

Directorate General of Fisheries and Aquaculture (DGPA)
Ministry of Forest Economy, Waters, Fishery and Aquaculture
Republic of Gabon

**THE STUDY
ON
THE MASTER PLAN OF INTEGRATED
DEVELOPMENT OF SMALL-SCALE FISHERY
AND INLAND AQUACULTURE
IN
THE REPUBLIC OF GABON**

FINAL REPORT

JUNE 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

OVERSEAS AGRO-FISHERIES CONSULTANTS, CO., LTD.

PREFACE

In response to a request from the Government of the Republic of Gabon, the Government of Japan decided to conduct a development study on “the Master Plan of Integrated Development of Small-Scale Fishery and Inland Aquaculture” and entrusted the study to the Japan International Cooperation Agency (JICA).

From April 2007 to May 2009, JICA sent to Gabon a study team for six times led by Mr. Yasuo ISHIMOTO of Overseas Agro-Fisheries Consultants Co., Ltd.

The team held discussions with concerned officials from the Government of Gabon, and conducted a field survey 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 Gabon for their close cooperation extended to the team.

June 2009

Ariyuki MATSUMOTO
Vice-President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

Mr. Ariyuki MATSUMOTO
Vice-President
Japan International Cooperation Agency

Dear Mr. MATSUMOTO,

We are pleased to submit to you the final report on the Study on the Master Plan of Integrated Development of Small-Scale Fishery and Inland Aquaculture in the Republic of Gabon.

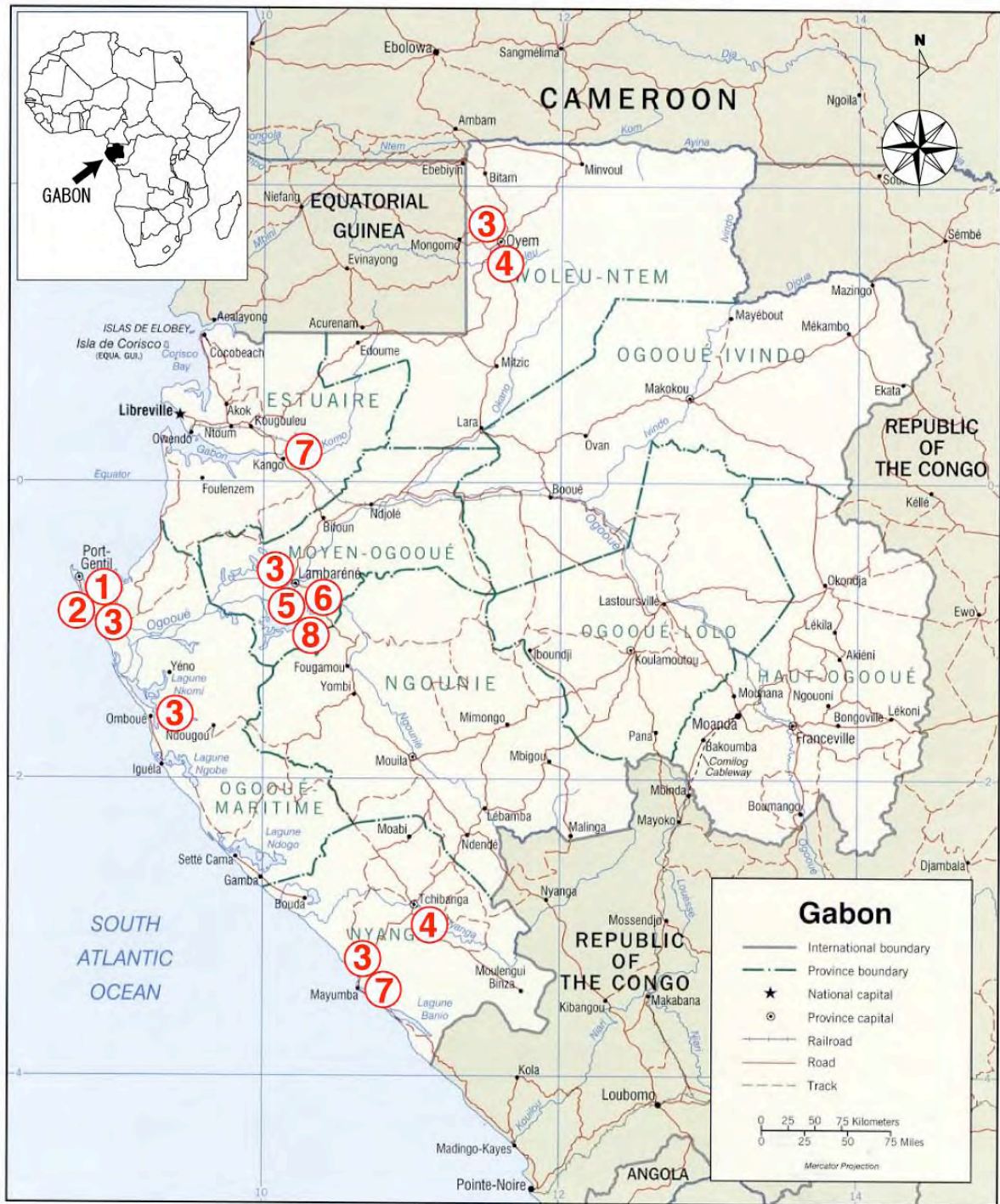
This study report is a compilation of the study results conducted by the study team, with close relations with the Directorate General of Fisheries and Aquaculture (DGPA) of the Ministry of Forest Economy, Waters, Fishery and Aquaculture and concerned organizations during the two-year period from April 2007 to June 2009. It consists of the orientation and concrete programs of the integrated development of small-scale fishery and inland aquaculture for improvement of rural livelihood, stable supply of foods, and the sustainable utilization of fishery resources.

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 Fishery as well as from your agency, during the study period. Additionally, as for the Government of the Republic of Gabon, we would like to note the respectful cooperation that we received from the DGPA and other concerned officials of the Government. Moreover, we would like to express our gratitude to the personnel of Gabon office of your agency for their valuable advice and support. Finally, we hope that this report will contribute to your further promotion of the project.

June 2009

Very truly yours,

Yasuo ISHIMOTO
Team Leader
Study team for the Master Plan of Integrated
Development of Small-Scale Fishery and Inland
Aquaculture in the Republic of Gabon
Overseas Agro-Fisheries Consultants Co., Ltd.



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Republic of Gabon

Figure in circle shows the site of each pilot project.

- | | |
|-----------------------------------|--|
| ① Introduction of Set-net Fishery | ⑤ Cage Culture |
| ② Coastal Fishery Development | ⑥ Valorization of Sans-Nom |
| ③ Micro-credit | ⑦ Participatory Management of Fishery Resources |
| ④ Integrated Aquaculture | ⑧ Experiment on Introduction of Long-tail Engine |

SUMMARY

Summary

1. Positioning of the Development Study

Gabon has a population of 1,548,000 inhabitants (2003), and has a surface area of 267,667 km² – corresponding to ¼ of the size of Japan, and is rich in natural resources such as petroleum, manganese, uranium and wood. The Gross National Income (GNI) per capita is \$4,080 USD (2004), high compared to its neighbors, putting Gabon in the middle-income bracket. However, petroleum production has been in decline after having attained its peak production levels in 1997, and in 2003, the percentage of the petroleum sector in the national revenue was below that of the non-petroleum sectors. Therefore, the country was considering “the departure from the dependence upon petroleum, through the diversification of industry” as the pillar of the economic policy, the Growth and Poverty Reduction Strategic Paper (GPRSP) (2005). Especially fishery, since Gabon has both ocean and continental fishery grounds that are rich, is considered to be a high potential development sector, at the same level as tourism.

Fishery represents only 1.5% of GDP, with an active population of only 21,700 people, but the consumption of fish per person is from 25 to 30 kg per year, which is quite high compared to the neighboring countries, and fishery products are an essential nutritional source corresponding to 40% of the animal protein consumed by the inhabitants. Since the domestic demand for fishery product is estimated about 70,000 tons/year, while the country’s annual catch is stagnating at 40,000 - 50,000 tons/year, the shortage is supplemented by the import.

Although the inland fishers (including fish farmers) do fishery activity together with agriculture on self-sufficient basis, the difference of income between urban and rural areas has been increased as a result of rapid outflow of population caused by increase of labor opportunities in urban area by petroleum industry since 1980. In this circumstance, it is required to correct the difference through the rural development utilizing natural resources (fishery and agriculture). On the other hand, in the coastal area, foreign fishers who have migrated from neighboring countries are main contributors to fishery production. It is the issue on fishery administration how to involve these foreign fishers positively in harmonization with Gabonese fishers, but not to eliminate them.

In this context, the Government of Gabon requested to the Government of Japan to elaborate the master plan for sustainable development of fishery resources. Based on this request, Japan International Cooperation Agency (JICA) conducted a preliminary study in October 2006 and a preparatory study in January 2007, and decided to execute this “Study on Master Plan for the Integrated Development of Small-Scale Fishery and Inland Aquaculture” upon the signature and exchange of the Scope of Works (S/W) and the Minutes of the Meeting (M/M) with the Gabonese side.

This Study has executed by Overseas Agro-Fisheries Consultants, Co. Ltd., in collaboration with the Directorate General of Fisheries and Aquaculture (DGPA) of the Ministry of Forest Economy, Waters, Fishery and Aquaculture, as a counterpart agency of the Gabonese side.

2. Development Potential

2.1 Demand for Fishery Products

The average per capita fish consumption per year during the past five (2001-2005) is estimated at 27.7 kg. The national production has been stagnating at around 41,000 - 46,000 tons per year since the year 2000, and that around 7,000 - 10,000 tons of fishery products are imported every year in order to fulfil the needs not being met by the national production. The present demand is 50,000 - 55,000 tons per year.

If the future per capita fish consumption is kept between 20 and 30 kg, which is the level of present consumption, the demand for national consumption will be around 43,000 to 64,000 tons in 2020. Moreover, the volume of exports of fishery products is estimated at 7,000 - 10,000 tons per year during the past several

years. As fishery resources have a tendency to drop on a global level, we can henceforth foresee a gradual increase in the demand for exports, with particular emphasis on the neighbouring 3 countries (Cameroon, Nigeria, Congo), and the estimated volume to be 10,000 - 15,000 tons per year. Consequently, the total demand for fishery products is estimated between 58,000 and 79,000 tons per year in 2020

2.2 Fishery Resources

The exclusive economic zone (EEZ) of Gabon is around 213,000 km², and the coastal line from Cocobeach to the far North to Ndindi to the far south is about 750 km. The continental plateau of less than 200 m in depth, extends approximately up to 60 km off shore, with a surface of around 40,600 km². Moreover, the majority of natural inland waters cross the central part of the country and are located in the river basin of the Ogooué, which represents 72% of the national territory. This river, having a total length of 1,200 km, has a river basin of 215,000 km², and its flow at the mouth attains 100,000 m³/second. The river basin includes many lakes and swamps which are essential zones for inland fishery.

Based on the results of past studies carried out by FAO / NORAD, ORSTOM, N.O.F. Nansen, etc., the maximum sustainable yield (MSY) is estimated at around 300,000 tons, whereas the actual annual catch is around 45,000 tons, which shows that in general, the exploitation rate of the resources does not go beyond 15%.

2.3 Target of Fishery Production

The demand for fishery products in 2020 is estimated at around 58,000 to 79,000 tons per year in Gabon. The species targeted for production increase are the sardines, semi-pelagic and demersal fish. The sardines caught by small-scale coastal fishers will be used for consumption (smoked), and companies producing fish-meal will be set up. The demand for fish-meal should increase in the future as an ingredient of aquaculture feed. Moreover, there will be a system for increasing the production of demersal fish by small-scale fishers. In addition, since it appears difficult to attain production increase for semi-pelagic through small-scale fishery only, the presumed development of companies seems promising. Economic value and job opportunities expected by the increase of fish production and processing are estimated at 7.38 billion Cfa francs/year and 4,900 – 5,700 persons respectively.

For aquaculture, it is necessary to increase production through the activation of existing fish farms (mainly integrated farming), and develop the production by investment in industrial aquaculture through the mining and forestry companies for the purpose of feeding their employees, as well as semi-intensive aquaculture, for example, aquaculture in cages. The aquaculture production, the estimated values for the economic value and the job opportunities for the year 2020 are expected to be 1,000 tons, 1.55 billion Cfa francs, and 800 – 1,000 persons, respectively.

3. Development Frame

3.1 Target Year

This Master Plan indicates the development plan during the next 10 years (2011 – 2020).

3.2 Development Objectives

(1) Development Problems

1) Problems concerning the poverty of farmers – fishers

- The socio-economic study of rural communities executed in the Study showed that the average monthly incomes of the farmers-fishers per person were as follows: 46,847 Cfa francs for the coastal fishers, 36,764 Cfa francs for the lagoon fishers, and 41,719 Cfa francs for the inland fisher. Although these figures go slightly beyond the absolute poverty level (income of less than 29,000 Cfa francs per person), 50.1% of the coastal fishers, 48.4% of the lagoon fishers and 63.2% of the inland fishers are below the poverty level.

2) Problems tied to the delay in the organization of the fishers

The DGPA has been late in the organization of the “Fishery Cooperatives” promised within the framework of fishery development. And even if there existed an organization, since it is not economically active, it is not sustainable and the members do not feel the advantages of being a member. The lack of fishers’ cooperative organization is leading to economic losses for the fishers in such ways as higher fishing and aquaculture costs, scarce sales outlets, and low sale prices.

3) Problems tied to the lack of the management system of fishery resources:

The coastal zones and inland zones are under a free access fishing rule, and any Gabonese can fish there. Rules concerning the equipment and fishing zones are administrated by the government, but illegal fishing is frequent since the penalties have not been determined. Gabon is rich in fishery resources, and although presently there is a certain margin in the resources, that margin is decreasing or disappearing particularly in parts of the lakes and small streams. Moreover, according to the fish species, some luxury sea food species such as shrimp, crabs and lobsters which are fished heavily by the industrial fishery will have to be taken measures quickly concerning the management of these resources.

4) Problems tied to the lack of preparation of the support services and fishery infrastructure

In terms of existing facilities for support services in the area of small-scale fishery and aquaculture, there are: (i) four community fishery centers (Owendo, Port-Gentil, Omboué and Lambaréné), (ii) Ten fish farm stations, and (iii) Fishery and Aquaculture Training Centre (CMPA). It is necessary to develop the centers at other six major landing places as for (i), to streamline the existing stations as for (ii), and establish new center as for (iii).

5) Problems tied to the Stagnation of Fish Production and Aquaculture

Domestic fish production is stagnating, and the average quantity of fish consumed per person, which was around 40 kg per year in 1996-2000, dropped to 27.7 kg in 2001-2005. Moreover, the demand for inexpensive fishery products, such as smoked ethmalosa from neighbouring countries, such as Equatorial Guinea or Cameroon, has been increasing in the past few years.

(2) Development Objectives

The resolving of the above-mentioned problems is strongly tied to the Growth and Poverty Reduction Strategic Paper (GPRSP) and the PSFE. The development objectives of this Plan are set forth as follows, in correlation of these programs.

i) Increase in the income level of small-scale fishers and fish farms

Reduce the percentage of fishers and fish farmers living below the poverty line (29,000 Cfa francs per person per month) before the year 2020.

- Coastal fishery: 50.1% to > less than 25%
- Lagoon fishery: 49.4% to > less than 25%
- Inland fishery (throughout the territory): 63% to > less than 30%

ii) Stable supply of fishery products in the country and to the neighbouring countries

in order to guarantee food security

Increase fish production by around 5,000 tons in order to meet the demand of domestic fishery products by the year 2020. Moreover, increase production by about 10,000 tons in order to meet export demand for neighbouring countries.

iii) Sustainable management of fishery activities and fishery resources

The objectives to be reached by the year 2020 shall be as follows:

- Establish a shared system of surveillance of the three nautical miles off the coast (joint surveillance system of the government and the inhabitants);
- Establish an autonomous management system for each fishers association for local fishery activities (at least two sites);
- Establish regulations for fishing methods and fishing equipment in the inland fishing zones.

3.3 Development Strategy

The following four main strategies are provided in order to attain these above-mentioned objectives:

- i) Build a sustainable management system for fishery activities and fishery resources, and guarantee the sustainable use of the resources
- ii) Promote the utilization of unexploited resources through improved fishing techniques and aquaculture
- iii) Improve the quality of fisheries products by setting up distribution infrastructure and developing processing technologies
- iv) Establish small-scale fishery and aquaculture in all zones by supplying support services centred upon the community fishery centres and fish farm stations

3.4 Development Approach

In the PDDI, the approaches here below shall be adopted based on above-mentioned development strategies in order to solve problems at the level of general development of small-scale fishery and inland aquaculture.

(1) Increase in the revenue of fishers and fish farmers

- i) Promotion of integrated agricultural management
Integrated agricultural management allowing the fishers and fish farmer to obtain several different products, such as agricultural products, fishery products, animal raising products, shall be extended to facilitate a stable cash income in addition to the production of food for self-sufficiency. Fishing and hunting shall be positioned as economically sustainable and important activities allowing for them to earn daily cash income, and their development shall be guaranteed.
- ii) Improvement in the management awareness of agricultural operations
Instructions shall be given to fishers and fish farmers for keeping accounts in order to allow them to become conscious of the importance of management and to improve their degree of confidence.
- iii) Extension of low-cost production techniques
Production techniques without use of purchased feed shall be extended to the small fish farms. The increase in the effectiveness of catching fish through the improvement of fishing techniques and the improvement in fuel efficiency through the introduction of small diesel engines shall be attained for the fishers

(2) Training/reinforcing of the fishers' organization

- i) Inducing of collective activities
Economic inducement to encourage collective activities of the fishers shall be set up, and collective activities based on mutual confidence shall be encouraged. Village leaders shall also be trained to promote shared activities. For the development of collective activities, the farmers or fish farmers will be allowed to decide freely without any constraints whether or not to set up groups and define the conditions that would allow the members to establish relations of mutual confidence.
- ii) Planning and managing premises for the fishers' organization
The fishers' organizations shall be set up and reinforced, and they will actively participate in management. By the year that has been targeted for the project (2020), the fishery community centers shall be set up in ten places in the country, and autonomous fishers' organizations shall be established through training and joint management with the DGPA.

(3) Establishment of a management system for fishery resources

- i) Joint Surveillance System of the 3 nautical miles off the coast
The introduction of a daily surveillance system through fishery activities and its effective execution shall be assured in order to make the fishers aware of the fact that they must "protect their own 3 nautical miles of coastal fishing grounds".
- ii) Autonomous management of fishery activities by the fishers and the supplying of alternative income sources by the Government
The support in giving information, exchanging opinions and supplying replacement income sources making up for the decrease in income because of regulations, shall be guaranteed for the fishers in

order to be able to establish limitations on their fishery activities in the zones defined upon the initiative of the fishers themselves.

(4) Improvement of Support System for Services

i) Management and use of Micro-credit

Credit shall be assured for individuals or groups who meet the requirements and are felt to have the capacity to reimburse the amount borrowed. Moreover, credit conditions shall be diversified according to the level of credibility of the individual or group.

ii) Review of the system for obtaining the small-scale fishery permit and fish farm permit

The training level shall be improved by making the population conscious of the fact that fishery and aquaculture are attractive activities. To do so, the present system for obtaining the small-scale fishery permit and fish farm permit shall be reviewed by classification.

iii) Establishment of an effective system for extending & communicating techniques

The fishery community centers and aquaculture stations shall be improved or enlarged in each zone, and the emphasis shall be put on advice and training on site by inviting the fishers and fish farmers to participate in more effective fishery and aquaculture techniques.

iv) Reinforcing of the system of fingerling production and aquaculture technical developments

The Peyrie Aquaculture Station shall be developed and reinforced as an aquaculture research and technical development centre, and it will actively be involved in testing on other fish species that might also be raised on the fish farms.

(5) Stable supply of fishery products

i) Diversification of fishing grounds and preparation for semi-industrial fishery

It will be necessary to promote the enlarging and modernization of the fishing boats, introduce diesel engines, improve the fishing equipment, etc. and begin the launching of semi-industrial fishery up to the targeted year (2020).

ii) Supply of Ocean Fish at low prices

The possibility of exploiting the resources of small pelagic by the small-scale fishers is high, and this could allow for an increase in exports towards neighboring countries, as well as the stable supply by Gabon of fishery products to Central West Africa.

iii) Attracting Private Companies for participation into the fishery development

Intensive aquaculture projects or the distribution of fresh and frozen ocean fish are being planned in these zones, and favorable measures shall be taken to assure the active participation of private companies.

4. Development Concept

4.1 Development Concept par Region

The concept of development per region for the target year (2020) is as follows.

(1) Integrated Development Zone (Libreville - the capital and the Estuary province)

Strategic production base - Libreville shall be developed by promoting the development mainly on the distribution and processing of fishery products, considering its role in shipments of fishery products to the inside and outside the country. By taking advantage of the proximity to the place of consumption, we shall insist upon the development of fishery and intensive aquaculture within the authorised limits for the resources.

(2) Coastal Fishery Development Zone (Ogooué-Maritime and Nyanga provinces)

With the strategic production bases at Port-Gentil and Mayumba, the development of unexploited resources shall be centred in the coastal zones of the South centre of Gabon. Collaboration shall also be assured with the community fishery Centres of Omboué and Gamba, serving as fishery support bases in the coastal lagoon zones.

(3) Inland Fishery Development Zone (Moyen-Ogooué and Ogooué-Ivindo provinces)

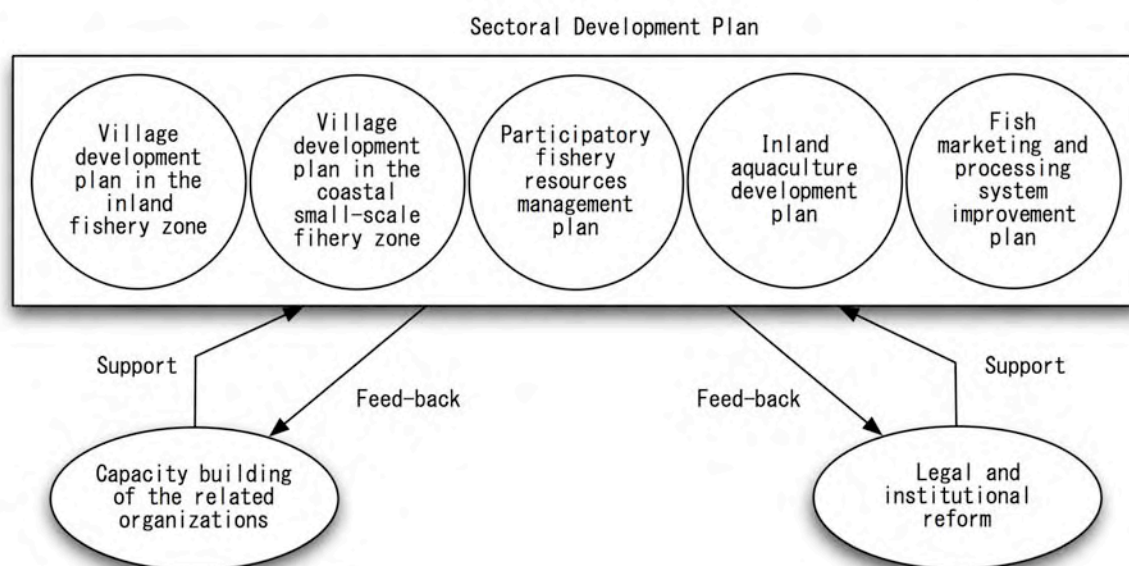
The sustainable development and support of inland fishery shall be based on the two strategic centres of Lambaréné and Makokou. The first shall serve as the base for shipping towards Libreville, and the second as the distribution base for fishery products within the zone.

(4) Inland Aquaculture Development Zone (Woleu-Ntem, Ogooué-Lolo, Haut-Ogooué and Ngounie provinces)

The development of aquaculture shall be based on the strategic production centre of Oyem, and exports of farmed fish to Cameroon shall be promoted. Moreover, the development of aquaculture shall take place in the three south eastern inland provinces in order to establish a system of self-sufficiency of fishery products in the zone.

4.2 Concept of Sector Development

As indicated in the picture here below, this master plan is made up of five sectional plans that comply with the development strategy, and two support plans. The support plans concern the “training in human resources” and the “legal management and reform of the system” to facilitate the execution of the sectional development plans; the feedback of information and the state of progress of the sectional development plans will allow for a better adapted support system.



Structure of the Master Plan

4.2.1 Development Plan for the Rural Communities in the inland fishery zone

Development Objective: Improve the financial situation of the fishers doing inland fishery

Development Orientation:

In the lagoon fishery area, the production of value added products, like vegetables, fruit and special local products shall be encouraged. In the middle-stream of the Ogooué River (Moyen-Ogooué province), aquaculture shall be developed as a main source of alternative income. In the Woleu-Ntem province, the introduction of a diversified management combining fishery, agriculture, animal raising and aquaculture has been proposed. In other inland waters, the development underlining the establishment of income from outside of fishery will be targeted.

Development Concept:**1) Support shared activities of the inland fishers combined with micro-credit**

Since in the Gabonese society, the idea of the necessity of mutual assistance is not widespread, we are encouraging the setting up of fishery cooperatives as entities for economic activities aiming at the improvement of income. Micro-credit shall be introduced for the shared purchase of fishing equipment and the necessary material to promote the organization, in order for the fishers' cooperation to have the capacity to manage shared funds.

2) Promotion of collective sales and purchases by the Fishers organization

In order to increase the income and improve fishery activities in the village and region, we must further develop capacity of the fishers' cooperative created in the above-mentioned concept 1), and financially and technically support the fishers so that they can carry out collective shipping, collective purchases and develop processed products.

3) Creation of alternative income sources for the low fishing periods

In order to assure a stable and higher family income throughout the year, various family activities allowing them to obtain cash income outside of fishing, such as agriculture, animal raising and aquaculture shall be promoted.

4.2.2 Development Plan of Rural communities in the small-scale coastal fishery zone

Development Objective: Improve living conditions for the families of the small-scale fishers in the coastal zone

Development Orientation:

It is necessary to make the fishery activities more effective and to exploit new fishing grounds by the introduction of new fishing equipment and methods. The creation of an environment wherein foreigners and Gabonese can securely fish together shall be promoted.

Development Concept:**1) Reinforcing the activities of the fishers organizations**

The existing fishery associations shall be stimulated by setting up small installations and purchasing boats, motors and fishing equipment with the introduction of financing services.

2) Increase in the effectiveness of coastal fishery

For small-scale coastal fishery, we are planning on creating secondary income sources for the fishers, and reducing the cost of fishery, and finding new fishing grounds and developing unexploited resources.

3) Improvement of the fishing village environment

In the coastal fishing villages, it is first necessary to permanently assure and guarantee the present place of residence. It is important to assure the availability of land that is suitable for fishing and the sale of fish and also for lodgings, and then to plan on available space for fishery production activities. In the villages of the lagoon and coastal fishing camps, it is important to improve access to the markets and contacts in general.

4.2.3 Participative Fishery Resources Management Plan

Development objective: Regularly manage the environment of the fishing grounds and volume of fish caught by the inhabitants

Development Orientation:

The application of the scientific approach for the management of fishery resources in Gabon (management of a "top-down" type supported by the results of serious studies) should in the future require lots of time and funding. Consequently, a participative social approach (management of a "bottom-up" type of the water zones by village unit) shall be established in the Master plan.

Development Concept:

1) Improvement of the collection method of fishery data

Technical extension activities are conducted so that fishers can keep records on daily fishing and management in a logbook. Measurements of length and weight of the concerned fish species for each of the main fishing grounds shall also be done once a month in order to verify the variations per fishery and per season. The data that has been collected and analysed scientifically shall be communicated to the fishers in the form of information, and will then allow the local fishers and the administration to verify the tendencies in the catch and in fishery resources, and if necessary, they will act to define local regulations for the autonomous limiting of fishery activities.

2) Income Stabilisation through the diversification of income sources

The awareness and understanding on the part of the inhabitants (fishers) are indispensable for fish resource management. Moreover, in order for the fishers themselves to manage the resources with the understanding of that value, it is important to diversify income sources that can contribute to the improvement of the fishers' financial situation.

3) Establishment of a participative management system for fishery resources

It will be necessary to assure a more effective surveillance and reporting system for illegal coastal fishing activities by the inhabitants in collaboration with the public surveillance system. In addition, it is possible to set up artificial reefs in the fishing areas, which will allow for the creation of new fishing grounds, and also to physically control the movement of the fishing boats into the reserved area. Simultaneously, it will also be important, as actions to maintain fishery resources, to monitor tendencies in the fishery resources and, if necessary, to limit fishery activities based on the initiative of the fishers themselves.

4.2.4 Development Plan of Inland Aquaculture

Development Objective: Improve the state of management of fish farm operations

Development Orientation:

It is considered to increase aquaculture production by re-using the abandoned fish farm ponds to supply fish to the markets. Once the aquaculture activities are developed, those who are interested in getting involved in this activity will certainly appear, and this will slowly lead to the extension of aquaculture. The existing aquaculture stations shall be streamlined in order to allow them to better carry out their initial functions as a research, development and extension base for aquaculture techniques.

Development Concept:

1) Establishment of a research and development system on aquaculture techniques

The Peyrie Fish Farm Station shall be set up as aquaculture research centre, and aquaculture techniques adapted to Gabon shall be developed in collaboration with the regional aquaculture stations.

2) Expansion and reinforcement of aquaculture Stations

The three aquaculture stations including the Peyrie, Oyem and Tchibanga, shall be used respectively with the following functions: "research and development of techniques, training", "extension of extensive aquaculture in the North" and "extension of extensive aquaculture in the South", respectively. In addition, three aquaculture stations will be developed, Koulamoutou aquaculture station for the extension of aquaculture in the inner part of inland areas, Lambarene aquaculture station for extension base of cage culture, and Makokou aquaculture station for creation of alternative income sources.

3) Extension of aquaculture to the private sector

We shall be carrying out the extension of aquaculture techniques adapted to each region, using the aquaculture stations as model farms. Simultaneously, as soon as we have received the information on the results obtained from the extension activities, we shall prepare an aquaculture manual on extension services and assistance. In addition, aquaculture cages will be made available to the private sector on the basis of results of the pilot project.

4.2.5 Plan for Improvement of processing and distribution system of fishery products

Development Objectives: Promote the production of processed fishery products and organize their distribution system

Development Orientation:**1) Fish Supply for the inland region of the country**

The supply of fishery products to the inland provinces other than Moyen-Ogooué province, should be improved through the distribution of marine fish caught in bigger volumes and at a lower price, but not freshwater fish for which we cannot expect a short-term increase in production.

2) Desire for wild animal meat

Sensitisation and extension activities shall be carried out to increase the supply of fishery products as alternative protein sources to reduce the consumption of wild animal meats.

3) Value Addition

Not only the improvement of the quality of existing processed products (smoked fish, salty dried fish), but also advanced fish processing such as canned fish, sterilized vacuum-packed, frozen “IQF” shall be done when the cost of energy comes down in the future.

Concept of Development:**1) Improvement in the distribution system of fresh fish**

Landing and distribution facilities shall be developed on the main fishing bases, such as Libreville, Cocobeach, Port-Gentil, Mayumba, Kango, Lambaréné, Ebel-Abanga, Ndjolé and Makokou. To improve the hygiene of the processing of the fresh fish, standards concerning the specifications of handling equipments shall be established and applied first to Libreville and then to Port-Gentil.

2) Promotion of fish processing and distribution of processed products

It is important to transfer the various processing techniques developed for Sans-Nom, and actively develop the spreading of fish consumption and sales promotional activities. In addition, there shall also be an improvement of the quality of smoked sardines.

3) Quality Management and Product Safety of fishery products

The training and increase in the number of SQIS inspectors and technicians, as well as the reinforcing of their knowledge and techniques shall be strengthened to assure product safety of all products distributed in the country and their supply to the inhabitants. Adjustments shall be made so that quality management and product safety of fishery products at the level of distribution should not be the responsibility of the SQIS alone, but shared between the relevant organizations.

4.2.6 Training of Human Resources of the concerned institutions

Development Objective: Acquisition by the DGPA of technical and administrative capacity for successful fishery project development

Development Orientation:

Education and training will be promoted under “South-South Cooperation” and through the cooperation with CEEAC countries, so as to increase efficiencies of human development in the counterpart agency. As for research and technical development, it would be advantageous to establish in Gabon a fishery development centre in Central Africa (interim name) and this centre should play a key role in the region.

Development Concept:**1) Technical Capacity Building of the DGPA Personnel (especially of the provincial personnel)**

Training in order to improve capacity shall be made a priority for the staffs below section chiefs at DGPA and provincial field personnel who have had few opportunities to be trained.

2) Training of extension staffs

We must first begin by training instructors who train the field extension staffs, and gradually consolidate a training system of field staffs at the head office as well as in the regions. We must also provide a budget and the necessary means of transportation to periodically visit the farming and fishing villages, such as scooters, boats, vehicles, etc.

3) Organising a communication system between the DGPA headquarters, the Provincial Inspection Offices, the Fishery Brigades and the Centres and Stations

The needed equipment shall have to be set up in order to improve communications and the functions of data processing of the provincial inspection offices and the fishery Brigades.

4.2.7 Legal Organization and Reform of the System

Development Objective: Define Rights and the necessary legal system for sustainable fishery development in Gabon and a well-adapted and effective application of the Master plan

Development Orientation:

An arrangement or review of rights and systems concerning fishery defined and published up to the present shall be carried out, and the missing parts shall be clarified with references to the rights and systems of advanced fishery countries and neighbouring countries.

Development Concept:

The legal organization felt to be necessary in the immediate future is as follows:

(1) Legal Organization

i) Regulations concerning the management of fishery zones

- Regulation on fishing right in the selected water area and its license fee
- Provision of exclusive usufructuary right of coastal water to the respective local organization.

ii) Definition of sanctions for violations of the regulations

- Strengthening of penalties against illegal trawl fishing in the coastal 3-mile zone.

iii) Limitations concerning fishing equipment and methods, fish species, fishery zones and periods of the year

- Setting forth of local regulations on regional fishery resources management
- Documentation of the regulations on fishing gears and methods in inland fishery
- Establishment of a proper disposition system of old fishing nets.

(2) Support system for fishers and fish farmers

i) System of fishery permit

- Provision of licenses based on the training experiences on coastal fishery, and differentiation of support services
- Registration of fishers and fish farmers in inland fishery and issuance of fishing permits

ii) Financing system for fishery (micro-credit, long-term credit, subsidies)

- Establishment of a micro-credit system
- Establishment of a long-term loan system, and a subsidiary system for interest of loans
- Establishment of a subsidiary system against the increase of operation cost caused by fuel price escalation.

(3) Support system for private companies

- Provision of incentives for the activities related to job opportunities creation, capacity building of personnel, and increase of food supply

5. Outline and Results of Pilot Projects

The pilot projects were executed during 6 months from May to November 2008 in this study in order to verify the effectiveness of the Master Plan (pertinence, processes and methods of execution).

5.1 Introduction of Set-net Fishing

Objective: To verify that set-net fishing is a useful means for the artisanal coastal fishers to earn additional incomes.

Activities:

- i) To make one set of the small set-net with materials available in Gabon and install it.

- ii) To operate and maintain the set-net, recording data of the operation/sales of catches.
- iii) To settle and share the sales money and deposit a part of the sales money as a fund for management of the project.
- iv)-1 To train counterparts (C/P) to conduct the activities of the project.
- iv)-2 To explain on the set-net fishing to other fishers who are interested in the fishing.

Results:

- i) Although the effectiveness of set-net was acknowledged as the net was adequately assembled, installed and operated, the catch efficiency was low. It is necessary to examine the design and specifications of nets suitable to fishing ground conditions, including possibilities of the seasonal relocation of the net and development of new net structure in the future.
- ii) Although the fish catch after July has severely declined with decrease of sales income, the account balance in the project management fund of CCPAP has been certainly increased.
- iii) The capacity of counterpart personnel was upgraded so as to explain to the interested fishers on structure, methods of assembling, installation, operation, and maintenance of the set-net introduced in this project.

5.2 Coastal Fisheries Development

Objective: To confirm the possibility to operate a new fishing boat equipped with an inboard engine by local fishers for exploitation of the coastal areas.

Activities:

- i) To give technical instructions to operate the boat and equipment.
- ii) To conduct fishing operations and keep recording of the fishing operations and sales of catches.
- iii) To manage expense/sales money and deposit a part of the profit of the fishing operations as a fund for the project.
- iv)-1 To give the technical training to the C/P.
- iv)-2 To teach how to operate the new boat to other fishers interested in the project.

Results:

- i) It was verified that the project boat has high fuel-efficiency, seaworthiness as well as a long sailing distance and confirmed the possibility to exploit the resources in the coastal areas including the southern part of the country. There were no difficulties for the fishers to learn how to operate the boat and equipment.
- ii) Through the fishing operations, the project made a gross profit after settling direct fishing expenses and the fishers received shares of the profit accordingly. It is however severe to consider repayment for the boat due to its high value. According to the chef of the fishers group, it is possible to continue the fishing with the boat, if they make three voyages per month with same catches and sales of the first or the second voyage.
- iii) The operation of the boat was conducted by the fishers group under management by the Fishery Center, and the distribution system to share operating profit by 50% each to fishers group and CCPAL was established.
- iv) Both fishers group and counterpart personnel can operate and maintain by themselves, and can also guide other fishers.

5.3 Microcredit

Objective:

- i) The sustainable credit system is established, and the financial status of fishers' households is made stable.
- ii) The consciousness of business management of artisanal fishers is improved, and the DGPA's capacity of data collection is also improved.

Activities:

- i) Collect repayment money from fishers' groups once a month, and save them into particular accounts of revolving funds.
- ii)-1. Distribute record books to fishers, and explain how to record their daily fishing activities,
- ii)-2. Collect / confirm their record books from fishers once a month, and advise them how to improve

their records of fishing activities.

iii) Make credit contracts with fishers' groups, and provide fishing gears to them.

iv) Conduct regular monitoring to fishers' groups once a month.

Results:

According to the results of the pilot program, we suggest that the following points should be considered for future credit programs;

- The amount of credit should be decided by reviewing actual fisheries incomes in order to support fishers groups preparing their whole necessary materials.
- The amount of operational cost is up to 10% of total amount of credit.
- The repayment period set the amount of credit up to 12 months considering peak fishing season. 200,000 – 300,000 FCFA for coastal fishers groups and 100,000 FCFA for lagoon and inland fishers groups are appropriate as monthly repayment.
- The credit interest should be set up individually in accordance with the amount of credit. 2 – 3 % is appropriate as monthly interest for micro-credit.
- The grace period for fishing equipment preparation is up to 30 – 45 days. It should be sufficient to prepare fishing gears, even though fishers ask someone to make them.
- In principle, the credit should be provided as materials / equipments, not as cash.
- In case of purchasing materials and equipments for rural villages far from Libreville and transporting them to the villages, a transport fee and commission on the amount of credit is added.
- It is desirable that the credit scheme should target to small fishers groups consisted about 5 members. In case of lending credit to family's groups, we have to request additional guarantors of other families as the security of credit repayment. However, in the aspect of strengthening fishers' organizations, we should not approve credit applications by individuals.
- When fishers association have existed in communities, all members of the fishers association have to be obligated to repay total amount of their credits and receive monthly account audits and management advices serviced by DGPA.
- The fishers groups received the credit are obligated to take records of fisheries accounts and catch quantities.
- DGPA provincial offices and fisheries inspection offices visit fishers' groups every month, and make effort to collect fisheries record sheets and repaid money from the fishers.
- Fishers have to receive trainings and seminars on fishing gears' assembling and repairing.

