, and not the fishermen concerned or their representatives. Moreover, for projects with several profit sectors and topics such as the installation of roads, the collaboration of CRD made up representatives of notable aborigines are essential. In any case, if one does not omit precise information and obtains approval and confirmation for the execution of the project, one can expect that such notable people would not be opposed to a project contributing to the development of a sector or an area.

2) Benefit Principle (burden of beneficiary) and Ownership

In the coastal part of Guinea, the installation (improvement) of access roads to agricultural (fishing) villages and the construction of wells are often partially funded by the recipients in the form of monetary contributions, work or materials. The repairs thereafter also are carried out by recipients. The CRD play the central role for roads, or a management board of a sector being created for wells. In other words, the “benefit principle” (assumption of responsibility by the beneficiaries) is also being rooted among the inhabitants of agricultural villages, which represents a significant potential for development. To support this guideline, and not to place itself in contradiction with the approach of other givers, participation of the recipients will be introduced in one way or another for realization of this project.

4-3-4 Plan for Inland Water Fisheries Development

The 3 principal problems of the inland water fisheries in Guinea based on the discussion in the Chapter 3 “Current State of Artisanal Fisheries” are as follows:

The fishermen lack the means necessary to supply themselves with equipment and materials for fishing;

The places of production (camping) move, and as the fishermen move, the adjustment of a fixed network of distribution becomes difficult;

Seizure by the state of fishery resources in the rivers is impossible.

Fishing ground which is rivers, is filled with sand

In this Master Plan, we propose three projects for a target year of 2010 for the three points listed above.

(1) Plan for the Improvement of Fishermen’s Incomes

Background

Since river fishermen cannot buy fishing gear necessary, they do not catch enough fish and thus they cannot buy fishing gear needed to obtain sufficient income, which all constitutes a vicious circle. The fact that during the dry season they leave their villages to go to work elsewhere in the Guinea Forest or in the higher reaches rate of the rivers is one of the means which allows them to solve this problem. But available resources are not generally abundant in the rivers at the edge of which they work, and even if many of these fishermen meet their quota, there is a significant risk of exhaustion of those resources. In addition, one needs sufficient machines "to work

elsewhere", say the fishermen. But how can they catch enough fish, and obtain sufficient income near their villages? The answer to this question is already found in almost all prefectures of the Guinea Forest, in other words, fisheries and agriculture as a side job.

Objectives

This project does not propose converting fishermen into farmers, but leaves fishermen to remain fishermen in the future. Agricultural income is there only to supplement the income of fishermen, and it is essential for the acquisition of fishing gear. The option to reduce the number of fishermen does not seem realistic, but duality with agriculture will help to reduce the efforts of each fisherman, and let us hope for a negotiable instrument of maintenance or reestablishment of fish resources for long-term.

Contents of the Project

This Project provides for fishing gear to enable an increase in fisheries income. Moreover, agricultural extension personnel will ensure support on a technical level and with equipment and materials. A study will have to be made to define how to distribute the agricultural tools, seeds, food to fishermen, and whether to carry it out for free or at some cost. Nonetheless, it is necessary initially to establish a general system, with support from the Ministry of Agriculture and the Ministry of Fisheries and Aquaculture, to give technical guidance through visitations by agricultural promoters to fishing communities. At the same time, as a long-term prospect, it will be necessary to study a system of credit for fishermen in order to allow fishermen to supply themselves with fishing gear in a stable way.

(2) Plan for the Improvement of Fishery Products Distribution Networks

Background

River fishermen generally practice migratory fishing while living in camps, as indicated earlier. This is why there are no fixed landing sites for river fishing, which means that it is also difficult to install necessary facilities. Moreover, fish markets which correspond downstream through the distribution network do not have the social infrastructure, such as electricity, so no installation provides for maintenance and freshness of catch. Although the inhabitants of the interior prefer fresh water fish, the smoking of the excess and catches from camps far from markets is necessary.

Objectives

Under the restrictive situation of poor social infrastructure installation, the current project proposes provision to inhabitants with limited river catches in greater number, in a more stable way and at low prices by the means of an infrastructure of distribution which will profit fishermen, wholesale fish merchants and consumers. Technical guidance of personnel from regional management will be conducted with respect to fishermen and wholesale fish merchants concerning the maintenance of fish freshness as well as the hygienic management of catches.

Contents of the project

1) Introduction of Floating Net Cages

Floating net cages are regarded as a perspective piece of equipment to be carried in the case of migration during fishing operation and for campers who cannot store fresh fish. At first, the plan will focus on catfish, which are very resistant fish-even if the fish are hurt they do not die - and also for species such as tilapia and labéo, etc, which, if they are not fatally injured during capture, will remain alive until the arrival of wholesale fish merchants.

2) Improvement of Cooling Boxes for Fish and Storage for Smoked Fish at Distribution Bases

The catches are transported to the nearest village from the camp by wholesale fish merchants or the fishermen's wives. They are then divided for consumption in and out of the village; those planned for consumption outside the village are temporarily stored on the spot, and it is necessary to decide on their setting in the distribution network because of supply, on close markets, and the trend in prices. On several bases, it is significant to arrange simple facilities to maintain freshness and regulate shipping, such as the case with isotherms, gas refrigerators, stores for smoked fish, etc. to at least limit the losses from distribution and price fluctuation of the catches.

3) Improvement of Fish Markets at Major Centers of Consumption

The fish markets of principal cities of the interior are almost all-open air, without sinks or taps to wash the catches, without a drain system for water, and the fish are sold to consumers amongst flies, under very unhealthy conditions. To improve this situation, well-ventilated markets need to be built with shelter from the sun. In addition, the employees of regional offices will sensitize and give technical guidance to women who come to sell their catches at the market on the hygienic handling of fish.

4) Installation of Small-sized Ice Machines and Refrigerators

Even the principal cities of the interior of the country are not fed in electricity 24 hours a day. SONIT and COGIP, private organizations that deal with imported frozen fish distribution have power generators to supply their cold storage, but difficulties on the level of profitability are feared for public facilities. The use of solar energy, which has been spreading for a few years now for supplying water to the villages, will be studied. The initial investment is significant for solar energy, but a power supply is possible thereafter with practically no expenses for exploitation and maintenance. Since energy is not abundance, solar systems are not adapted to large facilities, but should be sufficient for the distribution of fishery products in the interior of the country. Ice necessary for distribution will not only be used by markets but also for facilities of fish distribution where there is hope for improved fish conservation using ice at a upstream of distribution network.

5) Refrigerated Containers for Transporting Catches

To transport catches to market while maintaining freshness, traditional envelopes made from raffia fibers (kind of palm tree) should be replaced by “Styrofoam” boxes that are being increasingly employed for the export of fish from Conakry. Combined with ice for distribution mentioned above, the range of distribution of fresh fish will increase considerably, and more fresh fish should appear at the markets.

(3) Plan for the Promotion of Resources Management Type Fisheries

Background

No scientific studies have been made on the hydrographic system of the Niger River, so the potential volume of catches is unclear. Moreover, fishermen being unaccustomed to using balances, and in the absence of a common system in the prefectures for collection and analysis of fishing statistics, no precise figures on actual catches exists.

Objectives

In this Project, we will promote long-term stock management of the fisheries through the installation of a system of collection and classification of fisheries data from the point of view of human resources development and materials.

Contents of the Project

1) Unification of Methods for Collection and Analysis of Statistics on Catches

Methods of collection and analysis for the statistical data of the fisheries currently left to the judgment of the Director of the prefectural management will be unified. For example, currently in the prefecture of Kankan, the volume of catch by a unit of fishing gear is calculated based on data accumulated over the years, and by multiplying the number of gear, one obtains the volume of catches in the prefecture. In the prefecture of Mandiana, volume of catch in the prefecture is obtained without multiplying the number of days and the number of boats, which culminates in an extremely under-estimated landing. Concretely, it is necessary for the Division of Inland Water Fisheries and Aquaculture and the Boussoura National Center for Fisheries Sciences to establish together a unified method to be implemented by each prefectural management.

2) Creating a Database for each Prefecture

To control long-term data collected through this unified method it is necessary to establish a computerized database for each prefecture with a standardized format. The information processing system required for this formation will be installed by the ministry at each prefectural management level, and instructions for its employment will be given to the director or to the person in charge of statistics.

3) Improvement and Enforcement of Legislation Based on Statistical Data

To maintain and increase the current volume of resources, it will be necessary to establish a concrete legal system with measures limiting mesh size and fishing grounds, regulation of the periods of fisheries, etc. together with the Boussoura National Center for Fisheries Sciences. For the time being, it should not only be based on scientific data but also on the opinions of the administration and the fishermen themselves. The installation alone of a legal system will not accomplish anything. It is necessary to continue dialogue with fishermen and provide necessary guidance so that they adhere to the system.

4) Implementation of a Registration System for Fishing Vessels

Steps will be taken to improve the fishing licensing system currently used. At the time of payment of fishing excise tax, the register number of boats, owners' names, fishing methods, place of booking etc, will be stored into a computer data base. This will not only provide data on the number of boats necessary for stock management, but it will also make it easy to recognize boat infringements during monitoring activities.