5.4 Integrated Aquaculture

Objective: To improve appropriate aquaculture techniques and dissemination method for small-scale aquaculture farmers.

Activities:

- i) To make the aquaculture farmers understand the difference in the productivity of the ponds through the culture experiments.
- ii)-1 To conduct the fertilization experiments using different livestock excrements.
- ii)-2 To conduct the experiments of livestock culture.
- iii) To conduct the experiments of vegetable cultivation using the mud of the ponds and the animal excrements.
- iv) To train the staff of the aquaculture stations using on-the-job-training (OJT) system.
- v) To conduct an initial training and an on-the-job-training to the participating aquaculture farmers.
- vi) To rear brood-stocks and to produce fingerlings in the stations.
- vii) To compare and study the financial balance after selling the harvest.
- viii) To save the half of the profit as the dissemination fund.

Results:

Through the execution of this pilot project, it was verified that integrated fish farming is effective to diversify the sources of income (time) and to stabilize the farm management. In addition, fish farmers and station's staff who participated in the project could improve their knowledge and technical capacity, and could raise their motivation. Thus, the aquaculture station was activated.

5.5 Cage Culture

Objective: To clarify the possibilities of cage culture using some captured fishes.

Activities:

- i) To conduct the hearing investigation from local fishers and to perform the possibility investigation of seeds acquisition.
- ii) To conduct the aquaculture experiments using the cheap feed (small fish, viscera of wild animals, processing residuals of local edible fish etc.) which can be obtained locally.
- iii) To train the staff of the center using OJT system.
- iv) To analyze the data of the project and to study the profitability.

Results:

Through the execution of this pilot project, it was verified that 1) cage culture can constitute a source of secondary incomes, 2) the knowledge and the techniques of the participating staff of the centre is reinforced undoubtedly, and 3) inspired by the project, and some already started their cage culture.

5.6 Value addition of Sans-Nom

Objective: Develop and extend good quality processed products of Sans-Nom

Activities:

- i) Form groups of interest fishers concerning quality and hygiene management of Sans-Nom processing
- ii) Organise a processing and equipment room, and give advices on management and adequate maintenance.
- iii) Teach processing techniques of the Sans-Nom to the groups of processing.
- iv) Periodically produce processed products and promote sales in Libreville.
- v) Invent new processed products of Sans-Nom and organise tasting events.
- vi) Install an improved oven and compare its performance with that of existing ovens.
- vii) Advise on adequate methods for processing products as well as conservation of products.

Results:

- i) The techniques on various processing method of Sans-Nom and sanitary control were transferred to local processors. The processed products satisfy the consumers taste, and the sales outlets of products have already fixed although it is still promotional stage.
- ii) As for profitability, it is necessary to reconsider the selling price appropriate after sales promotion period, through the reduction of production cost by the improvement of work efficiency. After that, it is possible to be viable as small-scale processing industry during the limited season.
- iii) It is adequate to do experimental processing taking the same procedure and method, by using other fish species and processing methods.
- iv) The execution system applied in this project was effective in harmonization between processing activities by CCPAL / local processors and the sales promotion activities by NGO, under collaboration and guidance by SQIS.

5.7 Participatory Fishery Resources Management

Objective: Create an activity model for participative resource management

Activities:

- i)-1 Distribute a fishery activity sheet to the fishers and explain and instruct for the recording method;
- i)-2 Collect and verify the activities sheets once a month, and analyse the data;
- ii)-1 Carry out a biological study of freshwater shrimp and lobster;
- ii)-2 Carry out a analysis of water quality of the fishing grounds;
- ii)-3 Carry out fish catching tests with cages (Mayumba only);
- iii)-1 Supply to fishers groups equipment that will contribute to the diversification of income sources and the improvement of the working environment, and check the use of this equipment;

- iii)-2 Create and apply the activities for alternative income sources;
- iii)-3 Carry out activities for the improvement of the fishers working environment;
- iii)-4 Carry out surveillance of the coastal zone through the small-scale fishers activities (Mayumba only);
- iii)-5 Set up a resource management unit to discuss the need for management measures

Results:

- i) It is considered as possible that the survey activities can be conducted continuously by using the low-cost method such as collection of biological samples in collaboration with fishers and in utilization of the information from fishers. In addition, the introduction of fishery equipment and material was effective for diversification of fish species / fishing grounds and improvement of fishers working environment. Furthermore, the repayment from fishers for credit has been commenced, and the continuous execution system of the activities for improvement of fishers' income and living condition are being developed.
- ii) The data both from fishers' log-book and biological survey was analyzed and owned in common with fishers. Based on these data, the regional committee for resources management was established.
- iii) With participation of local NGO and the IRAF's researcher, the activities on both village socio-economic and biological aspects were conducted for promotion of resources management. In addition, necessary services are provided from the administration. It is considered that the execution system in collaboration among DGPA, local NGO and IRAF would be the most appropriate to do the resource management activities from now on.

5.7 Experiment of the long-tailed motor

Objective: Introduce a motor having a low initial investment and low operations costs for the fishers.

Activities:

- i) Install the long-shaft motor on the model boat (a boat in FRP of CCPAL) and carry out test navigation.
- ii) Verify the way of handling the motor.
- iii) Organise test navigation with the local fishers interested in the motor
- iv) Compare the amount of investment and the operational cost of the long-shaft motor.
- v) Based on the results of the above activities, examine the possibility to extend the use of the long-shaft motor and establish an activity plan.

Results:

- i) The long-tail engine showed the fuel consumption of 2.0 – 2.2 liter/hr (about 1,200 FCFA/hr), that is more economical than the 40hp kerosene type outboard engine (19.5 liter/hr. or 4,800 FCFA/hr.).
- ii) The long-tail engine can be installed on the existing FRP boat, and can be operated stably.

6. Priority Projects

6.1 Basic Orientation for the formulation of the priority projects

The basic orientation for the formulation of the priority projects was defined by taking into account the particularities of Gabon (small population, limited human resources, limited industry and market) and contents and scope that would not present an excessive burden for the DGPA – the responsible body.

6.1 Composition of the Priority Projects

Each priority project is proposed by taking into consideration the results of the pilot project and the development objectives

6.2 Contents of the Priority Projects

6.2.1 Project for Financing of Small-scale Fishery

(1) Overview

A financing system allowing for the small-scale fishers to obtain financing when they need sizeable capital

shall be established. Two types of financing shall be set up for the small-scale fishers: micro-credit centred on assistance for the purchase of fishing equipment, and a long-term credit for support in buying expensive equipment such as a boat or outboard motor. These fishery credit systems shall be managed by a Fund Management Committee, composed of those responsible from the DGPA, representatives of the fishers, etc.

(2) Target Areas and Groups

All of Gabon (100 fishing villages), 500 fisher’s groups (50 groups/year x 10 years, 5 fishers per group);
 Priority zones: Estuary Province, Ogooué-Maritime Province, Nyanga Province, Moyen-Ogooué Province, Woleu-Ntem Province

(3) Period

- Micro-credit: 2009 to 2020 (twelve years)
- Long-term credit: 2012 to 2020 (nine years)

(4) Objectives

A. Micro-credit

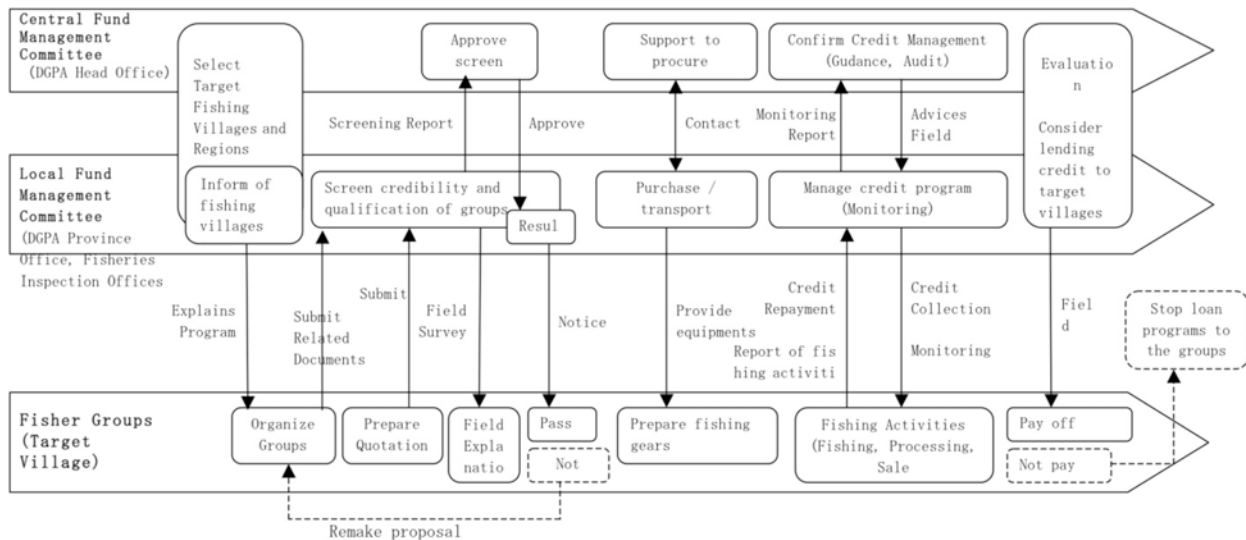
The micro-credit system was established as a support project for the small-scale fishers by the DGPA, and the fund is used adequately for the acquisition of equipment and materials that are necessary for the fishery activities of the small-scale fishers.

B. System of Long-term Credit

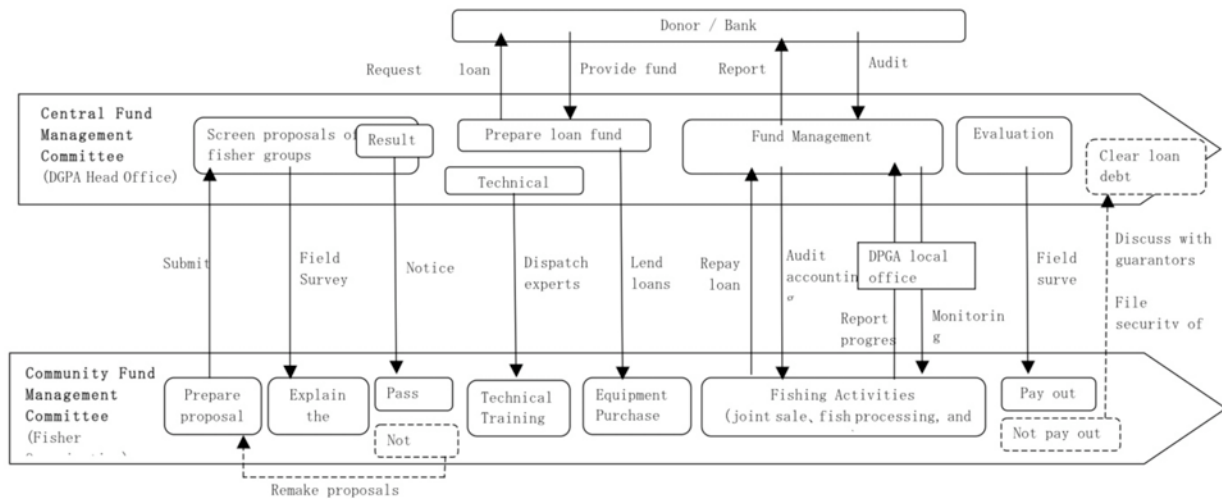
Groups of fishers who are participating in the micro-credit project will be able to obtain an ample profit through cooperative activities in products sales, material purchases, the development of processed products, etc.

(5) Contents

A. Micro-credit



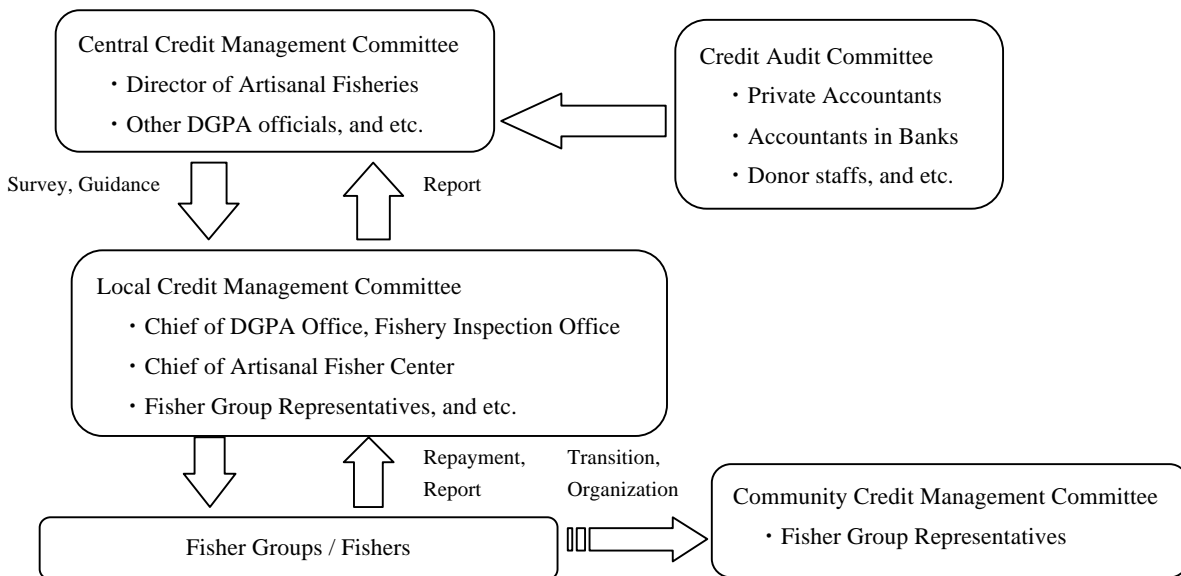
B. System of Long-term credit



(6) Equipment

3 outboard motor boats, 4 pickup trucks, 7 computers, 7 communication modems for mobile phones

(7) Management



(8) Personnel

- Five DGPA agents, five agents for the Inspection offices x 7 sites
- Five people from the private sector, 1 expert, 7 volunteers

6.2.2 Project for Strengthening of the Fisher's Organizations

(1) Overview

The existing fisher's organisations in the coastal fishing villages shall be improved in terms of training and the reinforcement of the fisher's organisation at the regional level. For the inland and lagoon fishing villages, an effort shall be concentrated on the training of fisher's groups at the village level and the creation of networks between these groups.

(2) Target Areas and Groups

- Coastal zone: Estuary Province, Ogooué-Maritime Province, Nyanga Province

- Lagoon zone: Ogooué-Maritime Province, Nyanga Province
- Inland Fishing zone: Moyen-Ogooué Province, Woleu-Ntem Province

Target groups: Small-scale fishers tied to the small-scale fishery community centres, fishers affiliated with the fishery associations and organisations

(3) Period

2011 to 2020 (ten years)

(4) Objectives

- The coastal fisher’s associations and organisations shall reinforce the small-scale fisher’s services;
- The fisher’s associations in the lagoon and inland zones shall be trained and a support system for fishing activities and income generation shall be set up.

(5) Contents

A. Training and reinforcement of fisher’s organisations in the coastal villages

By taking advantages of existing fisher’s associations and organisations, the management system of the association or organisation and its activities shall be reinforced in collaboration with the DGPA. In fact, we hope to create an independent management body capable of offering services to the local fishers as a profitable business.

B. Training and reinforcement of the fisher’s organisations in the lagoon and inland zones

In order to improve the income of the small-scale fisher’s families, it is essential that the fishers from the same zone or village should work together, carry out sales and processing activities together, and collaborate in order to increase the added value of the catch. For this purpose, the villages in the zone must first organise and form fisher’s groups (minimum of five fishers) who can become the beneficiaries of the DGPA support services. We shall then introduce micro-credit to support the related activities of these fisher’s groups.

(6) Equipment

3 outboard motor boats, 4 pickup trucks, 7 computers, 7 communication modems for mobile phones

(7) Management

DGPA

(8) Personnel

- Two agents from the DGPA, 7 agents for the Inspection Offices
- One expert, 7 volunteers

6.3.3 Project for Diversification of Income Sources

(1) Overview

In order to stabilise or increase their income throughout the year, the diversification of income shall allow the fishers to have income from activities outside fishing: for example, farming, animal raising or aquaculture, will be promoted with the fisher’s families. Moreover, the reduction of their degree of dependence upon fishery income shall allow for a decrease in intensive fishing in the inland fisheries that have limited resources capacity.

(2) Target Areas and Groups

30 villages shall be selected throughout the country, and a group of fishers (around 20 to 30 people) per village shall be involved.

- * Woleu-Ntem Province (inland fishery) : 10 villages
- * Moyen-Ogooué Province (inland fishery) : 5 villages
- * Ogooué-Maritime Province, Omboué Sector (lagoon fishery): 5 villages
- * Other requesting villages (inland or lagoon fishery) : 10 villages

(3) Period

2016 to 2020 (5 years)

(4) Objectives

As a source of income during the periods wherein the fishery resources are limited, the fishers doing lagoon or inland fishery can obtain other cash income outside fishery for the support of their family budgets.

(5) Contents

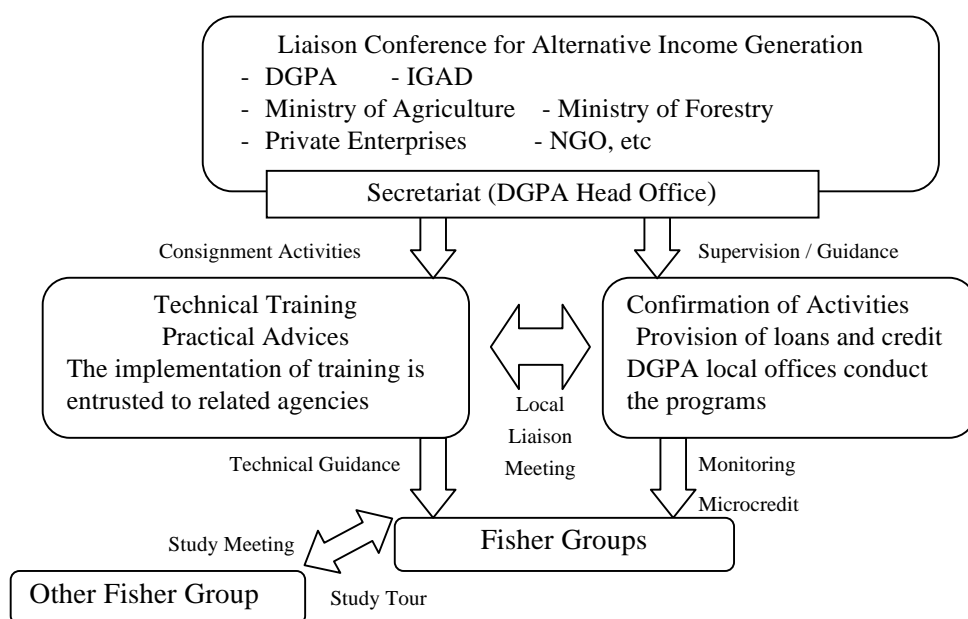
In order to broadly extend diversified income sources, such as agricultural products (fruits and vegetables, flowers), animal raising (chickens, milk cows), processed products (processed fishery products, processed agricultural products), forestry products (charcoal), direct sales and small-scale articles, the activities here below shall be applied:

- Creation of a study committee to obtain alternative income;
- Planning and setting up a model project for the diversification of income;
- Organisation of technical training and seminars;
- Presentation of examples of alternative income generation and exchange of ideas;
- Promotion of the sale of the developed products as a source of alternative income;
- Development of a movement "One Village, One Product".

(6) Facilities and Equipment

Not necessary

(7) Management



(8) Personnel

- Two experts, 3 volunteers
- 20 people from governmental bodies, the private sector and the NGO's involved;
- Two agents from IGAD and the Ministry of Agriculture, Animal Raising and Rural Development, 4 people from the private sector (processing, sales).

6.3.4 Project for Development of Set-Net Fishing

(1) Overview

In this project, based on the results from the pilot project, set-net fishing shall be extended in the coastal marine zones, including Port-Gentil and in the inland zones. Phase 1 shall be the stage of technical

development, and several fisheries and villages concerned shall be selected in the coastal and inland zones for the production and management of the set-nets. In Phase 2, the set-net fishing shall be introduced and extended to the fisher's groups from the other zones by using the first groups as models.

(2) Target Areas and Groups

- Phase 1: Port-Gentil, Libreville, Kango and Omboué (8 groups, 80 people)
- Phase 2: Port-Gentil and area around Libreville (40 groups, 400 people)
Kango and Omboué (20 groups, 200 people)

(3) Period

- Phase 1: 2011 to 2012 (two years)
- Phase 2: 2014 to 2017 (four years)

(4) Objectives

The introduction of set-net fishing shall allow the fisher's groups, who will be managing and repairing these set-nets, to obtain additional income.

(5) Contents

(Phase 1)

The fisher's groups shall construct and use model set-nets appropriate for their fisheries. Through a series of set-net operations, teams of DGPA technical instructors and other execution bodies, as well as the participating fisher's groups, shall learn how to produce and install, maintain and technically use the model set-nets for fishing.

(Phase 2)

Teams of DGPA technical instructors and other execution bodies shall give instructions to the selected fisher's groups on the production, installation of the models nets developed in Phase 1 and for the fishing techniques to be applied when using these nets. The procedure for the activities shall be the same as for Phase 1.

(6) Equipment

Two already mounted set-nets, 68 batches of accessory equipment, 4 FRP boats with outboard motors, 4 batches of equipment for studying the fisheries, four 40 HP outboard motors.

(7) Management

Supervisory Body: DGPA

Onsite Execution Body: Estuary Provincial Inspection Office (Libreville and Kango)

Ogooué-Maritime Provincial Inspection Office (Port-Gentil and Omboué)

(8) Personnel

- Three DGPA agents, 16 agents for the Inspection Offices
- One expert

6.3.5 Project for Modernisation of Fishing Boats

(1) Overview

The pilot project within the framework of the study for the PDDI carried out in 2008, has shown the effectiveness of fishing boats with diesel motors, and the possibilities of extending the fisheries in the coastal zone. Considering these results, new fishing boats shall be introduced and distributed, instructions for their use shall be given to the fisher's groups, and the fisheries and equipment and fishing methods shall be developed and communicated in view of extending coastal fishing adapted to navigation and fishing off the coast.

(2) Target Areas and Groups

- Phase 1: Port-Gentil (4 groups, 20 people)

- Phase 2: Libreville (10 groups, 50 people), Port-Gentil (10 groups, 50 people), Mayumba (2 groups, 10 people)

(3) Period

- Phase 1: 2011 to 2013 (three years)
- Phase 2: 2015 to 2017 (three years)

(4) Objectives

Fishing boats adapted to navigation and fishing off the coast shall be introduced and distributed to promote coastal fishing. Experiments in fishing will be carried out with the new boats and fisheries will be developed to promote the catch of demersal fish, semi-pelagic and small pelagic.

(5) Contents

- Training and assistance of the fisher's groups by the DGPA in the methods for navigating the fishing boats ;
- Creation of « Fishing Boat Management Associations » by the DGPA and instructions for the management, introduction of the new fishing boats, selection of the groups of fishers ;
- Support for the maintenance of the motors ;
- Development of fishing methods and fisheries (Mayumba) by the DGPA.

(6) Equipment

- 26 FRP fishing boats (length 12 meters, integrated diesel motor), 26 batches of spare parts for the motor, 26 batches of buoys and anchors for anchoring the boats, 2 batches of fishing equipment for Mayumba (small ring nets, pelagic longlines, base lines, pelagic reefs), 3 VHF radio telephones.

(7) Management

Under the direction of the supervisory body (DGPA), the boats shall be navigated and managed by the Fishing Boat Management Associations, the technical instructors of the CMPA and the Provincial Fishery Inspection Offices, as well as the groups of fishers.

(8) Personnel

- Two DGPA or CMPA agents, 16 agents from the Inspection Offices or Fishery Centres

6.3.6 Project for Management of Fishing Villages Environment

(1) Overview

For the purpose of serving as a model for the management of the environment in the fishing villages, the present project shall set up a telecommunications system in the inland fishing villages, roads and drainage pipes in the coastal fishing villages, as well as a support system for the women in the villages wherein the women do lots of fishing.

(2) Target Areas and Groups

i) Setting up of a communication system between the fishing villages :

- Moyen-Ogooué Province, the lacustrine region of the Ogooué river basin to the Southwest of Lambaréné (South Lakes, North Lakes);
- Ogooué-Maritime Province: region around the Nkomi Lagoon (including the Olende fishing camp);
- Nyanga Province: region around the Banio Lagoon.

ii) Improvement of the living environment in the fishing villages :

- Ogooué-Maritime Province: Coastal fishing villages of Port-Gentil;
- Estuary Province: fishing villages of Pont Numba, the Aviation and Owendo.

iii) Setting up of a support system for women who do the fishing

- Estuary Province: Kango (200 women who do the fishing).

(3) Period

- Setting up of a telecommunications system between the fishing villages : 2011 to 2013 (three years);
- Organizing of the living environment in the fishing villages: 2012 to 2016 (5 years);
- Setting up of a support system for the women in fishing: 2012 to 2015 (four years).

(4) Objectives

Set up a telecommunications system that will connect the fishing villages deprived of roads and means of communications, to the provincial fishery inspection offices and aquaculture and fishery centres, and by doing so, support the transmission of advice and information from the administrative services, as well as the activities of the local communities, fish product distribution activities, etc. Moreover, by setting up roads, drainage pipes and simple systems for purifying the water in order to improve the living environment of the fishing villages, this will improve the daily life of the population and facilitate their activities. In addition, supporting the social activities of the women by improving the work environment will provide a source of security for the women.

(5) Contents

- i) Setting up of a telecommunications system between the fishing villages;
- ii) Organising of the living environment in the fishing villages;
- iii) Setting up of a support system for the women in fishing.

(6) Facilities and Equipment

i) Setting up of a communication system between the fishing villages:

- 43 SSB radio telephones (including antennae, masts, earth lines), 39 battery chargers and batteries, 40 solar panels (including the support foundations for mounting the panels, the support pillars, batteries), 40 small electric generators.

ii) Improvement of the living environment in the fishing villages:

- Water drainage pipes (one kilometre total length per village), simple water treatment equipment for purifying wash water (two places per village), Roads (one kilometre total length per village).

iii) Setting up of a support system for working women:

- "Centres for Women" (training rooms, nurseries, restrooms, depots, around 100 m²).

(7) Management

- Supervisory and Control Body: DGPA
- Execution Body:

i) Setting up of a telecommunications system between the fishing villages:

- Provincial Fishery and Aquaculture Inspection Offices and Fishery Centres in each region of the project.

ii) Improvement of the living environment of the fishing villages

- Provincial Fishery and Aquaculture Inspection Offices in each region of the project.

iii) Setting up of a support system for the working women:

- Town of Kango, Women's Association of Kango.

(8) Personnel

i) Setting up of a communication system between the fishing villages:

- Three DGPA agents, 6 Inspection Office agents, 40 village people

ii) Organizing of the living environment of the fishing villages

- Two DGPA agents, One Inspection Office agent, One engineer from the Ministry of Public Works, 40 village people

iii) Setting up of a support system for the working women:

- Two people from the local associations, Three people from the Women's Association of Kango.

6.3.7 Project for Participative Management of Fishery Resources

(1) Overview

In this project, measures shall be set up and taken for the sustainable management of local fishery resources

by both the administration and inhabitants; simultaneously, support shall be given to the small-scale fishers concerned by the supply of fishing equipment and technical advice contributing to the diversification of fishing equipment, the diversification of income sources, as well as the improvement of the living environment.

(2) Target Areas and Groups

- Kango: Mainly 12 groups of women who do the fishing of crayfish (around 100 people);
- Ten fishing villages in the area surrounding Lake Onangué: Small-scale fishers using gill nets on motorized dugout canoes (around 100 people);
- Ten fishing villages in the area surrounding Omboué: Ten small-scale fisher's groups (around 50 people).

(3) Period

2010 to 2013 (three years)

(4) Objectives

Data concerning fishery resources shall be effectively collected and analysed, and based on these results, the fisheries and fishery activities shall be managed autonomously by the fisher's associations in order to assure a sustainable lifestyle for the fisher's families.

(5) Contents

1) Data Collection and analysis

- i) Recording of fisher's activities (daily recordings, monthly collection);
- ii) Biological study (once a month for one year, 100 samples taken per site and per month, length, weight, sex, maturity).

2) Activities to Improve Household Budgets

If a control of the fishing pressure over one species is necessary, it will first be necessary to a new income source that replaces the income obtained from the concerned species by the fishers, and improve their household livelihoods before taking measures to manage the resources. Necessary equipment shall be supplied through the granting of credit to the concerned fisher's groups. The credit given for the equipment must be reimbursed. The limit for the credit will be an amount that is theoretically reimbursable over the period of one year, and in line with the experience of the pilot project, the amount to be reimbursed shall be a maximum of 100,000 Cfa francs per group.

3) Establishment of an autonomous management system for local fishery resources:

- i) Creation of a management unit for local fishery resources and preparation of bye-laws;
- ii) Establishment of resource management measures.

(6) Equipment

i) For fishery resource data collection and analysis:

- Analysers of water quality, measurement instruments for samples, depth recorders, GPS, coolers = three sets for each equipment.

ii) For improvement activities of household budgets:

16 FRP boats, 15 outboard motors, 12 gill nets, 320 cages, 2 fishing traps, 25 coolers, 25 first aid kits, 125 raincoats, 10 batches of replacement equipment for nets.

(7) Management

This project shall be managed and administered by the "Fishery Resource Management Committee" made up of the following bodies and established at each site concerned by the project:

- Provincial fishery Inspection Offices, Fishery Brigades
- IRAF
- Local experienced NGOs in the area of fishery resource management.

(8) Personnel

- Three DGPA agents, 3 agents from the Inspection Offices, 3 IRAF agents
- One expert

6.3.8 Project for the Management of Coastal Fishing Grounds

(1) Overview

For the small-scale fishers to protect their fishing grounds by themselves, daily surveillance and notifications by the inhabitants shall be carried out in collaboration with the surveillance system of the Administration (surveillance system of the boats (SSN), radars, speedboats with surveillance). Moreover, artificial reefs shall be set up near the coastal fishing grounds in order to discourage the fishing boats by provoking material damage to their boats, and to create places for the spawning of young fish and other marine creatures.

(2) Target Areas and Groups

- Coastal waters of Mayumba (20 small-scale coastal fisher's groups (around 60 people)
- Coastal waters of Port-Gentil (10 small-scale coastal fisher's groups (around 100 people)
- Coastal waters of Mayumba (20 small-scale coastal fisher's groups (around 100 people)

(3) Period

- Establishment of a common surveillance system over the coastal fishing grounds: 2009 to 2012 (three years)
- Production, setting up and management of artificial reefs: 2011 to 2013 (three years).

(4) Objectives

- The surveillance system of the coastal zone shall be set up jointly by the Administration and the inhabitants through the participation of the small-scale fishers. The setting up of the artificial reefs will limit the activities of illegal fishing boats and create spawning places for young fish.

(5) Contents

1) Organisation of the co-surveillance system over the coastal fishing grounds:

- i) Establishment of a surveillance system of the coastal fishing grounds and notification by the local fishers;
 - Training of fish resource management units;
 - Notification to the Provincial Inspection Office (or the Fishery Brigades) by the fishers;
 - Night surveillance (introduction of night lantern fishing of cuttlefish or troll line fishing).

- ii) Organisation of a DGPA coastal surveillance system (executed by the PSPA):

- Establishment of two new Fishery Brigades at Iguela and Sette Cama;
- Assignment of speedboats and radars for the four existing Brigades;
- Legal arrangements for charging and arresting illegal fishing boats.

2) Fabrication, installation and management of artificial reefs (creation of fishing grounds):

- i) Study of the sites that have been proposed for the artificial reef project;
- ii) Design of the artificial reefs;
- iii) Management of the installation sites for the artificial reefs.

(6) Facilities and Equipment

1) Organisation of a co-surveillance system of the coastal fishing grounds:

- Three batches of surveillance equipment, two Fishery Brigades, two slipways, six surveillance speedboats with hauling trailer, six SSB radio telephones, six VHF radio telephones, six radars, 6 batches of surveillance equipment;

2) Fabrication, installation and management of reefs:

- * Forty lobster reefs, 150 medium-size reefs, 600 small-size reefs, three batches of equipment for onsite

studies, three batches of equipment for follow-up studies, three batches of surveillance equipment.

(7) Management

This project will be managed and implemented by the “Fish Resource Management Committee” made up of the DGPA (including the Inspection Offices and Fishery Brigades) and the Fisher’s groups.

(8) Personnel

- Eight DGPA or IRAF agents, Fifteen agents from the Inspection Offices or Fishery Brigades;
- Four experts, three people from the private sector.

6.3.9 Project for Development of Aquaculture Techniques

6.3.10

(1) Overview

Gabon possesses abundant water resources (streams, lakes, lagoons, etc.), however, in spite of their aquaculture development potential, almost no profit has been drawn from them. The present project shall lead to the development of new species, new fish feeds, techniques in aquaculture engineering, as well as brackish-water aquaculture. It will also improve facilities and equipment as required.

(2) Target Areas and Groups

- i) Development of aquaculture techniques in fresh water:
 - Aquaculture station of la Peyrie in Libreville, Estuary Province, will become the National Aquaculture Development Centre;
 - Around ten fish farms present in the Libreville area, around ten agents from the Aquaculture Station of the Peyrie;
 -
- ii) Development of brackish-water aquaculture techniques:
 - Mayumba, Nyanga Province (lagoons of intermediate salinity);
 - Two groups of fishers in the surrounding area of Mayumba (around ten people);

(3) Period

2009 to 2018 (ten years)

(4) Objectives

- i) Development of new species: aquaculture species other than the tilapia and fish species that can be used in combination with the tilapia shall be developed;
- ii) Development of fish feed: fish feed using local materials shall be developed (including the production of pellets);
- iii) Aquaculture engineering: standard designs of aquaculture structures shall be created.
- iv) Brackish-water aquaculture: there will be a selection of the best adapted species for the water of intermediate salinity, and we can then define the methods to be used in raising them.

(5) Contents

- 1) Development of new species
 - Study of the present situation of species being proposed for aquaculture;
 - Collection of wild young fish in experimental fish culture;
- 2) Development of Fish Feeds
 - Study of the usefulness of raw materials;
 - Testing in the production of fish feed by changing ingredient formulation in experimental fish breeding;
 - Examination of the methods for the production of pellets and the writing up of a manual.
- 3) Development of aquaculture engineering techniques
 - Establishment of standards in the design for aquaculture facilities
- 4) Development of brackish-water aquaculture
 - * Oyster cultivation and the development of techniques of mangrove crab cultivation

(6) Facilities and Equipment

One biological laboratory (including a wet laboratory), one stereomicroscope, one refrigerator, ten tanks made of polycarbonate resin “Panlite”, two aerators, one freezer, one granulator for the fabrication of pellets, one pickup truck, one FRP boat with an outboard motor, one package of netting for cage construction, one roll of rope

(7) Management

The executing body shall be the DGPA, and “Project Management Committee for the Development of Aquaculture Techniques” will be set up. This committee shall take care of the management and follow-up of the project in each aquaculture station.

(8) Personnel

- Two DGPA agents, two aquaculture Station agents, nine fishers
- One expert

6.3.11 Project for Strengthening of Production Capacity Fish Fry / Fingerling

(1) Overview

The present project shall improve the facilities of three existing aquaculture stations as the bases for the extension of integrated aquaculture, and as a complement activity to the PSPA programme which plans to develop two other fingerling production centres, the project will extend fingerling production techniques to the fish farmers in the surrounding area.

(2) Target Areas and Groups

- Woleu-Ntem Province: Aquaculture station of Oyem (5 fish farmers, 13 agents from the Oyem aquaculture Station);
- Nyanga Province: Aquaculture station of Tchibanga (3 fish farmers, 9 agents from the aquaculture station of Tchibanga);
- Ogooué-Lolo Province: Aquaculture Station of Koulamoutou (5 fish farmers, 8 agents from the Aquaculture Station of Koulamoutou).

(3) Period

- Organization of the aquaculture stations: 2009 to 2011 (three years);
- Training of the personnel of the stations and the extension of techniques to the fish farms: 2011 to 2015 (five years).

(4) Objectives

- Improvement in the fingerling production capacity in each aquaculture station (the distribution of fingerlings therefore becomes possible);
- Extension of the fingerling production methods for tilapia in the fish farms (the production of fingerlings at the farms will become possible);
- Preparation of a fingerling production manual.

(5) Contents

- 1) Reinforcement of the capacity of the Stations
 - Training of the station agents (on-the-job training on fingerling production);
 - Improvement in extension techniques for the fish farms.
- 2) Extension of techniques to the fish farms
 - Selection of fish farms and training (two day courses taking place at the fish farm stations) and three day on-the-job training (at the fish farm sites);
 - Production of fingerlings in the ponds of the fish farms (refurbishing of production ponds);
 - Recognition of pilot farms (nomination as trainers in the following training sessions)
- 3) Preparation of a fingerling production manual.

(6) Facilities and Equipment

Refurbishing and expansion of Aquaculture Station (Koulamoutou):

- Three batches of equipment for aquaculture stations (submersible pumps, digging tools, fish catching equipment, live fish transportation tank).

(7) Management

The executing body shall be the DGPA, and a “Project Management Committee for the Improvement in the Fingerling Production Techniques” will be set up. The implementation and follow-up of the project will be directed by each aquaculture station.

(8) Personnel

- One expert

6.3.12 Project for Aquaculture Extension

(1) Overview

Through on-the-spot training, extension activities for integrated aquaculture methods will be spread to the fish farms (an appropriate aquaculture technique) bringing together fish culture, animal and poultry raising, gardening and other activities. Moreover, the region of the Moyen Ogooué is not very well adapted to gardening or animal raising since it is one of the hottest places in Gabon. Therefore, aquaculture in cages can be extended as one of the sources for income generation.

(2) Target Areas and Groups

- Woleu-Ntem Province: Aquaculture Station of Oyem (24 fish farmers, 13 agents from the Aquaculture Station of Oyem)
- Nyanga Province : Aquaculture Station of Tchibanga (12 fish farmers , 9 agents from the Aquaculture Station of Tchibanga)
- Ogooué-Lolo Province: Aquaculture Station of Koulamoutou (12 fish farmers , 8 agents from the Aquaculture Station of Koulamoutou)
- Ogooué-Ivindo Province : Aquaculture Station of Makokou (12 fish farmers, 8 agents from the Aquaculture Station of Makokou)
- Moyen-Ogooué Province: Aquaculture Station of Lambaréné (12 fish farmers , 5 agents from the Aquaculture Station of Lambaréné)
- Ogooué-Maritime Province: lagoons of the area surrounding Omboué (12 fish farmers)

(3) Period

Organisation of the Aquaculture Stations: 2009 to 2011 (three years)

Extension of aquaculture techniques : 2011 to 2015 (five years)

(4) Objectives

- Extension of integrated aquaculture techniques in order to increase the income of the fish farmers;
- Extension of aquaculture in cages as an extra source of income for small-scale fish farmers (source of additional income during the rainy season).

(5) Contents

- 1) Integrated fish farming (Aquaculture Stations of Oyem, Tchibanga, Koulamoutou and Makokou):
 - Selection of fish farmers and training (around six months);
 - Preparation of a technical manual on integrated fish farming;
 - Study of the potential of fish farm ponds.
- 2) Aquaculture in Cages (Aquaculture Station of Lambaréné)
 - Selection of fish farmers and training (around two months);
 - Continual Follow-up and technical support by the Station;
 - Meetings to explain aquaculture techniques to the fish farmers of the area;
 - Study on the possible places to set up cages and the mapping thereof.

(6) Facilities and Equipment

Refurbishment and expansion of the Aquaculture Stations (Oyem, Tchibanga, Koulamoutou), building of aquaculture stations (Lambaréné, Makokou), Four batches of equipment for aquaculture stations (submersible pumps, digging tools for the ponds, equipment for catching the fish, live fish transportation tanks), one batch of equipment for the aquaculture station of Lambaréné (cages for fingerling production and for grow-out, equipment for catching fish, live fish transportation tank, four vehicles for transporting fingerlings and the raw materials for fish feed.

(7) Management

The executing body shall be the DGPA, and a Project Management Committee for the Extension of Integrated Fish Farming and the Project for the Extension of Aquaculture in Cages” will be set up. Project implementation and follow-up will be carried out in each aquaculture station.

(8) Personnel

- 24 fish farmers per year

6.3.13 Project for Improvement of Fresh Fish Distribution System

(1) Overview

The present project shall set up small-scale fishery community centres at the main landing places in the regions that have no infrastructure for the distribution of fresh fishery products, and will prepare standards for the manipulation of these products (standardization especially of the materials and equipment for distribution). In addition, concerning Mayumba, on the Southern Coast where there is a high potential development for luxury seafood products (lobsters, blue crabs, oysters, mangrove crabs, etc.), the project will develop the distribution of living products and fresh products towards Libreville and Port-Gentil, after the consolidation of the fish resource management system that is now being implemented.

(2) Target Areas and Groups

- 1) Setting up of Fishery Community Centres:
 - Cocobeach, Mayumba, Kango, Ebel-Abanga, Ndjolé, Makokou :
- 2) Standardisation of materials and equipment for distribution: Libreville, Port-Gentil;
- 3) Development of the distribution of live and fresh fish:
 - Mayumba (é to 3 groups of fishers).

(3) Period

- Setting up of the Fishery Community Centres: 2009 to 2012 (three years) ;
- Standardisation of distribution materials and equipment: 2011 to 2013 (three years);
- Development of the distribution of living and fresh fish: middle of the year 2011 to the middle of the year 2014 (three years).

(4) Objectives

The distribution infrastructure and standards for the handling of fresh fish shall be set up in Gabon, and the quality and hygiene of fishery products shall be improved. The luxury seafood resources of Mayumba shall be effectively used and the income of the fishers shall increase.

(5) Contents

- 1) Setting up of Fishery Community Centres at the main landing places (implementation anticipated through the PSPA);
 - (Six sites: Cocobeach, Mayumba, Kango, Ebel-Abanga, Ndjolé, Makokou).
- 2) Standardisation of distribution materials and equipment for the fresh fish.
- 3) Development of the distribution of live and fresh fish from Mayumba:
 - i) Distribution of live fish (trial transportation of live langouste and blue crab);
 - ii) Distribution of fresh fishery products (shipping and sales of fresh fish to Port-Gentil and to Libreville).

(6) Facilities and Equipment

Building of the Fishery Community Centres (Cocobeach, Mayumba, Kango, Ebel-Abanga, Ndjolé, Makokou), 1000 fish cases, 500 insulated fish cases, 72 weighing scales, 6 batches of repair equipment, 1 refrigeration truck, 3 vats.

(7) Management

It is the DGPA (especially the DPA and DRCS-SQIS) which will implement the above-mentioned project. However, concerning the “Development of the Distribution of Live and Fresh Fish from Mayumba”, the Association of small-scale fishers from Mayumba and the sales group shall be the executive body, with supervision and technical advice from the DGPA.

(8) Personnel

- Local consultants (study of the structures, architectural plan, building supervision)
- 14 DGPA agents (SQIS, DRCS), two private sales groups.

6.3.14 Project for Valorization and Improvement of Quality of Fishery Products

(1) Overview

In order to develop processing techniques for fishery products (increase of added value) and to improve their quality and their hygiene, the present project shall set up the facilities and systems leading to trial processing and necessary quality inspections.

(2) Target Areas and Groups

Site for the setting up of facilities: In the Libreville Support Centre for Small-Scale Fishery (proposed name);

Site for the Development of processing techniques: Processing workshop of the Lambaréné Community Centre for Small-Scale Fishery and structures mentioned above;

Site for training the personnel: Centre Specialised in the Valorisation and Technology of Seafood Products” (Agadir, Kingdom of Morocco);

People involved: 19 DGPA agents, two or three groups of women working in processing of fishery products.

(3) Period

Development of the processing of the nameless fish and sardines : mid-year 2009 to mid-year 2011 (two years);

Setting up of a qualitative and sanitary inspection system for fishery products : 2011 to 2013 (three years)

(4) Objectives

- Jobs to be created by new processing industries thanks to the development and effective use of new processing techniques of fish species that have a good catch potential;
- Techniques for the use and maintenance of control equipment for the export of fishery products to be acquired;
- Necessary functions for the quality and sanitary management of fishery products to be created in Gabon.

(5) Contents

- 1) Development of processing techniques for Sans-Nom fish and sardines (including therein the small-scale production of fish flour using sardines);
- 2) Setting up of a qualitative and sanitary inspection system for fishery products.

(6) Facilities and Equipment

Libreville: Inspection and experimental processing facility, one batch of equipment for processing experiments, one batch of inspection and testing equipment;

Mayumba: Workshop for the production of fish meal, temporary storage of the fish raw material, sun drying zone, storage of products, one small pot to boil the fish (with three internal baskets), one chain hoist, 40 fish cases, one wagon, one

mill grinder, one plate weighing scale, ten frames for sun drying the fish.

(7) Management

While benefiting from the technical advice of the SQIS, the DGPA will be the executing body for the building of the facilities and the installation of the equipment. Once the building and the installation is finished, the SQIS will be responsible for the implementation and surveillance.

(8) Personnel

- Local consultants (study of the structures, architectural plan, supervision of the building) ;
- Eleven DGPA agents (SQIS), five members of the women's fish processing group.

6.3.15 Project for Capacity Building of Fisheries-Related Organizations

(1) Overview

Gabon does not have enough technicians in the fishery sector, and this creates a bottleneck for the development of fishery and the fishing villages. In the present project, there will be a communication system set up between the Center for Fishery and Aquaculture Skills and Occupations at Port-Môle in Libreville (CMPA), and the regional structures concerned with fishery, and there will be training of instructors, technicians, extension agents and data collectors.

(2) Target Areas and Groups

- All the agents of the DGPA, the CMPA, the Provincial Fishery Inspection Offices (nine places), the Fishery Brigades (four places), the Small-Scale Fishery Community Centres (four places), and the aquaculture stations (four places).

(3) Period

From 2009 to 2020 (twelve years).

(4) Objectives

- A training system for the fishery sector shall be established in Gabon in order to effectively apply this Master Plan. Concretely, the related structures and equipment shall be set up, and the human resources who take care of the development of fishery will be trained.

(5) Contents

1) Technical capacity-building of the DGPA agents:

- i) Training of the agents in fishing techniques (reinforcement and benefits of the South-South Cooperation);
- ii) Training of the aquaculture technicians (technical cooperation with Benin and Cameroon);
- iii) Training of the regional agents (at the DGPA Headquarters, twice a year, for around ten days each time).

2) Training of fishery extension agents:

- i) Training of extension agents and data collectors (30 days each time, for 50 people);
- ii) Organisation of an extension system for the fishers and the women doing aquaculture;
- iii) Organisation of the training structures.

3) Organisation of a communication system between the DGPA and the regional bodies.

(6) Facilities and Equipment

- Building of the CMPA Management Centre, its laboratory and residence, one batch of training equipment, 21 pieces of equipment for processing data, 21 fax machines, 21 pickup trucks, 42 motorcycles.

(7) Management

The DGPA shall be in charge of project management from the planning stage to implementation.

(8) Personnel

- 10 DGPA (CMPA) agents, 50 agents from the Provincial Inspection Offices.

6.5 Approximate Cost of the Priority Projects

The approximate cost of each project is estimated as follows: At the time in the year 2008, the total amount estimated was 26,633 Million Cfa Francs (around 40.6 million Euros and 5,278 million yen, using an exchange rate of 1 Euro = 130 yen), and of this amount, the cost of the structure and equipment was 17,288 million Cfa francs (64.9%), personnel expenditure (experts, consultants, personnel from the NGOs) at 4,634 million Cfa francs (17.4%), management expenses (including therein the personnel expenses for the Gabonese authorities) at 4,710 million Cfa francs (17.7%).

6.6 Plan for the Implementation of the Projects

6.6.1 System for the Implementation

The competent authority of the PDDI is the Ministry of the Forestry Economy, Waters, Fishery and Aquaculture (MEEPA), who is responsible for the execution of the priority projects and the budgeting of the projects upon the initiative of the DGPA. In order to realise this PDDI with no problems, as a concrete measure, it will be necessary to first establish within the Ministry, an upstream body who manages the projects, the Coordination Committee for the Projects (CCP), then create within the DGPA another body which will establish the order of priority of all the projects and make a decision concerning the concrete orientation of each project, the Committee for the Execution and Management of the Projects (CEGP).

(1) Coordination Committee for the Projects (CCP)

The CCP shall be presided over by the General Secretary of the MEEPA who is in charge of fishery, and will be composed of those responsible for planning from the following four ministries: The Ministry of Planning and Programming for Development, the Ministry of the Economy, Finance, Budget and Privatisation, the Ministry of Public Works, Infrastructure and Construction, and the Ministry of Lodging, Habitat and Urbanism. At the meeting of the Committee, the members will discuss the most effective realisation of the PDDI, as well as the stage of advancement of the priority projects. Through the Committee, moreover, the collaboration and support of the ministries other than the MEEP shall be involved.

(2) Committee for the Execution and Management of the Projects (CEGP)

The CEGP shall determine the basic orientation for carrying out the priority projects, shall supervise the activities of each project realised in each region, and shall carry out the follow-up and technical evaluation. In addition, they shall establish the order of priority of the projects, and shall decide matters concerning the implementation and improvement in the management of the projects. The CEGP shall also be obliged to carry out studies concerning the projects and to write up and send reports on the results to the CCP, if the CEGP is so requested by the CCP.

(3) Office for the Projects

At the beginning of each priority project, a project office shall be arranged (several projects which are similar and take place at the same time can share the same office). Each office shall be managed and maintained by a Project Leader designated by the DGPA.

6.6.2 Management and Maintenance Plan

The present PDDI consists of 14 priority projects, if we presume that the various equipment and facilities shall be provided. The orientation of the management and maintenance of this equipment and facilities shall be as follows: the equipment sold on credit to the fisher's groups shall be managed and maintained by the

fishers themselves, the facilities belonging to the State shall be managed by the concerned governmental bodies, the equipment and facilities used in common, shall be managed by the bodies directly concerned, such as the Community Fishery Centres, the Aquaculture Stations or the Fisher's Associations.

6.6.3 Calendar for Implementation

The priority projects proposed in the present PDDI shall be implemented within the ten year period (2011 to 2020) after having spent two years in the preparative stage. However, the projects having parts which are to be carried out within the context of other projects that are already being developed, such as the PSPA, may be implemented as early as 2009.

6.6.4 Monitoring (Surveillance, Evaluation, Improvement)

The CEGP shall carry out the follow-up on the advancement of all projects, shall organise annual meetings for the revision of projects and shall write up the reports on the evaluation of the activities. Concerning the current projects, the results and lessons obtained per project as well as the impact of the project, shall be compiled in this report; concerning the projects being prepared for implementation, the anticipated calendar and the situation of the budgeting shall be specified in this report. Since the annual report on the evaluation of the activities plays an important role in the realisation of the projects that depend upon the collaboration with donors, the report will be distributed among the main donors.

On the other hand, at the end of the year, the CEGP shall establish a financial report on each priority project. This report, after having been controlled by the internal services of the DGPA, shall again be verified and approved by outside auditors.

6.7 Evaluation of the Priority Projects

6.7.1 Expected Effects

The relevance and effectiveness of the 14 priority projects proposed in this Master Plan have been controlled through the pilot projects or similar projects that had been developed before. Concerning the effectiveness of the execution, the system and method of execution of the priority projects has been verified through the pilot projects in order to assure their effective execution.

This Master Plan, which is narrowly tied to the Strategic Document for Growth and Poverty Reduction (SDGPR), the general overview and the Sectional Forestry, Fishery and Environmental Programme (PSPE), allows us to hope for a positive impact not only in Gabon, but also in the neighbouring countries, from the viewpoint of the effective use of the abundant water resources (increase in food production and resource management) and the development of the farming and fishing villages (increase in the income of the farming villages and the reduction of regional disparities).

The different pilot projects realised over the past six months during the development study, have clearly indicated the effective results and lessons, and have represented a precious experience for the DGPA – the executive body, in order to assure the development of future fishery. It has been decided that the DGPA shall pursue these pilot projects, the necessary funds for which shall be covered by the funds set up during the execution period of the pilot projects. Moreover, the equipment bought within the context of the micro-credit projects and the participative fish resources management project are being reimbursed by the concerned groups, and a system has been established for the use of these sums of money as funds for the continuation of the projects. In addition, the budgeting of the necessary cost for the management and monitoring of the DGPA is also advancing.

The above points allow us to hope for an adequate autonomous development of the Gabonese party, even for the execution of the priority projects which represent an enlarged and applied version of the pilot projects.

6.7.2. Economic Evaluation

The calculation of the internal rate of return (IRR) for the priority projects has given a value that is relatively high at 29.8%. The sensitivity analysis in case of profits -50% has allowed us to obtain IRR that is relatively high at 12.5%, thereby allowing us to presume that this is an investment with low economic risk. Moreover, the IRR remains high at 19.3%, even if the cost of the projects should increase by 50%. If we consider the annual growth rate from 3 to 5% for Gabon, these figures allow us to hope for adequate investment returns.

6.7.3 Social Effects

By the implementation of the priority projects, the following social effects can be expected.

- (1) The activities for upgrading of income of farmers / fishers will bring i) upgrading of education / health standards, ii) ensuring of safety life, iii) habitation of young generation in the villages, iv) upgrading of safety during fishing operation, and v) job creation for fishers who cannot engage in fishing due to physical reasons.
- (2) The activities for strengthening of farmers / fishers organizations will bring i) stabilization of cooperative activities, ii) stabilization of fishers household management, iii) upgrading of creditability of fishing villages, and iv) upgrading of management awareness.
- (3) The activities for establishing the resources management system will bring i) elevation of regional solidarity and ii) security-keeping in the region.
- (4) The activities for stable supply of fishery products will bring i) upgrading of women's independence, ii) improvement of food life (nutrition), and iii) expansion of distribution and human exchanges with other regions.

Furthermore, the ripple effects from the implementation of priority projects will include the activation of communities and ii) upgrading of social status of fishery sector. With the outbreak of the above effects, the correction of differences by fishing villages (nationalities) as well as between urban and rural areas will be accelerated.

6.7.4 Initial Environmental Examination (IEE)

Twenty-five environmental and social headings judged to be adapted to the evaluation of a priority project were extracted by referring to the process of the Initial Environmental Examination of Gabon, and according to the guidelines related to environmental and social considerations of the JICA. The degree of undesirable influence of these 25 headings was evaluated for each project. And each project was totally evaluated using three general categories, A, B, and C, in conformity with the JICA guideline. Consequently, all priority projects do not have any impact level 'A' evaluated in the environmental and social items, and have at least one item indicated with impact level 'B', except "14. Project for Capacity Building of Fishery-Related Organizations". Accordingly, all priority projects except "14. Project for Capacity Building of Fishery-Related Organizations" correspond to 'Category B'.

7 Recommendations

The following recommendations have been made so that the Master Plan can be set up very quickly, and the operations and maintenance carried out in a way that is both sound and sustainable.

(1) Continued Execution of the Pilot Projects

The DGPA – the executive body of the present PDDI, is being asked to cover the budgetary and personnel needs required for the continuation of these pilot projects and to integrate them into their annual activity programme.

(2) Prompt adoption and execution of Master Plan

It is recommended that this Master Plan will be promptly adopted by the Gabonese Cabinet of Ministers. For its realization the Gabonese government has to urgently tackle on the arrangement of necessary budget and manpower and other measures to be taken. After the approval of this Master Plan by the cabinet of Gabon, DGPA is requested to hold “the Forum on Small-scale Fishery Development” so as to be considered positively on implementation of the Master Plan in the Round Table Meeting of Donor Countries in the future.

(3) Reinforcement of the collaboration with the other Donors

The contents of the Support Programme for the Fishery and Aquaculture Sector (PSPA) financed by the African Development Bank shall be reviewed in February, 2009 based on the present Master Plan. It is therefore desirable that the numerous priority projects proposed in this Master Plan should be started and implemented very quickly within the framework of the PSPA. Concerning the parts of projects which cannot be realised within the framework of the PSPA, the DGPA shall have to make an effort in view of rapidly executing this Master Plan by constantly repeating the explanation of the contents and discussion of this Master Plan to the donors who can cover the financing.

(4) Reinforcing of the collaboration for the Development of Fishery and Fish Resource Management in West Central Africa

The promotion of exchanges in human resources and techniques in West Central Africa (Gabon, Equatorial Guinea, Congo, Cameroon, Sao Tomé and Príncipe, Chad, The Central African Republic, etc.), and the reinforcing of the collaboration for the development of fishery and the management of fish resources is necessary. One of the desired means shall be the organisation of a Centre for the Development of Fishery in West Central Africa (provisional name) in Gabon, which could play a central role in the development of regional fishery.

(5) Improvement in the Administrative Capacity of the DGPA Agents

It is not necessary to increase the number of DGPA personnel for the execution of this Master Plan. For that reason, we will be asking the personnel of the headquarters to report on the capacity of available personnel to carry out the management, follow-up, structuring and assistance of several projects (technical assistance capacity and management capacity), and the capacity of the provincial agents already assigned to the provinces that shall have to be improved in order to allow them to carry out the execution and management of their daily activities onsite as extension agents and data collectors, to write up the recordings and periodical reports, and to carry out the coordination with concerned stakeholders. It is essential to systematically and effectively improve the capacities of the personnel.

(6) Restructuring of organizations (Establishment of Ministry of Fishery and Aquaculture)

For the implementation of the Master Plan, it is desirable to establish an independent organization, namely, Ministry of Fishery and Aquaculture, for development of fishery and aquaculture sector. By doing so, it is expected that the budget execution and various arrangements will be more rapidly made, and the programs and projects will be able to implement more smoothly as originally planned.

(7) Measures to be taken on taxation and finance in the fisheries sector

To develop small-scale fishery and inland aquaculture by Gabonese in Gabon, the government should tackle on the introduction of exemption / reduction from value added tax (VAT) on fishing and aquaculture materials and fuels. In addition, the Gabonese Government should establish a financing system for medium- and small-scale farmers/fishers for the development of agriculture and fisheries.

(8) Promotion of the Privatisation (operation of the facilities based on self-supporting accounts)

The profit-producing activities among the functions of the Community Fishery Centres shall gradually be

transferred to the fishers' cooperative associations, and the DGPA shall then mainly be responsible for the non profit-producing activities that can be done by a limited number of agents, such as extension of techniques or the support of the credit service.

Moreover, this Master Plan has proposed to regroup the existing fish farm stations onto six sites: i) the Centre for the Development of Aquaculture Techniques (one site at the Peyrie), ii) the Centre for the Production of Fingerlings (three sites: Oyem, Tchibanga and Koulamoutou), and iii) the Centre for the Extension of Aquaculture Techniques (five sites including the three sites mentioned in ii), Oyem, Tchibanga, Koulamoutou, Lambaréné (new) and Makokou (new). The structures of the other existing stations shall be sold, thereby presuming a process of privatization.

(9) Commitment of the Administration in Resource Management

Gabon is generally rich in fish resources, however, a management system of fish resources must be set up at present. The previous experience of Japan has shown that it is too late to set up a plan once the decrease in the fish resources has already become visible. The management of fish resources which constitutes food for the inhabitants at this critical situation is very difficult. It is therefore essential for the Administration to rapidly take the following measures in view of resource management: i) Reinforcing of the surveillance and control of violations in the coastal marine zone, ii) Creation of a system of collaboration with the concerned inhabitants (the fishers themselves, etc.).

(10) Administrative guidance and Supervision for small-scale Set-net Fishing

At the initial stage of development and extension of set-net fishing, it is essential to set up the rules for this type of fishing, including (i) people qualified to use, (ii) zones for setting up, (iii) size and number of nets, (iv) procedure for issuing the authorisation, (v) obligation for reporting, and (vi) penalties for violating rules, based on preceding concrete studies on the structure and size of fishing nets, the number of nets, the zones wherein they are being set up. and that.

(11) Effective participation of Gabonese to fisheries sector

To increase the number of Gabonese fishers more effectively and to improve their technical and financial levels, however, it is important to transfer technology in collaboration with foreign fishers in the training, as well as to take incentives by taxation and credits. Nevertheless to say, it is necessary to fulfill the training facilities and to upgrade the training staff for new Gabonese fishers.

TABLE OF ABBREVIATION

Abbreviaiton	English name
CCP	Project Coordination Committee
CCPAL	Lambarene Artisanal Fishery Community Center
CCPAP	Port-Gentil Artisanal Fishery Community Center
CEEAC	Central African States Economic Community
CEGP	Project Execution and Management Committee
CMPA	Fisheries and Aquaculture Professional Center
COREP	Regional Committee of Fisheries of the Gulf of Guinea
DAQ	Direction of Aquaculture
DGPA	Direction General of Fisheries and Aquaculture
DPA	Direction of Artisanal Fishery
DRCS	Direction of Regulations, Controle and Surveillance
DSCRIP	Growth and Poverty Reduction Strategy Paper
EU	European Union
FAO	Foods and Agriculture Organization
F CFA	CFA Francs
FRP	Fiberglass Reinforced Plastic
GDP / PIB	Gross Domestic Products
IGAD	Gabonese Institute for Development of Support
IQF	Individual Quick Freezing
IRAF	Agronomy and Forestry Research Institute
JICA	Japan International Cooperation Agency
NGO / ONG	Non-governmental organization
NORAD	The Norwegean Agency for Development Cooperation
OFCF	Overseas Fisheries Cooperation Foundation
OJT	On-the-job training
ORSTOM	Overseas Scientific Research and Technology Office
PASA	Food Security Support Project
PDDI	Tha Master Plan of Integrated Development of Small-Scale Fishery and Aquaculture
PSFE	Forest and Environment Sector Programme
PSPA	Fisheries and Aquaculture Sector Support Project
SQIS	Quality and Sanitary Inspection Section
WCS	Wildlife Conservation Society
WWF	World Wildlife Foundation
ZEE	Exclusive Economic Zone

CURRENCY

(As of December 2008)

1 F CFA = 0.191 Yen

655.957 CFA Francs (fixed rate) = 1 Euro = 125 Yen

OUTLINE OF THE STUDY

Outline of the Study

Context of the Present Development Study

The Gabonese Republic (hereinafter designated “Gabon”) has a population of 1,548,000 inhabitants (2003 census), and its territory is 267,667 km² – corresponding to $\frac{3}{4}$ of Japan. It is rich in natural resources such as petroleum, manganese, uranium and wood, and the Gross National Income (GNI) per inhabitant is \$4,080 USD (2004), high compared to the neighboring countries, placing Gabon among the middle-income bracket. Moreover, the petroleum production has been decreasing after having attained its top levels in 1997, and in 2003, the percentage of the petroleum sector in the revenue was lower than that of the non petroleum sectors. In 1986, the country was considering the “release from its dependence upon petroleum through the diversification of industry” as the pillar of economic policy, the concrete promotion of this policy was declared in the Strategic Document for Growth and Poverty Reduction (SDGPR). In particular, since Gabon has both ocean and inland fishing grounds that are rich, is considered to be a high capacity development area, at the same level as tourism.

Fishery represents only 1.5% of the GDP, with an active population of only 21,700 people, but the per capita fish consumption is from 25 to 30 kg per annum, which is quite high compared to the neighboring countries, and fishery products are an essential nutritional source corresponding to 40% of the animal protein consumed by the inhabitants. Domestic demand for fish products is estimated at 70,000 tons per year, but the annual catch has remained at around 40,000 to 50,000 tons, the rest of the need is imported. The supply of a stable volume is required in order to avoid the outward drain of currency.

The inland fishers (including the fish farmers) do fishing combined with agriculture for domestic consumption. However, since the 1980s, jobs in the cities have increased because of the export industries, and with the rapid rural exodus of the population, the difference of salary between the rural and urban zones is growing. In this context, the correction of the disequilibrium through regional development by using natural resources is required. Moreover, in the coastal zones, foreigners coming from the neighbouring countries have formed communities, and they are the ones in general who take care of the fishing production. The problem to be resolved for the fisheries administration, is not to reject these foreign fishermen, but rather to work actively so that they can coexist with the Gabonese fishermen.

Considering this context, the Gabonese Government has requested to the Government of Japan to elaborate a Master Plan for sustainable development of fishing products. In response to that request, the Japan International Cooperation Agency (hereinafter called the “JICA”) carried out a preliminary study in October, 2006, and after an agreement on the minutes of the discussions held (M / M), carried out a preparatory study in January, 2007, and the Work Setting (S / W) compiling the contents of this development study was signed by the two parties and exchanged. This is how the study began for the Master Plan of integrated development of small-scale fishing and inland aquaculture.

This study was realised by Overseas Agro-Fisheries Consultants Co., Ltd. designated by the JICA, in collaboration with the Direction General of Fisheries and Aquaculture (hereinafter designated the “DGPA”) of the Ministry of the Forest Economy, Waters, Fishery and Aquaculture, the executing agency of the Gabonese side.

- **Overall Objective of the Management Plan**

This Master Plan, in correlation with the Strategic Document for Growth and Poverty Reduction (DSCR) and the Sectional Programme for Forests, Fishery and the Environment (PSFE), has three development objectives: (1) the increase in the small-scale fishers and fish farmers’ incomes, (2) stable supply of fishery products inside the country and to the neighbouring countries, and (3) sustainable management of the fishing activities and fishery resources.

- **Time Period of the Master Plan**

This Master Plan is a medium-term plan that should cover twelve years beginning in the year 2009 (target year is 2020).

- **Target Zone of the Master Plan**

The target zone of the Plan includes the coastal fishery zones, the inland fishery zones (including the lagoons) and the inland aquaculture zones in all nine provinces of Gabon.

- **Structure of the Master Plan**

This Master Plan is organized along five development axes and two transversal axes.

Development Axes :

- i) Development Plan of rural communities in the inland fishery zone;
- ii) Development Plan of rural communities in the small-scale coastal fishery zone;
- iii) Participative Management Plan of the fishery resources;
- iv) Development Plan of inland aquaculture;
- v) Plan for the Improvement of processing and distribution systems of fishery products.

Transversal Axes

- vi) Training of human resources of the concerned organizations;
- vii) Legal structuring and reform of the system.

- **Study Method**

The Study is composed of the following two phases:

Phase 1 April to November, 2007: (Analysis of the present situation and the preparation of the outline of the Master Plan);

Phase 2 December, 2007 to June, 2009: (Verification of the Master Plan by pilot projects);

Seven experts (excluding the interpreter, assistants) have participated in this study.

In Phase 1 of the study, the identification of the problems by sector and by region, the technical, socioeconomic and organizational aspects were carried out based on reconnaissance assignments at the main fishery and aquaculture sites, exchanges of views with the people concerned, as well as workshops "Project Cycle Management (PCM)". Moreover, the socioeconomic study in the eighty main fishing villages of the country (around 480 families) was conducted by World Promus Gabon (local NGO), and the basic data indicating the socioeconomic situation of the concerned fishers-farmers were recorded. The outline of the Master Plan was prepared based on these results.

In Phase 2, eight pilot projects were envisaged to verify the effectiveness (relevance, method of execution and contents, system of execution) of the contents of the Master Plan, and realised in six months, from May to November, 2008. During the period of execution, the follow-up and evaluation took place periodically. The final Master Plan was established on the basis of these results and its relevancy was carefully studied.

Composition of the Report

This Report is made up of five chapters: i) Present Situation, ii) Development Concept, iii) Contents, Results and Evaluation of the Pilot Projects, iv) Development Strategies and Programs and v) Recommendations.

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CHAPTER 1

**ANALYSIS OF
PRESENT SITUATION**

Chapter 1 Present Situation

1.1 Positioning of the Fishery Sector

Gabon is located on the west coast, in Central Africa, in the deepest part of the Gulf of Guinea, and shares a border with Equatorial Guinea, Cameroon and Congo. The country has a population of 1,548,000 inhabitants (2003 census), and has a surface area of 267,667 km² – corresponding to $\frac{3}{4}$ of the size of Japan, and is 80% covered by tropical forest climate. Gabon is rich in natural resources such as petroleum, manganese, uranium and wood. The petroleum industry, in particular, corresponds to around 45% of the GDP, approximately 80% of the exports and about 60% of annual revenue for the State. The Gross National Income (GNI) per capita is \$4,080 USD (World Bank, 2004), high compared to its neighbours, putting Gabon in the middle income bracket. However, around 33%¹ of the population live below the poverty level, and in 2004, the Human Development Indicator of the country put it at the rank of 122 out of 177 countries being classified.

Moreover, petroleum production has been in decline after having attained its top production levels in 1997, and in 2003, the percentage of the petroleum sector in the national revenue was below that of the non-petroleum sectors. In 1986, the country was considering “the release from the dependence upon petroleum, through the diversification of industry” as the pillar of the economic policy, the concrete promotion of this policy was declared in the Growth and Poverty Reduction Strategic Paper (GPRSP) (2005). Especially fishery, since Gabon has both ocean and inland fishing grounds that are rich, is considered to be a high capacity development area, at the same level as tourism.

Fishery represents only 1.5% of GDP, with an active population of only 21,700 people (including around 3,000 small-scale coastal fishers and around 5,000 inland fishers), but the consumption of fish per person is from 25 to 30 kg per year, which is quite high compared to the neighbouring countries, and fishery products are an essential nutritional source corresponding to 40% of the animal protein consumed by the inhabitants. Moreover, although fishery resources are abundant, since their development has been delayed, the country depends on imports to meet their needs. Considering this situation, it is indispensable, first of all, to promote the replacement of imported fishery products, to develop sustainable fishery in Gabon in terms of assuring food security for the Gabonese, and also for the inhabitants of the neighbouring countries, so that Gabon should become a supply base for fishery products in Central Africa in the future.

Table 1.1 Important Fishery Indicators in Gabon (2005 / 2006)

Year	2005		2006	
Fishery Production	43,941 t	Small-scale marine fishery: 22,543 t, industrial fishery: 11,620 t, Inland fishery: 9,700 t, aquaculture: 78 t	42,032 t	Marine fishery: 32,868 t, Inlandfishery:8,653, Aquaculture: 511
Imports	6,902 t	Canned sardines: 3,391 t, frozen fish (corb, mackerel, jack): 3,011 t	10,699 t	Canned sardines: 4,175 t, frozen fish: 6,007 t, etc.
Exports	2,585 t	Frozen shrimp: 1,932 t, frozen fish : 161 t, frozen crab: 112 t, frozen cephalopods: 87 t, etc.	4,400 t	Frozen shrimp: 1,416 t, frozen fish : 2,852 t, frozen crab: 111 t, frozen lobster: 4 t, etc.
	4,285 t	Smoked Ethmalosa	4,285 t	Smoked Ethmalosa
Domestic Fish Consumption	43,973 t	Per capita fish consumption: 27.6 kg / year	44,046 t	Per capita fish consumption: 27.0 kg / year

Source: Fishery Statistics of the DGPA, FAO-FISHSTAT (*1: estimated value by the members of the mission)

¹ Gabonese enquiry for the evaluation and follow-up of poverty, 2005

In rural communities of Gabon inhabitants generally have enough food and use cash revenue from fishery activities for payment of educational expenses or transportation costs. As for employment possibilities, there are almost no opportunities except agriculture and fishery in most rural communities. In a few regions where labour is needed for the production of mineral resources (petroleum, iron ore, manganese) or else for timber activities, there exist some specific job offers, although these are limited. Within the context of the accelerated flight of young people to the large cities in Gabon, it is important to develop fishery in each region in order to increase cash revenue. Moreover, whereas agricultural development requires enormous investments and time since the villages are surrounded by forests, inhabitants can rather easily begin fishing, thus making it possible to begin receiving daily cash receipts. Fishery therefore brings hope for an increase in employment.

1.2 Overview by Province

1.2.1 Province of the Ogooué Maritime

Port-Gentil, the capital of the province, is the second largest city in the country, and the base of central coastal development zone. The coastal zone of this province includes 2 lagoons: Nkomi, Iguéla and Ndogo, in addition to the mouth of the Ogooué River. For this reason, road access to this zone from Libreville is limited to the dry season, and travelling there is usually done by plane (around 30 minutes) or ferry boat (around – hours).

Since the Iguéla lagoon is located in a national park, fishing there is forbidden, except for self-sufficiency fishing (including therein recreational fishing). Community fishery centres have been set up in Port-Gentil and Omboué, and the DGPA Fishery Brigades have been set up at Omboué (Nkomi lagoon) and Gamba (Ndogo lagoon). Fishing villages can be found here and there around those three bases, as well as fishing camps used seasonally. Gabonese fishers do only a little fishing in the lagoons, whereas foreign fishers go fishing along the coast around Port-Gentil.

Since the main local industry is petroleum, young workers are attracted to the petroleum sector because of the income that is higher than in fishing; this tendency is quite strong, especially in the Gabonese villages practicing lagoon fishing. In the lagoon zone, fishing is a source of revenue, although the revenue depends upon the frequency of the expeditions of the wholesale fishmongers called the Subscribers, and agriculture and animal raising are done only for family consumption. The major part of the fishery products is sent to Port-Gentil, the capital of the province, and another part of the fresh fish is sent to Libreville.

1.2.2 Province of the Moyen-Ogooué

This province is located in the middle section of the Ogooué River, and you need around 4 hours by road from Libreville, the national capital, to go to Lambaréné – the capital of the Moyen-Ogooué. Located half way between Libreville and the provinces of the interior, this province is also a distribution base. The connection with Port-Gentil is by the Ogooué River, taking around 6 hours by speedboat and around 18 hours by ferryboat.

The surroundings of Lambaréné are abundant in water resources, such as lakes and marshes of all sizes and river streams, etc., this is the most active zone for inland fishery. A community centre was built with the Japanese cooperation, and around 70% (more than 80% if we exclude family consumption) of the catch unloaded in the fishing villages spread out around the lakes and rivers of the area, are taken to the Centre. The fish taken to the Centre are sold in the city or sent to Libreville as fresh fish kept on ice. Processing, such as drying or smoking, is also done, and the products are then transported as far as Franceville, and elsewhere around the interior of the country.

The fishing villages are spread out around the lakes and marshes and rivers, and are only accessible by water routes. Animal husbandry hardly exists in the villages, and secondary productive activities outside fishing only include the hunting of wild animals, agriculture and logging for self-sufficiency. Since those sending the catch come only if a big quantity has been gathered in the fishing villages that are far from Lambaréné,

the source of liquid cash is limited. The creation of replacement cash revenue, especially during the rainy season where the water levels are high, is an important issue since the volume of the catch is reduced.

1.2.3 Province of Ogooué-Lolo

The capital of this province – Koulamoutou, is located by land, around 12 hours by car or 10 hours by train, and by plane, around one hour (3 flights per week) from Libreville. Logging is the main industry of the province, and the rain forests cover all areas not occupied by the cities or the villages.

River fishery in the secondary streams of the Ogooué is also done on a small scale, mostly as a secondary activity (half is for domestic consumption). They go fishing taking into consideration the day when the fishmongers are to pass by (once or twice a week). Since getting ice is impossible, the fishmongers prefer to buy the fish smoked rather than fresh fish. Professional fishers, very few in numbers, spend the greater part of the week in camps, and they smoke all their catch and then sell the smoked fish directly to hotels and restaurants of Koulamoutou at the end of the week. For this reason, even though Koulamoutou is in the interior of the land, there is practically no fresh water fish on the market of Koulamoutou, but they do sell lots of smoked sardines at a cheap price. The fishers have not set up fishery associations, but rather make up groups of individuals who fish together.

As for aquaculture, there is a DGPA aquaculture station at Koulamoutou built in 1976 with the cooperation of the American Peace Corps, however, it is made up of shallow water ponds which do not allow for water drainage of the old stagnant water. A total refurbishing of these ponds is necessary in order to get it operating again. There is also a total of five private fish farms around Koulamoutou and Lastoursville. These are almost all projects that were based on investment proposals that promised lots of profits in fish farming, however, production levels have not fulfilled those promises. At a fish farm outside Lastoursville, managed by a big timber company and set up in order to feed its personnel, there is an integrated approach of fish farming together with the raising of ducks.

1.2.4 Province of Haut-Ogooué

The road trip starting from Libreville and going to Franceville, the capital of the province, takes around 15 hours by car, about 12 hours by train, and by plane, around one and a half hours (daily flights). The main activities of the province are sugar production and manganese mining.

SODEPAL (the Manganese Mining Company) is located at Bakoumba in this province, and as secondary activities, there are protected natural areas, and the largest fish farm in the country. Almost all the tilapias produced here are used as food for the personnel, and another portion is sold on the market to hotels and restaurants, etc. In Franceville, a private company – FAEN, breeds tilapias together with the raising of pigs and ducks, within a context of integrated fish farming together with animal raising. In addition, a modern set up aiming at intensive fish rearing of tilapias based on Israeli techniques, unfortunately, not functioning now because of financial problems, is located at Souba near the border with the Republic of Congo. As mentioned above, the aquaculture centres of this province, supported by the private companies, are big in size, although there is not yet fish farming as a secondary source of revenue for small scale farmers.

Small-scale river fishery is also practiced in the upper areas of the Ogooué River, however, the fishing camps are far from Franceville, fishing equipment and supplies are quite unsophisticated and the volume of the catch is limited. For these reasons, the fishmongers do not show up to pick up the products, and the fishers themselves smoke their fish and sell it.

The demand for fish is nevertheless quite strong in Franceville, although you see almost no fresh water fish at the city markets. The majority of the fishery products sold there are frozen ocean fish, salted or dried fish and smoked sardines that have come from Libreville by train.

1.2.5 Province of Ngounie

The capital – Mouila, is located around 8 hours by car, and around one hour by plane (3 flights per week) from Libreville. This province has no resources, such as lumber or petroleum, and its voluminous flat surface areas could allow for a profitable agricultural development, including animal husbandry. Since at present there is no developed activity, the development of infrastructure has been retarded in the other provinces.

There are a great number of abandoned fishponds. Because of financial difficulty, they have been abandoned after 2 or 3 years of operations. The development and extension of appropriate techniques adapted by the governmental aquaculture stations have probably been insufficient. In this province, there are three DGPA aquaculture stations established in 1955 (Lébamba, Mimongo and Mbigou), the activities to extend fish farming of the American Peace Corps were applied. However, the assistance of the American Peace Corps ended in 1993, and there was practically no extension or structuring of fish farming for the neighbouring areas because of the operational livelihood of the stations that was insufficient, in addition to the lack of means of transportation, such as scooters, to go from one area to another. When in the area, the important questions are the refurbishing and reinforcing of the operations of these aquaculture stations, and the reactivation of the fish breeding ponds that have been abandoned.