5) Organization of Fishermen's Groups and Promoting Literacy

Dialogue between the prefectural office and fishermen is essential to the series of activities mentioned above. It is not easy to assimilate the concept of fisheries stock management to ordinary fishermen, and initially through intermediary dialogue with fishermen's organizations, we will be able to pass information to the fishermen one by one, and take measures which will benefit fishermen on the whole. Up to now fishermen's organizations have been used only to receive aid assistance, much of which was provided by simply asking the administration. In the future, sensitizing activities will be carried out at the level of fishermen and employees of the prefectural offices so that each fisherman will be able to cooperate with such organizations.

(4) Counter Measure for the Sand Sedimentation on Riverbed

Background

The Niger River, both mainstream and its branches, is filled with sand particularly in its lower reaches and deep spots of the river, that are fishing grounds, are disappearing. There are some areas where people can walk across the river in a dry season. It is a great concern in the long term of view such as 50 to 100 years. The cause of sand sedimentation is simply saying that the retaining capacity of soil is being lost on the basin. And there are some reasons for the phenomenon such as the deforestation on the basin, improper and ineffective agriculture, clay extraction for block fabrication. These elements are all related to the economic activity of residents along the river. Therefore, it is necessary to regulate these activities in order to restore and maintain the condition of river for a long time.

Objective

Dredging on the riverbed to regain the deep spot brings the temporary effect. After the flood period, the riverbed is again filled with sand. As it is meaningless to pour water into the bag with a hole, it is rather important to prevent sand from coming into the riverbed than taking out the sand.

Contents of the Project

There are 2 important points to maintain the geographical features of rivers such as protection of riverbank and protection of soil on the basin. To protect the riverbank, it is important to leave two different economic activities away from riverbank as far as possible, with compensatory measure like providing alternative revenue source or alternative place and with sensitization and education program. Those who practice economic activities on the riverbank are clay block makers and farmers who cultivate the land near riverbank.

The soil of basin is so wide that people living there belong to various social classes and socio-economic groups. Essential thing is not to cut trees and not to set fire in the bush. Even though the authorities enforce them not to cut trees, they may do that if live is tight. It is important to let residents understand the importance of soil protection through any effort to improve fundamental living condition and sensitization. Forestation should come at the final stage, after the comprehension of residents.

4-3-5 Plan for Aquaculture Development

In Guinea, aquaculture is practiced in the following forms; maritime aquaculture and in brackish waters along the coastal areas; aquaculture on ponds and lakes in the area of Fouta Djalon in Central Guinea; seasonal aquaculture on ponds within the flood plain of the Niger River in Guinea Highland; and aquaculture using the ponds in the Guinea Forest. It is therefore a country with good conditions for aquaculture, which is possible in various forms throughout the country. However, since technical capabilities and current budget of the Ministry of the Fisheries and Aquaculture are limited, priority for development is given to the Guinea Forest which has the highest potential, and a strategy of development concerning limited areas and techniques is being implemented. In addition, it is necessary to establish a plan based on long-term development. It is not sufficient to develop aquaculture only in the Guinea Forest but this experiment will ensure a regional production of aquaculture allowing the development of other areas. This is a setting up period of accumulated techniques for the establishment of a base for the development of aquaculture nationwide.

As already described in “3-3 Inland Water Aquaculture” and “4-2-4 Guinea Forest (Development Design by Region)”, much of the natural, economic and social conditions of the Guinea Forest are adapted to aquaculture, but the concept of “aquaculture”, namely the culture of fish, does not exist in traditional agriculture; the real annual production is limited to very small 20t because of the lack of human resources and governmental facilities to diffuse aquaculture techniques. In the future, in order to realize the high potential of Guinea for aquaculture, it will be necessary initially to examine the natural resources, social development and current human resources of the country, and to seek the development of realistic and adaptable aquaculture through local conditions. For a new field like aquaculture, stimulation

from abroad is essential. The guidelines for development, based on the current situation and centered on the points below is recommended.

(1) Effective Use of Existing Domestic Development Resources:
Harmonization with Agricultural Development

Whereas the Ministry of Fisheries and Aquaculture has assigned only one zone coordinator for an area covering 6 prefectures, the Ministry of Agriculture has assigned 258 agricultural extension personnel in the Guinea Forest for the popularization of agricultural techniques. Considering the current structure and budget of the Ministry of Fisheries and Aquaculture, its independent activities of diffusion of aquaculture in Guinea Forest are limited. It seems realistic for the agricultural extension personnel to follow training courses and learn aquaculture, so they can spread aquaculture to the villages. Since agricultural development of hollows (*bas-fonds*) as pond began in the 1980s, infrastructure such as access roads have been constructed in the development areas. It is easy to obtain rice bran feed, an essential food for aquaculture, where rice growing has been developed. Moreover, a study of socio-economic conditions such as the possession of land in the selection of the areas of the development and state of the infrastructure is essential. However, as agricultural development becomes more advanced, information accumulated on this area will be usable, which will reduce the possibility of problems and failures appearing. The development of aquaculture where agriculture is already developed has the advantage of being able to use common infrastructure and information.

The points indicated above represent the relationship to agriculture. However, in general, when new investments are required in the development of aquaculture, we can check the level of development in other related fields, making it possible to reduce investment thus avoiding waste and overlapping of available soft (human) and hard (material) resources.

Although human resources and basic facilities for development of aquaculture within the framework of the National Development of Aquaculture are very limited in the country, we can also observe the inefficiencies of the Ministry of Fisheries and Aquaculture at least when using these limited resources. For example, aquaculture facilities established near Mamou are not fully utilized. Even though qualified staffs have taken training courses abroad, they do not display sufficient competence in the development of aquaculture in the country. While ensuring collaboration with organizations aside from the Ministry, it is essential to unify these aquaculture activities within the Ministry and to ensure cooperation between different sections of management concerned.

(2) Human resources Development:
Establishment of the Aquaculture Development Center and Accumulation of Domestic Aquaculture Techniques

The Ministry of Fisheries and Aquaculture must ensure the formation of national technicians, leaders of the development of fisheries in the country, and ensure their cooperation in great numbers. Traditionally, aquaculture is not included in the economic activities of agricultural villages in Guinea, and we recommend the introduction of necessary techniques in advance into this field, for example from Asian countries or neighboring Côte d'Ivoire. A center for the development of aquaculture must also be created to carry out tests to amend imported techniques and to develop suitable

techniques. Apart from its functions toward technical development, this center will also be equipped with facilities for aquaculture training courses, such as practice ponds, and will assume a central role of contributing to the rapid diffusion of developed techniques across the country.

It is desirable that the exploitation of the center be based on the production and sale of fish eggs and larvae for aquaculture. The production of eggs and larvae is at the heart of aquaculture techniques, and once techniques in the production of eggs and larvae are consolidated, the accumulation of techniques among employees of the Ministry of Fisheries and Aquaculture will be able to provide technical training courses for agricultural extension personnel. Moreover, since there is a request for eggs and larvae for aquaculture, and in particular those of catfish, the Center will be able to ensure sound financial exploitation in an autonomous way based on egg and larvae production, making possible the stable and permanent operation of the Center. Conversely, it is desirable to conceive and build a center whose operation cost is within the expected income from the egg and larvae sale.

(3) Utilization of Excellent Natural Conditions: Aquaculture Development in *bas-fonds*

Hollows (*bas-fonds*) in the Guinea Forest are particularly adaptable to the development of aquaculture. Hollows with natural slope conditions, moderate precipitation and temperatures, constitute topography facilitating the creation of ponds for aquaculture in the valleys of Guinea Forest. Two types of aquaculture were practiced by the pioneers of aquaculture in the Guinea Forest: aquaculture of an individual farmer type that usually use several small ponds, and extensive aquaculture used by group of farmers that usually use dams. A recent project study by SOGUIPAH of Diéké has contributed to the development of these two types of aquaculture. For the development of aquaculture in the Guinea Forest, it is recommended that the Ministry of Fisheries and Aquaculture study modeling²³ and the promotion of aquaculture in the hollows while referring to the SOGUIPAH project. The accumulation of development techniques for aquaculture using the hollows, which are unique to Guinea, will be the key to aquaculture development of which is to follow in other areas in the future.

(4) Serious Consideration of Traditional Production Techniques:
Study on *Pêche Collective* (Collective Fisheries)

In the Guinea Forest, a collective fishery refers to traditional seasonal fishing practices carried out by the fishermen at the height of the dry season. Prohibition of fisheries is adhered to throughout the year at various water levels, except for one day, which allows the *Pêche Collective* (collective fisheries) a traditional practice of "management of resources" through artificial management of the fish resources. This practice of once-a-year fishing by water level is of great socio-political significance to the village society and well beyond a simple economic activity, and was not taken into account up to now by the Ministry of Fisheries and Aquaculture. However, seasonally isolated water levels remaining in April to May at the height of the dry season are used for *Pêche Collective* (collective fisheries) without exception, not only by fishermen, but by 80% of the population, which clearly shows that it is a significant fishing activity and a means of

23 Specialist in IRD, Mr. Hem Saurin, modeled aquaculture on hollows in 4 stages, simple type energy for ponds obtained using slopes, and by gradually adding artificial elements (increase in the level of fertilization) finally created complex ponds for aquaculture in the hollows, and recommends further development.

obtaining protein during the dry season for the Guinean population. Since almost all the inhabitants in the agricultural areas take part several times in the *Pêche Collective* (collective fisheries) during the dry season it shows that a weak increase in catches has a great influence on consumption. Currently collective fishing is practiced using only the technique of simple stock management, which is the limiting fishing season. In the future, it will be possible to develop *Pêche Collective* (collective fisheries) by implementing techniques of active stock management such as the management of organic fertilization in floodplains, the creation of hiding places and shelters for juvenile fish, artificial amendment of the composition of species, and we recommend the formation for this development as a purpose of the fisheries be ensured. The Boussoura National Center of Fisheries Sciences has staff holding PhD in ichthyology and in hydrobiology, and the Ministry has personnel qualified in the study of stock management necessary for collective fishing. Likewise, in the advance of the study, it is desirable for applicable techniques directly related to production be developed and implemented rather than concentrating on scientific interests.