Moreover, there are five inland fishery development bases (Sindara, Fougamou, Idoumi, St. Martin and Ndendé) all small scale in size, where various secondary activities such as agriculture, animal raising and hunting are also done. For this reason dried and smoked ocean fish products are sold in the city markets, wherein we rarely see fresh fish and freshwater fish. The issue from now on is to increase the cash revenue coming from fishing, at the same time as the people continue their other secondary activities.

1.2.6 Province of Nyanga

The capital – Tchibanga, is located around 12 hours by car, or one hour and a half by plane (3 flights per week) from Libreville. Logging is the main activity of this province.

The DGPA aquaculture station of Tchibanga benefits from the best conditions among the aquaculture stations in the country (good water source and good quality water, possibility of fresh water inflow and gravitational drainage), and the ponds themselves are also well managed. The situation of the inland fishers (half farmers – half fishers) and the fish farmers around Tchibanga is practically the same as in the province of Ngounie.

Moreover, in Mayumba along the Atlantic Ocean, the population of fishers is divided into Gabonese fishers, practicing mainly lagoon fishery in the Banio Lagoon, and foreign fishers (Beninese) practicing marine fishery.

The fishery in the lagoon are often half farmers – half fishers, and outside the camp (N'koka) where professional fishers get together, these are fishers who integrate agriculture and animal raising (hunting is almost inexistent in this area). Villages having from 50 to 100 inhabitants, are found here and there in the lagoon, and the catch is sold to fishmongers using transporting boats shared by the city of Ndindi, which makes the round-trip twice a week to expedite the catch. Since there is no ice and the means of conservation of the fish is limited, the majority of the fish is smoked or salted and dried. The price of fish is also quite low since customers and the means for expediting the fish is limited.

The Beninese prefer large scale marine fishery in Mayumba, and a lot is expected of them for the future development of the abundant fishery resources off the coast of Mayumba. The biggest problem there is that the resources, such as lobster, oysters, demersal fish, small pelagic are numerous, but the market where they could be sold (Libreville) is far away. Whether or not there will be a development of these abundant fishery resources shall depend upon the possibility to expedite and sell the catch to Libreville and the neighbouring country of Congo.

1.2.7 Province of Ogooué Ivindo

The capital of the province – Makokou, is located around 10 hours by road (vehicle) from Libreville, and around one hour by plane (2 flights per week) from Libreville. The province is rich in iron ore, and the Chinese company which has obtained the extraction rights, began production in 2007. Forestry development (by a Malaysian company) has also been prosperous.

The office of the WWF and the Provincial Inspection Office for Water and Forestry, have established and carried out a National Park Management Plan for the North-East of Gabon. The DACEFI Project, an environmental protection project financed by the European Union, has created and is proposing replacement revenue sources to the inhabitants (village forests, animal raising, aquaculture) in order to prevent the illegal cutting down of trees in the forest of the national park. In the local villages also, fishers accumulate agriculture and hunting: they do fishing in mobile camps during the dry season, and their financial dependence on fishery is stronger than the fishers of the Southern provinces. Moreover, the fishers are conscious of the tendency to decrease the catch because of the overexploitation and the increase in the number of fishers (competition with the Cameroonian and Congolese fishers). It is important to create sources of replacement revenue outside fishing (animal raising, fish farming, etc), however, doing so presents many problems because of the absence of specialized technicians from WWF and the European Union. Aquaculture is not at all being done at present.

1.2.8 Province of Woleu-Ntem

This is the province in the North of Gabon, bordering upon Cameroon. The capital – Oyem, is tied to Libreville by a paved road, and the distance can be covered in around 8 hours (45 minutes by plane (2 flights per week)). Agriculture and hunting are also done in the villages where inland fishery is done, but many fishers are professionals (villages where their livelihood depends upon fishing). The distribution of agricultural and fishery products is not a serious problem there; it is useless to go to Libreville to buy fishing equipment and supplies, since they can be purchased locally. Moreover, there are characteristic problems: navigation on the river up to the fish breeding areas is impossible during the dry season because of the low water level, mosquitoes are numerous in the camps (lack of medicine). The willingness of the fishers to organise in groups is much stronger than in the other provinces, and a fishery association was set up in a village (Bigouta), which was quite rare for inland fishery in Gabon. Plantations (corn, peanuts, pineapple, cocoa, etc.) are relatively numerous, and the countryside of the agricultural villages is clearly different from that of the other provinces. The inhabitants of this province are from the Fang ethnic group and they are typically involved in farming. This same ethnic group is quite numerous in Cameroon, and there are many cultural and historical differences with the Bantus (hunting ethnic group) from the other provinces.

Fish farming is also quite prosperous compared to the other provinces. There are around 200 private fish farms throughout the province, the majority of which are operational. Fish breeding methodology is extensive, and there are lots of ingenious elements in terms of installations and food based on local ingredients. Moreover, many are hoping for a technical framework from the government (structure of ponds, food, water management), however, whereas there are 4 aquaculture stations in the province, the majority of those operating them, have never had any training and began fish breeding only by observing and imitating.

1.2.9 Province of the Estuary

This is the province you have the city of Libreville, the capital city, and which has six main landing port areas: Owendo, Numba Bridge, Aviation, Cocobeach, Milembié and Kango. Since they are all close to Libreville, a big consumer city, there is no problem distributing primary fishery products and agricultural production of products that must be sold fresh, such as vegetables, is also prosperous (about 40% of the national demand of lettuce is met through the production of this province).

A fishing community support project in Milembié (Gabonese fishing village) was carried out by the FAO / PMEDP in 2002, and a port platform, depots for fishing equipment and supplies, a meeting room and smoking equipment were set up. In addition, a pirogue, an outboard motorboat and fishing equipment for training fishers were also supplied through the Canadian cooperation. However, conflicts within the village concerning the use of the equipment brought about a division into two camps. We can conclude that this was

the result of the lack of attention paid to the social aspect of project development. Fishery associations and women's groups (for transforming the fish, etc.) have been established in the majority of the villages along the coast of this province. These are simple associations wherein the members gather periodically to discuss issues, where the money of the association is distributed for ceremonies, for sick members, for accidents, etc. The background of their development should be taken into consideration for the promotion of the organising of inland fishery associations in the future.

Kango, situated at the end of the bay of Libreville, is famous for its production of fresh water Missala shrimp. The shrimp are captured, transformed and sold by the women, but there will have to be an effort made towards the management of the resource, since more recent catch has tended to decrease.

In Libreville, the aquaculture station of the 'Peyrie' takes care of the development of aquaculture techniques for the entire country and the extension to all the other stations. A technical cooperation of Overseas Fishery Cooperation Foundation (OFCF) has been operational since 2006 for this station. Some twenty private fish farms exist around Libreville, and a commercial production has taken advantage of the proximity of the markets.

Table 1.2 hereinafter gives a summary view of the basic data, and the fishery data from each province.

Table 1.2 Basic data and fishery data by provinces

A. Basic Data

Data Base	Estuary	Ogooué Maritime	Nyanga	Moyen-Ogooué	Ngounié	Haut-Ogooué	Ogooué-Lolo	Ogooué-Ivindo	Woleu-Ntem
1. General data									
Surface area (km²)	20,740	42,322	37,503	34,193	79,010	36,547	36,792	36,126	78,124
Population	463,187	97,123	39,430	42,316	77,781	104,301	43,915	48,862	97,271
Pop.Density/km²	22.3	2.3	1.1	1.2	1.0	2.9	1.2	1.4	1.2
Main Industry	Logging, commerce agriculture	petroleum	Logging	Logging	Drinks	Sugar, iron ore	Logging	Logging, agriculture	
2. Coastal fishery									
Production t/year	12,797	5,410	4,337						
Main species	Sardines, bar, big captain	Demersal and, migratory fish	Bar, sardine, sole, catfish, shark, lobster, crab						
Main fishing methods	Net, longline, traps	Net, line fishing, casting net							
High season	All year	All year (especially June-Dec)	All year						
No. of fishers	1,922 (foreigners:86%) (Women: 691)	387 (foreigners: 90%) (Women: 61)	194 (foreigners: 94%) (Women: 0)						
No. of pirogues	481 with motors 123 without motors	103 with motors 21 without motors	25 with motors 7 without motors						
Fishing areas (number of fishing villages)	Aviation (9), Cocobeach (14), PontNomba (12)	Cap-Lopez, Lip I, II, III, Matanda, Irekikongo (11)	Tchiolé - Ndembé, Louando, Bana Aviation, Bana Centre (4)						
3. Inland fishery									
Production t/year	1292 (lakes & marshes, rivers & streams)	135 lagoons	144 lagoons	5,783	246	460	299	1,044	433
Main species	Mulet, shrimp, big captain	Tilapia, arias gambensis, big captain, mulet,	Tilapia, arius gambensis, mulet, jackfish, sardines	tilapia	Arius gambensis, yara, barbus, catfish, tilapia, eels	nothing	Yara, arius gambensis, catfish, big captain	Tilapia, arius gambensis, catfish, yara, barbus	Catfish, arius gambensis, mulet
Main fishing methods	Net, longline, casting net	Net, bottom fishing		Net, bottom fishing	Trammel net, bottom fishing, casting net	Net, line fishing	Casting net, line fishing	Gill net, casting net, bottom fishing	
High season	All year	All year	All year	All year	Oct-April trammel net	All year	March-May(net) June-Sept(line)	July-Sept	All year
No. of fishers	279 (Women: 85)	683 (Women: 156)	202 (Women: 21)	1,497 (Women: 379)	385 (Women: 42)	295 (Women: 22)	126 (Women: 1)	520 (Women: 50)	402 (Women: 31)
No. of pirogues	46 with motors 37 without motors	203 with motors 139 without motors	21 with motors 82 without motors	195 with motors 386 without motors	23 with motors 132 without motors	2 with motors 151 without motors	0 with motors 81 without motors	11 with motors 358 without motors	1 with motors 296 without motors
Fishing areas (Number of fishing villages)	Kango (24), Ntoun (5)	Omboué (41), Gamba (11), Iguéla (1), Lac Alombiet (1), Lac Onéngué (7), Lac Avanga (1), Lac Iwandet (4), Mpage (9)	Basse Banio (4), Haut Banio(11), Tchibanga (5)	Lambaréné (10), Ogooué-Aval (12), Laes nord et Sud (57), Azingo (4), Ebél-Abanga (14)	Mouila (5), Fougamou (4), Mandhi (8), Lébamba (9), Ndéndé (5)	Franceville(6), Moanda (5), Okondja(4)	Koulamoutou (12), Lastourville (4)	Makokou (11), M'vady (10), Booué (12), Mekambo (4)	Woné (5), Bikondom (1), Fauné-2(2), Toulon(3), Zomoko(3), Selle-ville(8), Otouma(3), Ngomané (7), Mévéme(7), Nkolmelen Assa (6)
4. Aquaculture									
Production t/year	2.8		0.3	ND		122.0	ND	1.5	ND
Main species	Tilapia		Tilapia	Tilapia	Tilapia, catfish, jewelfish	Tilapia	Tilapia	Tilapia	Tilapia, catfish
Breeding techniques	pond		Pond	Pond in a cage	Pond	Pond	Pond	Pond, dam in lake	Pond
Location of fish farms	Libreville, Cap Esterias, Owendo, Donguila	-	Tchibanga	Lambaréné, Lac Onangué	Lébamba, Mbigou, Mimongo, Mouila	Lekoko (Bakoumba), Franceville (FAEN)	Pana, Koulamoutou	Makokou, Ovan, Booué	Oyem, Bitam, Minvoul, Mitzic
No.of prod.units	19	-	ND	2	4	1 (SOEPAL)	2	6	200
5. Agriculture									
Main products	Cassava, bananas, eggplant, tomatoes	Cassava, bananas, taro	Cassava, bananas, lettuce	Cassava, bananas, vegetables	Vegetables, roots, bananas, tubers, peanuts, corn, eggplant, fruit	Cassava, bananas, pineapple	Cafe(7 tons) cocoa (25 tons) cassava (240 t) bananas (120 t) taro (96 t) potatoes (90 t)	Cassava, peanuts	Cassava, bananas, peanuts, cocoa

Production t/year	ND	ND	3.5	ND	ND	115	ND	ND
No.of prod.units	137 (GAT Project)							
Agr.surface area(ha.)	ND	ND	(3 no irrigation)	ND	ND	ND	15 (no irrigation)	

Source: Provincial Inspection Office for Fisheries and Aquaculture

B. Development Potential

Data Base	Estuary	Ogooué Maritime	Nyanga	Moyen-Ogooué	Ngounié	Haut-Ogooué	Ogooué-Lolo	Ogooué-Ivindo	Woleu-Ntem
1. Water surface area (km2)									
Coastal Zone (3 miles)		1,920	5,556						
Lagoons		1,604	90					2 000 – 2 200	
Lakes & marshes								755	
Rivers & streams								2,177	
Flood Zone									
2. Human Resources	Possible hiring of young people, aquaculture technicians	Sufficient labour, but attracted to the petroleum production	Not enough inquirers (2 for the coast & 1 for the lagoons)	Not enough workers but many with a high level	-	The workers are getting old (40-70 years old)	-	Not enough technical capacity & too few	Village people
3. Demand for Products	High (30kg/ inhabitant / year)	High demand, especially in urban centres	Demand is dropping with bad weather at sea	Very high (Lambaréné is the N-S distribution centre of Gabon)	Although no waters, strong dependence on fishery products	High demand compared to low productivity	-	Family consumption & consumer markets in the regional centres	Very high
4. Others	More than half the Gabonese population lives here	-	-	-	-	-	-	Training of fishmongers in sales techniques of necessary fish	

C. Obstacles to Development

Data Base	Estuary	Ogooué Maritime	Nyanga	Moyen-Ogooué	Ngounié	Haut-Ogooué	Ogooué-Lolo	Ogooué-Ivindo	Woleu-Ntem
Product distribution	Processing / distribution process ill adapted	Good improvement in expedition means and necessary conservation	No cold chain including refrigerated warehouse & ice	The majority of fishery products are sold outside the province, but with no means of conservation	Isolation of production zones and consumer zones. Absence of means of conservation. Absence of governmental assistance	Difficult distribution because of absence of communication network and bad access	-	A refrigerated warehouse should be built at Makokou to allow for food self-sufficiency	Bad roads
Labour	Bad quality : capacity building is necessary	Low quality of fishery activities of Gabonese fishers	Necessity to apply responsible strict fishery code	--	-	Labour limited since young people are not interested in agriculture	-	Lack of personnel in inspection office	Village people
Techniques	Use of monofilament & surveillance mechanism /evaluation of night activities are necessary	Dependence on traditional techniques	Necessary increase in inquirers to cover the entire province	Labour is useable in the conditions defined by the State	Gill net & bottom long line only	Ancient techniques such as (manual) because of lack of funding	-	No commercial development of aquaculture for self-sufficiency	traditional
Organization	Absence of organization, association communication inadequate	Existence of an association but many problems	There is an association but it does not function	There are groups at each lake but no association	No organization for fishery activities	There are several organizations & associations but training is necessary	-	The State must develop aquaculture & necessary measures must be taken	Lack of means & equipment
Others	Lack of information on Fishery Code. Sensitization seminars are necessary	No training on modern fishing techniques	Inadequate fishing equipment & infrastructure	-	-	-	-	Stations (production, distribution of young fish) are necessary for aquaculture development	-

1.3 Overview by Sector

1.3.1 Fishery Resources

Studies on the fishery resources in the Gabonese ocean waters were carried out in the 1980s by FAO / NORAD, IRD (ex-ORSTOM), etc. Thanks to the cooperation of the FAO / NORAD, an overview of the situation of the resources in the Gabonese waters is present here below, according to the report of the study carried out by the research ship (N/R) Dr. Frito Nansen in 1985.

(1) Marine Environment

The Gabonese waters have undergone the influence of the easterlies from the South-east which come from the high pressure zone of the South Atlantic Ocean, as well as that of the high pressure from the North of the African continent. The currents include the one that moves from the coastal region North of the Gulf of Guinea towards the North coast of Gabon, and from the South, the cold current (Angola current) which comes from the waters of Angola and Congo. These two currents extend into the South Equatorial current.

All year, the currents coming from the North coastal region of the Gulf of Guinea, bring warm waters having a low salt content to the Gabonese coastal zone to the North of Cape Lopez, but because of the intensity of the easterlies from the Southeast (movement South-North of the wind zone), there are two seasons: summer (December to March) and winter (June to September) of the Southern hemisphere.

In summer, the temperature of the surface water is high, from 28° to 30° degrees, and a significant thermo cline develops at a depth that includes from 20 to 30 meters. During this period, because of the maximum precipitation, the voluminous brackish currents, mixing salt water and fresh water, are present from the Congo River and the mouth of the rivers of the Gulf of Guinea, and the salt content of the surface levels drops. The water which is only slightly salty coming from the mouth of the Congo, also follows the continent up to Cape Lopez.

In winter, the easterlies from the Southeast become remarkable and intensify. This reinforces the currents coming from the South (Angola current), the temperature of the water drops. The waters to the South of Cape Lopez present temperatures that are lower than to the North, and we can observe the forming of up welling. In winter, the thermo cline becomes significantly shallower and weaker.

(2) Resources by Fish Species

1) Small Pelagic Species

Under the influence of the marine environment described here above, the small pelagic species of the maritime zone of the Gabonese coastal continental plateau include warm water species and cold current species. In addition to the study of N/R Dr. Fridtjof Nansen, various studies on the resources carried out in the 1980s also reported that rich resources in small pelagic species are found in the waters to the south of Cape Lopez in August and September. This involves groups that have a seasonal movement towards the North from the Angolan and Congolese waters, and which are mainly sardines (*Sardinella aurita*) and jackfish. Many are young or immature, and the eggs and newly hatched fish still attached to the yolk mass, are transported along the continental plateau from the South around May-June. Moreover, because of the change in the direction of the currents, the schools of young fish migrate towards the South until the end of the year.

Table 1.3 Estimation of the Biomass of the Small Pelagic Species according to the Study carried out by N/R Dr. Fridtjof Nansen in 1985

Period of study	North of Cape Lopez		South of Cape Lopez	Total (tons)
	Small pelagic	Grey triggerfish	Small pelagic	
Mar.2 -15		52,000	24,000	76,000
May 30 - June 15		15,000	30,000	45,000
Sept.14 - 27	10,000		160,000	170,000
Dec.7 - 18	5,000		54,000	57,000

The majority of small warm water pelagic are observed in deep waters. We find among them the alosa or shad fish, the Atlantic bumper fish (*Chloroscombrus chrysurus*), etc.

The most important species for Gabon, the ethmalosa (*Ethmalosa fimbriata*), is not mentioned in the study of N/R Dr. Fridtjof Nansen.

2) Demersal Species

The demersal species are analogous to those of the Gulf of Guinea. The South of Cape Lopez is more abundant, in this respect, than the North. We think this is due to the seasonal arrival of cold currents rich in nutrient salts. In terms of the main species, we find the otolith (*Pseudotolithus senegalensis*, P. Typus), captain (*Galeoides decadatylos*) and others, that live near the shore, the dentulous fish with teeth (*Dentex angolensis*, D. Congoensis), perch (*Ariomma bondi*) and others, that live in general in the deepest waters below the thermo cline, as well as the grunters or snappers (*Brachydeuterus auritus*) and the ballista (*Balistes capriscus*) which sometimes move from the ocean depths and appear above and below the thermo cline. The demersal species do not undergo any significant pressure from fishery activities. In the study of N/R Dr. Fridtjof Nansen of 1985, the estimation of the biomass of the demersal species carried out by radar and sonar scanning was as follows:

Table 1.4 Estimation of the Biomass of the Demersal Species by Zone according to the study of N/R Dr. Fridtjof Nansen of 1985

	North of Cape Lopez	South of Cape Lopez	Total (tons)
Total Zone	16,000	120,000	136,000
(By Depth)			
0 – 50 m	6,000	41,000	47,000
50 – 100 m	3,000	56,000	59,000
100 – 200 m	4,000	20,000	24,000

Since the waters under 18 meters in depth, which was the limit of the study of N/R Dr. Fridtjof Nansen, were not examined, the species having commercial significance in the shall coastal zone, such as otolith and captain, are practically not included in the biomass estimated in the table below. The biomass estimated in the study of N/R Dr. Fridtjof Nansen in 1985 is as follows:

Table 1.5 Biomass estimated by types of fish according to the Study by N/R Dr. Fridtjof Nansen of 1985

	North of Cape Lopez	South of Cape Lopez	Total (tons)
Small pelagic	10,000	30,000	40,000
Seasonal pelagic		160,000	170,000
Seasonal Balista	50,000		50,000
Demersal			
(Acoustic Study)			30,000
(Study by scanning)	20,000	120,000	140,000
Total after addition of seasonal species	80,000	280,000	360,000

The sustainable exploitable biomass is estimated as follows:

Table 1.6 Exploitable Biomass by Type of Fish according to the Study of N/R Dr. Fridtjof Nansen of 1985

	Biomass	Exploitable Biomass	Present volume captured in tons (2005)
Small pelagic in Gabonese waters	40,000	16,000	11,000
Small pelagic coming from the South in seasonal migration	130,000	50,000	2.372 (*1)
Demersal (outside shall waters)	140,000	20,000	740 (*2)
Balista (uncertain)	50,000	12,000	

(*1) = catch of sardine (*Sardinella aurita*)

(*2) = catch of bream fish and redfish

3) Possibilities of Exploitation

According to the results of the study mentioned above and the present fishery situation, we can consider the following in terms of orientations for future development of marine fishery.

i) Expansion of fisheries in the coastal zone:

Commercially important species for Gabon – otolith and captains, for example, are caught in the shallow coastal waters, but their fishing range is limited to only one portion of this area. The coastal zone to the South of the trawl fishing forbidden area to the South of Port-Gentil is practically unused by small scale fishery, and we shall try to develop these fishing zones toward the ocean coast to the South.

ii) Exploitation of demersal species far from the coast:

Demersal species having a high commercial value – the dentulous, redfish, grouper, etc., are present in the waters outside the shall zones, but they are presently not being caught by small scale fishery activities. We shall consider the exploitation and use of these species useful with long line fishing, vertical line fishing, etc. The demersal species in the shallow coastal waters seasonally lead to bad results. For the purpose of complimentary fishing and to extend fishery production into the future by avoiding the concentration of fishing pressure on these species in this area, we can promote the development of the fishing of the demersal species farther from the coast.

iii) Expansion of the use of small pelagic:

There are resources of small pelagic, mainly sardines (*Sardinella aurita*) in the ocean waters to the South of the country, but these are especially the young and resources in seasonal migration from southern waters. This does not involve resources that can sustain large-scale industrial fishery, but rather the possibility to exploit and use small-scale fishers. According to the statistics of the catch of the DGPA, 2,300 tons of sardines (*Sardinella aurita*) are caught at Mayumba, and if we foresee an increase in the demand of this species, we can then seek to increase the catch by improving and reinforcing fishing techniques associated with the improvement and development of processing activities, and distribution networks.

1.3.2 Resource Management

(1) Collection of data on fishery

For small-scale coastal fishery, inquirers (data collectors) have been sent to the main bases to collect data. For inland fishery, only the data for the province of Moyen-Ogooué were collected, since inquirers were not sent to the other provinces because of budgetary restrictions. Outside of the province of Moyen-Ogooué, the landing places are scattered and the quantity of fish caught for self-sufficiency is low. Given the restricted budget of the DGPA, the inquirers were not sent to the other provinces where fishery is not active. And even if they had been sent there, the lack of means of transportation, such as cars, scooters, boats, etc., would have made it difficult to visit the fishing villages and scattered landing places.

Table 1.7 Assignment of Fishery Data Collectors (in July, 2007)

Estuary Province			Ogooué Maritime Province			Nyanga	Moyen-Ogooué Province		Total
Owendo	Jeanne Ebori	Coco beach	Port-Gentil	Omboué	Gamba	Mayumba	Lambaréné	EbéI Abanga	
3	1	1	1	1	1	1	1	1	11

Source: DGPA Inquiry

The data collected are compiled every month and put into the prescribed form and sent to the DGPA through the Provincial Inspection Office for Fishery and Aquaculture. At the DGPA, these data are put into the ArtFish programme – an FAO software for fishery statistics, and published every year as a statistics document. The statistics for the provinces where inquirers were not assigned, have been estimated based on the number of pirogues, the number of fishers, etc. For that reason, the data specifically indicating the state of inland fishery in five different inland provinces are missing

because there were no inquirers sent there, and these statistical data cannot be used as such for the definition of the development plan.

(2) Surveillance of the 3-mile coastal zone

In 2004, the DGPA introduced a ship surveillance system (SSN) through the French satellite – ARGOS, and fishing boats are obligated by law, in application of the decree of February, 2005, to install a terminal in their boats. This has allowed for the setting up of a surveillance system of ships fishing illegally in the 3-mile ocean zone of country coastal waters. In July, 2007, some thirty (30) fishing boats had installed the terminal (about 45 to 50% of all fishing boats fishing in the Gabonese waters). For those fishing boats that are not yet equipped with the terminal, the DGPA has planned to purchase and set up terminals in its 2008 budget (a terminal costs around one million Cfa Francs, and the cost shall be recuperated by invoicing the fishing boats). The DGPA acquires data from ARGOS two or three times per day via Internet. For the fishing boats fishing within the 3-mile coastal waters, negotiations are carried out with the boat owner, and a fine is imposed (legally, the fine is from 2 to 50 million Cfa Francs).

The Support Programme for the Fishery and Aquaculture Sector (PSPA) is planning on setting up swift motorboats and radars with six fishery Brigades off the coasts (Cocobeach, Libreville, Port-Gentil, Iguéla, Sette Cama and Mayomani). Therefore, SSN and the radar image shall be compared, and the fish that are caught on unregistered fishing boats shall also be controlled. The use of swift motorboats shall be carried out through the cooperation of the police who can also make arrests.

(3) Fishery and Aquaculture Code

The first law on fishery in Gabon, “the Fishery and Aquaculture Code”, (Law N° 15/2005), was adopted on August 8th, 2005. Although the detailed regulations were defined in time by the ministerial decrees and decisions, what had been published before the adoption of this Code, does not comply with the real situation. For example, there is a decision indicating the limit for the mesh of the gill net that should be more than 45 mm, but the type of net and the zone concerned were not mentioned. Moreover, the monofilament net is forbidden, but since there was no fine established for the limit of the mesh, the prohibition is not properly applied.

1.3.3 Small-scale Fishery

(1) Marine Fishery

1) Present Situation

Coastal fishery is done around Libreville in the Estuaire province, around Port-Gentil in the Ogooué-Maritime province, and by Mayumba fishers in Nyanga province. Many of the fishers doing this coastal fishery have come from Nigeria, Benin, Ghana, Togo, etc., and their children, they are almost all professional fishers. Total number of marine fishers is 2,503, comprising of 1,922 in the province of Estuaire (86% by foreign fishers), 387 in Ogooué Maritime (90% by foreign fishers) and 194 in Nyanga (94% by foreign fishers).

Fishing boats are almost all pirogues, and partially boats in FRP made in Gabon and wooden boats covered with FRP. Many of the boats are equipped with an outboard motor (15 to 40 horsepower), with several outboard motors for a boat transporting the catch, for example. Total number of fishing boats is 760, of which 80% (609 boats) are motorized. By province, there are 604 units in Estuaire (481 with motor or 80%), 124 in Ogooué-Maritime (103 with motor or 83%) and 33 in Nyanga (25 with motor or 76%).

Fisheries are generally located in the bays or in the coastal zone and the inlets, and the main fishing methods, including the bottom gillnet, the surface gillnet, the bottom longline, the beach seine, etc. Out of total fishing gears, fishing nets such as bottom gillnet, surface gillnet and sardine gillnet accounts for 83%.

Major fish species are composed of demersal fish, like captain (*Polydactylus quadrifilis*), bar (*Pseudotolithus* spp.), the humped fish (*Pseudotolithus elongates*), redfish (*Lutjanus* spp.), *Arius gambensis* (*Arius latiscutatus*), and the small pelagic fish such the sardine (*Ethmalosa fimbriata*),

etc. are the main fish being caught. Especially the sardine represents a significant portion of the volume caught (40 – 50%) in small-scale coastal fishery (around 22,000 tons per year, including the volume caught in the lagoons). The majority of these fish species are caught around Libreville.

In many cases, fishing is done by going out and coming back on the same day, but in zones such as Libreville and Port-Gentil where ice supplies are possible, there are also fishers who take ice with them, fish with a bottom gillnet, a bottom long line, for three to four days and keep their fish on ice. Moreover, the owners of fishing boats, outboard motors and fishing equipment in Port-Gentil and the fishing teams they employ, also carry out fishery activities spending several days in camps near fisheries which serve as a base. The camps are on the Ogooué, at Ozori and at Olendé, near the mouth of the river, they most often use bottom gillnets and beach seines in the coastal fisheries near the river mouth. A team includes around ten fishers and the fishing is done with two or three boats (with outboard motors), the conservation of the fish is on ice, and transportation included. The trip from Port-Gentil to the camps is done by the secondary streams of the Ogooué River.

The majority of the sardines are smoked by the women and expedited and sold everywhere in the country and in the neighbouring countries of Cameroon and Nigeria.

In the province of Nyanga, the population is rather small, even at Mayumba and Tchibanga, the capital of the province, and the other consumer zones are quite far; although they say there are unexploited fishery resources on the coast, coastal fishery has not developed.

2) Problems

(a) Fishery zones are limited by the capacity of fishing boats, and the resources off the coast are not exploited

The boats are pirogues made of wood with an outboard motor. Boats made of FRP and wooden boats covered with FRP made locally are partially used, but they are all boats with a flat bottom and their deck sheer is reduced. These are boats to be used for fishing in the bays, lakes, marshes and on the rivers. Since the navigation and control of these pirogues made of FRP when used at sea is quite weak, and they are not adapted to use at sea with big waves and surges, their zone of activity is limited to within the bays and along a part of the coastal zone.

(b) The cost of fishing is high

Pirogues equipped with outboard motors go into the fisheries, in the bays and in a part of the coastal zone, but each time they use a lot of fuel, the price of which has soared, and this brings on a high cost and significant impact upon the fishery activities and the fishers livelihood.

(c) Collision with other boats and destruction of fishing equipment

There is a significant loss of fishing equipment because of the big fishing vessels and collisions. The small-scale fishers have no means of avoiding accidents, and they do not have the right to receive any kind of indemnification in case of an accident.

(d) Disputes between villages for the use of fisheries

In the Aviation and Cocobeach zones in Libreville, the fisheries of the two zones overlap and there are disputes over the fishing rights.

(e) Difficulty in getting an ice supply

In Libreville it is possible to get ice from the fishing company located at Port-Môle or at the Community Fishery Centre in Owendo, however, many villages are far away, and ice supplies are practically impossible, especially for the village fishers in the Cocobeach and Aviation zones. Certain fishers from the Aviation zone sometimes have the ice transported by truck from Port Môle, but it is quite difficult during the rainy season because of the bad condition of the roads.

In Port-Gentil the community Centre fulfils an important role in supplying ice, thereby allowing neighbouring fishers to fish all night, and then to expedite and sell their fish quite fresh, although sometimes the volume of the ice supplied decreases because of the problem of having water supplies. Because of this, the trips out of the fishers are sometimes limited.

In Mayumba in the province of Nyanga, there is no ice factory, and the fishers cannot go fishing over several days where they might have kept their catch on ice, as do the fishers of Libreville and Port-Gentil. Any fish that goes unsold at the landing place, must be put into the refrigerator (freezer box) that the families of the fishers have in their possession (the small pelagic fish are smoked). There is no ice factory at Tchibanga – the capita of the province, either, and the fishmongers who go to Mayumba, transport the fish after buying ice produced in household freezers.

(f) Consumer Centres are far away and the sale of the catch is difficult

In the province of Nyanga, different from the other provinces, there is no big consumer market as in Libreville and Port-Gentil. Mayumba, the base of coastal fishery in the province, is an important place for the purchases of business people and for the fishmongers of Tchibanga, but since the road connecting Tchibanga and Mayumba is not paved, traffic is difficult during the rainy season. For Tchibanga, the population is small and the market is limited.

(g) Instability of the residence

When the villages were being established, there was no particular urban planning for the use of the land area, and foreign fishers set up their activities based an agreement with the traditional land owners, and the villages were built around the fishery activity. This lasted until a few years ago, however, because of urbanisation and the development of the industrial zones in Libreville, the fishers are sometimes obligated to leave the existing villages for new zones, and many are worried about the instability of their residence.

The Community Centre of Owendo in Libreville serves as a base for departures, landing and the sale of fishery products from the boats using a bottom long line and bottom gillnet for big demersal fish. However, with the industrialisation of the surroundings, the community centre is now isolated in the industrial zone, and fishers who must go a great distance to get there, are bothered by the new situation since they cannot keep an eye on their boats, as they could before.

(h) Complaints from the inhabitants living around the smoke houses

The village of Pond Numba and Grand Poubelle in Libreville are the biggest landing places for sardines, and the smoking of the sardines is quite developed there. However, the inhabitants complain about the smoke coming from the smoke houses.

(2) Lagoon Fishery

1) Present Situation

The provinces of Ogooué-Maritime and Nyanga are situated along the Atlantic coast, the lagoons are numerous, and the inhabitants around the coastal area do lots of fishing. Since fishing in the lagoons is forbidden to foreign fishers, almost all the fishers are Gabonese, and they do both self-sufficiency agriculture and small-scale fishery. The boats are small wooden pirogues, most having a motor with an oar or perch. The main fishing methods are casting net, gillnets, long line, fishing line, bamboo tube, traps, etc. Certain fishers fish for several days and stay at camps far away because of the lack of fish stock near the village. However, it is not easy to go far away with pirogues and no motor. Fishing is for many inhabitants a rare means of obtaining cash revenue in spite of the small volume of fish caught and few opportunities to sell and transport the catch.

In the zone to the North of Nkomi lagoon in the province of Ogooué-Maritime, (Omboué and the ocean zone to the North), the rate of distribution of outboard motors is high compared to that in other lagoons. The distribution of fresh fish in the Port-Gentil market is a routine event, for example, because of the conservation on ice of the fish caught in the fisheries of some of the fishers, the purchase by the fishmongers of Port-Gentil, the purchase and expedition and sales in Port-Gentil by local business people and some of the fishers themselves. The fact that this ocean zone is located at a place which allow one to go directly to the Port-Gentil market and to the ice supply at the Port-Gentil Community Centre, as well as the supplying of ice at the Oboué Community Centre, are essential elements.

The lagoons to the South of the zones mentioned above, are distant from the consumer markets, the pirogues and fishing equipment are limited, and fishery activities are rather slow.

2) Problems

(a) Distance from the consumer markets and Difficulty in selling the catch

There are many areas that are far from consumer markets, without roads nor the possibility to sell their fish. In areas where transportation is possible, business people come through from time to time, and this would practically be the only possibility to sell.

(b) Outboard motors and fishing equipment are expensive and obtaining them is difficult.

Fishing equipment in remote areas is much more expensive than in Libreville, and since liquid cash is problematic, getting this equipment is uncertain. Certain people have no pirogue. Some fishers rent fishing equipment and pirogues to go fishing.

(c) Absence of Ice maker and Conservation Equipment

The lagoons to the South of Omboué have no means of conserving fish, such as an ice maker or freezer. Without electricity, both the ice maker and the freezer are unrealistic. In the protected areas, there are limits to the construction of installations.

(d) Destruction of fishing equipment by other boats and numerous collisions

In the northern part of the Nkomi lagoon in the Ogooué-Maritime province, the traffic of transportation boats, barges and company boats is significant, and these boats cause the destruction of fishing equipment and collisions. This brings on great losses for the fishers, however, there is no means of assistance.

(e) Drop in the catch in the fishing villages

As the resources decrease around the villages, the catch is less than it used to be. For that reason, certain fishers leave for several days to go to the distant camps to fish. The departure to these distant camps is not easy when rowing without a motor. Even if you can handle the rowing, since fishing equipment is limited, they generally catch only two to three kg per day. It is necessary to fish for several days with ice, but then again, it is not easy to get ice.

In the Banio lagoon in the province of Nyanga, fishing has become difficult near the village to the North, and it now appears that one has to go to the South of the lagoon (Upper Banio) to fish. There is still a good possibility in the southern zone compared to the northern zone of the lagoon, but again the distance is long and rowing that far is not easy.

(f) Foreigners fish in the lagoons.

Sometimes there are some foreign fishers, or fishers whose origins were foreign, who fish in the lagoons. They are professional fishers, and compared to the local Gabonese fishers, their fishing techniques are better, their equipment bigger, they use outboard motors and they constitute a certain threat for the local Gabonese practicing fishing.

(g) A part of the lagoons is polluted by petroleum activities

Petroleum activities have developed in the Nkomi lagoon in the Ogooué-Maritime province, and numerous barges and company boats have increased. The maritime zone is polluted by the flow of oil from these boats and installations, fishery stocks have been impacted by this situation.

(3) Inland Fishery

1) Present Situation

The inhabitants fish in the inland rivers and lakes and marches. The majority of those who fish, do both agriculture or logging on a small-scale level, and their fishery activities help provide food self-sufficiency. Total number of fishers is 4,389, of which 787 or 18% are women (including those engaging in lagoon fishery described in the afore section). By province, Moyen-Ogooué has the largest number of 1,497 or 34%.

The main fishing methods are surface gillnet, bottom gillnet, cast net, and hook & line, while bamboo tube and traps are partly used. About 50% of fishing gears used are surface gillnet, followed by bottom gillnet (17%), while line fishing such as bottom longline accounts for 24%. The equipment they use is small for lack of money, they cannot even buy satisfactory tools. They almost all fish with wooden pirogues operated with an oar or paddle or a perch. Many do not have a pirogue. Total number of pirogues is 2,164, of which 98% are wooden. Motorization rate of pirogues is far lower than that of marine fishery, 23% in average of all provinces but only 0 to a few percent in inland provinces.

Fishing material is expensive, getting it is difficult and the material is not always well adapted. The catch is, therefore, not good, and they cannot get the funds necessary to buy good equipment. Since Libreville is far away, they can only distribute the fish through the help of fishmongers, and this reduces their profits.

In the zones where there are no other activities, such as logging, fishing is practically the only means of obtaining cash revenue. However, the number of fish you catch is limited, the big consumer markets are far away and individual shipping by the fishers is not easy. The fishmongers do not come by very often, and opportunities to sell their fish are limited.

During the dry season and rainy season, conditions such as the water level, the surface of natural water and the speed of the river flow, and the lakes and marshes changes considerably. During the dry season where the water level drops, the natural water level drops, the speed of the river flow is slower (from June to August), and the catch of fish and delivery at landing places tend to increase.

In the Moyen-Ogooué province, the Ogooué River and main lakes and marshes tend to flow together. This is the province having the greatest number of landing places for inland fishery in Gabon (around 9,500 per year). Lambaréné, the capital of the province, is located 4 hours by road from Libreville, and the roads leading to the other zones inland from Lambaréné tend to be centralized in the provincial capital. Sales people come there to buy fish from the fishers in the villages along the main roads around Lambaréné, that they then transport to the big consumer markets of Libreville and further inland, and some is expedited and sold to neighbouring countries such as Cameroon. The Community Centre of Lambaréné is a base which is particularly effective for the distribution of fresh fish by the fishers and neighbouring business people. However, in the distant zones of Lambaréné, fishery production and sales of catch are not easy because of the numerous problems of distribution.

2) Problems

(a) Consumer markets are distant

Consumer needs in terms of inland natural water facilities is practically inexistent, and the distance to go to the big consumer markets limits the possibility of expediting and selling the fish that have been caught. Lambaréné in the Moyen-Ogooué province has the advantage of being tied to a distribution network going towards Libreville and other regional centres, and shipping and sales of fish by the fishers and the local sales people are active. However, in the areas of inland waterways far from Lambaréné, the transport and sale of fish is difficult and stagnating.

(b) Supply of fishing equipment is difficult

Fishing equipment is expensive and since the fishers have little money, it is difficult for them to obtain the necessary equipment. It is a vicious circle, since fishing equipment is limited, the catch is insignificant, and therefore the funds for purchases cannot be accumulated.

(c) Cost of fishing is increasing

Compared to other zones, in Lambaréné in the Moyen-Ogooué province, fishers and the fishmongers are active, and the distribution of outboard motors and boats is relatively advanced, but the price of an outboard motor, fishing equipment and fuel, are quite high, and the cost of fishing has gone up.

(d) Variation in the water level is significant between the dry season and the rainy seasons, and this considerably impacts upon fishery activities.

During the rainy season, river flow is rapid, and the water level goes up, thereby increasing the surface level of natural water, and making fishery more difficult. During the dry season, the water level goes down, and since obstacles such as fallen trees, rocks, sand beds, etc., then appear, taking the boats down river to the fisheries becomes more difficult.

(e) Increase in the number of fishers and the penetration of foreign fishers reinforces the pressure on fishery activities.

The number of people accumulating fishery together with other activities has increased. In addition, in the Woleu-Ntem province, fishers from other neighbouring countries, come to Gabon to fish, thereby increasing the pressure on fishery activities, and could make things more difficult to catch fish. In the Estuary province, according to the period, foreign fishers in the coastal zone follow fish schools and catch these fish after having led them into inland waterways, such as Kango, and this creates a threat to the inland Gabonese fishers.

(f) Fish that are caught are small and cheap

In the inland zones such as the Woleu-Ntem province, fish being caught are a small size, and with the stagnation and difficult distribution, their price is quite low.

1.3.4 Inland Aquaculture

(1) Overview

1) Production

If we classify the inland aquaculture in Gabon according to form, we obtain: (1) intensive aquaculture, (2) semi-intensive aquaculture and (3) extensive aquaculture. According to Fish Stat, the production of aquaculture attained its summit in the year 2000 with 558 tons, and has stagnated at around 80 tons since 2003. (See table here below):

Table 1.8 Annual Production of Inland Aquaculture Unit (tons)

Year	2000	2001	2002	2003	2004	2005
Tilapia	533	102	83	80	80	78
Catfish	10	-	<0.5	-	-	-
Other fish	15	<0.5	-	-	-	-
Total	558	102.5	83.5	80	80	78

Source: Fish Stat of the FAO

These production statistics were established on the basis of documents submitted by the DGPA, however, verification of the data base has shown that these statistics include only intensive aquaculture by a private company in the Haut-Ogooué province and the semi-intensive aquaculture of a farmer in the Estuary province, and that the other data was not included. The production of aquaculture in Gabon is sustained by a small percentage of intensive aquaculture exploitation. The semi-intensive and extensive aquaculture production are minimal, and in many cases, probably for self-sufficiency. This tendency also appears in the form of consumption, under “for self-sufficiency” and under “for self-sufficiency and sale of surplus”, representing 91%, and what is left for sales, represents less than 10%.

2) Fish Species High

In terms of fish species for aquaculture, there is the *Tilapia nilotica* (called here below “nilotica”), catfish (*Clarias Gariepinus*) and other fish species. Catfish entered the waters by chance or were reproducing in the pond (natural pond such as a marsh) and was captured, it is never kept for the purpose of production. Among the other fish, there are mainly carnivorous tilapias (*Hemichromis fasciatus*) which are used to avoid the increase in the number of niloticas through reproduction; even if they grow, they never become very big, and they are used simply to increase the productivity of the niloticas. It would not be an exaggeration to say that the niloticas represent nearly 100% of the species raised as a product.

3) Aquaculture Method

i) Intensive Aquaculture

Intensive aquaculture is done mainly by the private companies who use their important capital and eminent human resources and are supplied in feed grade that is available on the market or in basic ingredients and then make their own mixtures. Certain among them do integrated aquaculture with cattle raising and market gardening, which is an ideal form of aquaculture.

Theoretically, the type of fish is mainly nilotica, but certain fish farmers raise them together with catfish and carnivorous tilapias which serve as predators. Sales methods are diversified: fish sold fresh, in fish filets, through wholesale to restaurants of the same group, or at times organised as a tourist outing for sport fishing, etc. Among the private companies, certain promote their sales upon their own initiative, others build ponds on their land and raise their own food source to provide their employees with meals, especially in the case of the tilapias;

Private companies practicing this aquaculture are found in the Haut-Ogooué and Ogooué-Lolo provinces, and certain produce from 40 to 50 tons per year.

The main problem of intensive aquaculture is the supply of the ingredients for the fish food. Especially, the fish powder or its replacement product is difficult to obtain inland. And there are problems, the imported fish powder from other countries is bad quality, the supply of brewer's grains, which are an important food ingredient in the country, is also becoming difficult to obtain since the price is increasing based on the increased transportation costs billed by the transport companies.

ii) Semi-intensive Aquaculture

Semi-intensive aquaculture is mainly done by the farmers around Libreville in the Estuary province, and by civil servants having a certain amount of capital in other provinces.

They purchase the feed only bran and brewer's wet grains, or they use feed that they themselves have concocted, stale bread or leftovers from a restaurant. And as for intensive aquaculture, certain do integrated aquaculture together with cattle raising, thereby allowing them to obtain a complementary source of nutrients, since the feed itself is not sufficient.

The fish products are mainly nilotica, however, the majority are sold to individual guests who come from the city to buy them. The fish farmers do not transport their fish products to the city, and there are no fishmongers who come to buy big quantities.

The biggest problems of semi-intensive aquaculture is also the feed. Since the pellets sold in the stores are too expensive, they use a powder based on bran and brewer's wet grains, but many fish farmers would like to have a cheaper source of feed.

iii) Extensive Aquaculture

Extensive aquaculture is done mainly in the Ogooué-Lolo, Ngounie, Nyanga and Woleu-Ntem provinces, the ponds are diversified in form, ponds with a dam in a valley stream, natural pond used as such, pond dug out near a water source or a stream wherein the water is used as such, etc.

Theoretically, many of the fish farmers have several ponds (from one to five), they put in tilapias they have bought at a Aquaculture Station or that an aquaculture farmer, called a promoter, has sold to them, and they raise them extensively, only using them around one year later and feeding them only cassava and taro. Even under conditions that come close to no feed at all because of financial problems, we can see these fish growing through the use of cattle droppings and a necessary water source. However, this is not often the case. In compliance with the instructions of the American Peace Corps, some have put grass they have cut into the ponds, hoping that this will be a good nutrient, but the effect is far inferior to the animal droppings. Since the mud at the bottom of the ponds has never been removed since the ponds were built, their depth has also considerably diminished, and some are only 30 cm in depth. For this reason, the grass grows at the bottom of the

basin to such an extent that it is difficult to distinguish between the basin and the marshes. The inquiry allowed us to know that those doing aquaculture had been doing so during the presence of the American Peace Corps, but after their departure, the farmers had too many problems and finally stopped the activity. In truth, the abandonment of the aquaculture ponds was verified in many of the provinces, except for Woleu-Ntem. The most serious case is in the Ngounie province, according to DGPA data from the Aquaculture Station of Lébamba, only four are still operating today among the 29 aquaculture farms that functioned before. This tendency also appears in the statistics of the study of the overall present situation, in comparison with the Ngounie province, it appears that around 10% of the aquaculture farms were abandoned in the other provinces studied (see table here below).

Table 1.9 Percentage of the Abandoned Fish Ponds

Estuary	Woleu-Ntem	Haut-Ogooué	Ogooué-Lolo	Moyen-Ogooué
11% (2 / 18)	5% (1 / 19)	10% (1 / 10)	100% (12 / 12)	27% (16 / 59)

Source: Study of the present aquaculture situation in 2006 (document presented at the aquaculture seminary)

The reasons for the above situation are: i) the harvest is done only once a year, and the financial situation has become difficult, ii) since the ponds are small and so few, the harvest is small, iii) there is a lack of tools to increase the size of the ponds or to make them deeper, iv) financial and technical assistance from public entities is insufficient, v) there is a lack of labour because the children have grown up and have left for the city, vi) the problem of profitability, etc. If we compile the above points: 1) There has been no extension of aquaculture techniques for small fish farmers, 2) after the departure of the American Peace Corps, public entities, such as the Aquaculture Stations, did not pursue the technical support, 3) there has been no public entity giving financial support to the aquaculture farmers.

(2) Present Situation of the Aquaculture Stations

The Oyem Aquaculture Station managed by the government take care of the extension of aquaculture in all of Gabon. Nine of them were studied this time, and the following problems appeared in all those Stations.

i) Problem of the Budget and Personnel

The inquiry revealed the opinion that both the budget and personnel were insufficient, but this was a problem due to the impossibility of clearly dividing up the budget by the DGPA, since the role of each Station is not clearly defined. As a prerequisite, the problem of the administrative role of each Aquaculture Station must be clarified.

ii) Structural Problem

Here we can mention the problem of the water source and the drainage, the problem of the depth of the ponds, the caving in of the sides after a long period of use, etc.

The problem of the water source and drainage is the most serious. Among the nine Stations we visited, only four (Tchibanga, Lébamba (at Moukoundou and at Moakombo), Oyem) have no problem for the water source. In the others, the problem is that the volume of water for the source is reduced or decreased, or even if there is enough water, it is accidentally mixed with the used domestic water because of leaks, and the quality of the water suffers the consequences. Moreover, only the Aquaculture Stations of Tchibanga, Lébamba (at Moakombo) and Oyem do not have a drainage problem, or else the drainage takes place in spite of a few problems. In the other Stations, the drainage from the basin is totally impossible because of the dirt that has accumulated in the drainage pipes and the level has become higher than the bottom of the basin. There are even some Aquaculture Stations that do not sufficiently fulfil the functions of production.

The next serious problem is the depth of the ponds. In all the Aquaculture Stations there are very few ponds that have a sufficient water depth (more than 80 cm), thereby decreasing the productivity of the basin. For this reason, the production of young fish to be distributed to the aquaculture farmers is insufficient. The data of the Oyem Aquaculture Station in the Woleu-Ntem province, shows that 25 out of 30 farmers studied have acquired young fish from the Aquaculture Station, or a

percentage of more than 80%. The fact that the Woleu-Ntem province is not included in the provinces where numerous ponds have been abandoned is tied to the fact that the Aquaculture Station is functioning correctly.

1.3.5 Distribution / Processing of Fishery Products

(1) Overview

Fishery products distributed in Gabon and in neighbouring countries, such as Cameroon and Congo, by road transport, are supplied by large-scale industrial fishery, small-scale coastal fishery and inland small-scale fishery.

Here is an overview of the distribution and processing of fishery products of the various forms of fishing.

1) Large-Scale Industrial Fishery

The total production in 2005 was at 11,620 tons (around 23.2 billion Cfa Francs), and the main species captured were shrimp: 2.01 tons (17.3%), bar: around 1,954 tons (16.8%), and captain: 1,617 tons (13.8%). Among the fish caught, 3,400 tons (9.3 billion Cfa Francs), were exported, and the rest – 8,220 tons of fishery products were distributed inside the country.

Although there was a part of the products that did not comply with export standards among the shrimp frozen on the boats and vacuum-packaged in the fishery products of industrial fishery distributed inside the country, the fish frozen on the ships constitutes the major part of the production. Not including big size fish (wherein each fish is frozen individually), the small and medium-sized fish are frozen in blocks of 18 kg par species on the boats and are mainly sold wholesale to companies having refrigerated warehouses in Libreville, the capital, where the population is concentrated, but another portion is dried and salted and then distributed in the inside of the country, such as Franceville.

2) Coastal small-scale Fishery

Small-scale coastal fishery, carried out in three coastal provinces of Gabon, is done by 2,503 fishers (around 20% Gabonese) and using 760 pirogues (around 75% having outboard motors). The production in 2005 was at 22,542.2 tons (for a value of 16.2 billion Cfa francs).

The main landing places are the Aviation, Numba Bridge and Cocobeach in the Estuary province, Port-Gentil and Omboué in the Ogooué-Maritime province and Mayumba in the Nyanga province. The production and amount for each province in 2005 was 12,769.6 tons (9.45 billion Cfa francs) for the Estuary province, 5,410.5 tons (4.64 billion Cfa francs) for the Ogooué-Maritime province, and 4,336.1 tons (2.07 billion Cfa francs) for the Nyanga province.

Here is an overview of the distribution and processing of the fishery products in each province.

i) Estuary Province

Libreville (population of about 538,000 inhabitants), the capital, a big consumer centre for fishery products, is located in the Estuary province. Around 70% of the small-scale coastal fishery production is distributed to this province, including around 70% sardines from the Clupeidae family, which are practically all smoked and distributed in the inland regions outside Libreville, or exported by road towards Cameroon and Congo, etc. In this case, the trucks used for shared group transport of the transformed fish, are often trucks that transport necessary cheap vegetables to Gabon. Other species are mainly distributed in the region as fresh fish through the public markets (there are three or four that deal with fresh fish in Libreville, or salty dried or smoked fish and distributed to the inland or even to the neighbouring countries. If the fresh fish are sold on the public markets, they are partially conserved on ice, but since there is no fresh running water to wash the products, the conditions of hygiene are quite bad.

A community centre was built in Owendo in the area of the Numba Bridge in 1984 with the help of the European Community and Italy. Its management was then put into the hands of the private

sector, the landing zone was eroded out, but in 2002, an ice-making factory, an ice storage cold chamber and a refrigerated room, etc., were set up or rehabilitated by the OFCF, and the stable supply of ice became possible for the distribution of fresh fish, although the ice is sometimes insufficient according to the seasons. Moreover, the landing places and fishing villages spread out in this area, have a background of forced expulsion because of the urban development plan, and the small-scale coastal fishers are fearful of any redevelopment to the point of not being able to concentrate on their fishery activities. There is a problem in the urban development plan, an environmental problem concerning sanitation with the inhabitants of the neighbourhood, and a problem of smoke because of the smoking of the fish, and the redevelopment or rearranging of each landing place seems quite difficult to resolve.

ii) Ogooué-Maritime Province

Port-Gentil, the second city of Gabon (population around 105,000 inhabitants) is located in the Ogooué-Maritime province. Its special geographic situation has made it obligatory to access other geographic zones only by air or by water, so that almost all the fishery products from this province are distributed and consumed within the province. Consequently, the consumption of fishery products per inhabitant is twice as high as in the other provinces. There are seven public markets in the province, but only the Market of the Big City (“Marché de Grande Ville”), Balize Market and the Community Centre sell fresh fish, and ice is used only in the Community Centre.

The main sources of revenue of the Community Centre, built by the non reimbursable financial Cooperation of Japan, is the sale of ice and the renting of material and equipment associated with the market: no user fees are collected from the fishing boats, from the transportation boats landing at the Centre or from the fishmongers. Presently, the Centre includes round 75% of the landing volume in the zone, the remaining 25% are landed at other landing places, including the village of Matanda (a village in the area around Port-Gentil). About 75% of the fishery products landed at the Centre are sold at the Market of the Centre.

Since the beginning of the making of ice at the Centre, and the setting up of an ice factory by the OFCF at Omboué, the volume of ice now necessary in this zone is guaranteed. However, in the case of a water shutdown, which happens often here, the production of ice becomes impossible, and then there are problems concerning the effective use of the fresh catch, the guarantee of quality and the distribution.

iii) Nyanga Province

For the Nyanga province, it has a high potential for the fishing of pelagic, demersal fish, crustaceans, etc., but the arranging of the access and infrastructure have been delayed, and this has prevented the development of the coastal small-scale fishery.

3) Inland Small-Scale Fishery

Small-scale inland fishery is carried out by 4,389 fishers (90% of whom are Gabonese) with the help of 2,164 boats (the majority of which are pirogues, around 23% having outboard motors). The production in 2005 was 9,700 tons (for a value of 9.7 billion Cfa Francs). The tilapia is the main species being fished with 3,425 tons (35.3%), followed by the nameless fish with 1,791 tons (18.4%), then far behind in the running come the catfish and the arius gambensis. Located in the basin of the Ogooué River, in an environment that has the advantage on a geographic level of abundant water sources due to the numerous lakes of the area, the Moyen-Ogooué province counts for about 60% of the total national production, far in advance of the Estuary province (about 14%) and the Ogooué (Ivindo province (about 10%).

Not including the Moyen-Ogooué province, fishery is mainly done for family consumption, and when the catch goes beyond family consumption, it can be sold at a local market. However, as in the case of the sale of wild animals and vegetables, the fresh fish are suspended or put on a board set up along the road by each fisherman, and sold to cars passing by for a little extra cash.

Moreover, the distribution of fishery products from inland small-scale fishery centred on Lambaréné where the production is significant, has considerably changed since the building of the Lambaréné

Community Centre for Fishers and its beginning operations. In the past, the boats docked and landed at four places according to circumstances. However, since the building of the Center, the number of fishers and fish buyers has progressively increased, and now around 80% of the landings are concentrated at the Centre. And since the supply of ice has been organised, by the ice machine, this has contributed to the distribution of good fresh fish in the region and all the way to Libreville, and other cities.

(2) Traditional Processing of Fishery Products

Even if the species used vary by region and there are few differences, theoretically, the salting, drying and smoking of fish are done according to tradition for the conservation of extra fishery products. These are the most rational methods of conservation when the use of a freezer, refrigerator or ice is problematic. Traditional Gabonese dishes based on salted and dried or smoked fish, are prepared even today. Consequently, even if the source of electricity is guaranteed in the future with development, whether or not the inhabitants have refrigerator-freezer appliances or not, and whether the distribution of frozen fish or fresh fish kept on ice is developed, there will continue to be a certain demand for smoked fish or salty dried fish, according to the traditional processing methods, and this is so, even with the introduction of diverse cooking recipes for fresh fish that are being introduced and developed.

Here below is an overview of representative examples of salty dried and smoked fishery products in Gabon

1) Salting and Drying of Fish

Relatively big fish are salted and dried, with or without the head, and whether or not the internal organs are removed, depends upon the species and the regions, or even the nature of the order that has been placed. Big-sized fish are cut into pieces or split open along the backside; fish having a thick skin are cut into slices that are finer, a cutting is done parallel to the dorsal spine to accelerate the infiltration of the salt. Once the preceding treatment is finished, after the salting, the fish are rapidly dried in the sun and then removed for a period, and this is repeated for several days, or after a longer period following the salting, the fish is put into a basin for one or two days or into a linen bag, wherein the drying and rest period are repeated for several days.

2) Smoking Process

As a prerequisite treatment, the internal organs are removed from the larger fish, this is not done on the small fish, like the tilapia and sardine, the medium-sized fish are treated as they are and the big fish are cut into pieces or cut open along the backside. The medium and big fish are smoked with a relatively big fire for three to seven hours (that varies according to the size of the fish), then they are left in the smoke for two to five days. The sardines, after being actively smoked with scantling wood for two to three hours, are then finished with a relatively mild smoke for one day with sawdust. It is easy to obtain cheaply from a sawmill products such as the scantling wood, which is not saleable as such by the sawmill, and the sawdust, however, the transportation of this must be covered separately.

(3) Import of Fishery Products

According to the statistics of the DGPA, imports of fishery products were at 7;730 tons in 2005. In cans, sardines in oil or in tomato sauce are numerous, and canned fish in oil, such as tuna and mackerel with tomato sauce, fill the shelves in the supermarkets. Moreover, slices of salmon and cuttlefish, peeled shrimp, mussels, etc. frozen vacuum-packed are also sold in the big supermarkets, and among them, St. Jacques crustaceans originating from the Japanese prefecture of Aomori, arriving via France. In addition, frozen filets of packaged Atlantic cod, as well as these filets treated initially for pan frying, also imported, and are all for sale.

These products, except for the canned fish, are relatively expensive, and are certainly supplied to the luxury hotels and restaurants, and only a small portion of the rich class can afford them.

(4) Hygiene and Quality Control of Fishery Products

In terms of exports of fishery products, the European Economic Community (EEC) adopted the "Sanitary Standards of the Community for Consumer Protection" in 1991. To export fishery

products to Europe, Gabon has created a Quality Service and Sanitary Inspection (SQIS) within the Direction of Regulations, Control and Surveillance (DRCS) of the DGPA, and the export of frozen products, and of all fishery products, except for bivalves, became possible respectively in 2000 and 2001 simply by undergoing an inspection in Gabon.

The main task of the SQIS today is sanitary inspections and the delivering of the certificate for boats that freeze fish on board for export, refrigerated warehouses and companies that transform fishery products. However, since the SQIS does not have the various documents necessary for the inspections, it can only cover the sanitary inspection for installations and a sensory examination of the products; the chemical examination and microbiological examination are confided to laboratories in other ministries.

Consequently, the SQIS carries out only the examination of fishery products and the delivering of certificates for the export of industrial fishery, and does not at all control the quality and sanitary condition of fishery products directed towards the distribution in Gabon by industrial fishing companies, nor the fishery products of the small-scale coastal fishers or the inland fishers, as well as their transformed products.

1.3.6 Organization of the Rural Communities

In this paragraph, characteristics of each type of village (coastal, lagoon, and inland fishing villages) are mentioned:

(1) Coastal Fishing Villages

Villages where they practice coastal fishery are located in the Estuary province (around Libreville, around Cocobeach), in the Ogooué-Maritime province (around Port-Gentil) and in the Nyanga province (around Mayumba). The inhabitants of these villages are practically all foreign fishers coming from neighbouring countries, and the Beninese, Nigerians and Togolese are most numerous. In rare cases, there are villages in the coastal zone of the Estuary province wherein it is the Gabonese who do coastal fishery (village of Milembié, etc.).

1) Economy and Livelihood of the Fishing Villages

The foreign fishing villages were created mainly on unused coastal land allowing them to fish more effectively. Since they could not obtain big surface areas of land, agriculture and animal raising were difficult to organise as secondary activities, and they live along the coast only upon their fishery revenues. However, in the village of Cape Lopez (Togolese village) near Port-Gentil, the women use the land further from the coast for market gardening; lettuce, tomatoes, etc.

Compared to inland fishery, the volume of the catch of coastal fishery is bigger, and a certain volume can be expected per year. Outside the Beninese village near Mayumba, the coastal fishing villages are located around and on the outskirts of Libreville and Port-Gentil, and the fresh fish is easily sold to consumers in the city. Almost all the sardines which can be caught in big quantities, are smoked at the landing place, distribution companies with trucks come buy the sardines in big quantities, and transport them by road to neighbouring Cameroon and Togo. Sales conditions of the catch are good in the coastal fishery done by the foreign fishers, and the cash revenue necessary to cover daily living expenses is guaranteed.

With the foreign fishers, the husband and wife often have separate livelihoods. The husband goes fishing and returns to the village with his catch which are sold to his wife, or the women of the village. The profits constitute the revenue for the husband. The wife sells this fresh fish or sometimes, smokes it first and then sells it. These profits are for the wife. Sometimes the husband gives his entire catch to his wife who sells it as fresh fish, or after smoking it. In this case also, the profits from the sales are divided up 50/50 between the husband and the wife. In other words, there are monetary relations between the men and the women of the village, and each has his own livelihood.

Since the work at sea is difficult in coastal fishery, the men have a tendency to spend their money on alcohol and gambling. If the woman has her own livelihood, the husband does not touch the profits his wife has obtained through her work, and the profits he has made by fishing will be kept in the family. It is a system of family savings that lead to an accumulation of cash life insurance.

2) Organization of the Fishing Villages

In the coastal fishing villages, the foreign fishers have often founded villages according to country of origin. If the fishers of several nationalities live in the same village, groups form according to nationality and a mayor of the village appointed per group. These groups of foreign fishers are not organizations registered with the government, but rather monthly contributions collected in these groups, and fishery activities lead to communal assistance, thereby giving these groups a social function similar to an association.

Moreover, in Port-Gentil and Owendo, a fishery association was created at the local level upon the initiative of the government for the coastal fishers in view of joint management of the Fishery Community Centre. The leaders of the association are representatives from the groups of fishers according to nationality, and the foreign fishers and Gabonese fishers cover management needs jointly.

In addition, in the Gabonese coastal fishing village of Milembié, there is a fishery association organised within an FAO programme, and the Gabonese fishers from around the village are also affiliated with this group. The association maintains its organization through the support of its own revenue obtained by renting out equipment, fishing supplies, outboard motors, etc., furnished by the FAO, or by selling ice and fuel to the fishers.

In general, the Gabonese fishers do not like to fish at sea, but in Port-Gentil recently a young Gabonese looking for a job in Port-Gentil, entered these groups of foreign fishers and began to do coastal fishery. There is a type of shared coastal fishery of foreign fishers together with the Gabonese which is beginning to appear. Similar to the children of foreigners who are born in Gabon and obtain the Gabonese nationality and who continue working in the family activities, they are now beginning to do coastal fishery, no longer as foreigners, but rather as Gabonese.

3) Daily Life in the Fishing Villages

The fishers catch mainly coastal pelagic, and as the fisheries are not far from the village, theoretically, they can go in the morning and come back in the evening. Foreign fishers organise several teams and use driftnet fishing or beach seine fishing. The men go to sea for fishing and the women sell or smoke (especially sardines) the fish; the role of the men and women is clearly separated.

There should be no inconveniences for daily life in the coastal fishing villages around Libreville and Port-Gentil which have electricity and canalised running water. However, since garbage pickup is not regular and there is no sewer system, junk and used water stagnates around the villages and on the coast. For this reason, we often see garbage here and there in the villages, and we cannot say whether or not the sanitary conditions are good.

4) Main Problems

There do not seem to be any serious problems from the viewpoint of revenue and livelihood for the foreign fishers doing coastal fishery. The biggest problem is their unstable social situation in Gabon. Since they are immigrants, they cannot hide, if the Gabonese Government gives them the order to return to their home countries. In addition, even if they have money, since they live in constant fear of being obligated to return to their countries upon government order, they have to live on little and their homes are practically unhealthy temporary cabins on unused land.

Especially, foreign fishers living around Libreville are always worried about a forced demolition from the village. In the beginning, they built their village on unoccupied land adjacent to the coast around the capital, and they built houses where they lived off fishing and smoking their catch. However, in 2002, their village was demolished by force because of public security, upon orders of

the Gabonese Government, and for a short period of time, they had no where to go, and they broke up separately. Today the foreign fishers have begun their activities again (landing fresh fish and smoking) on the vacant lot of their ex village. But since they are using this land without any authorisation, a new forced demolition is possible. Since the fishers cannot live in this place, they have built temporary lodgings on rented land near the landing zone, or they rent a house or an apartment at a high price in Libreville.

(2) Lagoon Fishing Villages (brackish waters)

The geographic particularity of the Gabonese coast is the existence of several big lagoons. Numerous Gabonese fishing villages can be found in these lagoons. Although it is rare, sometimes Senegalese or Togolese live in these same fishing villages.

The lagoons wherein they do lagoon fishing are the Nkomi Lagoon and the FernanVaz Lagoon near the village of Omboué, the Iguéla Lagoon near the town of Iguéla, the Ndogo Lagoon near the town of Gamba in the Ogooué-Maritime province, and the Banio Lagoon near the town of Mayumba in the Nyanga province. All the villages are scattered out near the lagoons, the fishers go out on the lagoon in pirogues and fish with gill nets, with bottom long lines, with casting nets and with bamboo tubes. The pirogues of the Gabonese fishers are too small to fish on the ocean, and many fishers do not have outboard motors and therefore, do not go out of the lagoon for fishing. However, since the waves cannot enter the mouth of the lagoon facing the ocean and the ocean fish have a higher commercial value, some fishers have built villages or camps just within the mouth of the lagoon.

1) Economy and Livelihood of the Lagoon Fishing Villages

In the lagoon villages, fishing is an important source of revenue allowing the fishers to obtain cash funds immediately. But the lagoon villages are scattered far from the cities, and since there are no roads connecting the villages to the city, the catch must be transported to the cities in outboard motorboats crossing the lagoon. Since very few fishers have an outboard motor in the villages, even if they have caught lots of fish, they cannot go to the cities to sell it.

For this reason, many fishers depend upon the distributors who come to the villages periodically to buy the fish for resale. Many of these fishers have therefore signed a sales agreement for all their caught fish to be sold to these distributors who in turn, supply them with ice and fishing nets. In this case, the fishers do not receive fishing equipment and ice free of charge, but they pay for everything through the handing over of their fish. The price they pay for the equipment and ice is the price stated by the distributors, which is a higher price than the regular store price. However, for the fishers who live far within the lagoons and have only their pirogues as a means of locomotion, they can only hope that the distributors will be willing to bring them these necessities.

Since the lagoons are rather vast, it is possible to get the volume of fish necessary to support their daily lives, but the volume of fish convertible into liquid cash is limited if they depend upon the distributors for the sale of their fish. Moreover, since the urban centres of the lagoons (Omboué, Mayumba, etc.) have a population of only a few thousand inhabitants, the volume of fish consumed in those centres is also limited. With the present situation, fishing brings in a liquid cash revenue that is sufficient to cover the needs of the fishers for self-sufficiency, but it is difficult to increase this revenue.

In the lagoon fishing villages, the fishers do not do only fishing, but also agriculture through prescribed burning.. It is mainly cassava, bananas and taro which are planted in the burnt out forest area after having cut the grass. Theoretically, these agricultural products are produced for family consumption, but the distributors passing through the villages can buy some, so that agriculture also becomes a source of liquid cash revenue. Small animals caught in traps or hunted in the forest, theoretically for family consumption, constitute precious animal protein, but they are also sometimes sold to other inhabitants or to the distributors. The raising of hens, goats, etc. is rare in the villages, and not sufficiently active to obtain liquid cash.

The revenue obtained from fishing and agriculture covers the cost of living for families, the purchase of salt and spices which constitute food expenses, and they supply themselves with fish, agricultural produce and wild animals.

2) Organization of the Fishing Village

There is practically no organization at the village level in the lagoon fishing villages, and the fishers, even if they all live in the same village, are not motivated to create an association for communal assistance. The fishers fish individually or in the family, with the help of small pirogues and fishing equipment, and it is rare that several fishers should fish together. For that reason, as long as fishing continues in its present form, working alone or in the family is sufficient, and the fishers feel no need to develop village communal activities or regional fishery associations.

In the Ogooué-Maritime province, there are fishery associations in each department bringing together the Gabonese fishers in the departments of Etimboué and Ndougou. These are organizations formed under governmental direction which function after having selected a president, secretary and accountant from among the local fishers. However, many villages are scattered in the vast lagoons and contacting them is quite difficult, since the mobile phones cover only a part of the area of the lagoons. A fishery association cannot make arrangements for all the villages and remain in contact with all of them. This limits the number of fishers who can participate in the association, and since contacts with many of them are difficult, they do not see the advantage of being a member. In Mayumba, there are two small associations of fishers of the Banio Lagoon. However, they involve receiving organizations who have requested funding from the government and donors, and they offer almost no association activities for fishing.

3) Daily Life in the Fishing Villages

In the lagoon fishing villages, fishing is often done according to the days when the distributors come to buy the fish, and the other days, they work in agriculture on the burnt out forested land or in hunting small game in the forest. Theoretically, agriculture is women's work, and fishing and hunting is men's work. However, it is possible that women stay in the camps and do bamboo tube fishing, and there is no longer the clear distinction between men's work and women's work.

The lagoon villages are practically all scattered out and isolated, with no electricity nor running water. But some political figures and well-known people at the local level have given solar panels to certain villages, thereby covering night lighting in many of them. School have been built in many of the villages, and elementary school is offered in the villages. Beginning at the age of about ten, the children have to continue their studies in an urban centre of the region. For this reason, the children leave their parents and become boarding students in nearby towns. This expenditure represents a heavy burden for the families.

4) Main Problems

In the lagoon villages, the fishers regularly receive liquid cash funds from fishery and agriculture, although this represents small amounts, but since the main food products are available in the villages, they do not seem to worry about their daily life and subsistence. By maintaining their present living standards, they have sufficient cash revenue to cover their food requirements.

The essential problems of the lagoon villages are that the fishers cannot get the fishing equipment themselves, and they depend upon the outside distribution entities for the sale of their catch. It is this geographic situation of the lagoons which is the major problem since it makes access and contacts with the city difficult when living in the lagoon villages.

(3) Inland Fishing Villages

The inland fishing villages in Gabon can be more or less divided up into three types on an economic and subsistence level:

i) Fishing villages where the cash revenue from fishing on the major rivers and freshwater lakes is significant.

Here we can mention mainly the fishing villages of the Myéné and Fang ethnic groups who use the fisheries of the freshwater lakes such as Lake Onangué and the river basin of the Ogooué River

wherein the urban center is Lambaréné in the Moyen-Ogooué province, the fishing villages of the Myéné ethnic group using as their fishery Lake Anengué, located on the lower part of the Ogooué River in the Ogooué-Maritime province, and the fishing village of the Fang ethnic group of Kango in the Estuary province.

ii) Fishing villages where the cash revenue is obtained through a combination of river fishing, agriculture and animal raising

Here we can mention mainly the fishing villages of the Fang ethnic group in the Woleu-Ntem province, wherein while they do river fishing on the upper part of the Woleu and Ntem river system, they also cultivate vegetables, fruit and sugar cane, and raise goats and cattle, etc.

iii) Fishing villages where the cash revenue from river fishing is limited, centred rather on self-sufficiency agriculture and hunting

The fishing villages of the inland provinces not included in those mentioned above, do small-scale river fishing for family consumption, and cash revenue from fishing is minimal. They can sell agricultural produce or wild animals, but theoretically, agriculture and hunting are for family consumption.

This classification shows that only the Myéné and Fang ethnic groups actively do inland fishery in Gabon. Similar to the other inland ethnic groups, they were originally mainly hunters, and only do fishing within the context of hunting, and few fishers live mainly off their fishery revenues.

1) Economy and Livelihood of the Fishing Villages

In case i) mentioned above, since the fishers use the fisheries of wide rivers and big freshwater lakes, a certain volume of fish is guaranteed throughout the year. The volume is bigger during the major dry season (June to September) where the water level of the rivers and lakes goes down, and the volume decreases during the major rainy season (March to June) where the water level is high. However, there is practically no season when the volume of fish caught goes down to zero. This zone is also geographically near population centres such as Libreville, Port-Gentil and Lambaréné, and there is no problem concerning the demand for fish. Since the negotiating price for fish goes down during the high fishing season, there is very little fish that goes unsold. If the fishers could transport their own fish to Lambaréné or Port-Gentil, this would have the advantage of always allowing the conversion into liquid cash. Given this situation, the inhabitants practice agriculture and hunting, but in many of the fishing villages in the region, the degree of dependency upon fishing to obtain liquid cash is quite high. But whereas the volume of fish they catch is high, many of the fishers have no outboard motor and no means for transporting their catch by river. For this reason, in the villages far from Lambaréné, there is no conversion into liquid cash for the fish they have caught, since there is no means of transportation to the markets. The same is true for the agricultural produce.

In case ii) mentioned here above, since the fishers mainly use narrow waterways upstream, the water level of the rivers goes down during the major dry season (June to September), rocks and fallen trees appear on the surface of the water, and the navigation of the boats becomes impossible in certain places. For this reason, the volume decreases during this period. Moreover, during the major rainy season (March to June), the rivers have a good water level, the gill net and the bottom long line can be used, and the volume of fish caught is good. This is exactly the contrary in (1) above. However, since the surface of the natural water is reduced, the volume of fish caught is limited, and if a lot of fishers concentrate their fishing in a particular fishery zone, the volume of the catch begins to gradually decrease. For this reason, intensive fishing is not advised in this region, but rather traditional fishing, taking into consideration the resource of available fish in the river basin. The particularity of the fishing villages in this region is also that in addition to fishing, agriculture and animal raising serve as cash liquid revenue sources. In the same villages coexist the inhabitants who live off fishing, agriculture and animal raising, and the fishers help or begin to get involved in agriculture and animal raising during the period or years when the volume of fish to be caught is reduced, and this provides a good opportunity to guarantee a regular cash revenue. In the typical families in the region, the husband goes out fishing on the rivers, the wife cultivates the land recuperating from burning the forested area. Since the villages in this region are not far from urban centres such as Oyem, Bitam and Minvoul, it is possible to transport their fish and agricultural

produce by vehicle to sell things. The conversion into liquid cash is therefore, not difficult, and the fishers can obtain cash for their effort.

Case iii) corresponds to the fishing villages of the inland provinces, other than those mentioned here above, river fishing is done on a small-scale only for family consumption and cash revenue from fishing is quite low. Sometimes they sell agricultural produce or wild animals, but theoretically, agriculture and hunting are for family consumption. For this reason, as for the wild animals, the local river fish are distributed only through special transactions, and since no fish can be seen in the local markets in the villages, this leads one to imagine that the volume of fish distributed in the region is very low. But when the fishers sell their fish, the price of river fish is higher than in the other regions, which is interesting as liquid cash from time to time. Since the amount of fish caught is limited, and the consumers buy directly from the fishers, the fishmongers who take care of river fish do not do much business here.

2) Organization of the Fishing Villages

There is only one case where the fishers of the Fang ethnic group from an inland fishing village have organised a fishery association around the village of Bitounga in the Woleu-Ntem province. The fishers who are members (62) of the Bitounga association pay a monthly contribution and the amount necessary is invested as capital to cover the expenses of ceremonies, medical care, the purchase of fishing equipment. An fishery association of the Fang ethnic group was also created within the FAO programme in the village of Ebel-Abanga in the Moyen-Ogooué province. However, the activities carried out by the association together have stopped, and only a few fishers have continued with the salting and drying of the nameless fish. Similar to lagoon fishing, inland fishery is done on a small-scale individually or in the family, fishing operations done jointly are difficult to imagine, thereby affecting the promotion of fishers associations. Especially in the fishing villages around the rivers in the South of Gabon, fishing is almost entirely for family consumption, and there is no industrial fishing base that exists as an activity for the creation of a fishery organization.

In Nengue-Ntogolo on Lake Onangué in the Moyen-Ogooué province, the fishers playing the role as leaders, who are the owners of pirogues with outboard motors, collect the fish caught by the other fishers on their dugouts that have only oars and no motors. They take the fish to Lambaréné to be sold, and then split the profits 50/50 with the fishers of the villages. There is no fishery association in this village, but it is a good example wherein the roles are divided up between the fishers and a suitable fishery revenue is covered through a collective effort. This type of approach wherein the fishers are brought together through mutually profitable economic activities, should make the concept of organization easy to accept by the fishers in Gabon.