Then, by taking into account the above-mentioned four points, concrete guidelines can be established for a development plan for aquaculture. For aquaculture, which is practiced in a spontaneous way in the Guinea Forest, the guidelines introduce two different techniques. These are “individual-firm aquaculture” selling cultured fish at the fresh fish market in densely populated cities and “subsistent pond aquaculture” operated at low population area. There are also intermediate types, but there is no clear line of demarcation; nevertheless, for the diffusion of aquaculture, it is important to differentiate between these two concepts of aquaculture. To regulate the problems by supposing typical forms and composing a handbook for each type will provide agricultural promoters without any basis or experimentation in aquaculture, and farmers with technical guidance efficiency and planning. Moreover, the problems of each of these developments will become clear by specifying the differences between the two.

As the “Individual-firm aquaculture” is profitable, if the environment for aquaculture is provided, the economic incentive will naturally cause its diffusion. There are already some aquaculture pioneers in each city who have begun the operation. The obstacles for aquaculture are the difficulty of obtaining eggs and larvae, concern for the applicability of the site and absence of knowledge on the construction of the ponds for aquaculture (insufficient diffusion of technical training in general). Rice bran feed is available in abundance, although there is a great margin for improvement, and is unlikely that the problem of insufficiency of food will occur in the immediate future. Usually, if harvest information is by word of mouth, it is easy to sell the fish at harvesting time on the edges of the ponds since the supply at the market is insufficient. Consequently, the production of eggs and larvae and the popularization of techniques are essential elements in the promotion of development. Since 1999, the AFVP began a pilot project for diffusion of “individual-firm aquaculture” and the results are expected soon. But concern for technical support also exists because the AFVP does not have its own aquaculture facilities. It is difficult to take realistic measures without having facilities to supply eggs and larvae, and to find solutions by carrying out tests on the ponds, technical problems which we ran up against during popularization. It is not only for the AFVP project, but also for the agricultural extension personnel when they start diffusion of aquaculture, the same problems will appear. To solve these technical problems, a center of aquaculture development and managed by the government will be at the heart of the development of aquaculture.

More extensive “subsistent pond aquaculture” is significant to the producer for its protein contribution while the economic motivations are less strong than for individual aquaculture-firms. It is an activity carried out by lower socio-economic people of agricultural villages and since substantial funds are needed to build a dam at the beginning, if there is no financial assistance, development difficulties unlikely. Whereas the “individual firm-aquaculture” is for economically powerful population who can buy fish (persons earning income like the civil servants), “subsistent pond aquaculture” is an activity for people who do not have source of proteins other than fish which they raise. Social benefit of the activities is much higher for the “subsistent pond aquaculture”, From the long point of view, the improvement of nutritional state of the inhabitants will be stimulated agricultural villages, and grants of government aid should not decide based on a comparison of the profits from a short-term investment. Fortunately, Guinea has a method of traditional multiplication of fish known as *Pêche Collective* (collective fisheries), a habit according to which the production of the natural ponds is not the property of one individual, but of all the inhabitants of the village. The families which managed the same pond over several generations accumulate practical knowledge. Stock management is not a problem that one can solve simply by knowledge of biology, the implications to villagers are a significant element, and without such practical knowledge and techniques, one cannot expect good results. Compared with the *Pêche Collective* (collective fisheries), subsistent pond aquaculture requires more artificial management, but the insertion of the element of *Pêche Collective* (collective fisheries), which is of more social nature, provides hope for an increased success rate for the project. Development should be encouraged while considering expansion of subsistent aquaculture not like an activity to be managed individually, but to manage by the traditional village community. Moreover, rather large ponds must be chosen, and even with introduction of relatively reduced fertilization and food, it will have to be made so that all inhabitants can benefit from produced fish.

To summarize it is recommended to support for the development of inland aquaculture in Guinea on the four following pillars:

- 1) Effective use of existing domestic development resources: Concretely, use of facilities and human resources in harmony and collaboration with for plans for the development of agriculture which preceded, and practical use of human resources and the facilities of the ministry;
- 2) Human resources development and accumulation of techniques: Introduction of advanced foreign techniques and the training of human resources and accumulation of techniques nationwide. A center for development of aquaculture is necessary because it will be in the heart of these activities;
- 3) Use of excellent environmental conditions: For the Guinea Forest of which development has priority, (*bas-fonds*) hollows should be utilized further for aquaculture;
- 4) Collaboration with traditional production techniques: By adopting new scientific methods into traditional production techniques rooted in the social mechanism, development adapted to local conditions can be possible.

By considering these four points for “individual-firm aquaculture” and “subsistent pond aquaculture” realized in the Guinea Forest, the former type, will attract more participants

when economic environment is improved. For the later type, it will be good to adopt a policy as a central engine so that free competition on the markets between firms pushes the development of aquaculture trade. In the immediate future, we will start by increasing the production of eggs and larvae and the expansion of activities for diffusion of aquaculture. Considering the benefits in agricultural areas are significant, it is good to adopt a long-term policy so that the aquaculture development can be shared by the vast majority of villagers. Introduction of the element of *Pêche Collective* (collective fisheries) in this design of aquaculture by modern fertilization moves in the direction of these guidelines.

4-3-6 Plans for Education and Training for Fishermen

Education and training for fishermen to facilitate development of artisanal fisheries can be divided into two categories: direct general education for artisanal fishermen and education for the training of extension personnel and researchers. In this section, the focus is given to the ideas directly related to the development of artisanal fisheries.

(1) Implementation of Traveling Workshops Directed toward Artisanal Fishermen

Since it is unrealistic to force artisanal fishermen, whose daily fishing constitute the basis of their income, to take training courses for long duration, workshops based on a particular topic over 2 to 5 days could be executed. Depending on the content of the training courses, courses held during the rainy season are preferable.

Topics for training course include diffusion of effective techniques for curing (smoking) using popular types of improved ovens, treatment of fish on board after capture, processing techniques for fish paste, new fishing method such as trap fishing, cuttlefish fishing, octopus pot.

Pilot research project will be the basic element for some of these training courses, but effective technology transfer by a delegation of specialists over a short period, or in the form of a joint study directly with fishermen or fishing co-operatives is also possible. While attending the training courses, personnel from the Ministry of Fisheries will be able to learn through OJT (refer to the project for the assignment of extension personnel in fishing communities).

(2) Training for Extension Personnel, Trainers and Researchers

As indicated above, by training fishermen to become leaders, we will have people who will become leaders of co-operatives of fishermen, as well as human resources for the popularization of the new techniques. It will be necessary to improve the competency of trainers and researchers in a planned way. Through studies in foreign countries, researchers of the Boussoura National Center for Fisheries Sciences and Maritime Scholl teachers will be trained. Exchange of personnel and studies with other West African nations will be encouraged.

(3) Effective Utilization of Maritime School

The Maritime School at Conakry is established for commercial fisheries development (partially artisanal fisheries). At the time of its creation, it was hoped that the government would mediate the employment of fishery firms owning industrial fishing vessels.

However, in recent years it has become difficult to enter fishery firms as the position is very limited and the employment rate after graduation is less than 10% of the graduates. With the movement of decentralization of the government, a self-supporting accounting system is also required at this school. Restructuring the courses towards hands-on (practical) training based on economic needs and fisheries development plan for Guinea is considered important.

We propose the reexamination of the 3-year courses (navigation, machines, shipbuilding) study of the introduction of one-month short-term course to meet the needs. One can think of short-term training courses as the training of leaders for artisanal fisheries, for example, in the manufacturing of fishing machines, processing, distribution of the fishery products and economy, management of the family budget and cooperatives, etc. and general education, elimination of illiteracy, etc. could also be included. This school could also actively be used for training courses for personnel at the Ministry of Fisheries and Aquaculture.

(4) Effective Use of the Vocational Training Center of the Ministry of Social Affairs for Women and Children

The Ministry of Social Affairs already has the Vocational Training Center for women and children, which functions well. However, the courses currently provided are mainly sewing, embroidery, dyeing and soap manufacture, and nothing for fish processing. We propose the creation of technical courses such as fish processing and management of hygiene at this Center. We propose the courses of improved techniques specialized for people already working in the fisheries sector as well as courses open to general public thus contributing to the development of fish consumption and the restaurant business. The literacy education and accounting will be included in each course. For persons who are already engaged in fisheries and with the limitation of the time, studying at the Vocational Training Center is not realistic. Perhaps setting up short-term intensive courses during the holidays or night classes throughout the year depending on the life cycle of the student should be more appropriate.

(5) Effective Use of the Educational System by Grouping

The Department of the Elimination of Illiteracy of the Ministry of Education has put in place a complementary system in order to promote the elimination of illiteracy, and various groups aiming to eliminate illiteracy combining with professional training will realize support. In areas where the Vocational Training Center of (4) is difficult (i.e. there is no center in the area concerned, its program does not correspond to the needs of everyday life), this system could be implemented for the training of fish processing techniques, in particular curing, and the elimination of illiteracy-training and computation. Instructors for literacy education and computation are often NGOs carrying out their activities at local sites. There were cases in the past where instruction for curing was provided within this framework, but for processing techniques, one will be able to also resort to the delegation of instructors of Ministry of Fisheries and Aquaculture, or ask NGOs which deals with the processing of fish.

4-3-7 Plan for Formation of Fishermen's Organizations

When forming organizations of fishermen, points to be taken into account and problems that appeared during the study of organizations of fishing villages and a study of organizations related to fisheries are listed below.

(1) Points to be Taken into Account and Problems with Organizations in Fishing Communities

1) Effective Use and Reorganization of Existing Organizations

The Islamic collective spirit or the traditional spirit of collaboration and mutual aid organizations represented by *Tonchins* described in 3-6-2 (2), present a great potential for organizations. In reality, fishermen who have formed co-operatives and mutual aid organizations carry out spontaneous activities. The most desirable methods of these organizations involve assisting with the formation of such nonofficial organizations, and to convert them into official organizations after they have reached a certain level of maturity. In addition, co-operatives already created for the reception of aid assistance or with a view toward this reception strongly depend on the assistance. Certain members of these co-operatives have been the subject of many training courses and types of assistance, and have been taught reading and writing and know the management methods of an organization. Partisan organizations are considered to be qualified to encourage organizations among other fishermen. However, there is also discrimination and separation of other members in the community due to a difference in knowledge. While effectively utilizing the existing organizations, re-educational activities to shift the organizations to more independent and open organizations is required.

2) Correcting the Gap in Access to Information

There are differences in access to information between the capital city and other areas, between agricultural villages and agricultural extension personnel and the fishing communities, and between the members and non-members of organizations. The access to credit or equipment and materials with appropriate prices is determined by the existence of access to information on these matters. Equal distribution of benefit is impossible without distribution with equality of information. The creation of an organization is necessary to obtain outside facilities, but information on the procedures does not reach fishermen, and fishermen do not have the necessary capacity to fulfill these formalities. The main obstacle with the transmission of information in Guinea is illiteracy. It is not a problem which can be solved overnight. Consequently, for measures such as the installation of information networks, skillful utilization is necessary. At this moment, the existence of the common language Sousou is important. Imagine news flashes on the radio in Sousou, information on goods for mosques to the villages along the coast. Moreover, a periodic network of information from the regional offices of the Ministry of Fisheries for each village and a system of support for the organization must be established.

3) Incorporation of Non-Guinean Fishermen and Non-settlers

Although there are many Sierra Leoneans on the principal landing sites along the coast, their positioning in the artisanal fisheries is not clear. They cannot be ignored from a statistical point of view, and it is they who have played a major role in technical innovation of fisheries on the coast of Guinea. In addition, in 3-6-3 (1), we also referred to the existence of sedentary fishermen. We need to think of an organization that provides access to credit for these non-Guinean fishermen people (persons who do not settle) for the landing sites where they are numerous. Their influence will undoubtedly be their degree of contact with the other inhabitants. There will be no problem if the inhabitants of the area accept them as members of the community. It is the community for access to the facilities of projects for foreign fishermen, Sierra Leonean for example, and other nomadic fishermen.

4) Coexistence of Modernization and Tradition

Each village has its own decision-making system based on traditional custom, modern law or mixture of the both. It is difficult to say which of them has priority, and sufficient communication is necessary with local persons in charge to be able to adhere to both. In particular, attention should be paid to this because the times when women and minors express themselves are very different for the two networks. As a whole, villages seem to have a strong traditional tendency; individually, the differences are significant, which is difficult to perceive by an outsider. It is necessary to consult with and to always hold discussions with related persons in charge.

5) Gender-related Partial Roles

Although we can partially observe the exchanges of tasks, the splitting of tasks by gender is relatively clear. This splitting is often due to traditional and religious values and during the formation of groups such as cooperatives; all too often there is a splitting between men and women. However, there observed to be more flexibility in roles than the scope of activities by gender just for Moslem. For example, for professional organizations, the acceptance of accession according to gender does not exist; therefore, it is necessary to eliminate the stereotypes in advance: fish smoker = woman. The division of labor varies according to area', and it is more apparent in the interior than on the coast.

The gender-related partial roles between men and women in Guinea are relatively clear, although there are partial exchanges. Currently, the question of gender strengthening is being promoted by women themselves (defending humans rights or empowerment), and little attention is given to men. If the splitting up of work is clear, there might also be potential problems for men. As indicated earlier, it is essential to create places and occasions for women and minors to express themselves. On the other hand, due to excessive focusing on the problems of women, it is necessary to take in consideration the gender issues of the male side in the future. Concretely, the division of labor between men and women will not be introduced in activities in relation to the project; we will not force men to take excessive responsibilities and will give women the possibility of ensuring roles or activities which they can carry out.

(2) Issues of Fisheries-related Associations

- 1) Strengthen the participative management of landing sites and other facilities by people concerned, fishermen, smokers, wholesale fish merchants, etc. is necessary;
- 2) Simultaneously, since the competency of the organization to operate and administer facilities or to manage a business with high profitability through only the participation of producers (for example, CDG of Kamsar) is limited, assistance from outsider should be sought.
- 3) Rather than increase the membership of a certain organization, create several relatively small organizations of 30 members as more realistic from a management perspective.
- 4) To ensure compatibility of points 2) and 3) above, one should create a confederation of several organizations and to engage in human resources outside its management;
- 5) Ice factories at Kamsar are not managed by personnel of the CDG, but under a kind of contract of external commissioning called a partnership, and this method requires attention because it justifies for effective management of the organization of producers;
- 6) The government and the NGOs should assist the organization at the same time, they should take a supervising role as a third party. If this role is difficult to assume by the Ministry of Fisheries, assistance from the Ministry of Agriculture should be examined;
- 7) Until now, assistance for the organization of producers focused on adjustment of the production infrastructure such as landing sites and buildings for curing; it would also be necessary to study the aspect of profitability of the infrastructure of everyday life, such as wells, toilets, primary schools, elections; adjustment of the infrastructure by a system of “joint and several groups of fishing communities” also deserves study.
- 8) Paralleling the development of the infrastructure, there use to be a measure of assistance for the fishermen’s organization to obtain low prices of engines and fishing gear, and goods for credit. But among groups of fishermen trained at the request of groups of farmers, there are groups that have made a success in the installation of credit in an autonomous way, although they are small in size. It would be necessary to recommend this type of mutual aid credit through self-effort.
- 9) Compared with groups of farmers, fishermen are generally behind; however, there are also various cases of success in organizations of fishery producers. And in the past, there have been some successful cases of mini-credit for women groups, such as the co-operative of smokers in Kamsar. To promote the organization of fishery producers, with the Ministry of Fisheries at the center, it will be necessary to study these successful examples, and to analyze elements of their success. It would then be effective to diffuse information about these cases to fishing communities nationwide through videos, brochures, local visits to fishermen, etc.

Based on the points to be taken into account and problems indicated in (1) and (2), we recommend measures of assistance listed below for fishing communities with the purpose of creating fishermen’s organizations.

(3) Plan for Arrangements of Extension Personnel to Support Fishing Communities

Background

In Guinea, fisheries aid had been mainly focused on infrastructure development and provision of equipment. Except for part of the landing site development, practically no sustainable help, for example activities of sensitizing of fishermen, organization, diffusion of techniques, etc. was provided. In addition, the system of diffusion and knowledge are to a certain extent consolidated in the agricultural sector, which will be very useful for designing assistance for fishermen, and will have to be largely taken into account. Moreover, assistance for organizations of farmers and guidance for the improvement of conditions of life in agricultural cities carried out within the framework of the diffusion of agriculture is also necessary for fishermen, and it is necessary to examine the possibility of collaborating with the Ministry of Agriculture. But since the number of agricultural extension personnel is limited along the coastal area, one can only hope that they extend the field of their activities into the fishing communities. Let us propose this project by considering what will be needed for long-term assistance rooted in the fishing communities for the formation of fishermen's organizations and improvement of the living conditions from a human aspect.

Objectives

Promoters in support of the fisheries will be delegated to principal villages to ensure sustainable support for the improvement of living conditions in principal villages and other villages, to ensure the activities of sensitizing for fishermen and to provide information, the organization, and the creation of a confederation, etc. In the future, the Ministry of Fisheries will increase the number of regional civil servants or will train managers for federations of organizations of fishermen.