3) Daily Life in the Fishing Villages

In the inland fishing villages, the men are generally in charge of fishing and hunting, and the women are in charge of cultivation on the burnt land. But in certain villages, the women use baskets and bamboo to catch small fish and shrimp in the rivers, or they go out on the lakes in pirogues to fish with gill nets or bamboo tubes, so fishing is not always the work of men. Moreover, when they do not go fishing, the men help in agricultural work, and carry out tasks according to the family situation. The women bring in the firewood in bamboo baskets when returning from the fields in the forest.

The fisheries are often far from the villages, so the fishers build camps near the fisheries and stay there for fishing. Sometimes also the fishers, accompanied by their wives and children, stay a long time in a camp, where not only they fish but also smoke and conserve the fish before taking it to the village.

4) Main problems

In the inland fishing villages, self-sufficiency for necessary products is guaranteed, and the maintenance of the present standard of living is not a problem if some liquid cash is obtained from fishing and agriculture. However, there is no social assistance organization in the village or region, and since the Gabonese are individualistic, there is still no basis to encourage the fishers to get together for work or social reasons at the level of the village. In order for the inland fishing villages

to escape from this life based on self-sufficiency, organised economic activities at the level of the village, such as collective sales of fish and agricultural produce, and the development of products with added value, etc. is necessary, and the main problem is to know how the fishers will get organised in the future and work in cooperation.

1.3.7 Gender Issue

Generally, the Village chiefs and leaders in fishing activities are often men since they respect the opinions and viewpoints of men. However, there are also a certain number of villages wherein the women occupy the position as village chief and leader in fishing activities, making it difficult to say that women occupy a lower social position. The study team did not observe unfair treatment of women in the villages and fishing families, and their position and role are well protected.

Theoretically, the roles are separate : the men fish and hunt, and the women take care of the fields in terms of the burning and transforming activities. However, they often work together for fishing and the processing of the catch. On the other hand, household tasks and collecting firewood are tasks for women only, and it is rare for men to help them. Therefore, if we include household tasks and firewood collection, the work time for women is longer than the work time for men.

Moreover, since women have no one to whom they can give their children, they are not free to work as they want, thereby leading to a drop in income. In particular, they sometimes attend classes or meetings accompanied by their children or newborn infants, and often they cannot concentrate on the contents of the meeting. This is not limited to Gabon, but we must take into account the handicap that women have, strapped with the obligation of raising their children, when considering support for their social promotion, especially in areas where the aging of the population is progressing, we must fear for the lack of continuity which will become even more serious if we do not support activities for young people.

(1) Coastal Fishing Villages

In the families of the coastal fishers, the roles are clearly defined; the men do the coastal fishing and the women take care of the processing and sale of the catch. The men obtain the liquid cash from the fish sales made to the women. The women obtain cash income through the processing into smoked or salty dried fish, and the sale of fresh or transformed fish. Therefore, in the same family, the husband and wife have separate accounts: the husband pays for his cigarettes, alcohol and entertainment. The women spend their money for the education of their children and for meals. Husband and wife are financially independent, and if the husband needs a big sum of money to buy fishing equipment, the women lend him the money from their savings.

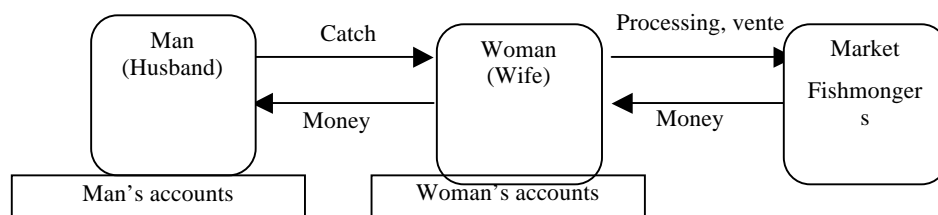


Figure 1.1 Financial Relations between Spouses in the Coastal Fishing Families

(2) Lagoon Fishing

Since the lagoon villages are rather remote from the consumer centres, maritime transportation is necessary, and arrangements for the transportation and sale of the catch play an important role in the villages. Women often take care of the transportation and sale of the catch, and in that case, the men who do the fishing, obtain a cash income from the women who gather and sell the catch from the village. It is mainly men who do the lagoon fishing, but many women also go out fishing.

(3) Inland Fishing

In the villages where they do inland fishing, the food production is often divided between the men and women, the men fish and hunt and the women carry out agricultural activities based on burning. However, in certain regions such as Kango, women catch crayfish in the rivers. The husband is responsible for the family livelihood, but it is the woman who manages the livelihood. For that reason, the husband receives pocket money from his wife and he uses it to buy cigarettes or alcohol.

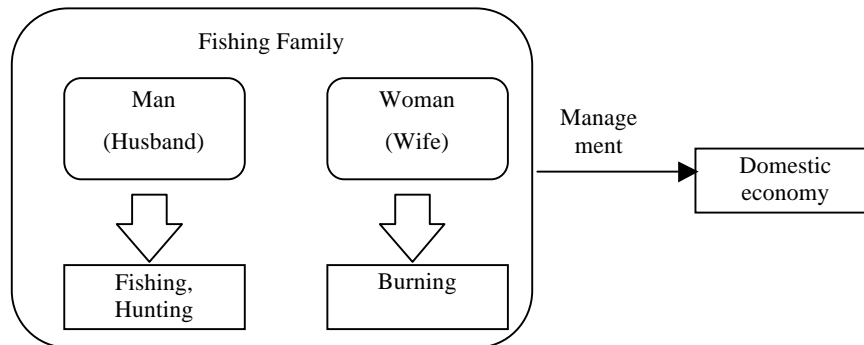


Figure 1.2 Financial Relations between Spouses in Inland Fishing Families

1.3.8 Agricultural Production / Processing of agricultural products

The traditional concept of agriculture for the inhabitants of Gabon is to extensively cultivate on the burnt land various food products such as plantain bananas and cassava, a sub-section on self-sufficiency centred on women. Plantations have been created throughout the country, even after colonisation, and although commercial products for export, such as coffee, cocoa and rubber, etc. were widespread, the traditional agriculture of self-sufficiency was theoretically maintained at the level of the inhabitants of the communities, but once the production of petroleum began, as the economic structure of dependency upon imports for the majority of agricultural products was established, agricultural production moved backwards.

However, in the middle of the 1980s when the price of petroleum dropped, although the Gabonese Government, having fear of the future food security problem, defined the increase in the rate of food self-sufficiency as a major strategy, numerous existing or new governmental structures, and not the existing agricultural production units, were selected as the main elements for production in all areas, such as animal raising and food cultivation. Management of these structures by the elite Gabonese class with a tendency to choose French technicians or European management models, presented problems in high costs and governance. Now it has practically disappeared without leaving any good results, except in the area of sugar, palm oil and chicken production. Moreover, with the disappearance of the feeling of crisis following the increase in petroleum prices in recent years, dependence upon the importation of food products and agricultural products has continued to the present, and since wheat and rice, in particular, have developed at prices that are relatively low now, meals based on bread and rice are widespread among the inhabitants of the cities and the low-income classes. Around the cities where it has become difficult to continue with the traditional culture of burning, the traditional crops of cassava and bananas have suffered from a drop in the fertility of the soil, and in spite of the increase in the population, food production is not increasing and the rate of self-sufficiency has dropped. Moreover, the method of small farms in the city areas, adopted by the Gabonese Institute for the Support of Development (IGAD), created in 1992, has shown results for market gardening promoted by the government, by replacing imports as in other sectors of agriculture: According to IGAD statistics for 2006, the importing of fresh vegetables had decreased by 60% since 1993.

Not including a small area of the savannah, animal raising is not part of the traditional in Gabon where there are few grasslands, and it is still not yet important, except for poultry in the area around cities. The exploitation of beef began in the Haut-Ogooué province through a governmental structure was dissolved because of management problems. Now the Company for the Development of Agro-Tourism of the Ogooué (SODATO) financed by the President, has acquired around one million

hectares in Lékabi in the same province, and has begun raising cattle with the French co-operation, however the head count has not yet reached 300 head of cattle.

(1) Coastal Fishing Zone

We cannot say that those who do coastal fishing consider agriculture and the processing of agricultural products as important. Since the majority of those who do the coastal fishing are foreigners who do not have the right to possess land, as do the Gabonese, and who do ambulatory fishing by using camps². They know that the increase in fishery production and the processing of fishery products is a means of increasing one's revenue. Doubtless as a consequence, they are technically more advanced than the Gabonese coastal fishers, and their fishery income is higher. They therefore, have less need to look for sources of income in addition to fishing. Whereas some of them have small gardens around the houses where their families live, it is difficult to think that for them agriculture represents a good potential source of income as long as there are restrictions upon them concerning land ownership.

(2) Lagoon Fishing Zone

Lagoons are extended almost continuously throughout the coastal region, going as far as Congo to the South from Omboué in the Ogooué-Maritime province (Nyanga province included therein), and villages with permanent residences of Gabonese fishers are found there where they work in agriculture for family consumption. The main crops are, as in the other Gabonese villages, bananas and cassava. In addition to the food crops, such as taro and sweet potatoes, small quantities of traditional vegetables (leafy vegetables such as folon, gombo, white eggplant, etc.) for family consumption, and red nut oil palm trees are also cultivated. Animal raising is rare, but it is done, although this involves only small domestic animals, such as hens and ducks. The processing of agricultural products is done largely for family consumption, generally the processing of cassava (simple food products obtained by grating, putting the product into bags and then into hot water, or else by drying it and then pulverizing it), and the extraction of palm oil, the production of palm wine, etc.

Given the abundance of the forests in the background, the possibilities of increasing agricultural production are great, and it is relatively easy to increase or reduce the production for family consumption according to the size of the family, which is what is done in reality. However, increase the production in this sector beyond family consumption and produce commercial products for the markets, poses numerous problems. First of all, the villages are remote and distant from the markets, and the road network has not yet been developed, making it difficult to transport agricultural products (such as fishery products), and even the activities themselves to produce for the markets is difficult. Moreover, in traditional society, the cutting down of trees and the clearing of the forest for cultivation based on burning, was a man's job. However, in the fishers's society, it is not realistic to use many people for such a job. And given the rich fishery resources, for them, the first obligation in terms of using hand labour was in fishing, then in hunting, and even if the road structure has been arranged, the priority of agriculture will not be reinforced easily.

As we will later indicate for the other remote regions, in the secondary forests around villages where a population relatively numerous have been living for a long time, it often becomes difficult to wait long enough to allow the soil to re-establish its fertility, and sometimes the degree of fertility of the burnt fields has considerably dropped. In that case, the women involved in agriculture, are obligated to make long round-trip journeys to get food that is becoming more difficult. It is essential for the fishers to pursue their agricultural production for family consumption in order to maintain their living conditions, but in this case, the adoption of new cultivating techniques for food products is now being promoted by IGAD as being pertinent: (the Association with crops serving as organic fertilizer, crop rotation and the association and alteration of various vegetable crops, permanent agricultural structures through the use of animal dung as fertilizer). The use of fishery sub-products (fish internal organs, etc.) obtained when salting and drying fish, would allow farmers to obtain organic fertilizer of good quality without having to have big domestic animals. The fishers of this

² For the Gabonese, agriculture based on burning, for family consumption, centred upon food products (cassava, bananas mainly, then taro, sweet potatoes also) carried out in the forests and extending behind the community represents an important production activity. The right of usufruct concerning land specified individually, is a hereditary right.

region have various advantages, therefore, compared to the inland fishing-farming villages that have a small volume of catch.

(3) Inland Fishing Zones

In all areas outside the coastal and lagoon areas, there are fishers doing inland fishing on the rivers, lakes and marshes. The situation of the resources, the ethnic groups, the traditional culture and life styles vary according to regions. Fishing, agriculture and the processing of agricultural products and their degree of dependence on these activities also varies. For the sake of convenience, these areas have been divided into three categories here below according to their level of dependence on fishing.

- 4) Lake and marsh zones
- 5) Woleu-Ntem province
- 6) Others

1) Fishing / Farming Villages in the Lake and Marsh Areas

Around Lambaréné in the Moyen-Ogooué province are the great lakes (Ogooué River) and other scattered lakes and marshes attached to them, as well as many fishing villages that take advantage of the voluminous fish resources. Here also cassava and bananas are the most important food products for family consumption, and theoretically, the production for family consumption is done, but in the villages where conditions of river traffic are good, the women send the transformed cassava (sticks: soaked cassava wrapped in a banana leaf and Ipothi: soaked potatoes) that they prepare with smoked fish and salty dried fish. But people have been living in the villages for a long time, and have always had good river transport conditions. The problem is that the nearby burned fields are not so fertile as before. In order to continue cultivating for family consumption, they have to choose between cultivating distant fields wherein there is overgrown brush, or re-establish the fertility of fields near the village. Since the first choice would increase the women's work, we can imagine that they use crop rotation and the application of organic fertilizers or manure being promoted by IGAD or ONADER. According to IGAD, since the manpower that is necessary for clearing the forests has diminished, the reduction in production costs is also possible, and the destruction of the forests should also be limited. Moreover, whereas the village farming population is decreasing, cultivating after having left a secondary forest for planting after having cleared the forest through the traditional burning method followed by a sufficient waiting period, represents a form of sustainable agriculture. It is obvious that the soil productivity of this agriculture is at a high level³. The problem is that the traditional burning method, which requires a lot of manpower to cut down trees and clear them out of the planting area, has become a heavy burden for the village population who have begun to appreciate the fruit of more convenient modern farming techniques, and this is the case of the villages around the big cities, wherein the main tendency has always been burning, a short waiting period and then planting.

2) Fishing / Farming Villages in the Woleu-Ntem Province

The majority of the inhabitants here are from the Fang ethnic group (the same as in neighbouring Cameroon), who traditionally do hunting and collecting, as well as farming. Since there are many streams in this region, the volume of fish caught decreases in the dry season wherein the water level goes down and river navigation becomes difficult. For this reason, economic activities other than fishing are important for the inhabitants, and farming wherein the harvest is during the dry season, plays an important role in the family livelihood. Generally, the inhabitants of this province are considered to be hard-working, and the population density is higher than in the other provinces. In the past, they produced coffee and cocoa on family plantations, but now it is cassava and plantain banana crops that are now being produced, and products such as tomatoes and surplus family vegetables, including therein transformed cassava products, are sold through intermediaries who transport them by truck to the capital city. One of the reasons for the distribution activity, compared to the other provinces, is that the road tying the region near Cameroon and Oyem – the capital of the Woleu-Ntem province, to Libreville, the capital of the country, has recently been improved. Cameroonian products, profiting from cheaper labour and production costs in Cameroon, such as potatoes and onion – typical vegetables that can easily be transported over long distances, carrots

³ The unitary production (calories) in mixed farming with the brush burning method (cassava, plantain bananas, rice) in a tropical forest similar (Democratic Republic of Congo) goes beyond the rice fields in Japan (Kazuhiko Sugimura "Economy of African Farmers", 2004, p. 255).

and cabbage have taken up a market share that has smothered the Gabonese production of the same. Concerning fresh vegetables that are easily damaged by road transport, such as tomatoes, lettuce, leafy vegetables, spices, the Gabonese products can compete with them and have maintained a certain market share in Oyem and Libreville. The number of market gardens managed by foreigners has tended to increase over recent years in Gabon, especially those of nationals from Burkina Faso and Mali who use irrigation for crops. In this province, IGAD also does training for the Gabonese in view of developing the production of fresh vegetables in Gabon.

Considering its cultural context and road network, this province seems to be better adapted to commercial farming, and this allows us to hope for an increase in agricultural production, and in particular, a contribution to the local supply of fresh vegetables.

3) Other Inland Fishing / Farming Villages

Farming based on burning in very low population areas compared to the immense tropical forest is characterized by long fallow periods, and theoretically, this is sustainable agriculture. Since there are many regions that are distant from the urban markets and the transportation infrastructure has not been developed, a radical change in commercial farming cannot be envisaged. Consequently, the possibility of greatly improving their livelihood through the increase in agricultural production and marketing of its products are minimal for the fishers, and their lives will probably remain simple, supported by an autarkic economy. The fact that many among them hope to escape from this lifestyle is visible in the number of departures towards the bigger cities such as Franceville and Libreville, however, it is especially important to take measures to increase their livelihoods so as to encourage them not to leave.

The savannah region in the two southern provinces in the country is the home of the tsetse fly, however, if appropriate measures are taken, such as the solution of preventive treatment, this region can be adapted to cattle raising. Although the development by a governmental structure failed, there are several private animal raising units, and small production units managed by families could be created.

1.4 Orientations of Assistance for the Fishery Sector

Cooperation for the Gabonese Republic (hereinafter designated “Gabon”) in the area of fishery has until present been directed by Japan, Spain, France, the FAO, etc. In this sector of inland aquaculture, there has also been a significant contribution made by the American Peace Corps (United States Peace Corps – USPC). The following activities have been developed through meetings with the concerned entities.

1.4.1 European Union (EU)

Putting a priority on the sustainable use of the oceans and the protection of the environment as a policy (Green Book), the objective of the European Union is to prevent production activities in targeted countries exporting towards the EU and others, from deteriorating the marine environment. In Gabon, the EU keeps a watchful eye on the activity of its own fishing trawlers that they should not do any over fishing or excessive exploitation of resources. In compensation for the use of Gabonese territorial waters, the EU pays to Gabon 860,000 Euros annually, and the DGPA uses around 60% of that amount for the surveillance of fishing boats, knowledge on the situation of available fishery resources and the improvement in the administrative capacity of the DGPA. The EU has no direct contact with the development of small-scale fishery in Gabon.

The three following projects are begin developed or are waiting to be developed:

1) Project for the Improvement of the Sanitary Condition of Fishery Products:

- Improvement in the administrative capacity;
- Reinforcement of the sanitary control laboratories;
- Improvement in the Sanitary management capacity of ship owners;

2) Project for the Reinforcing of Fish and Biodiversity Management (Central African coastal countries):

This project should bring support to the Regional Fishery Committee of the Guinea Gulf countries (COREP) so that they can be major stakeholders in the establishing of a surveillance system of local fishing boats. The livelihood and other questions have not yet been determined. The evaluation report of this project was presented in August, 2006.

3) Study (on the Qualitative Improvement of Fishery Products):

A study on the distribution of fishery products towards the European Union was done by the countries of the Central African Economic and Monetary Community (CEMAC) and Sao Tomé and Príncipe, including seven countries, with a workshop for the purpose of attracting donors.

1.4.2 World Wildlife Fund (WWF)

Concerning the projects related to coastal fishery, the WWF has responded with the objective of helping the lives of the small-scale fishers in the protection of the natural fishery reserves in their southern coastal region along the Atlantic Ocean.

(1) Activities in cooperation with the Fishers Association of the Ndougou Department (activities based in Gamba);

The collection of fishery statistics and a study of the fishing equipment was carried out. The SODEXO Company buys the fresh fish and then resells it to the petroleum companies for meals for their personnel. The WWF has technically supported the series of processes from the catching of the fish to their consumption.

(2) Project with the General Direction of the Environment within the Ministry of the Forestry Economy, Waters, Fishery and Aquaculture

The WWF has been developing conservation activities of the coastal environment from Omboué to the Republic of Congo with a project tied to the Ramsar Convention (Protection of wetland zones). Their intention is especially to keep an eye on the industrial fishing boats and protect small-scale fishery.

(3) Shell Sustainable Livelihoods Programme – A programme for sustainable subsistence in the Ndougou Department

This project began in 2004, supported by a fund of Shell Gabon – a petroleum company. They have mobilised micro-finance for the population to support fishery, agriculture and tourism. The UNDP presides over the steering committee of this project.

1.4.3 Wildlife Conservation Society (WCS)

This NGO has set up support in thirteen areas for the protection of wildlife living in Gabon. Within this structure, the CCRP (Cetacean Conservation and Research Program) is a joint project with the American Natural History Museum which protects and studies the cetaceans of the maritime zones, mainly those of the Mayumba National Park. In these zones you have the humped whale and manatees. Their protection has become a major priority, since petroleum production is active in the coastal waters, and the destruction of their habitat is rapidly advancing.

The projects that have been programmed in the area of fishery include the two following:

(1) Programme for the sustainable use of fishery resources for the peripheral area of the Mayumba National Park

The ocean and lagoon fishery resources are listed and the development of the fishery products upon the initiative of the population is supported in order to help out in the daily lives of the inhabitants of the area around the Mayumba National Park. Special emphasis is put on oysters that are being raised experimentally in the Banio Lagoon in order to improve the revenue of the population.

(2) Fishery Research Project for the Ivindo and Djidji Rivers

These two waterways are located within a national park. The living conditions of the inhabitants who live off fishing there are studied, the level of economic dependence on fishing is highlighted and the organization of cooperatives is supported. The setting up of resource management and participation in the tourism sector by setting up organizations is being encouraged.

1.4.4 FAO

Until the year 2006, in the area of coastal fishery, the FAO carried out micro projects for poverty reduction in Milembié, across from Corisco Bay, by setting up fishers associations and supplying, among other things, fishing equipment. Beginning in 2007, in application of food security programmes and South-South cooperation with the Ministry of Agriculture, Animal Raising and Rural Development (MAEDR), it was decided to begin technical support for inland aquaculture. In this project, they will be sending Chinese aquaculture experts and technicians to four inland provinces to give technical support to private agro-fish farms.

1.4.5 COREP (Regional Fishery Committee for the Gulf of Guinea Countries)

COREP is a regional fishery consultancy established in 1984, having its headquarters in Libreville, and which is made up of four countries: the Gabonese Republic, the Democratic Republic of Congo, the Republic of Congo and the Democratic Republic of Sao Tomé and Príncipe. It was founded in order to materialise fishery activities in this zone by harmonizing the foreign fishing boats and those of the member countries. It applies to foreign fishing boats rules that are common to the member countries. Through its intermediary, the European Union is planning on establishing fish resource management, and in particular, a system of surveillance of industrial fishing boats. However, this has not materialised since COREP is not yet developed and its livelihood is insufficient.

1.4.6 The African Development Bank and PSPA (Fishery and Aquaculture Sector Support Programme)

In August, 2007, the African Development Bank sent a research mission to evaluate the state of advancement of the PSPA. The administrative formalities of the project, among other things, having undergone a serious delay at that time, the evaluation was quite severe. However, the project did begin in September, 2007, and its various projects began: the study of the regional fishery situation, the supply of material and equipment, the recruiting of a consultant, the examination of the rehabilitation plan for the Aquaculture Stations, etc. This project shall be operational until the year 2020, and henceforth, we are expecting that a narrower cooperation with the present development study will serve as motivation for its execution. The African Development Bank has also expressed their desire for a technical support system to be sponsored by the Japanese contribution.

1.5 Results and Problems of the Precedent Japanese Cooperation Projects

1.5.1 Japan International Cooperation Agency (JICA)

(1) Grant Aid Cooperation (Construction of Fishery Community Centres);

i) Port-Gentil Fishery Community Centre (2001);

This centre is jointly managed by the Regional DGPA of Port-Gentil and the Small-Scale Fishery Group of Port-Gentil (GPAP). It is a fishing base and distribution centre wherein they receive about 60% of the catch of the Port-Gentil zone, using the installations that have been built and set up. The supplying of ice has allowed for the extension of the distribution of fish up to the Omboué region in the South. The main problem to be solved is the consolidation of the support for fishery activities, as for the support for the fishers Group and the setting up of a credit system.

ii) Lambaréné Fishery Community Centre (2003-2004);

This Centre is directly managed by the Regional DGPA of Lambaréné. It provides a landing place and supply of ice for the fishers and distributors, cold preservation of landed fish, and a wholesale and retail sales market. Around 70% of the catch in the Lambaréné zone is brought to this Centre which represents a distribution base towards the consumer centres of Libreville. Problems to be

solved are the reinforcing and consolidation of the support activities for the fishers, such as training for the organization of the fishers and the setting up of a credit system.

iii) Libreville Small-Scale Fishery Support Centre

The DGPA has planned on the building of a general support structure for small-scale fishing (landing area, processing structures, workshop for boats and motors, hygiene inspection structure for fishing products, training structure, etc.) in the Oloumi Zone of Libreville. The Gabonese Government has requested to the Government of Japan a grant aid assistance in order to set up this structure, and the JICA has carried out a preparation study for the cooperation for that purpose. This project is under consideration by the Government of Japan for execution during the 2009 fiscal year based on the results of this study.

(2) Donations for local Micro-Projects contributing to Human Security

i) Supplying of equipment for the Training Center for Fishery and Aquaculture at Port-Môle in Libreville (CMPA) (2000)

The CMPA was built with the support of the French cooperation, and French technicians covered the organization and administration until the year 2005. However, after the end of the French cooperation (2000-2005), activities stopped. There was a problem of the renting of the land on which the installation was built, and as a result, all the equipment, including that equipment supplied by Japan, was put into the DGPA warehouse. The equipment supplied by Japan had been used by the JICA experts up until the year 2004 to train and extend knowledge for local fishers, although the results were not sustainable since there was no coherent training system for the Gabonese instructors and extension trainers. Given the situation, the training of the Gabonese instructors, and the writing up of a training program and a manual by Tunisian experts are now ongoing within the context of JICA South-South cooperation (See paragraph on technical cooperation here below (3)).

ii) Building of an Ice Transportation Boat to Omboué (2001)

An outboard motor boat with a refrigerated hull, using the Omboué Fishery Community Centre, was built on site and supplied in order to promote the expediting of the catch and supplying of ice to the surrounding fishing villages. It was to support the activities of the fishers association of Omboué, but the transporting was finally stopped because of the competition with the private fishmongers and the inadequate organization of the Fishers Association of Omboué at that time. The problems to be solved in the future are the support of the members of the association and capacity reinforcement through the activities of the Fishery Community Centre of Omboué.

iii) Construction of a Mechanical Workshop in Port-Gentil (2006)

A mechanical workshop was built next to the wharf of the property of the Fishery Community Centre of Port-Gentil. The Japan Overseas Cooperation Volunteers (JOCV) were sent there beginning in May, 2007, and have been covering the mentorship on techniques for repairing the outboard motors for the mechanics of the Centre and the fishers. The training of the mechanics of the Centre is advanced, and the workshop plays a central role in the technical mentoring for fishing boat motor maintenance in the Ogooué-Maritime province.

iv) Construction of the Junior High School in the fishing village of Omboué

This structure was finished only in November, 2007. We hope that its use will lead to an increase in the school attendance rate of the village children at the junior high school level.

(3) Technical Cooperation (Three-Year Programme for the CMPA Reinforcement in Gabon: 2006-2009)

Within the framework of the South-South cooperation between Tunisia and Gabon, the training of Gabonese instructors (advanced technicians), (S.Fax in Tunisia) and the sending of Tunisian experts to Gabon (setting up of a training programme and manual) are ongoing in four areas: (i) fishing techniques, (ii) navigation and security, (iii) motors and (iv) freezers. Presently, two trainees in area (i) and two in area (ii) above (total of four) study in Tunisia four months a year for two years.

Moreover, the Tunisian technicians are sent to Gabon and this has been functioning since December, 2007. This cooperation will allow for the creation of a base in human resources for training in the fishery domain in Gabon. Nevertheless, a new training installation will have to be set up since the present CMPA premises are not usable as a place of learning and training.

1.5.2 Overseas Fishery Cooperation Foundation (OFCF)

(1) Improvement of Fishery Community Centres (Owendo, Omboué)

1) Owendo Fishery Community Centre (rehabilitation of an ice machine and refrigerated warehouse);

The arranging of these installations has allowed for the reestablishment / extension of the ice-making and refrigeration functions of the Community Fishery Centre, managed by the Fishers Association of Owendo, and which serves as a fishery and distribution base for the fishers and fishmongers of the Owendo zone. The setting up of private companies in the area of the premises in the past few years has led to the circling of the Centre by workshops and factories, and the limiting and of the landing place and anchoring. In the future, the plan is to reinforce the activities for an improved structure and support of the fishers organization together with credit for the fishers, the arranging of the landing and anchoring zones, as well as the improvement of the access roads for the fishers and fishmongers through the industrial zone.

2) Omboué Fishery Community Centre (rehabilitation of an ice machine)

The arranging of this structure has allowed for the re-establishing and reinforcing of the ice production of the Centre. It is managed by the Fishers association of Omboué, with the assistance of the Regional DGPA of Omboué. The main activities are the production and supplying of ice, although capacity building for training activities and the support of the fishers organization, together with the provision of credit for the fishers will be the future challenges to be solved.

(2) Aquaculture Development Support Project at Peyrie Aquaculture Station (2005-2010)

In this project, the refurbishing of the experimental ponds of the Aquaculture Station of the Peyrie and the setting up of structures for food production were carried out with the technical cooperation of the OFCF, and this assistance mainly concerned the development of food for the tilapias and technical contributions for the production of large-size fish. Workshops and seminars were organised and mentoring took place through regular visits by technicians to the other regional Aquaculture stations in order to extend the techniques that had been developed. This project has allowed for the consolidation of a semi-intensive fish production technique supported by the organization of a food source.

Similar to phase two, the technical cooperation concerning the development of extruded granules has continued, as well as the technical development of the production of young fish of a new fish species (catfish, etc.), problems to be solved (time period anticipated: two years beginning in the month of September, 2008).

CHAPTER 2

DEVELOPMENT CONCEPT

Chapter 2 Development Concept

2.1 Development Potential and Obstacles

2.1.1 Demand for Fishery Products

The average per capita fish consumption per year during the past five (2001-2005) and ten (1996-2005) years is estimated respectively at 27.7 and 33.9 kg. The long-term tendency is that the volume supplied in the country is decreasing with time, however, that is due to the fact that national production has been stagnating at around 41,000 - 46,000 tons per year since the year 2000, and that around 7,000 - 10,000 tons of fishery products are imported every year in order to fulfil the needs not being met by the national production. The present demand is 50,000 - 55,000 tons per year.

Table 2.1 Supply and Demand of Fishery Products in Gabon (1996-2005)

Year	Fishery Production (tons)					Exports		Imports	Domestic Consumption	Population (thousands)	Consumption per capita
	Industrial fishery	Small-scale coastal fishery	Inland fishery	Aquaculture	Total	Industrial fishery	Small-scale fishery				
1996					46,175	680	6,523	12,094	51,066	1,145	44.6
1997					43,641	1,527	7,347	11,553	46,320	1,192	38.9
1998					53,767	2,206	9,627	10,575	52,509	1,241	42.3
1999	11,384	29,200	10,000	559	51,143	2,624	8,704	9,522	49,337	1,292	38.2
2000	11,732	24,900	10,838	559	48,029	3,297	7,394	11,073	48,411	1,345	36.0
2001	9,481	23,496	8,943	102	42,022	2,886	4,663	11,595	46,068	1,400	32.9
2002	10,964	20,509	9,400	82	40,955	3,781	5,714	1,864	33,324	1,457	22.9
2003	12,494	22,781	9,500	80	44,855	2,039	5,580	3,914	41,150	1,517	27.1
2004	13,454	22,863	9,641	80	46,038	4,888	5,280	8,006	43,876	1,555	28.2
2005	11,620	22,543	9,700	78	43,941	2,585	4,285	6,902	43,973	1,594	27.6
1996-05	11,590	23,756	9,717	220	46,057	2,651	6,512	8,710	45,603	1,374	33.9
2001-05	11,603	22,438	9,437	84	43,562	3,236	5,104	6,456	41,678	1,504	27.7

Note : The export volume of small-scale fishery is an estimated value (supported by the results of on site interviews, we presume that 50% of the ethmalosa are exported to Cameroon).

Source : DGPA Fishery Statistics (Fishery production), FAO-FISHSTAT (exports, imports), 1993 and 2003 census (population).

If the future per capita fish consumption is kept between 20 and 30 kg, which is the level of present consumption, the demand for national consumption will be around 43,000 to 64,000 tons in 2020. Moreover, the volume of exports of fishery products is estimated at 7,000 - 10,000 tons per year during the past several years. As fishery resources have a tendency to drop on a global level, we can henceforth foresee a gradual increase in the demand for exports and the estimated volume to be 10,000 - 15,000 tons per year. Consequently, the total demand for fishery products is estimated at between 58,000 and 79,000 tons per year in 2020 (see table here below).

Table 2.2 Anticipated Demand of Fishery Products in Gabon

Year	Predicted Population (thousands)	Consumption per capita (kg/year)	National demand (tons/year)	Demand for exports (tons/year)	Total demand (tons/year)
2010	1,804	20	36,088	10,000	46,088
		25	45,111		55,111
		30	54,133		64,133
2015	1,992	20	39,845	12,500	52,345
		25	49,806		62,306
		30	59,767		72,267
2020	2,146	20	42,924	15,000	57,924
		25	53,655		68,655
		30	64,386		79,386

Source : Estimation of the study team (on the basis of the population at 1,518,000 in habitants, according to the national census of Gabon in 2003, an increase of 2.5% for 2003-2010, 2% for 2010-2015, and 1.5% for 2015-2020 – the supposition for the anticipated growth of the population).

The African Development Bank (ADB) estimates that the demand for fishery products in the Central and Western African countries including Gabon wherein demand increases every year will be more than 200,000 tons per year. Since the Gabonese population is only around 1.59 million inhabitants (2005), domestic demand is limited. However, the import demands from the three countries of Cameroon, Congo and Nigeria that are net importers of fishery products and appear difficult to increase the domestic productions considering their resources limitations would increase over 300,000 tons per year in 2020 (see the table here below). Moreover, there are only two really large exporting countries of fishery products in West and Central Africa regions: Senegal and Mauritania. Given this situation, if the fish production increases in Gabon, the possibility of increasing exports towards these neighbouring countries will increase due to the geographical proximity, in particular for inexpensive smoked Ethmalosa and frozen fish (industrial fish products).

Table 2.3 Demand for Fish Products in the Neighbouring Countries

	Cameroon	Congo	Nigeria
Production (tons/year)	108,000	43,456	465,251
Exports (tons/year)	72	2,004	4,350
Imports (tons/year)	121,132	19,984	570,441
Domestic Consumption (tons/year)	229,060	61,436	1,031,342
Population (thousands)	1,820	370	14,000
Consumption per person (kg/year)	12.6	16.6	7.4
Anticipated Demand (tons/year)	286,703	76,789	1,295,240
Increase in Demand (tons/year)	57,643	15,353	263,898

Note : Anticipated demand is calculated on the basis of 1.5% of the rate of increase of the population with a hypothetical stagnation of individual consumption.

Source : FAO in 2004

The African Development Bank has also pointed out the possibility of exporting high-valued fishery products (especially around 4,000 tons of shell fish, around 60,000 tons of demersal fish) towards European and Asian markets. Considering these points, even if the production of Gabonese fishery products increases in the future up to the volume of demand indicated in the above table, there will not be an over supply situation.

2.1.2 Fishery Resources

The exclusive economic zone (EEZ) of Gabon is around 213,000 km², and the coastal line from the north end of Cocobeach to the south end of Ndindi is about 750 km. The continental plateau of less than 200 m in depth extends approximately up to 60 km off shore with a surface of around 40,600 km². Moreover, the majority of natural inland waters cross the central part of the country and are located in the river basin of the Ogooué which represents 72% of the national territory. This river, having a total length of 1,200 km, has a river basin of 215,000 km² (193,000 km² in Gabon), and its flow at the mouth attain 100,000 m³/second. The river basin includes many lakes and swamps which are essential zones for inland fishery.

The fishery resources of the country have been studied twelve times in the past by FAO / NORAD, ORSTOM, N.O.F. Nansen, etc., and analyses and evaluations of these results have been done by French consultants (see the table here below).

Table 2.4 Estimation of Exploitable Fishery Resources

Fish species		Maximum sustainable yield (tons/year)	Volume of catch 2005 (tons/year)		Exploitation rate of resources	Observations	
			Small-scale fishery	Industrial fishery			
Small pelagic	Ethmalosa	14,000 ≤	8,570	-	61%	Distributed on the North coast	
	Sardines, etc.	North	14,000-20,000	1	26	0%	Including other small pelagic
		South	78,000-102,000	2,371	-	2-3%	
Semi-pelagic	White mackerel, Guinean barracuda large-eyed hair tailed	76,000	1,472	583	3%		
Demersal fish	Bream, snapper, grouper, bar, captain	North	10,000-13,000	5,149	6,542	40-51%	Including demersal resources difficult to fish by small-scale fishery
		South	20,500-25,600	3,897			
Langouste		100-150	27	53	50-80%		
Estuary fish	Coastal lagoons	14,000	8,807	-	63%	4 places : Nkomi, Iguela, Ndogo & Banio	
Freshwater fish	Lakes, marshes around the Ogooué River	5,000 ≤	3,941	-	79%	An average of 5000 kg/km2 (note 1)	
	Rivers	18,000	5,759	-	32%	An average of 70 kg/km2 (note 2)	

Note 1 ; Lake Azingo : 33 kg/hectare, Lake Onangué : 71 kg/ha (Survey of Inland Fishery Resources of Africa SIFRA, FAO, 1987)

Note 2 : Identical Hypothesis as for estimated fishery resources in Equatorial Guinea (Fishery Master Plan in Equatorial Guinea, BDPA-SCETAGRI/SEPIA, 1996)

Source : Development Project for Small-Scale Fishery and Fish Farms in Gabon, Report on the Preparation, May, 1998, SEPIA and COFREPECHE

As seen in the above table, the maximum sustainable yield (MSY) is estimated at around 300,000 tons, whereas the actual annual catch is around 45,000 tons, which shows that in general, the exploitation rate of the resources does not go beyond 15%.

2.1.3 Target of Fishery Production

As indicated in Table 2.3, the demand for fishery products in 2020 is estimated at around 58,000 to 79,000 tons per year (an increase of 13,000 to 34,000 tons per year compared to the catch in 2005). As shown in Table 2.5, this demand can completely be met by the exploitable fishery resources, and it is desirable to manage the demand through an increase in the production of sardines and semi-pelagic and demersal fish. In the above figures, the inland fishery resources (lagoons, rivers and lakes) also seem to present a certain exploitable margin. However, since there are domestic consumptions which do not appear in the statistics is certainly significant and therefore the exploitable margin should be smaller than it appears, it would seem appropriate not to plan for active utilization of inland fishery resources.

Considering these points made above, the fish production target in Gabon has been studied and defined according to fish species, presuming that anticipated demand will be met in 2020 through sustainable exploitation of resources (see the table here below).

Table 2.5 Production Target in 2020

Fish species		Volume of exploitable resources (tons)	Target for Volume of catch (tons) Exploitation rate	Observations
Small pelagic	Ethmalosa	14,000	8,600 (61%)	No change
	Sardines etc.	107,000	11,000 (10%)	Increase of 10,000 tons, 3 months of high season per year
Semi-pelagic		78,000	1,800-22,600 (29%)	No change, or maximum increase of 20,000 tons, 6 months of high season per year
Demersal fish		34,000	17,000 (50%)	Increase of 1,500 tons
Langouste		125	100 (80%)	No change
Brackish-water fish		14,000	8,800 (63%)	No change
Freshwater fish		23,000	9,700 (43%) + 1,000	No change + 1,000 tons of fish farm production
Total			58,000-79,000	

The species targeted for production increase are the sardines, semi-pelagic and demersal fish. The sardines caught by small-scale coastal fishers will be used for consumption (smoked) and for material of fish meal by companies to be set up. The demand for fish meal should increase in the future as an ingredient of aquaculture feed (presently, Gabon imports fish meal of low quality and high price from Senegal). Moreover, there will be increased production of demersal fish by small-scale fishers. In addition, since it appears difficult to attain production increase in semi-pelagic fish through small-scale fishery only, commercial fishing companies will be established for the exploitation of semi-pelagic resources.