Personnel, Period and Financial Resources

The Creation of a "Fishing Community Support Unit" in the Ministry of Fisheries with several counterparts (C/P) under the supervision of foreign specialists (especially persons in charge for financial management) should be established. Unit's duty will be adjustments and contracts with collaborating organizations, such as the Ministry of Agriculture or NGOs to assist financial management, to draw up projects for activities and to define elements to be diffused. At a regional level, the director of each regional office at the Ministry of Fisheries, by seizing the problems and analyzing the needs of fishing communities in the prefecture while supervising extension personnel will take part in defining the content of diffusion. Instructions will be given to extension personnel by people who already have experience in this field, people having undergone training courses in the past on the elements of diffusion, for example the organization and management of organizations within the Ministry of Fisheries, and having significant experience in these activities. Number of people currently working as technical specialists at the Ministry of Agriculture (TS) is 2 for each prefecture. NGOs' personnel are also good source of instructor. . The TS ensures the training of agricultural as well as fisheries extension personnel and their guidance on diffusion for the improvement of living conditions and organization that include the elements applicable to fishing communities. One to four extension personnel of the fisheries, who will play the principal role, will be assigned to each of the six prefectures along the coast. As extension personnel of the

fisheries, one can think to hire assistants of agent statisticians working on the principal landing sites or their trainees. Considering the employment situation in Guinea, recruiting educated people at relatively low wage rate does not appear to be difficult (higher than *baccalaureat*). As for conditions, a renewable one-year contract system until the completion of the project and settlement in a fishing community could be sought. The village concerned will provide lodging (same system as extension personnel in Côte d'Ivoire and voluntary teachers in Senegal). Remuneration for the extension personnel in distant areas and other areas will be increased through a premium account to promote a "move away from Conakry". And if the excellent extension personnel are later employed such as regional civil servants of the Ministry of Fisheries after the end of the project, it will increase the motivation of contractual extension personnel. The period of the project will be 5 years, including a 2-year pilot period.

Contents of the Project

For the pilot period, two coastal prefectures (for example Conakry and Boffa) will be selected, and will train extension personnel for support of the fisheries (approximately 20 in total). A system of diffusion including searching for a cooperative relationship with the Ministry of Agriculture, the information for diffusion and the methods will be established. Following the pilot project period, the full-scale project shall start. The contents of assistance for fishing communities anticipated at the present time are as follows:

- 1) Support for organizations (activities of sensitizing relating to organizations, support for legal and administrative formalities, support for the formation of confederations of co-operatives, etc.);
- 2) Support for the management of organizations (training of leaders of organizations, support for the management of exploitation of organizations, etc.);
- 3) Support for access to credit (information, activities for sensitizing a system of credit, support for the legal and administrative formalities, etc.);
- 4) Diffusion of improved ovens (installation of a network for provisioning materials and the diffusion of the means of obtaining, establishment of a oven model on each landing dock and transfer of execution techniques, etc.);
- 5) Support for the improvement of living conditions in fishing communities (diffusion of charcoal braziers, prevention of diseases such as cholera, etc.);
- 6) Information (network to supply fishing machines and presentation of successful cases of co-operatives etc.) and improvement of the network of information to fishermen.

1), 2) and 5) are possible within the framework of collaboration with the Ministry of Agriculture for the activities of diffusion, and 3) many things are possible by being learned from agricultural financing cases of the Ministry of Agriculture. Prevention of diseases of 5) could also be connected with the activities of sensitizing carried out by the health centers (or stations) in all areas.

As described earlier, after the end of the project, extension personnel will be employed as regional civil servants in the Ministry of Fisheries and continue support activities for fishing communities will continue. For this, it will be necessary for the Ministry of Fisheries to implement for the period of the project a restructuring as described in the section “Plan for Reinforcement of Administrative Functions”. Moreover, based on the fiduciary relations with fishermen cultivated during activities, it is also desirable to select extension personnel who will be employed as a manager of confederations organized by fishermen.

4-3-8 Plan for Reinforcement of Administrative Functions

We propose the five elements below to strengthen the administrative capacity of the Ministry of Fisheries and to administer the development of fisheries with high profitability.

(1) Realization of Budget for Regional Activities

In the prefectures where the fisheries sector is important, the Ministry of Fisheries has assigned a director of the Department of Fisheries and several employees to work under his orders. Although the wages of these civil servants are provided by the Ministry of Fisheries, they are not entitled to the expenses of ordinary administrators, which is a considerable obstruction to the activities of the Ministry of Fisheries in the areas. Without payment of transport charges or even stationery, the Director of Regional Management of Fisheries is forced to use his own money. Therefore, as mentioned earlier, this has serious effects on the regular activities of collection of statistical data and diffusion, as well as on various development projects realized in the areas. Even with initial small amounts, the insurance of a budget for the activities of personnel in these areas is an important subject.

(2) Improving the Imbalance in Personnel Arrangements between Central and Rural Areas

In addition to the problem of insufficient funding for regional activities, considering work disadvantages or personal economic disadvantages (possible loss of training courses, etc), employees requesting the Ministry of Fisheries to work in regional offices are far more numerous. This results in an imbalance in the assignment of personnel to centers and not in the rural areas. An excessive number of personnel related to statistics are assigned to the fishing ports of Conakry and many landing sites at regional offices are covered by only one agent statistician. At sites even more distant such as Katchek, nobody is covering the area, despite its importance on a commercial level.

(3) “Learning by Doing” of Staff at Actual Fishing Sites

The problem at the level of fisheries administration, which often is discussed by personnel in the Ministry of Fisheries, is the lack of knowledge and specialized training. The absence of higher educational institutions specialized in fisheries and the limited opportunities for education and staff training in Guinea are causes. The Master Plan of fisheries established with the assistance of FAO indicates a need for management training, in particular in the fields of aquaculture, the infrastructure of inshore fishing, and fisheries economy and statistics. However, there are aspects which one cannot agree entirely. Fishing villages are in fact schools where personnel of the Ministry of Fisheries should study. Before learning the logic of Western countries by studying abroad or taking

part in international seminars, it is necessary to acquire experience as a practitioner “learning by doing” focusing on increasing incomes and improving the living conditions of fishermen in the fishing communities.

(4) Improving Poor Coordination between Departments

Coordination between departments is a perpetual problem in all bureaucratic organizations, and usually, the solutions are not easy to find. But it is a problem which will worsen if left as is. Financial losses, even tiny ones, at the Ministry of Fisheries, whose budget is very limited, due to a bad coordination between departments, cannot be neglected. In particular, for statistics on fisheries and the formation of fishermen’s organizations, as proposed in various plans, it is necessary to study alternatives such as co-operation with the Ministry of Agriculture, etc. for activities that personnel from the Ministry of Fisheries cannot assume.

(5) Re-examination of Realistic Policy Goals

It is necessary to examine various projects carried out by the Ministry of Fisheries to which it contributed, and to learn from them. It is true that the Ministry of Fisheries depends almost entirely on overseas assistance for projects that it carries out. However, in a country receiving assistance, objective evaluation of assistance projects and transparency at the bookkeeping level are increasingly important. The report “Evaluation of the Fisheries and Aquaculture and their Perspective” forwarded by personnel of the Ministry of Fisheries in May 1995 is valuable. However, 5 years have passed since then. In addition, no concrete action plans or responsible persons are indicated. A feasible proposal should be made by preparing a new report incorporating a concept to manage clear objectives. It is also desirable that executives at the Ministry of Fisheries exhibit strong leadership qualities with a view of its realization.

4-3-9 Plan for Improvement of Fisheries Financial System

(1) Future Issues

Since the mid 1980s, the Guinean government has promoted the motorization of artisanal fishermen by receiving assistance from the governments of Japan and Canada. A scenario of its development is shown in Figure 4-2.

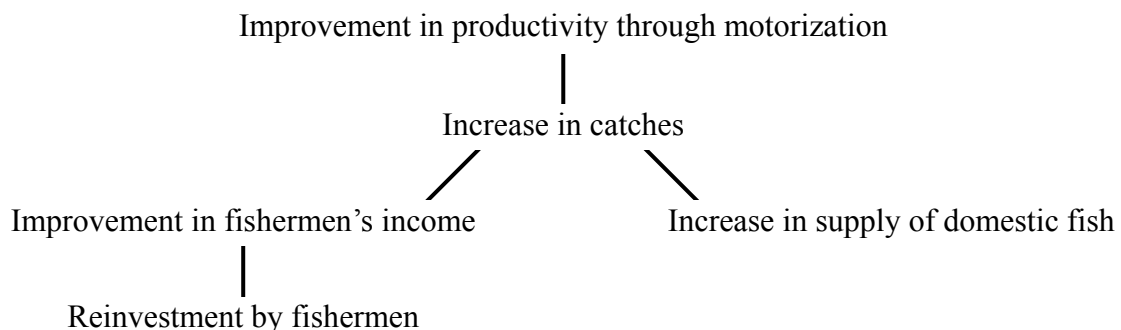


Figure 4-2 Scenario of the Development

To accomplish the improvement in productivity through motorization, fishing gear has been provided to artisanal fishermen at a cheaper price than the market price with the assistance of the Guinean governments; in addition, many mechanics that repair and maintain outboard motors have been trained. As a result of the motorization policy of the Guinean government, the motorization of artisanal fisheries has progressed considerably. At the present time, approximately 1,000 fishing boats have installed outboard motors and many mechanics work at landing sites. Furthermore, since around 2000, there has been an increasing number of exchanges (buying new) of outboard motors through the private market without relying on government aid. Sales of outboard motors, which was only 12 units in 1998, reached 225 units in 2002, during which time the number of units sold reached 633 (Table 3-10-5). Financing for artisanal fisheries developed from 2000 has greatly contributed to this movement. A little more than 40% of 15-horsepower outboard motors mainly used in the artisanal fisheries is provided through financing for artisanal fisheries and this ratio is expected to increase in the future.

Despite a motorization policy that has obtained excellent results, the provision of affordable outboard motors or fishing gear periodically implemented by the government is one of the factors hindering the development of the private market. Many fishermen have reported a bad selection of fishing gear, comparatively high prices for outboard motors, or difficulty procuring spare parts, which has become a hindrance to artisanal fisheries development.

As viewed earlier, artisanal fisheries development under the initiatives of the government through motorization has accomplished its initial goal. In the future, a mechanism to supply outboard motors, spare parts and fishing gear to meet the needs of fishermen at reasonable prices and at the appropriate time could be created. Accordingly, by fostering the market for outboard motors and fishing gear, lowering prices of fishing gear and materials, diversification of selection and provisioning at the appropriate time could be achieved.

A change in the domestic situation surrounding artisanal fisheries between 1985 and 1995 and after 2002, and developmental approach are summarized in Table 4-2. Since 2002, the three basic policies related to the development of artisanal fisheries are as follows.

Table 4-2 Change in Domestic Situation and Developmental Approach

Year	<u>Domestic situation</u>	<u>Developmental approach</u>
1985 to 1995	Non-existence of financing system for artisanal fisheries Non-existence of market for fishing gear & outboard motors Shortage of mechanics	Sale of affordable fishing gear & outboard motors by the government Training for mechanics
2002 to	Dissemination of motorization Under-development of market for fishing gear & outboard motors Start of artisanal fisheries financing Start of artisanal fisheries development through the market	Sound development of financing for artisanal fisheries Training for the private market, fishing materials and promotion of competitions Human resources development

4-3-9-1 Sound Development of Artisanal Fisheries Financing

As observed earlier, since financing for the artisanal fisheries have rapidly developed in recent years, users (borrowers) and the amount of utilization has greatly increased. Although the productivity of artisanal fishermen through motorization has improved, for expensive outboard motors or fishing nets, they cannot pay the whole amount at once unless they obtain financing and repay in installments. Accordingly, in order to provide equipment and materials through the private market, the sound development of artisanal fisheries financing should be promoted. Under a large framework, improvement of legislation and monitoring of business contents conducted by the Central Bank will begin from 2003. Here, we would like to discuss problems with the current financing system for artisanal fisheries and examine proposals for improvement.

Shift from Financing through the Federation of Associations to Financing Mainly for Associations

Guinean financing for artisanal fisheries functions well. The federation of fishermen's cooperatives presently implemented (in the case of the Federation of Artisanal Fisheries Associations of Douprou) is a mechanism of the Rural Credit of Guinea to efficiently and effectively provide financing for artisanal fisheries; however, one should understand that this is a risky approach, so this issue should be examined in the future. The financial mechanism through a federation is scheduled to be implemented in the Conakry area in a large-scale manner; therefore, attention should be taken. The reasons for this are as follows:

- Since a federation itself is financially weak, if an affiliated cooperative or member fails to repay, their competency of repayment is weak. In addition, although a federation collects guarantee money from each cooperative, its amount is extremely small compared to the entire amount of financing, and will disappear in a few cases due to breach of contract; so we do not have much confidence in this;
- Compared to the relationship between cooperatives and cooperative members who reside in the same community, solidarity between each cooperative under a federation is weak so that the motivation of the federation is weak. Consequently, cooperation in assisting with repayments for other cooperatives or cooperative members or applying pressure to refund is not expected.
- In the case of arrearages of a cooperative member, who is directly liable, the branch, federation or cooperative? Imputation of liabilities easily arises, so where the responsibilities lie also becomes unclear.
- Even if the refund has been completed through guarantee money, when the refund is received from the relevant cooperative, messages such as "There is no serious punishment for not paying" is certainly conveyed to other debtors, so repayments start to fall into arrears. At last, a refund from the debtor or the relevant cooperative should be forced.
- As mentioned above, a federation is not motivated to obtain repayments; as a last resort, despite repayments to be received from each cooperative, if arrearages arise in one cooperative in its federation, punishment is applied to all other

cooperatives; in return, the financing is suspended, so the activities of the fisheries become inconvenienced.

Since fisheries financing is implemented from a branch to each cooperative in principle, the Rural Credit of Guinea should improve their competency on solidarity of cooperatives or leadership of a president.

Establishment of a Committee to Purchase Outboard Motors

It appears that micro financing organizations such as the Rural Credit of Guinea and the Yete Mali will be the largest purchasers of outboard motors in Guinea, and this situation will not change in the future. When the financing of the African Development Bank begins in 2003, these implementing organizations will purchase approximately 150 units every year. Under such circumstances, some problems are expected.

For instance, since there is no adjustment between plans on sales of outboard motors at Yamaha agents and plans on the purchase of outboard motors (execution plans for financing) at micro financing organizations, financing is stagnated to put into the practice. Financing for outboard motors that the Rural Credit of Guinea was scheduled to implement in Conakry in 2002 was postponed for 3 to 4 months due to a shortage of stock. The Yete Mali also pointed out a delay in financing due to a shortage of stock at Yamaha agents. In addition, it was reported that when one took the trouble to pick up an outboard motor ordered from a rural area there was no stock, so it is a waste of time. The fishing season in Guinea normally starts in December and ends in March, so financing for outboard motors and fishing gear should be implemented before the peak-fishing season. There is a high possibility that it is difficult to repay through financing after the fishing season.

At the present time, Yamaha agents have a monopoly in Guinea, and when one wants to purchase an outboard motor, there is no choice but to purchase it from an agent. As a result, many fishermen or staff of micro financing organizations deems outboard motors to be relatively expensive compared to in other countries. While a considerable volume of outboard motors to be sold in Guinea after 2003 will be purchased by micro financing organizations, as a continuous large-scale purchaser, prices for outboard motors should be aggressively negotiated and lower prices should be obtained.

To meet these problems, we propose the establishment of a committee for the purchase of outboard motors. Its overview is as follows:

Objective

To contribute to artisanal fisheries development through the timely supply of outboard motors at a reasonable price;

Members:

- Representatives micro financing organizations provide financing for artisanal fisheries;

- Yamaha agents;

Major activities

- To adjust plans on the provision of outboard motors at Yamaha agents and financing execution plans of micro financing organizations;
- To negotiate the purchase prices of outboard motors at micro financing organizations.

Review of Interest Rates for Artisanal Fisheries Financing Proposed by the African Development Bank

The financial aid project for the artisanal fisheries of the African Development Bank mentioned earlier proposes that the interest rate for loans be kept to approximately 18%. However, the current interest rates of micro financing organizations providing artisanal fisheries financing are 24 to 28% at the Rural Credit of Guinea, 30% at the Pride Finance of Guinea and 24% at the Yete Mali, which are much higher. The low interest rate policy for special industries proposed by the African Development Bank is not only incompatible with the present liberalization policy of interest rates, but also the “approach²⁴ of financing as a means of training individual industries” has often been criticized, so it should be reviewed. In the case of setting a ceiling of 18% on interest rates for loans for artisanal fishermen, the following concerns arise:

- Since financial independency of the micro financing organizations in Guinea has not yet been realized, this will have a bad influence on the financial situation;
- Conformity with interest rates for loans for other industries such as agriculture, commerce and manufacturing industry cannot be taken;
- Since micro financing organizations carry out their unique operations independently, they are unfamiliar with a unitary interest rate system.

As you can see from the bankruptcy of the Mutual Credit of Guinea in 2001, if micro financing organizations cannot maintain sound management they will disappear due to bankruptcy; sufficient understanding of all financial services provided by these organizations is necessary.

Objections to the Implementation of a Financing Program by the Ministry of Fisheries and Aquaculture

At the Ministry of Fisheries and Aquaculture, some are of the opinion that “the Ministry itself should provide an artisanal fisheries financing program because artisanal fisheries financing by micro financing organizations is insufficient.” However, we cannot agree with this opinion. The reasons for this are as follows:

²⁴ Since the 1960s, fiscal finance (policy money) mainly concerning low interest rates and target loans was started in many developing countries under international financial institutions. However, the cost of aid or subsidies in the policy money was high; in addition, the ratio of repayments was extreme, so this disappeared in the 1980s. Presently we do not see international financial institutions or donors supporting the low-interest rate policy, except in this case.