The production and processing mentioned above would allow us to hope for an economic impact and the creation of jobs indicated in the table here below.

Table 2.6 Economic Impact and Creation of Jobs by Industrialisation

Fish Species	Activity	Period	Annual Economic Impact	Jobs Created
Sardines, etc.	Fishing	July-Sept ((3 months)	1 billion Cfa F (100 F/kg x 10,000 tons)	600-700 fishers
	Transformation (fish flour)	July-Sept ((3 months)	1 billion Cfa F (500 F/kg x 2,000 tons)	500-600 transformers
Semi-pelagic and demersal fish	Semi-pelagic fishing	All year	1.6 billion Cfa F (800 F/kg x 20,000 tons)	2,500-3,000 fishers
	Demersal fishing	All year	1.2 billion Cfa F (800 F/kg x 1,500 tons)	300-400 fishers
	Distribution & sale	All year	2.58 billion Cfa F (1,200 Cfa F/kg x 21,500 tons)	1,000 Intermediaries & retailers
Total			7.38 billion Cfa F/year	4,900-5,700

In addition, for aquaculture, it is necessary to increase production through the activation of existing fish farms (mainly integrated farming), and develop the production by investment in industrial aquaculture¹ through the mining and forestry companies for the purpose of feeding their employees, as well as semi-intensive aquaculture, for example, aquaculture in cages. The table here below indicates the objectives of aquaculture production for the year 2020, as well as the estimated values for the economic impact and creation of jobs.

Table 2.7 Aquaculture Production Target in 2020

Management	Type of aquaculture	Scope	Annual production target	Annual economic impact	Jobs Created	observations
Existing fish farmers (individuals)	Extensive & integrated	Around 200 operations (around 100 ha)	500 tons (5tons/ha)	0.75 billion Cfa Francs (1,500F/kg)	200-300	Revitalisation of abandoned ponds & improvement of present ponds
Existing companies	Semi-intensive	SODEPAL, SIAT GABON, FAEN etc.	200 tons (10tons/ha)	0.3 billion Cfa Francs (1,500F/kg)	40-50	Doubling of the production
Industrial aquaculture (new management)	Semi-intensive	New companies	200 tons (10tons/ha)	0.3 billion Cfa Francs (1,500F/kg)	40-50	
	In cages	2,000 cages	100 tons (50kg/cage)	0.2 billion Cfa Francs (2,000F/kg)	500	Installation in the Ogooué River and lagoons
Total			1000 tons		800-1,000	

Note : The Economic impact has been calculated on the basis of 1,500 Cfa F /kg wholesale price.

2.1.4 Obstacles

(1) Market access is limited

Given the population distribution in the country, the major consumption centre is Libreville, the capital. However, since the roads to Libreville are in bad condition, transportation costs are high, and

¹ Presently, SODEPAL (Franceville : manganese mining), FAEN (Lastoursville : forestry operation), SIAT GABON (Bitam : agricultural operation for rubber), etc. A Chinese company who has obtained the right to mine the iron ore in the Ogooué-Ivindo Province, which could also have activities in agriculture, animal raising and aquaculture.

transportation techniques for fresh fish have not been adopted (the appropriate facilities for the transportation of fresh fish have not been widespread), inter-province transportation of fishery products is limited to smoked Ethmalosa, salted/dried ocean fish and frozen fish. Frozen fish is a product of industrial fishery or imported fish, and the price at the production area in Gabon is around half the price of fresh fish. The price of salted/dried fish and smoked fish is also half the price of fresh fish on wet weight bases. Consequently, the fresh fish that could be sold at a high price if they were transported to major consumption centres are forced to be sold at a lower price at the production area due to various transportation risks.

Road transportation time (vehicle) from Libreville to the main cities in the country is as follows :

	237km (4 hours)	203km (3 hours)	171km (3 hours)	110km (3 hours)	(Total: 13heures)
i) South:	Libreville→→→	Lambaréné→→→	Mouila→→→	Tchibanga→→→	Mayumba
	226km (4 hours)	360km (7 hours)		181km (3 hours)	(Total: 14 hours)
ii) South-east:	Libreville→→→	Ndjolé→→→	Lastoursville→→→	Franceville	
	226km (4 hours)	351km (7 hours)			(Total: 11 hours)
iii) East:	Libreville→→→	Ndjolé→→→	Makokou		
	226km (4 hours)	308km (4 hours)			(Total: 8 hours)
iv) North-east:	Libreville→→→	Ndjolé→→→	Oyem		

(2) Human resources are poor

Foreigners represent around 20% of the population in Gabon, and they are the ones who do dangerous, dirty and complicated work.

In the area of fishery, many of the coastal small-scale fishers are foreigners who catch more fish than the Gabonese fishers by using large size dugout canoes and advance fishing equipment. In other words, foreign fishers have advanced fishing techniques, whereas the Gabonese fishers use simple equipment and operate in calm waters on the coastal area (rivers or lagoons without waves). Based on this reality, it is inevitable to utilize the foreign fishers (including their offspring who would get Gabonese nationality)² as the main manpower numerically and technically for development of marine fishery development.

Moreover, in the area of inland aquaculture, foreign technicians are always employed by the companies which practise intensive aquaculture. This shows that the human resource development of Gabonese technicians is slow and the available number of technician is severely limited.

(3) There are limits for support services

The DGPA facilities for support services in the area of small-scale fishery and aquaculture are i) Four community fishery centres (Owendo, Port-Gentil, Omboué and Lambaréné), ii) Ten fish farm stations (one in Libreville, four in the Woleu-Ntem province, three in the Ngounie province, one in the Nyanga province and one in the Ogooué-Lolo province), iii) Fishery trades and aquaculture centre at Port-Môle in Libreville (CMPA).

Existing community fishery centres provide physical services for the small-scale fishers and fishmongers / retailers from the surrounding area such as the production and sale of ice, storing and sales of the fish, storage and repair of fishing equipment. The services of these Centres are effective for supporting small-scale fishery, but the services provided at the other fishing bases are not enough due to insufficient facility and equipment. Moreover, the lack of the support for the supplying of dugout canoes, motors, fishing equipment, etc. (credit, sale of fishing equipment) is causing the stagnated fish production since year 2000.

² The foreign fishers spend nearly all year in Gabon, and today, several decades after immigration, the number of children and grandchildren with Gabonese nationality is increasing.

In addition, there are ten fish farm stations in the country, which not only no longer fulfil their initial role of extending techniques to the farmers and fish farmers, but also nearly stopped producing fingerlings or table fish. The reasons are due to the limited DGPA budget: i) physical problems such as fish ponds are not deep enough to drain water, ii) pollution of the water because of the population increase in the surrounding area, and iii) the lack of transportation means (vehicles, scooters) for extension activities. Although there is a plan to expand the main fish farm stations within the context of the PSPA, the number of extension agents is expected to be low because of the limited budget as well as the effect from the planned privatisation of several stations. This situation demands an establishment of more effective extension system that obtains results with a small number of extension agents. In addition, the low number of fish farmers is also a problem, and it will be necessary to encourage private companies to begin aquaculture.

In the year 2000, the CMPA was built with French assistance in order to reinforce training and capacity-building of fishery extension agents. However, this centre is not functioning presently because of the lack of instructors who were to train the extension agents. Moreover, for the time being, the centre has been closed because of non-payment of the tenancy rent. In this situation, the South-South collaboration of the JICA (between Gabon and Tunisia) began in December, 2006 for training in the fishery sector. Two trainers of the CMPA (instructors) were sent to Tunisia for training (four months per year during a 2-year period), and two Tunisian experts have come to Gabon for a period of six months to write up manuals. The training in fishing techniques for young Gabonese fishers will actually become possible after the successful human resources development of the Gabonese extension agents following the Tunisian cooperation programme.

(4) Access to micro-credit is difficult

Micro-credit in the countries of Central Africa began in a form of mutual local financing association that were made around the year 2000 by a women's NGO. Officially, the Central African Banking Commission (COBAC) which is an organization within the Central African Economic and Monetary Community (CEMAC) began it by defining the rules for micro-financing in Cameroon. In Gabon, micro-credit entities were organized in 2003, and the same rules have been adopted.

Micro-credit entities (those which have been authorised by COBAC) are divided into three categories. Today there are six micro-credit establishments in Gabon (three of which have been authorised), one of which in the past gave credit to the Ebel-Abanga fishers and farmers.

i) Category 1

These are cooperatives which collect and save the money of individuals (members + investors) and provide credit to the members. The capital is not limited, but there must be a minimum of thirty members.

- AGASS Savings & Credit Fund (CECAG): capital of 3 million Cfa francs: 44 members
- FEMO Savings & Credit Fund (CFEC): capital of 12 million Cfa francs: 30 members

ii) Category 2

These are group in company organizations. The funds are collected from among the shareholders and credit is granted to the members and other third parties. The minimum capital is 50 million Cfa francs.

- African Financing of Micro Projects (FINAM): capital of 100 million Cfa francs: 10,000 members

iii) Category 3

These are company organizations wherein the funds are collected from the employees and credit is granted to the employees and other third parties. The minimum capital is 25 million Cfa francs.

There is no equivalent in Gabon.

iv) Unauthorised Entities

- Mutual credit: unknown
- APEC-Gabon: Unknown
- CECAA: Capital of 3 million Cfa francs, 30 members

In Gabon up to the present, around 10,000 people have benefited from micro-credit schemes, and in 2005, around 3 million Cfa francs of investment and around 2 million Cfa francs of savings were made. Category 1 involves people carrying out economic activities and often it is used for the purchase of production and distribution equipment. The amount of credit is from 10,000 to 10,000,000 Cfa francs without any guarantee or mortgage (same condition in Category 2 also). Generally, the financing conditions of banks are severe and they cover only 20% of the candidates requesting financing.

Since the majority of existing micro-credit establishments are in Libreville, only people living around the city can use them. Savings is an obligatory condition for obtaining credit, and the amount of credit is determined by the amount of savings. For this reason, the farmers /fishers in the inland regions, who are not used to saving, are actually not taken into consideration.

2.2 Development issues

The development issues of small-scale fishery and inland aquaculture can be summarised here below on the basis of the results of a field data collection (April to July, 2007), of the workshop for the project management cycle of the project (PCM) (July, 2007) and of the socio-economic study of the rural communities (May to July, 2007).

(1) Issues concerning the poverty of farmers – fishers

The socio-economic study of rural communities (May to July, 2007) executed in this Study showed that the average monthly income of the farmers-fishers was as follows: 46,847 Cfa francs / person for the coastal fishers (86.5% coming from fishery activities), 36,764 Cfa francs per person for the lagoon fishers (73.8% coming from fishery activities), and 41,719 Cfa francs for the inland fishers (68.3% coming from fishery activities). Although these figures go slightly above the absolute poverty level (income of less than 29,000 Cfa francs per person), 50.1% of the coastal fishers, 48.4% of the lagoon fishers and 63.2% of the inland fishers are below the poverty level. Moreover, according to the Strategic Document for Growth and Poverty Reduction (December, 2005), 33% of the total Gabonese population and 53% of the farmers are below the poverty level, which leads one to believe that the situation for the fishers remains nearly at the same level as the farmers. The cause of the poverty of the fishers' families is presumed to be as follows:

- The high cost of fishing due to escalating fuel price as well as the poor fishing equipment does not allow them to do effective fishing;
- Many fishers are economically isolated, and do not feel the need to organise because of the type of their fishing methods or fishery activities. Even if there are fishery associations, their activities do not lead to an improvement in their fishery management since those associations do not play an economic role as such;
- There is few work opportunity in the rural communities, and fishery that is considered to be a difficult, dangerous and dirty job does not represent an attractive profession for young people. For this reason, there is a remarkable move of young people towards the cities, especially from the inland and lagoon fishing areas, resulting in no successors or other labour available for many fishers' families.
- In the rural communities, the roads are bad and the means of transportation are also limited. Access to the markets therefore requires a lot of time and high transportation costs.

(2) Issues tied to the delay in the organization of the fishers

The DGPA has been late in the organization of the "Fishery Cooperatives" promised within the framework of fishery development. And even if there exists an organization, since it is not economically active, it is not sustainable and the members do not feel the advantages of being a member. For these reasons, the fishers suffer from economic losses due to high production cost for fishery and aquaculture operation, scarce sales outlets of products, or cheap product prices which could be improved by working collectively in organizations.

- Governmental subsidies to support the fishery organization are inadequate;
- Since there are no human resources who can promote the reinforcement of the organization, instructions for the management of the associations are not given with precision;
- The fishers sometimes get organized in order to obtain governmental supports, but they are not motivated to do collective activities for themselves;
- Since kinship relation is strong, relations of mutual confidence hardly exist among the members of the same organization.

(3) Issues tied to the lack of preparation of the management system of fishery resources:

The coastal zones and inland zones are based on a free access rule for fisheries resources exploitation and any Gabonese can fish there. Rules concerning the equipment and fishing zones are administrated by the government, but illegal fishing is frequent since the penalties have not been determined. Gabon is rich in fishery resources, and although presently there is a certain margin in the resources, that margin is decreasing or disappearing particularly in parts of the lakes and small streams. Especially for the luxury sea food, such as shrimp, crabs and lobsters which are fished in heavily by the industrial fishery, there should be measures taken very quickly concerning the management of these resources.

- Since fishery resources are abundant, few fishers are conscious of the need to manage these resources. This interferes with the promotion of the co-management of the fishing zones.
- The 3-nautical miles zone off the coast is defined by law as the zone reserved for small-scale fishers, but illegal fishing by commercial trawlers is common and the problems such as the destruction of fishing equipment of the small-scale fishers is frequent;
- Monofilament nets and gill nets with a small mesh (less than 45 mm) is forbidden by governmental regulations, but there are fishers who continue to use them to catch sufficient numbers of fish in the small streams (the mesh restriction is not yet enacted in the inland fishery zones).
- We are conscious of the need for management or control of fishing in certain zones where the number of fish is known to have decreased, but fishing habits cannot be adjusted since there are no sources of income to replace fishing.

(4) Issues tied to the lack of support services

Although the support services in the area of small-scale fishery and aquaculture, are provided in the fishery infrastructure mentioned in the item (5) below, they are not well functioned due to the insufficient facilities and equipment as well as the lack of human resources. Therefore, the appropriate techniques for small-scale fishery and aquaculture are undeveloped and not extended, resulting in low livelihood level of farmers/fishers.

- The community fishery centres do not serve to provide other types of services including sale of fishing equipment, management of funds for credit, and extension services for the teaching of fishing techniques, etc.
- In the past, the CMPA temporarily covered the training of fishery extension agents, however, the Centre no longer functions (A training programme for the Gabonese instructors was undertaken in framework of a South-South cooperation of JICA in which Tunisian experts trains the Gabonese instructors.).
- The credit scheme available for fishers and fish farms is limited, and the income level of the fish farmers often does not meet the requirements to receive credits.

(5) Issues tied to the lack fishery infrastructure

In terms of public institutions of above-mentioned support services in the area of small-scale fishery and aquaculture, there are: (i) four community fishery centers (Owendo, Port-Gentil, Omboué and Lambaréné), (ii) ten fish farm stations (one in Libreville, four in the Woleu-Ntem province, three in the Ngounie province, one in the Nyanga province and one in the Ogooué-Lolo province), and (iii) Fishery trades and aquaculture centre at Port-Môle in Libreville (CMPA).

- The community fishery centres which offer the service of supplying ice, a place for storage and sale of fish caught, repair of outboard motors, etc. are not developed well yet at every main fishery base in the country.
- The aquaculture stations are old and cannot function correctly because of the lack of funds and human resources. They are not providing the extension services of aquaculture techniques, which is their main role (The rehabilitation of the stations and the training of human resources are included in the programs of the PSPA).
- Since the CMPA's existing facilities and equipment are time-worn, and its site is very limited, so that it cannot be used anymore.

(6) Issues tied to the Stagnation of Fish Production and Aquaculture

Domestic fish production is stagnating, and the average quantity of fish consumed per inhabitant which was around 40 kg per year in 1996-2000 dropped to 27.7 kg in 2001-2005. Moreover, the demand for inexpensive fishery products such as smoked ethmalosa from neighbouring countries especially from Equatorial Guinea or Cameroon has been increasing in the past few years.

- For coastal fishery, good quality fishing boats and equipment adapted to ocean fishing has not been introduced. For that reason, the fishing ground is limited to the bays and coastal waters.
- The difference in the catch of inland fishery between the dry season and the rainy season is substantial, and there is no way of increasing the catch during the rainy season;
- Since the equipment needed for small-scale fishery is not available in the rural fishing villages, fishers have to go to Libreville or Port-Gentil to get it. For this reason, the renewal of fishing equipment is a problem, and the effectiveness of fishing is decreasing.
- The inhabitants traditionally prefer eating the meat of wild animals to eating fish, although wild animal meat is more expensive. Although the distribution of wild animals in the public markets is restricted by the law, they are sold along the roads or at restaurants.

2.3 Basic Concept of Development

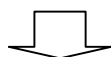
In the PDDI, the approaches here below shall be adopted based on development strategies in order to solve general development problems of small-scale fishery and inland aquaculture.

2.3.1 Approach to Problems

(1) Increase in the revenue of fishers / farmers

i) Promotion of integrated agricultural management

Problem: It is difficult for small-scale fish farmers to cover production costs up to the receiving of cash for the sale of their products.



Approach: Integrated agricultural management allowing the fish farmer to obtain several different products, such as agricultural products, fishing products, animal raising products, shall be extended to facilitate a stable cash income in addition to food self-sufficiency products. Fishing and hunting shall be positioned as economically sustainable and important activities that earn daily cash income and their development shall be sought.

ii) Improvement in the Awareness of Agricultural Operations

Problem: Since fishers and farmers are not familiar with financial management, they do not practice accounting of income and expenditure. Only 10% to 20% of all fishers have savings, and only a few among them keep accounting books. Under this situation, financial organizations lose confidence on the fishers and farmers and hesitate to provide credit for them.



Approach: Instructions shall be given to fish farmers for keeping accounts in order to allow them to become conscious of the importance of management and to improve their degree of confidence.

iii) Extension of low-cost production techniques

Problem: Since fish food and fertilizers are expensive, and their supply is difficult for agriculture, animal raising and aquaculture. Aquaculture production with purchased feed is not economical from the viewpoint of the size and benefits for small fish farms. Moreover, operational costs, such as fuel, have gone up dramatically for coastal fishing and inland fishing.



Approach: Production techniques without use of purchased feed shall be extended to the small fish farms. The increase in the effectiveness of catching fish through the improvement of fishing techniques and the improvement in fuel efficiency through the introduction of small diesel engines shall be attained by the fishers.

(2) Training/reinforcing of the fishers organization

i) Inducing of collective activities

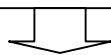
Problem: The mutual confidence among fishers is hardly developed, and they do not understand the value of collective activities.



Approach: Economic incentives to encourage collective activities of the fishers (measures favoring joint activities) shall be set up, and collective activities based on mutual confidence (sale of the catch, purchase of equipment) shall be encouraged. Village leaders shall also be trained to promote shared activities. For the development of collective activities, the farmers or fishers will be allowed to form groups freely not based the conditions for membership but based on their voluntary intention.

ii) Planning and managing premises for the fishers organization

Problem: Since the community fishing Centers are public structures that are usable by the fishers, the orientation of the Government is to manage them jointly based on a signed contract with the fishers organization. However, even if the fishers' organizations have been created, they lack management skills and cannot get along as in the cases of several fishers organizations that already exist.

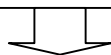


Approach: The fishers organizations shall be set up and reinforced, and they will actively participate in the management of community fishing centers. By the year that has been targeted for the project (2020), the community fishing Centers shall be set up in ten places in the country (Libreville, Cocobeach, Kango, Lambaréné, Ndjolé, Makokou, Port-Gentil, Omboué, Gamba, Mayumba), and autonomous fishers organizations shall be established through training in joint management operation with the DGPA.

(3) Establishment of a management system for fishery resources

i) Joint Surveillance System of the 3 nautical miles off the coast

Problem: Illegal fishing of fishing boats in the small-scale fishing zone within the 3 nautical miles off the coast is constantly taking place. The Government is now setting up a satellite surveillance system with Surveillance Ship System (SSN), radars and rapid speed boats, however, it does not appear to be operated very effectively.



Approach: The introduction of a daily surveillance system through fishing activities and its effective execution shall be assured in order to make the fishers aware of the fact that they must "protect their own 3 nautical miles of coastal fisheries". On this subject, the Fishing and Aquaculture Code of Gabon defines a zone reserved for small-scale fishing within 3 nautical miles off the coast, a zone beyond these 3 coastal miles is for industrial fishing, and a zone beyond 12 nautical miles from the coast is authorized for foreign fishing boats.

ii) Autonomous restriction of fishery activities by the fishers and the provision of alternative income sources by the Government

Problem: The state of fishing resources varies according to zones and fish species depends on natural conditions (biological environment) and artificial causes (fishing pressure). The coastal fishers who fish in each fishing zone know best if the resources are decreasing or not, however, this knowledge and experience is not being shared with the Administration.



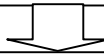
Approach: The support in giving information, exchanging opinions and supplying alternative income sources making up for the decrease in income because of introduction of fishing regulations, shall be guaranteed for the fishers in order to be able to establish restrictions on their fishing activities in the zones defined upon the initiative of the fishers themselves. Through these activities, the system for the attribution of fishing rights shall be established and the co-management system shall be introduced and extended to all those concerned fishers.

(4) Improvement of System for Support Services

At the DGPA we must immediately set up a system for providing support services for the small-scale farmers and fish farmers. In the short-term, it could be promoted by a government budget. However, to have a sustainable system and to reinforce the willingness of the farmers and fishers, such system should be operated based on the self-help efforts made by the farmers and fishers. Nevertheless, considering the population and the importance of the fishery sector in Gabon, it is not timely to increase the number of personnel at the DGPA. It would be better to improve the skills of the existing personnel, give them effective assignments, as well as use the community fishery centers and fish farm stations as a technical development base for extending and spreading those techniques. Moreover, it would be interesting to privatize certain productive activities, such as the production of ice, the conservation of fresh fish, the repairs of machines and the production of aquaculture fingerlings in order to establish the financial autonomy of each activity.

i) Management and use of Micro-credit

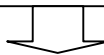
Problem: The possibility of credit approval is quite limited for farmers and fish farmers, and individually, they lack financial credibility sufficient to obtain most financial supports.



Approach: Regardless whether the applicant is individual or group, credit shall be approved for individuals or groups who meet the requirements and have the capacity to reimburse the amount borrowed. Setting up a group is a means for obtaining credit, but the constitution of a group must not be a requirement in order to obtain credit. We must allow the farmers and fishers to form a group based on their own wills. Moreover, credit conditions shall be diversified (maximum amount to be loaned, interest rates, reimbursement period) according to the level of credibility of the individual or group.

ii) Review of the system for obtaining the small-scale fishery permit and fish farm permit

Problem: We have a tendency to think that farmers or fishers do not need training to do fishing or aquaculture.



Approach: The training level shall be improved by making the population conscious of the fact that fishing and aquaculture are attractive activities. To do so, the present system for obtaining the small-scale fishing permit and fish farm permit shall be reviewed by classification (for example, three classifications: advanced, medium and elementary). By actively participating in the training, it will be possible to achieve the advanced classification, with the inducement of priority treatment for obtaining financial credit.

iii) Establishment of an effective system for extending techniques

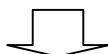
Problem: The dissemination of techniques carried out in the past for small-scale fishing and aquaculture was supposed to be done through seminars and manuals, but because of the lack of infrastructure, there was almost no extension activity to fishers and farmers. Although visits to the places where the fishers and fish farmers are working are important, they cannot be continued because of the insufficient budget transportation and travel allowance.



Approach: The community fishery centers and aquaculture Stations shall be upgraded in each zone, and the emphasis shall be put on advice and training on site by inviting the fishers and fish farmers to participate in more effective fishing and aquaculture techniques.

iv) Reinforcing the fingerling production system and aquaculture technical developments

Problem: Aquaculture techniques in Gabon have been developed only for tilapia, and are nearly inexistent for other fish species. For this reason, present fish farms do not have the choice of other fish species, and the possibility of diversifying their income of farmers who possess the land suitable for aquaculture is not realized.



Approach: The Peyrie Aquaculture Station shall be developed and reinforced as the national aquaculture research centre and technical development centre, and it will actively be doing testing on other fish species that might also be raised on the fish farms.

(5) Stable supply of fish products

i) Diversification of fishing grounds and preparation for semi-industrial fishery

Problem: In Gabon, small-scale coastal fishing is done only in the bays, river mouths and near the coast. Since the resources are abundant, the fishers are satisfied with the volume of catch obtained in the nearby fisheries.



Approach: In the future, it will be necessary to enlarge the fisheries to have a stable supply of fishing products by increasing the volume of the catch in order to meet the increasing demand due to the increasing population. To do so, it will be necessary to promote the enlarging and modernization of the fishing boats, introduce diesel engines, improve the fishing equipment, etc. and begin the launching of semi-industrial fishing by the targeted year (2020).

ii) Supply of Ocean Fish (small pelagic, frozen fish) at low prices

Problem: Big quantities of smoked ethmalosa (catch by small-scale fishing) and frozen fish (catch by mainly from industrial fishing) are now sent inside the country and to neighbouring countries, such as Cameroon. Since these are less expensive than demersal fish caught by small-scale coastal fishing, they constitute a valuable source of protein for the inhabitants inside the country and the inhabitants of neighboring Cameroon.

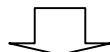


Approach: The increase in the catch cannot be envisaged for industrial fishing in the future because of the increase in the price of fuel. The possibility of exploiting the resources of small pelagic by the small-scale fishers is high, and this could allow for an increase in exports towards other neighboring countries, as well as the stable supply by Gabon of fishing products to Central West Africa.

iii) Attraction for Private Companies

Problem: In intensive aquaculture, unitary production is important and advantageous for the

Approach: In the zones where you have logging activities or mining resources, the companies must assure the food supply for their employees. The demand for fish products is high around the city of Libreville. Intensive aquaculture projects or the distribution of fresh and frozen ocean fish are being planned in these zones of high fish demand, and favorable measures shall be taken to assure the active participation of private companies. Moreover, considering the influence upon the fish farms of the setting up of companies, a system allowing for the coexistence of companies and small-scale fish farms shall be established.



2.3.2 Development Concept by Regions

In trying to estimate fish consumption per person in each province based on the existing data and the inquiry carried out by the study mission, we have obtained higher values in the three coastal provinces and in the Moyen-Ogooué province. If we consider the potential of resources indicated in paragraph 2.2.2, the fishery production of these four provinces could increase in the future. These four provinces can be strategically positioned as zones for the supplying of fish products in the country and for neighbouring countries. Although production is presently quite low in the Woleu-Ntem province located in the North-east (border with Cameroon), but the development of aquaculture is possible in this area considering the potential exports into Cameroon.

The Ogooué-Ivindo province has a big volume of catch by inland fishery and the fish consumption per person in this province is estimated at 22.2 kg/year which is higher than the other three inland provinces (Haut-Ogooué, Ogooué-Lolo and Ngounie provinces). However, since total quantity of fish consumption is low in the province, and distribution costs are high because of the difficulty of getting access to the markets outside the province, and that the fishing zones are limited because of the two national parks in the province, the development potential in this province as for the other three provinces. It is appropriate for this and other three inland provinces to aim establishing a self-sufficient fish production system to meet the demands within each province with supplemental transportation of inexpensive marine fish products to make up for the demand which is not met.

Considering the above-mentioned points, and considering the demand in fishery products and the potential of resources, Gabon can be divided into two zones separated by a curving line going from the Northeast corner to the Southwest corner (see Figure 2.1); the Northwest zone (five provinces) including the coast as a production and supply zone of fishery products, and the Southeast zone (four provinces) as a self-sufficiency zone for fishery products. It will be necessary to reorganize the capitals of these five provinces as strategic production bases and to develop the collection and distribution facility for fish products.

The concept of development per region for the target year (2020) is as follows (see Figure 2.2).

(1) Integrated Development Zone (Libreville - the capital and the Estuary province)

The strategic production base (production, consumption and distribution base for fishery products), Libreville, shall be developed mainly on the aspects in processing of fishery products and its distribution, considering its role in shipments of fishery products to the inside and outside the country. By taking advantage of the proximity to the place of consumption, development of intensive fishery and aquaculture within the authorised limits for the resources shall be sought.

(2) Coastal Fishery Development Zone (Ogooué-Maritime and Nyanga provinces)

With the strategic production bases at Port-Gentil and Mayumba, the development of unexploited resources (demersal fish, small pelagic) shall be focused in the central and southern part of the coast of Gabon. Port-Gentil can be developed as the strategic shipping centre to Libreville. Mayumba can be

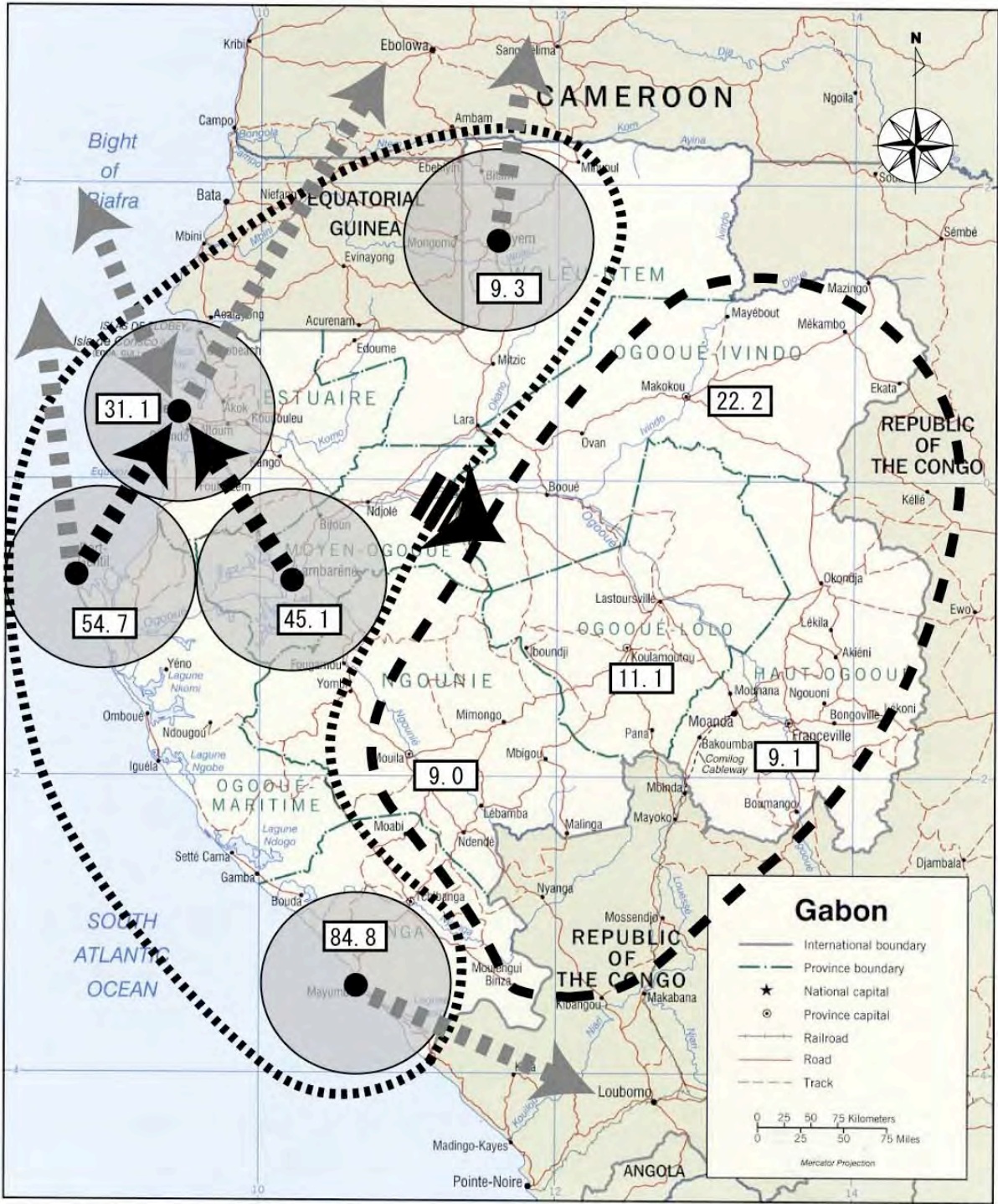
developed as a strategic shipping centre to Congo. Collaboration shall also be assured with the community fishery Centres of Omboué and Gamba, serving as fishery support bases in the coastal lagoon zones.

(3) Inland Aquaculture Development Zone (Moyen-Ogooué and Ogooué-Ivindo provinces)

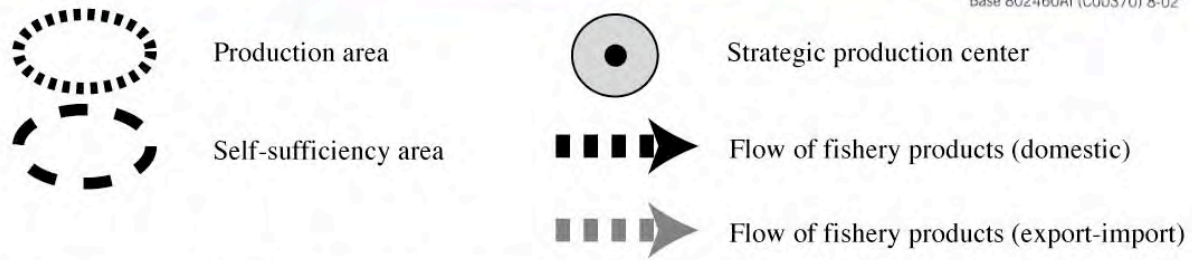
The sustainable development and support of inland fishery shall be based on the two strategic centres of Lambaréné and Makokou. The first shall serve as the base for shipping towards Libreville, and the second as the distribution base for fishery products within the zone.

(4) Inland Aquaculture Development Zone (Woleu-Ntem, Ogooué-Lolo, Haut-Ogooué and Ngounie provinces)

The development of aquaculture shall be based on the strategic production centre of Oyem which is close to the Cameroonian border, and exports of farmed fish (catfish) shall be promoted. Moreover, the development of aquaculture shall take place in the three south eastern inland provinces in order to establish a system of self-sufficiency of fishery products in the zone.

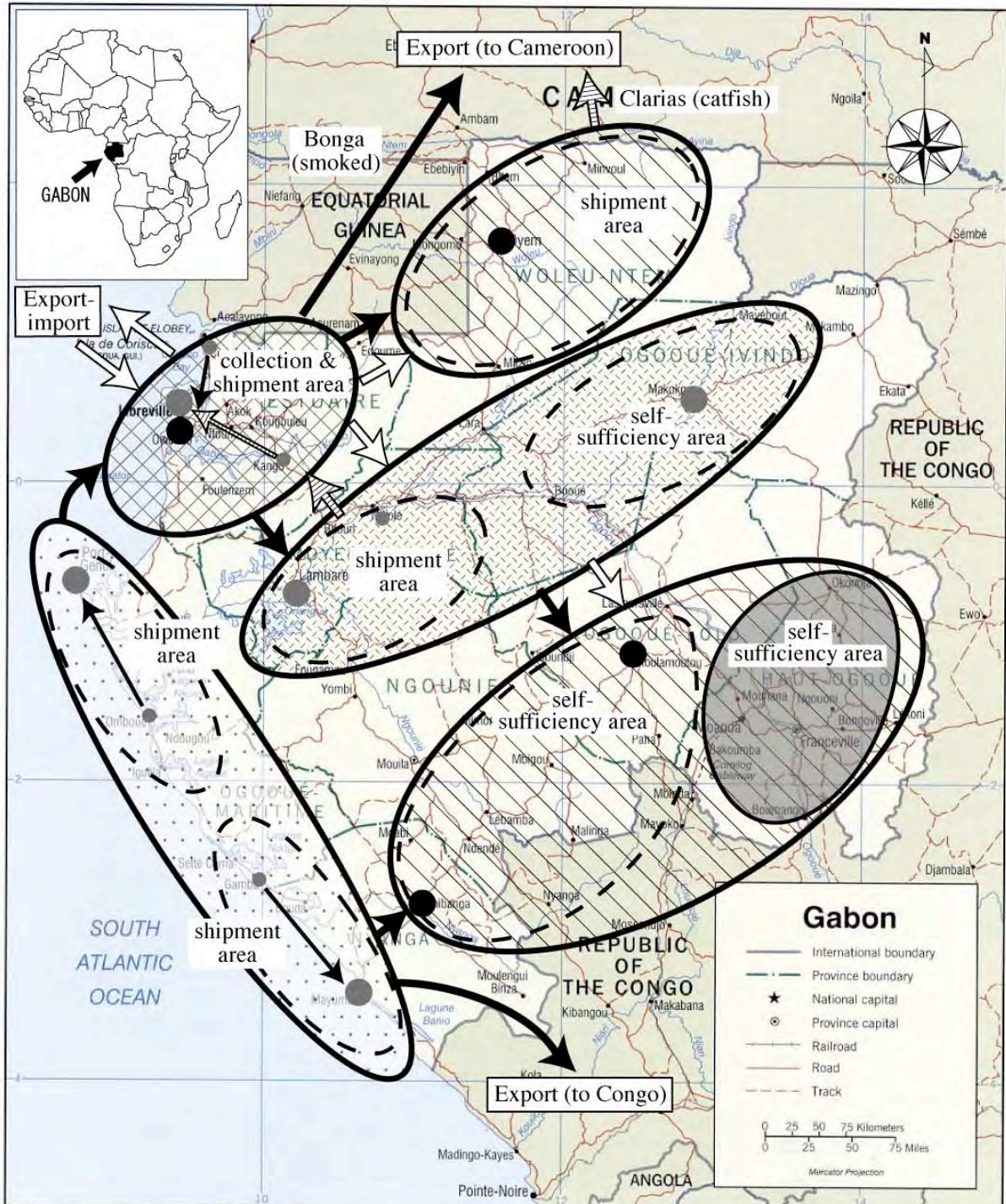


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Figures shown in indicate the per capita fish consumption (kg/year, estimated in 2005)

Figure 2.1 Strategic Production Bases in 2020














- | | | | |
|---|------------------------------------|---|---|
|  | Integrated development zone |  | Marine fish (frozen,canned) |
|  | Coastal fishery development zone |  | Freshwater fish (fresh) |
|  | Inland fishery development zone |  | Marine fish (fresh,salted/smoked) |
|  | Aquaculture development zone |  | Development center (fishery community center) |
|  | Industrial (semi-intensive) |  | Development center (aquaculture station) |
|  | Small-scale (integrated,extensive) | | |

Figure 2.2 Concept of Development by region for small-scale fishery and inland aquaculture (2020)

2.3.3 Concept of Sector Development

As indicated in the picture here below, this master plan is made up of five sectional plans that comply with the development strategy, and two support plans. The support plans concern the “training in human resources” and the “legal management and reform of the system” to support the execution of the sectional development plans; the feedback of information and the state of progress of the sectional development plans will allow for a better adapted support system.

For the training of human resources, the training of participants in the projects in the sectional development plans can be done on an individual basis to supply the technical officers and extension agents who shall become instructors for the execution of the projects. The practical training can be done according to the needs of each project.

Concerning the reform of the legal system, proposals shall be made concerning the laws, decrees, bylaws, and ministerial orders, as well as institutions considered to be necessary for the execution of the sectional development plans to make them effective according to the progress of the sectional development plans.