- Sales of fishing gear and materials, collection of sales charges in installments, or implementation and collection of loans are not operations of the Ministry of Fisheries and Aquaculture;
- The Ministry of Fisheries and Aquaculture does not have the necessary knowledge to implement a financing program, such as examination of the ability of clients to repay or loan accounting. In addition, since financing operations that only focus on artisanal fisheries are limited to fisheries-related persons, it is inefficient. In order to provide a sustainable program, high interest rates or limited number of branches is responsible for the high cost for both the executors and beneficiaries;
- In the 1960s, state-owned development banks were established in many countries. However, many of them went bad and could not accomplish their initial purpose. The reason for this is that awareness toward repayment was low because importance was attached to the development or provision of funds, inefficient management, politicians or administration and the business elite who intervened in the examinations for loans.

4-3-9-2 Fostering of a Private Market for Fishing Gear and Materials and Promoting Competition

As described earlier, since a mass volume of outboard motors and spare parts was procured through assistance and was provided at cheaper prices than market prices through governmental agencies up to now, the private market for outboard motors has not been developed, so Yamaha agents are in monopolistic position. More specifically, Yamaha outboard motors have always been procured through assistance, and people strongly trust in the Yamaha brand. However, under such a monopoly competition between firms does not exist, so a rise in the prices of outboard motors, shortage of spare parts or after-service is anticipated. Moreover, due to a drop in the *Guinéen Franc* (FG), the recent domestic currency, prices of imported products such as outboard motors and fishing nets or gasoline, accounting for 50% of management expenses, have suddenly risen. Under these circumstances, the possibility of affordable outboard motors by lowering prices, the introduction of outboard motors with higher gasoline economy, such as 4-cycle outboard motors, or improvement in the selection of spare parts is requested. By promoting competition in the domestic market for outboard motors, outboard motor prices are expected to drop, and the selection of spare parts and after-service, or diversity in sales items and services is expected to improve.

In the similar manner as outboard motors, the market for fishing gear, such as fishing nets, has been extremely underdeveloped. At one time, although the Rural Credit of Guinea examined the possibility of providing financing through the same mechanism, they could not find suitable suppliers; therefore, they could not implement the financing. In addition, in the Guinea Highland Region, according to an interview survey, it is reported that fishing nets cannot be obtained in the Guinea Highland Region and fishermen go to Bamako in Mali to buy their nets. Accordingly, some importers have shown an interest in importing cheaper fishing gear from Taiwan or China. To meet such conditions, we propose the following.

Establishment of a Market Training Committee

Since 2003, after the implementation of the artisanal fisheries financing project of the African Development Bank, the market for outboard motors in Guinea was deemed to be approximately 250 units annually (900 million to 1 billion FG). As for fishing gear, one might say the domestic market will rapidly expand. Accordingly, by creating a committee composed of the Ministry of Fisheries and Aquaculture, federations of fishermen's cooperatives and micro financing organizations, etc., the following activities will be conducted:

- To actively exchange information, and at the same time, by providing information to related firms, to encourage new agents to enter the market, or existing firms to participate in a business of fishing gear and materials;
- As the occasion arises, to appeal to related governmental agencies to reduce taxes on fishing gear utilized by artisanal fishermen or fuel for outboard motors, etc.;
- By monitoring activities of the private sector concerning sales of regulated fishing gear (such as regulations on fishing nets,), sales of fishing gear utilized through regulated fishing methods, a duty to carry spare parts for outboard motors, to provide advice or regulation if necessary.

Reinforcing the Competency of Fishermen's Cooperatives and Federations of Fishermen's Cooperatives

Each cooperative or federation of cooperatives should be strengthened. If joint purchases of fishing gear and materials are possible through the reinforcement of competency of fishermen's cooperatives or federations of fishermen's cooperatives, cost or expenses can be lower than those individually purchased by cooperative members. Through joint purchases, they are able to have a negotiation power on prices against the private sector; in addition, intermediate distribution costs or transportation expenses can be saved. In due consideration that artisanal fisheries financing is active, financing is operated mainly by cooperatives, and a cooperative can have a sizable sum of funds at once, compared to the previous time, a considerably number of joint purchases must be implemented. If they are competent enough to import fishing gear and materials from oversea, it is conceivable that they will have the negotiation power on prices toward the domestic private sector.

Improvement in the Ratio of Organization of Cooperatives

Under a low ratio of organization of cooperatives, disparity between cooperative members and non-cooperative members is great. For example, although they live in the same village, some receive financing from the Rural Credit of Guinea; whereas, some do not use a method to receive loans at all. Furthermore, since the financing method is currently based on cooperatives, non-cooperative members do not qualify for loans. In addition, since many constituent members of the Committee of Development of Landing Sites (CDD: *Comité de Développement de Débarcadère*) play a leading role in the development or management of landing sites in each area and are representative of each cooperative, for non-cooperative members, opportunities to express their opinions on the development or management of the landing sites are limited. In order to influence the advantage of "Reinforcing the

competency of fishermen's cooperatives and federations of fishermen's cooperatives" described above, the Ministry of Fisheries and Aquaculture should improve the ratio of cooperative organizations by strengthening educational activities, etc. Artisanal fisheries financing implemented through cooperatives can become an incentive for participation in cooperatives by non-cooperative members, so it is the time to reorganize cooperatives.

4-3-9-3 Human Resources Development

In the case of implementing artisanal fisheries development through the market, one obstacle is human resources. The Guinean government has carried out government-initiative development for a long period of time. Consequently, there is a shortage of human resources who are able to correctly understand the difference in roles of the private and governmental sectors, or roles of the government in implementing artisanal fisheries development through the market, and formulate a development plan or development project for its execution. Regarding such shortage in human resources, we can say the same thing about representatives of the Committee of Market Training of the Ministry; accordingly, human resources development is an urgent task.

Artisanal fishermen should also train human resources. In the expansion of motorization or artisanal fisheries financing, their disposition as a manager is being questioned. The concept of depreciation or fixed cost is necessary in the daily management of the fisheries; therefore, if they do not have a basic knowledge of accounting, sound and sustainable fisheries management is difficult. Even in small-scale management, in order to efficiently carry out management in a money economy, the ability to "read, write and accounting" is required to produce a profit utilizing knowledge or information. As a matter of fact, according to a field study of fishing communities, many fishermen pointed out the necessity for the literacy education, some development in fishing communities or landing sites implemented in the past includes literacy education. However, there are problems such as "Is functional literacy education, including accounting, a responsibility of the Ministry of Fisheries and Aquaculture?", and "Does the Ministry of Fisheries and Aquaculture have the competency (budget, human resources and skills) to provide the functional literacy education for fishermen?", or "Is the priority for functional literacy education higher than other activities of the Ministry of Fisheries and Aquaculture?" These should be addressed immediately by the Ministry of Fisheries and Aquaculture or related governmental agencies.

4-3-10 Environmental Consideration

4-3-10-1 Environmental Impact Assessment

Matters to be examined for the implementation of the environmental impact evaluation of the activities incorporated in the present project can be summarized as described in Table 4-3.

Table 4-3 Project Required for Environmental Impact Assessment

Project classification	Anticipated items of environmental impact assessment
Improvement in fishing communities at remote area of the mainland	Impact on the natural environment by the improvement of access roads (especially in the marshy areas) Waste disposal in processing before smoking
Improvement in fishing communities at remote islands	Disposal of drainage, general waste & sewage Possibility of an increase in the pressure to utilize mangrove forests through concentration of population
Improvement in key landing sites	Disposal of drainage, general waste & sewage Possibility of an increase in the pressure to utilize mangrove forests through concentration of population
Improvement in the consumption markets at urban cities	Disposal of drainage, general waste & sewerage, offensive smell, moving of residents
Aquaculture development in Guinea Forest Region	Impact on ecosystems of the downstream by converting into aquaculture ponds at the marsh land Possibility on ecosystems by scattering cultured fish to surrounding waters

4-3-10-2 Best Approach to Environmental Conservation in Artisanal Fisheries Development

Fishermen along the coast cumulate agriculture in general and directly and indirectly depend on the mangrove resources in both agriculture and fisheries. To ensure the management of these resources, recognition that this matter is community members' problem should be shared by administrative agencies and that environmental issues be internalized in the rural development. On the other hand, a village society is composed mainly of farmers in the Guinea highland region, so fishermen are in small number. Since agriculture and the mining industry are causes of river pollution in the interior and topsoil erosion, it is difficult to integrate problems of environmental issues of the fisheries sector. Consequently, the administration could take these initiatives and adopt an approach allowing an estimation of these all issues.

(1) Measures for Internal Environmental Factors

- i) Environmental Resources Management as Community Resource in the Coastal Region

The traditional management and use of land is still generally practiced today throughout Guinea. The government is unable to supervise the management of land in the coastal areas. The participation mainly of traditional land managers (families) is essential. The role of the government is to sensitize and inform those of the need

for the sustainable use of mangroves by means of a traditional system of land management. An approach creating economic incentive is necessary.

Although there are problems with rice plantations, fish smoking, and the production of salt, some of the causes of the pressure to utilize mangroves, measures for a solution have already been established; the problem is to know how to extend them to all areas. Currently, these activities are only carried out through mangroves projects and by several NGOs.

The structure of the village practice of rice cultivation, fish smoking and the manufacture of salt reflects the social structure as well as the model of land use in the village. Thus a change on the objectives for the use of resources is considered to be difficult.

As for the use of wood for cooking, the affect of mangrove use is not very significant in rural villages. This problem will be difficult to solve as long as requests for energy in the towns depends on the cutting of trees.

ii) Resource Management in Open Rural Communities

The use of resources by the tribal inhabitants of other areas of country is significant; however, in northern Boké prefecture and in the prefecture of Forécariah, there are problems with migrants, and refugees from neighboring countries. In these areas, the creation of a unit organization of inhabitants at the center of management of resources is difficult.

(2) Measures for External Environmental Factors

Internalization of the management due to the pollution in the rivers and the erosion of land in Guinea Highland from agriculture and mining, and the estimation of environment problems within the fisheries sector is difficult.

i) Erosion of Soil into the Rivers

Runoff from the land is due to the current type of extensive agriculture being practiced; consequently, adoption of an approach of readjusting land use that also protects the land when necessary. For example, prevention of runoff by adjusting rice plantations located on the floodplains of rivers to the creation of buffer zones along the banks of rivers through the use of dam as necessary. Since many farming communities are relatively well organized, management of these buffer zones could be entrusted to community organizations while basic field construction preventing erosion is done by the government.

ii) Impact of Drains from Mines

The mines of the interior of the country, mainly gold and diamonds, vary considerably, from large foreign organizations to artisanal exploitations. Evaluation of the environmental impact is obligatory for large-scale commercial mines, but practically no monitoring is carried out. To state the problem more clearly, it is necessary to set up a system that makes monitoring obligatory through measures that

influence the quality of wastewater from mines by an organization with the periodic inspections done by the government. Moreover regulations for artisanal mining should also be established.

iii) Influence of Spray Pesticides Used in the Onchocercose Program

As described in 3-9-2-2, the WHO indicated that chemicals used for the control of vectors in the onchocercose program are biodegradable and therefore there is no fear of concentrations forming in fish. However, cases of dead fish so far recorded are temporary problems due to errors made during spraying of chemicals of too high strength or from wells of mistaken chemicals. If spraying is implemented as planned, it should have no significant affect on fish, etc.

4-4 Selection of Priority Development Projects

The development of artisanal fisheries which really began in the latter half of the 1970s centered on coastal projects, thanks to the assistance of Western countries and international organizations. Fishery production, which increased six-fold annually at 10% between 1980 and 1995, plays a significant role in animal protein products for some 7.2 million (1996) inhabitants of Guinea. However, since 1995 the renewal of fisheries equipment and materials has stagnated due to economic reasons, and fishery production is dropping at intervals of 2 to 4% a year. On the other hand, the overall population is rapidly increasing at an annual rate of 2.8% (census of 1996) and the maintenance of a current fishery production is considered to play an important role as a part of a stable supply of foodstuffs to satisfy consumer demand indicated in “Guinea, Vision 2010”.

“Guinea, Vision 2010” indicates that in the year 1997 the consumption of fisheries products per capita was 13kg. The government projection is an increase in consumption of up to 17kg by 2007. However, with the current situation, the rate of increase in fishery production cannot catch up to demographic growth, and even maintaining 13kg will prove to be difficult. If current demographic growth of 2.8% does not change until 2007, the estimated population will be 9.76 million by 2007 and 10.6 million by 2010. Consequently, to maintain the yearly consumption of 13kg of fishery products per capita in 2007, 126,880t will need to be produced, and in the case of 17kg 165,920t per year (production of the fisheries + imports - exports). Since the national provisioning in 1997 was 98,000t (Chapter 2), if the volume of imports does not change, an increase in catches of 28,880t will be necessary to maintain 13kg, and 67,920t for 17kg per year.

However, if we begin to consider the resources necessary to support this increase, among the potential volume of catches indicated in Chapter 2, shrimp and *Cephalopoda*, which are captured completely by industrial vessels, leaves little hope for an increase in catches. For demersal fish, data of 1998 indicates that approximately 3t are caught by artisanal fishermen and industrial fisheries during the summer, which leaves a tiny margin. As for small pelagic fish, for which data on reserves indicates 50,000 to 200,000t, the current catches are 44,711t (1998), and indicates a stroke of significant development for the future. For this reason, in this Plan, basic guidelines for the development of artisanal fisheries will emphasize the exploitation of small pelagic species, with the view of stable provisioning of foodstuffs.

For the small pelagic fisheries, the major problems for development are the high prices for outboard motors and fishing gear, a cost that constitutes a significant expense for fishermen which is simply beyond their means. One can think of several reasons for this, the effectiveness of fisheries is poor with insufficient catches corresponding to the investment, and price of fish is low. Guinea is not an advanced country in the field of fisheries in Western Africa, and the techniques of advanced fisheries are not disseminated by fishermen. Moreover, the maritime area, which is less than 40m deep, makes the introduction of the latest fishing gear impossible. Ghana and Senegal, countries with advanced fisheries, fish effectively for small pelagic species using a simple purse seine net but these seines are difficult to use in the shallow waters off Guinea. Consequently, Guineans use encircling gill nets which have been adapted to the maritime conditions unique to Guinea. The gradual shift to this type of fishing method will provide hope for a significant increase in catches.

Moreover, the development of artisanal fisheries which is not harmful to the environment, should be planned and carried out with the participation of the inhabitants, starting with the women in a spirit of personal effort. Currently 80% of the small pelagic fish are smoked mainly by women. Current methods of curing, which involves the cutting of valuable forest resources such as mangroves, is unwelcome considering the recent boom for the protection of tropical forests. Since fuels and processing methods for replacement have not been developed, it is necessary to improve existing processing methods and the use of diffuse ovens (bandage) allowing more effective curing consuming less wood.

Finally, until now the development of artisanal fisheries was synonymous with development of coastal fishing, henceforth, it will be essential to correct the exaggerated importance given to the coastal area and to propose and carry out projects drawing on the favorable characteristics of areas such as in the Guinea Highland and the Guinea Forest. The population is also concentrated in the interior of Guinea, and if economic development creates jobs for inhabitants such that they settle on the spot, it will be possible to limit excessive concentrations of people in Conakry. This balanced development of fisheries nationwide will profit at a socio-economic level throughout Guinea.

Considering the points mentioned above, model projects are set by extracting out or newly planing sub-programs that are especially urgent, highly effective, and have extensive coverage for target beneficiaries in areas having high priority in the Master Plan for artisanal fisheries development targeted for 2010. There are 6 projects, and consideration was taken to cover overall target areas that differ in their natural or socio-economic environments (refer to Figure 4-1). Initially targeting the coastal area including Conakry, important for its significant fishery production, the “Fishing Equipment and Methods Research and Development Project”, which is assumed to contribute to an increase in fishery production, was extracted and set as a model project from several sub-programs, including the improvement of the statistical system and development of landing facilities, that were proposed in the Plan for Improvement of Coastal Fisheries Production by sector. The plan is for technical assistance focusing on technology development and promotion, and the implementation organization will take over the facility and staff of the Boussoura Motorization Center. It will be advanced by requesting support in the form of human resources and materials from the Centre National des Sciences Helieutiques de Boussoura and the Maritime Technology School.

Secondly, development of fisheries infrastructure facilities, which are assumed to increase fishery production and to contribute to the improvement in the living standards of fishermen and a relaxation of the poverty level, shall be planned for Conakry and a regional coastal fishing village. Since a rapid increase in population has been evident in the Kaporo and Nongo areas in Conakry City where the project is planned, the necessity to develop these areas as landing facilities, mainly for fresh fish distribution connected directly with places of consumption in backland areas, been identified. Koukoudé Village in Boffa Prefecture, where coastal village development is planned, had been a supply district of processed products specialized in traditional smoking. However, since the distribution infrastructure such as access roads, etc. had been developed, facility development to make it a supply and distribution center not only for smoked products but also for high-class fresh fish has been desired. Additionally, at the discussions for the restart of the Study, held in July 2002, it was decided that this project would be a substitute project for the Kénien fish market development project.

Thirdly, the Plan of Establishment of the Aquaculture Development Center in the "Project for Development of Inland Water Aquaculture" by sector is proposed. There was a sudden change in the target area, from Forest Guinea to Middle Guinea (during the discussion for restart of the Study held in July 2002) but it has been said that Middle Guinea has potential for aquaculture development after Forest Guinea. In fact, there is an aquaculture center there, developed by ODEPAG in 1994, and the project is aimed to develop and promote aquaculture methods based at this center.

Fourthly, the aim is to make the "Project for Development of Inland Water Fisheries" by sector a comprehensive development project that extensively covers all items proposed here. Inland water fishery is an industry that is easily affected by the environment so comprehensive results can not be achieved just by dealing with limited specific tasks. Thus, components for the river environment field, strengthening of fishermen's associations by distribution promotion, micro finance targeted to stabilize the economic condition of fish farmers, etc., are all specifically proposed.

The project of diffusion of improved ovens for curing (bandas) is proposed as a fifth objective overlapping several projects by sector, and aimed at the development of competencies and support for the autonomy of the women. Women fishermen and women in the villages, who have played an essential role in curing, traditionally have a principal (but unobtrusive) role in the distribution of fishery products; this project is however significant because it places women first in the support for development, and proposes technical and financial assistance.

The results of the Feasibility Studies on the above mentioned priority projects are explained in Chapter 5.