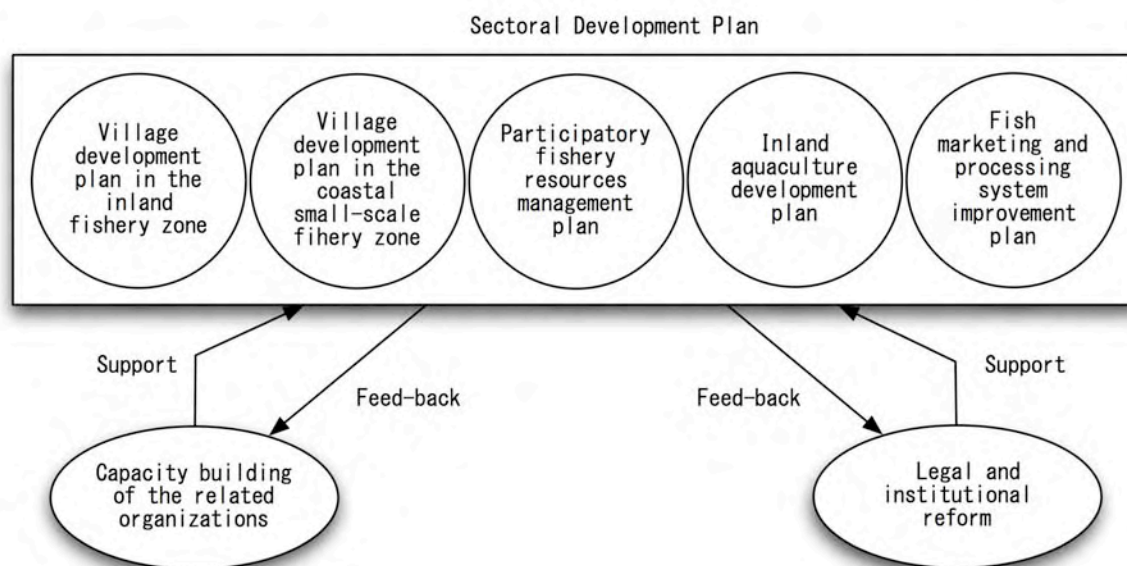


Figure 2.3 Structure of the Master Plan

The contents of sector development plan are explained here below. Priority projects proposed by this master plan were created on the basis of the sectional development concept, as well as consideration given to the results and the lessons from the pilot projects (see Chapter 4).

(1) Development Plan for the Rural Communities in the Inland Fishery Development Zone

Development objective: Improve the financial situation of the fishers doing inland fishery

Orientation of development:

1) Lagoon Fishery Zone

The lagoons extend almost everywhere in the coastal zone of Gabon, and many Gabonese fishers fish in these lagoons. In the Gabonese fishing villages, they fish modestly with small rowboats and small fishing equipment, but the fish caught represent a valuable source of income which can immediately be transformed into cash. However, the fishing villages are scattered here and there in the lagoons and their population is small, and since they are far from the main consumer centres, even if the catch should increase over the present level, it will be difficult to find a market. For agriculture also, the markets are generally limited to cassava and bananas. For this reason, for the lagoon fishers, if they continue with the

present state of fishery and agriculture, it will be difficult for them to increase their income. Consequently, the production of value added products, like vegetables, fruit and special local products shall be encouraged.

2) Middle stream of the Ogooué River (Moyen-Ogooué province)

In the fishing villages of this zone, the fishers catch fish in the broad section of the middle stream of the Ogooué River and numerous freshwater lakes and surrounding marshes, represented by Lake Onangué. They are able to obtain stable catch more than the fishers in the other inland fisheries provinces because they fish in broader fishing ground. The volume of fish caught varies considerably between the dry season and the rainy season, and their reduced income from fishing in the high water during the rainy season needs to be supplemented. The zone of the middle stream of the Ogooué River observes the highest river temperature in Gabon, and the area is not considered to be well adapted to market gardening or animal husbandry. For these reasons, aquaculture shall be developed as a main source of replacement income.

Since access from the villages to Lambaréné can only be available by boats through the river, the fishers have to depend on fishmongers going through the villages on boats with outboard motors to take their catch to the city market if they cannot transport it by themselves. Many villages have no outboard motor. Even if there was a motor in the village, it would be private property. A shared system for the collection and distribution of agricultural and fishery products for village fishers shall be set up in order to improve this situation. Simultaneously, the return trip to the villages shall be used for the joint purchase and distribution of daily consumer products as well as fishing equipment.

Since fishery is active in this zone, the level of fishery resources exploitation is estimated at about 60%. The fishers are conscious of the decreasing tendency of catch in a part of the lakes and marshes. Consequently, the development of sustainable fishery with the present equipment is encouraged but the introduction of new fishing methods which would amplify the fishery effort is not recommended in this zone.

3) Woleu-Ntem province

In the fishery villages of the Woleu-Ntem province, fishers use the fisheries of the upper part of the Woleu River and Ntem River system where the fishing ground is not broad. For this reason, the fishery resources in the river are limited and are sensitive to the fishing pressure with effective fishing equipment. Fishers, therefore, have problems living off fishery only and always look for other cash revenues. In the fishing villages of this zone, families do not live off river fishing alone, but often combine market gardening and fruit crops, the raising of goats and cattle and the aquaculture of tilapia. The Woleu-Ntem province is a province in Gabon wherein agriculture is relatively well-developed. Since it is possible during the period when the volume of fish catch is low to have cash receipts from agriculture or animal raising nearby, the introduction of a diversified management combining fishing, agriculture, animal raising and aquaculture has been proposed.

4) Zones of inland water in the other provinces

In the zones of inland water in the other provinces, there are few villages wherein fishery is the main source of income, and in fact, it is done within the context of hunting. Local river fish are not sold to markets, and fishery is done only for family consumption or for transactions between individuals, and it is difficult to say that inland fishery is widespread as a source of cash. For this reason, we must increase local demand in freshwater fish by promoting the consumption of fish and the opening of sales outlets before beginning the development of fishery in these zones. It will also be necessary to promote diversified management by combining fishing, agriculture, animals raising and aquaculture. Since fishing is forbidden in the national parks, and the fishing zones are thereby limited, the development underlining the establishment of alternative income from other than fishing will be promoted.

Development Concept:

1) Support shared activities of the inland fishers combined with micro-credit

Inland fishers (Gabonese) catch fish alone or with the family in dugout canoes with a paddle and with small fishing equipment. Until the present, they have almost never worked together in groups. For this

reason, there are no groups or associations in the villages or zones, and they cannot escape from their life of self-sufficiency still today. They do not take up organised fishery activities or the improvement of family finances. Since the idea of the necessity of mutual assistance is not widespread in the Gabonese society, we are encouraging the setting up of fishery cooperatives as entities for economic activities aiming at the improvement of income. Micro-credit shall be introduced for the shared purchase of fishing equipment and the necessary material to promote the organization in order for the fishers' cooperative to have the capacity to manage shared funds. In this way, an organizational base shall be created to allow for the beginning of various shared activities (collective distribution, co management of fisheries, etc.).

Examples here below are envisaged for the shared activities of inland fishers:

- The fishers together purchase fishing equipment at a low price (nets, twines and ropes, floaters, lead weights), assemble them, use them and manage all the fishing equipment;
- The fishers set up premises for processing activities (smoking oven, shelves for drying) with the equipment available at the village, and they carry out the processing / conservation activities by smoking or salting and drying the catch;
- The fishers together purchase coolers and ice to transport the catch conserved on ice until arriving in the city markets;
- Every day the fishers record the volume and size of the catch, and avoid the pressure of over fishing by adjusting fishery activities on the rivers and lakes;
- The fishers record the incomes and expenses of their fishery activities, getting involved together for the improvement in family budgeting and savings, so as to be to regularly reimburse their financial credit.

2) Promotion of collective sales and purchases by the Fishers organization

The transportation and processing of the catch and the purchase of fishing equipment are now carried out by individuals or families, thereby imposing a heavy economic burden with lots of work. Since such activities also strongly depend upon the efforts made by certain individuals of the family, the village fishers can do nothing if this person disappears. In order to increase the income and improve fishery activities in the village and region, we must further develop capacity of the fishers cooperative created mentioned in the above point "1) support of the shared activities of the inland fishers combined with micro-credit", and financially and technically support the fishers so that they can carry out collective distribution, collective purchases and develop processed products.

3) Creation of alternative income sources for the low fishing periods

The volume of inland fish caught varies easily according to the climate, geography and fish resources, and it increases or drops especially according to the change in the water level of the rivers during the dry season and rainy season. For fishers who depend only on inland fishery for cash income, life is difficult at certain times during the period when the volume of fish caught goes down. In order to assure a stable and higher family income throughout the year, various family activities allowing them to obtain cash income outside of fishing, such as agriculture, animal raising and aquaculture shall be promoted. By decreasing the degree of dependence upon fishery income, we also hope to reduce intensive fishing in the inland fisheries having a limited surface area and thereby limited resources.

(2) Development Plan of Rural communities in the small-scale coastal fishery zone

Development Objective: Improve living conditions for the families of the small-scale fishers in the coastal zone

Development Orientation:

Coastal fishery is done by foreign fishers who have migrated from neighboring countries; it is quite rare to see Gabonese fishers fishing in the offshore area. Since the ocean zone of Gabon is very long and the fishers and fishing boats doing the coastal fishery are not numerous, the major part of the coast is not exploited. There is still a big margin for the development of coast pelagic resources and demersal fish resources off the coast, and it is quite possible for coastal fishery to develop substantially in the future. Consequently, we must make the fishery activities more effective and develop new fisheries by the

introduction of new fishing equipment and methods. Furthermore, in order to make the Gabonese participate in coastal fishery as those who will be newly responsible for this activity, the easier fishing method (such as set-net) will be introduced and technical guidance will be given. The creation of an environment wherein foreigners and Gabonese can securely fish together shall be promoted.

Development Concept:

1) Reinforcing of the activities of the fishers organizations

The foreign fishers constitute the main element of coastal fishery. They have built up their villages along the coast, and historically go fishing in groups. Compared to inland fishers (Gabonese), the coastal villages are better organised, and associations have been created in many regions. Thereby, fishery organizations have already been set up under governmental initiative at the departmental or local level in the coastal zones of the Estuary, Ogooué-Maritime and Nyanga provinces. The purpose of these associations is to bring the fishers in the department or zone together, although there are hardly any services for the lives of the fishers or the promotion of sales, such as a low interest credit system, assistance in fish sales, etc. and the fishers see no advantage in paying their contributions. For this reason, many of them do not pay, do not go to meetings and the actual activities of the association are stagnating.

Within this context, the existing fishery associations shall be stimulated by setting up little facilities and purchasing boats, motors and fishing equipment with the introduction of financing services. In other words, shared activities shall be reinforced through financial credit with the fishers associations in the coastal villages. The capacity of the existing fishery associations shall be further developed, and a financial and technical support shall be given to the fishers to help them collectively distribute their catch and make purchases; and develop processed products in order to promote the increase in revenue and activities in the villages and region.

2) Increase in the effectiveness of coastal fishery

Since the majority of the boats of the Gabonese coastal small-scale fishery have an outboard motor, the fishers do some of the fishing in the lagoons and some in the coastal fisheries, but this requires a lot of fuel. For this reason, the expense of repairing outboard motors and the general overhead of fishing expenditure is increasing, thereby affecting fishery activities and the financial situation of the fishers. Moreover, although the 3-mile zone from the coast is reserved for small-scale fishers, the zones now being used are limited to the river mouths and the area close to the shore. This is because it is quite dangerous to go further off shore since their fishing boats are small and they have only one outboard motor. Once these problems have been resolved, it shall be possible to explore the abundant ocean resources to respond to the demand for fish products in the country and in neighbouring countries. Consequently, for small-scale ocean fishing, we are planning on (1) creating secondary income sources for the fishers and reducing the cost of fishing, and (2) finding new fisheries to utilize unexploited resources.

3) Managing the Environment of the fishing villages

Managing the environment of the fishing villages, the base of production activities, is indispensable for the development of small-scale fishery and the improvement of living conditions of the fishers who are responsible for those activities.

There are villages which, although they are situated near the capital, have problems accessing the markets and other services because of the bad condition of the roads. There are even the villages wherein daily life and production activities are carried out in an unhealthy environment since there are no water drainage facilities. These conditions must be improved in order to improve daily life and the production activities of the fishers. In the villages wherein smoking of fish is done, the smoke from the smoking chambers leads to complaints from the surrounding inhabitants. The smoking chambers must be renovated in order to improve the working environment of the workers and the effectiveness of their work, and also to eliminate the complaints coming from the inhabitants of the neighbourhood.

Moreover, for the past few years, especially in Libreville, the fishing villages have been forced to move because of the pressure of urbanisation and the extension of the industrial zones. Therefore, many fishers are worried about their place of residence. The fishers who had to move have experienced a great deal of

annoyance compared to their lives before since they must now go further to the landing zone, and this is also a problem for the management of the fishing boats and the processing and sales activities. In terms of human security, it is first necessary to permanently assure and guarantee the present place of residence, so that the fishers feel more secure and can again concentrate on fishing. This will also allow them to invest in their lodgings and make improvements in their living environment. We are also asking the inhabitants to support an effort to improve the village environment. In case it becomes impossible to become the owner of the present land where the village is located because of the urbanisation plan, it is important to assure the availability of land that is adapted to fishing and the sale of fish and also for lodgings, and then to plan on available space for fishery activities to be included in the long-term urbanisation plan.

The villages of the lagoon and coastal fishing camps are small and scattered here and there in a vast zone that is remote and far from the consumer markets, and wherein traffic and contacts hardly exist. This is one of the factors which discourages production activities and poses problems for the daily life of the fishers. It is important to improve access to the markets and contacts in general.

(3) Participative Fishery Resources Management Plan

Development objective: Regularly manage the environment of the fisheries and volume of fish caught by the inhabitants

Orientation of Development:

Twelve scientific studies have been carried out in the past on the resources in the Gabonese waters, and in 1998, an analysis / evaluation by French engineers and advisors was done based on those studies. The results obtained compared to the volume of existing resources and the volume of catch at the time of the studies, indicates that, in general, there are ample unexploited ocean and inland fish resources. However, since there are no data concerning the measurement of the length of the fish, it is impossible to judge if the resources have increased or decreased recently. If we consider that visually the size of the main species of fish is relatively big compared to those fish from neighbouring countries, we can only conclude that there is no problem for these fish resources. Nevertheless, a serious analysis of resources will demands data on the length of the fish species over a long continuous duration going back a minimum of over ten years and continuous monitoring these data through time. And even if there were sufficient data on present fish resources and tried to compare these results with the data of the past, it is not easy because of the different data collection methods applied. It is often physically impossible to simply adjust the study results from over ten years ago to be comparative to the results coming from new studies.

Considering these points, the application of the scientific approach for the management of fishery resources in Gabon (management of a “top-down” type supported by the results of scientific studies) should require excessive time and funding. Consequently, a participative social approach (management of a “bottom-up” type of the water zones by village unit) shall be established in the Master plan.

The following three elements are indispensable for the promotion of participative management of the fishery resources. The zones (villages) having these elements shall therefore be the priority sites.

- i) Local fishers are conscious of the “decrease in the volume of fish being caught”;
- ii) There is a local organization for the planning and management of community activities;
- iii) Relations of confidence with the government are well-rooted and the two parties understand each other and can work together well.

Development Concept:

1) Improvement of the collection method of fishery data

The fishery data, theoretically, is collected by the inquirers of a governmental institution based on the results of the studies on the landing places, but in practice it is difficult to obtain sufficient data since the number of inquirers is insufficient and they have no means of transportation to get around, such as a vehicle, scooter or boat, and the landing places in Central and West Africa and in Gabon in particular are

scattered far from each other. It is desirable to reinforce data collection capacity by improving the infrastructure such as the landing places, but that will require lots of time and funding.

Within this context, technical extension activities with daily registration in a logbook by the fishers themselves with notes concerning fishery activities and management of family finances shall be carried out with the existing means and within the present capacity, in order to reinforce the data already collected. This will allow for collection of specific data concerning the actual situation of small-scale fishery, and these data will be used to establish the development plan for future fishery. The registration will also allow the fishers to record the catch from each fishery and the monthly revenue and expenditure, and this will give the fishers a sense of management. The assistance of several donor organizations will be needed to set up this Master plan, and the recording of these data in the logbooks and their collection will contribute to the successful results of their onsite study on present conditions.

Measurements of length and weight of the concerned fish species for each of the main fisheries shall also be done once a month (a minimum of once every quarter, over a minimum of one year) in order to verify the variations per fishery and per season. The data that has been collected and analysed scientifically during this study shall be communicated to the fishers in the form of information, and combined with the results of the analyses of the data from the fishers logbooks mentioned here above. This data will then allow the local fishers and the administration to verify the tendencies in the catch and in fishery resources, and if necessary, they will be used to define local regulations for the autonomous limiting of fishery activities.

2) Income Stabilisation through the diversification of income sources

Fishery resources are generally abundant in Gabon, and there are practically no zones wherein a decrease in resources has been observed. However, over a part of the semi-closed natural inland waterways (small ponds and marshes, narrow bays at the mouths of rivers) wherein fishery activities are strong, fishers are conscious of the declining tendency of the catch in certain villages.

The awareness and understanding on the resources condition by the inhabitants (fishers) are indispensable for successful fish resource management. Good results shall not be obtained if resource management is done without their awareness; that would be nonsense. Even if the Government applies a “top-down” type of management with the rules, there will be no persuasive force since there is no scientific basis. Activities of participative resource management must be executed based on the condition that the fishers who are conscious of the necessity of these rules and regulations should be cooperative in the various activities of resource management. Moreover, in order for the fishers themselves to manage the resources with the understanding of that value, it is important to allow for diversification of income sources that can contribute to the improvement of the fishers’ financial situation.

3) Establishment of a participative management system for fishery resources

The Fishery and Aquaculture Code of Gabon defines the 3-mile zone off the coast as a fishing zone reserved for small-scale fishery, but the industrial fishing boats constantly penetrate into this zone and do illegal fishing. These illegal activities are done openly, but since the national control system for violations is still being organised, and since the present Code provides for no punishment against illegal fishing, the impact of any control is inadequate. Given this situation, the DGPA has requested that all fishing boats should be equipped with a ship satellite surveillance system, and they have planned on setting up surveillance stations (equipped with radars and surveillance speed boats) at six places along the coast under the authority of the PSPA.

For the surveillance of the coastal zone, it is certain that the setting up of a surveillance system by the administration is important, but above and beyond that, it is also indispensable that the small-scale fishers, for whom the coastal resources are vital, should be willing to protect their fisheries themselves and that they become leaders in these activities. Concretely, it will be necessary to assure a more effective surveillance by applying a surveillance system and daily notification on the part of the inhabitants who will collaborate with the surveillance system of the administration. In addition, it is possible to set up artificial reefs in the fishing areas, which will allow for the creation of new fisheries, and also to physically control

the movement of the fishing boats into the reserved area. Simultaneously, it will also be important, as actions to maintain fishery resources, to carry out the follow-up of tendencies in the fishery resources and, if necessary, to limit fishery activities based on the initiative of the fishers themselves.

(4) Development Plan of Inland Aquaculture

Development Objective: Improve the state of management of fish farm operations

Orientation of development:

The volume of fish supplied to the three provinces (Woleu-Ntem, Ogooué-Lolo and Ngounie) is insufficient compared to the other provinces. Since the rivers are narrow and shallow because of the earth and trees that move during the rainy season, the area of the fishing ground is limited. Consequently, it is difficult to hope for an increase in the catch through the development of inland fishery, and it is therefore considered to be a good strategy to increase aquaculture production by re-activating the abandoned fish ponds to supply fish to the markets. The re-establishing of aquaculture would allow for a secondary income for small farmers who were doing aquaculture before, since aquaculture for small inland farmers gives them an opportunity to have cash. Once the aquaculture activities are developed, those who are interested in getting involved in this activity will certainly appear, and this will slowly lead to the extension of aquaculture.

Moreover, each aquaculture station shall play the role of spreading aquaculture techniques to the neighbouring farmers, although they will not be able to fully fulfil this function because of the lack of human resources and equipment. Considering this situation, the existing aquaculture stations shall be streamlined in order to allow them to better carry out their initial functions as a research, development and teaching extension base for aquaculture techniques.

The following basic orientation shall be adopted for the establishment of this Master plan:

- i) The fish species available for aquaculture shall be limited to the indigenous fish and those that already imported, considering the influence on the biological ecosystem. Genetically modified tilapias shall not be introduced.
- ii) Aquaculture based on formulated feed shall be promoted in the area around Libreville because fish is expensive and material for raising them is cheap. However, we shall have to introduce techniques adapted to lower prices for fish in the markets in the rural zones. From this viewpoint, aquaculture integrated with animal raising activities and the effective use of processing by-products and meal leftovers shall be promoted.
- iii) The development of aquaculture techniques shall be centred on the fish farm Station of the Peyrie. The extension of aquaculture techniques to the farmers shall be done through the training of model farmers and fish farmers for each aquaculture station, and the creation of an extension system centred on these model farmers.

Concept of Development:

1) Establishment of a research and development system on aquaculture techniques

In Gabon only tilapia are used in aquaculture. Other fish species used in aquaculture hardly exist. Moreover, those aquaculture methods being used locally have hardly been studied. Foreign methods have been adopted as such. For these reasons, no aquaculture technique adapted to Gabonese conditions has been developed. Since aquaculture itself is not profitable, many fish farmers who do it have now abandoned it. In addition, the present situation of aquaculture has not been clearly studied, and there has been no planned production or selection of zones adapted to aquaculture.

The Peyrie Fish Farm Station shall be set up as aquaculture research centre, and aquaculture techniques adapted to Gabon shall be developed in collaboration with the regional fish farm stations. The proposed research agenda include: a study on the aquaculture situation in the Gabonese territory and its potential, a

feasibility study for raising new fish species instead of tilapia (catfish, *Arius gambensis*, Yukon yara, etc.), the development of feed for aquaculture for intensive aquaculture, a study of the feed ingredients, and the development of aquaculture techniques adapted to each region (aquaculture in ponds, in cages, and in enclosure or pen).

These activities shall allow for revealing the present situation of aquaculture, setting up of planned production and extending new aquaculture techniques in various zones. The development of new fish species other than tilapia shall broaden the option for fish culture and shall protect prices that might drop following the massive production of a single fish species. In addition, the development of aquaculture feed based on local materials will also allow for the spreading of intensive aquaculture.

2) Expansion and reinforcement of aquaculture stations

In order to stimulate aquaculture stations, we must identify the function of each selected station taking into consideration the physical conditions of fish ponds, water sources (quality and quantity), distribution of the private firms in the surrounding area, the technical level of the personnel in the stations. The three aquaculture stations including the Peyrie (Estuary Province), Oyem (Woleu-Ntem province) and Tchibanga (Nyanga province), among the eleven existing aquaculture stations, shall be used respectively with the following functions: “research and development of techniques, training”, “teaching of extensive aquaculture in the North” and “teaching of extensive aquaculture in the South”. The Koulamoutou aquaculture station (Woleu-Ntem province) shall also be re-established as a station for the extension of aquaculture in the inland region. We shall also consider privatization of other stations in long-term leasing agreements.

In this Master plan, the four aquaculture stations of Peyrie, Oyem, Tchibanga and Koulamoutou shall be enlarged and the research and development functions in aquaculture techniques and extension activities shall be reinforced. Moreover, in order to consolidate the production system and supply of fingerlings in the country, two production bases for fingerling in the north and central regions shall be built in the peripheral area of Libreville and Oyem. The aquaculture station of Lébamba shall be refurbished in order to serve as a production base for fingerlings in the South region (the project to be carried out by the PSPA).

3) Extension of aquaculture to the private sector

In three of the four provinces (Ogooué-Lolo province, Ngounie province, Nyanga province and Woleu-Ntem province) where there is extensive aquaculture (except that of Woleu-Ntem) development, many farmers have abandoned their aquaculture ponds and have stopped the practice. This is happened doubtlessly because of the fact that the appropriate aquaculture techniques were not extended and supported, and the sustainable maintenance became impossible.

We shall be carrying out the extension of aquaculture techniques adapted to each region. The aquaculture stations shall be reinforced as indicated in paragraph 2) here above thereby serving as a model. Simultaneously, as soon as we have received the the results obtained from the research programs, we shall prepare a aquaculture manual for extension services and assistance.

In addition, aquaculture cages will be made available to the private sector on the basis of results of the pilot project.

(5) Plan for Improvement of processing and distribution system of fishery products

Development Objectives: Promote the production of processed fish products and organize their distribution system

Orientation of Development:

1) Fish Supply for the inland region of the country

Small-scale inland fishery in the provinces other than the Moyen-Ogooué province is almost entirely for self-sufficiency. Fish is sold only in the case of a surplus catch to supplement cash income. It is therefore difficult now to study an improvement in the processing and distribution of freshwater fish that is caught in

these zones. The supply of fish products from these zones should be improved through the distribution of marine fish caught in bigger volumes and at a lower price, but not freshwater fish for which we cannot expect a short-term increase in production. However, since the transportation specialised in fresh fish on ice, frozen fish or transformed fish products is not profitable because of the insufficient quantity for the cost, mixed-loading transportation is used combining salted dried fish and smoked fish with vegetables, household articles and other miscellaneous items.

2) Desire for wild animal meat

Dishes of wild animal meat are preferred by Gabonese and served in restaurants in the inland part of the country. Presently, it is legally forbidden to catch wild animals more than for family consumption and their sale is totally forbidden. But a certain quantity still arrives directly in the markets for consumers. This shows that the Gabonese love wild animal meat and reducing their consumption should not be easy. The study carried out by the local NGO World Conservation Society in 2002 shows that the consumption of wild animal meat is 260 grams/day in the mountainous area, whereas it is 50 grams/day in the coastal area. The consumption of wild animal meat could decrease if the meat raised on farms and fresh fish were sufficiently distributed inside the country. Sensitisation and extension activities shall be carried out with an adequate supply of fishery products as protein replacement to reduce the number of wild animals that are caught.

3) Valorisation

The fish caught in big quantities in Gabon are Sans-Nom and tilapia for the inland waterways and sardine for the ocean fish. These fish species are mainly distributed as smoked fish. In particular, smoked sardines are even exported to the neighbouring countries (Cameroon, Congo). If we consider future demand for fish in Gabon from the viewpoint of price and volume supplied, processed products of fish caught in big quantities will remain as the main product form as in the past. Moreover, in Cameroon (population of around 15 million inhabitants) and Nigeria (population of around 100 million), the exploitation of fishery resources is considerably advanced because of the size of the population, and in the future, they should still be dependent upon fish imports. Given this point, in order to cover the stable supply of fish in Gabon and the promotion of exports in the neighbouring countries, not only the improvement of the quality of existing processed products (smoked fish, salted dried fish), but also the introduction of advanced processed products such as canned fish, sterilized vacuum-packed fish, frozen "IQF" shall be done when the cost of energy comes down in the future.

Concept of Development:

1) Improvement in the distribution system of fresh fish

In Gabon, the two fishery centres of Port-Gentil and Lambaréné have recently been reorganised through Japanese cooperation projects. The existing fishery centres of Omboué and Owendo have been refurbished and enlarged with an ice machine and installation of refrigeration. Because of this, the distribution of fresh fish in centres such as Libreville, Port-Gentil and Lambaréné has also programmed. However, since ice is insufficient on the southern coast wherein the fishery resources are abundant and in the inland zones outside Lambaréné, it is impossible to conserve the catch in these areas other than by smoking or salting and drying. In the fishing villages around the major towns, we must also develop the use of ice and insulated fish cases for the conservation of fresh fish. The fishers and fishmongers bear the risk of spoiling the fresh fish before selling out. They are also making financial losses by processing the higher valued fresh fish into the lower valued processed fish.

Considering this context, landing and distribution facilities shall be organized, enlarged and developed at the main coastal fishery bases, such as Libreville, Cocobeach, Port-Gentil and Mayumba, as well as at the inland fishery bases, such as Kango, Lambaréné, Ebel-Abanga, Ndjolé and Makokou. To improve the hygiene of the processing of the fresh fish, standards concerning the material used for the fish cases, the fish transportation vehicle and the ratio of ice to fish, shall be established and applied first to Libreville and then to Port-Gentil.

Moreover, the extension of consumption of fish and promotional sales activities shall take place in the inland zones in view of good distribution of frozen ocean fish and processed products coming from the

coastal zones. Adjustments shall also be made with the ministries concerned so that the improving of the roads to Mayumba, having a strong potential development of fishery resources, should be carried out by the Government, perhaps within the framework of the regional development plan.

In addition, especially for the big cities such as Libreville and Port-Gentil, we shall have to establish standards for the quality of the equipment to be used for the distribution (plastic fish cases, coolers, weighing scales) and manipulation of the fresh fish (ratio of ice to fish, conservation time) with a certain level of hygiene.

2) Promotion of fish transformation and distribution of processed products

The objective of the processed of fishery products in Gabon is to conserve fish that has not been sold fresh. Smoking, salting and drying are done traditionally. For the past few years, with the spreading of the distribution of fresh fish centred on the cities, with the collaboration of Japan, the development of new processed products is in demand. Within this context, an expert of JICA on the processing of fishery products was sent to Gabon from October, 2006 to April, 2007 and carried out testing of various processed freshwater fish products (Sans-Nom) mainly in Libreville, the capital. High quality transformed products met with satisfaction locally and were considered to be technically well adapted.

Taking this new technical development into consideration, it is important to transfer the various processing techniques developed for Sans-Nom to Gabon mainly at the regional centres and promote the consumption and sales of the processed product.. In addition, there shall also be an improvement of the quality of smoked sardines (development and spreading of more effective smoking facilities, improvement in conservation methods). When Gabon takes advantage of its position as a country possessing energy resources (supply of fuel at a low price is possible), the production of prepared food, such as canned food, sterilized and vacuum-packed food, will then begin.

3) Quality Management and Product Safety of fishery products

The SQIS of the DGPA inspects and delivers certificates only for export industrial fishery products. There is no quality and product safety control of industrial fishery products distributed in Gabon, nor any control of fresh fish or processed fish products from small-scale fishery. The training and increase in the number of SQIS inspectors and technicians, as well as the reinforcement of their knowledge and techniques shall be enhanced to assure product safety of all products distributed in the country and their supply to the inhabitants. For that purpose, the SQIS personnel shall be periodically sent to the specialised centre of value addition and technology of ocean products (an establishment set up by Japanese grant aid cooperation) in Morocco under the framework of the South-South cooperation. Adjustments shall be made so that quality control and product safety for the distribution of fishery products should not be the responsibility of the SQIS alone, but shared between the Public Health Ministry, the medical centres and city officials.

A system of certification (Eco-label, etc.) for fishery products supported by international standards shall also be introduced in the future, and Gabon shall take the initiative of various activities for the promotion of exports from Central African countries towards the countries of the European Union.

(6) Training of Human Resources of the concerned institutions

Development Objective: Acquisition by the DGPA of technical and administrative capacities allowing for successful fishery project development

Orientation of Development:

Until now the DGPA has trained its personnel through projects related to fishery carried out with the cooperation of FAO, African Development Bank, France, Japan and Spain, etc., and they have also carried out their training in Gabon. However, often the results of the training are not fully applied in the subsequent activities of the trained personnel or the trained knowledge and techniques are not spread to the other staffs.

Considering these points, we are recommending that the following points henceforth should become obligations for trainees undergoing personnel training in relevant institutions:

- i) Before the training, the candidates should submit a training plan to have an idea of the objective of the training (what is to be taught to them);
- ii) After the training, they should quickly write up a training report and submit it to their authority, thereby allowing their direction to see if the initial objective of the training has been attained;
- iii) The trainees should make presentation on what they have learned in the training in the offices, thereby allowing for the sharing of the information with the concerned personnel.

Research on fishery resources, aquaculture, processing of the fish caught, all require funding and personnel, thereby making it difficult to carry this out by a single country technically as well as financially. It shall henceforth be necessary to carry out joint studies with the Central African countries (the members of the Economic Community of the Central African States (CEEAC) and Sal Tomé & Príncipe). Since Gabon is the richest country in fishery resources among the Central African countries, and also the most powerful economically, it would be advantageous to establish in Gabon something akin to a fishery development centre in Central Africa (interim name) and this centre should play a key role in regional research.

Concept of Development:

1) Technical Capacity Building of the DGPA Personnel (especially of the regional personnel)

At the DGPA, the officers (directors and assistant directors) have a level of specialisation that is superior to a university diploma, and in practice, have the experience of a central role in various interconnected projects. However, the personnel of the class of heads of sections and below and the regional personnel have few opportunities to participate in the process of establishing, executing and evaluating projects, and the difference in the capacity is significant. Consequently, opportunities for training in order to improve capacity shall be made a priority for the regional personnel who work onsite in the fishery development environment, having daily contact with the agricultural and fishing villages, and also play a communication role between the central Government and the agricultural and fishing villages.

2) Arrangement of Community Fishery Centres and Aquaculture Stations as the basis for technical extension

The extension of techniques is an important role for the DGPA. However, there is no organization that directly covers the work of extension at the DGPA centre, not even an extension service system. For that reason, although the data collectors play this role in the regions, they do not master the techniques well enough to be able to teach them to the farmers and fishers of the surrounding area. Moreover, since they have no means of transportation to visit the agricultural and fishing villages, the possibility of contacting farmers and fishers is limited. The training of promoters is necessarily urgent in order to improve the situation. We must first begin by training instructors (advance level technical agents) to train the field extension agents, and gradually consolidate a training system of extension at the head office as well as in the regions. We must also provide a budget and the necessary means of transportation to periodically visit the farming and fishing villages, such as scooters, boats, vehicles, etc.

3) Organising a communication system between the DGPA headquarters, the Provincial Inspection Offices, the Fishery Brigades and the Centres and Stations

The provincial inspection office of each province often has a room in the premises of the provincial authorities, however, the setting up of communication equipment, such as a fax machine and internet has been delayed. In the regional centres (Libreville, Port-Gentil and Lambaréné) where there are fishery Centres, the joint use of communication equipment installed in the Centres does not pose a problem at the level of activities. However, in the other regional centres, since communication other than by mobile phone is difficult, one has to communicate from the post office or request a confirmation by Fax from another service. In addition, since there are no computers, analysis and classification of fishery data, as well as the shared safeguarding of data with the DGPA headquarters, are not adequate either. Consequently, the needed equipment shall have to be set up (fax machine, computers, printers, photocopiers, etc.) in order to

improve communications and the functions of data processing of the provincial inspection offices and the fishery Brigades.

(7) Legal Organization and Reform of the System

Objective of the Organization: Define Rights and the necessary legal system for sustainable fishery development in Gabon and a well-adapted and effective application of the Master plan

Orientations of the Organization:

In terms of regulations concerning fishery in Gabon, there is first of all the Fishery and Aquaculture Code published in 2005, as well as the decrees, ministerial decisions, municipal conclusions on fishery (including therein those published before the establishment of the Code). However, the contents defined by these various regulations are not adequate, and their application is not effective enough. Moreover, the practical system in support of small-scale fishers and fish farmers is still being prepared.

An arrangement or review of rights and systems concerning fishery defined and published up to the present shall be carried out on the initiative of the DGPA, and the missing parts shall be clarified with references to the rights and systems of advanced fishery countries and neighbouring countries. Simultaneously, through the execution of sectional development plans proposed in the Master plan (especially the participative fishery resources management plan), and at the same time, listing the needs and problems of the local concerned fishers and fish farmers, the preparation for necessary legal organization and for the establishment of a support system for fishers and fish farmers shall be carried out with the collaboration of legal specialists.

Concept of Organization:

The legal organization felt to be necessary in the immediate future is as follows:

(1) Legal Organization

i) Regulations concerning the management of fishery zones

- For the setting up of fishing equipment and structures occupying a certain place in the water, such as fixed nets and cages, a study committee shall be established by the concerned entities to discuss the pertinence of the request for authorisation in order not to disturb present fishery activities and traffic on the surface water, and so that there should be no influence upon the ocean currents or coastal relief. If it is approved by this committee, the DGPA shall issue fishing right and shall collect fishing fees (licence fees).
- If it is felt that the level allowing for the daily management of an existing coastal fishery by the local fishers (or associations of fishers) is attained through the realisation of a participative resources management plan), the fishing rights reserved for the fishery shall be given to the local association. Therefore, the local fishers should be more conscious of their important role in the protection of this foreshore.

ii) Definition of sanctions for violations of the regulations

- Sanctions for the violation of the law by the fishing boats that fish in the 3-nautical mile area from the ocean coast (for example, forbidding them to fish for a certain time period, seizure of the fishing boats and motors, confiscation of the fish caught and payment of a fine for damage to fishery resources, damage payments for harming the fishing equipment of small-scale fishers) shall be set up in order to reinforce the effort to eliminate illegal fishing.

iii) Restrictions concerning fishing equipment and methods, fish species, fishery zones and periods of the year

- In case of need, municipal decisions can be issued on the basis of results according to the regional pilot projects “project of participative management of fishery resources”. However, the publishing of these municipal decisions shall be put after the official examination and approval of the DGPA.

- In inland fishery also, there shall be the formulation and publishing of the interdiction of monofilament nets and clear regulations concerning the mesh of the nets that must be adapted to coastal fishery. However, for the setting up of rules, since the volume and size of fish that can be caught varies according to the type of hydrological system, and according to the size and form of the aquatic zone for inland fishery, this shall require sufficient knowledge on the fishing conditions in each zone and shall be carried out responding case by case to each zone.
- A system of collection of old nets shall be established in order to reduce “ghost fishing”. Concretely, in each provincial inspection Office or Fishery Brigade, motivation for replacing old nets by food and other products shall be established so that the old nets are not thrown away in the fishing zones.

(2) Support system for fishers and fish farmers

i) System of fishing permit

- For coastal fishery, a permit shall be granted according to the training classes taken, and differentiation will be made in provision of rewards such as financing for fishery activities according to the permits given;
- For inland fishery, it is urgent to register the fishers and fish farmers and to deliver fishing permits to them;

ii) Financing system for fishery (micro-credit, long-term credit, subsidies)

- Under the control of the Provincial Inspection Office or Fishery Brigade of each province, a micro-credit system managed by the fishers associations shall be set up;
- The DGPA shall establish a long-term loan system to allow the lending of funds for the purchase of a fishing boat and/or motor, or an allowance for the starting up of related activities. For cases that contribute for realization of national policy of food security such as the modernisation of the boat, a system of (partial) payment of the interest concerning the loan shall be considered.
- To allow small-scale fishery to subsist, certain subsidies shall be granted when there is an increase in costs such as fuel prices.

(3) Support system for private companies

- Privileges such as a decrease in the TVA (value added tax) shall be granted to private companies which want to get involved in the distribution / processing of fishery products or aquaculture, provide employment in the concerned zone, collaborate in the training of human resources, and increase fishery food production.

For regulations and systems in addition to those indicated above, a detailed study shall be carried out as needed when putting each project into action.

2.4 Proposed Projects and Components

Based on paragraph “2.4.3 Concept of Sectional Development”, priority development projects tied to each sectional concept, as well as parts of projects, are created (see Figure 2.4). Since existing projects such as the PSPA, OFCF, PASA, are already operational in the area of small-scale inland fishery and aquaculture in Gabon, it is essential to keep in mind the collaboration with these projects, as well as presenting projects that are feasible and urgent.

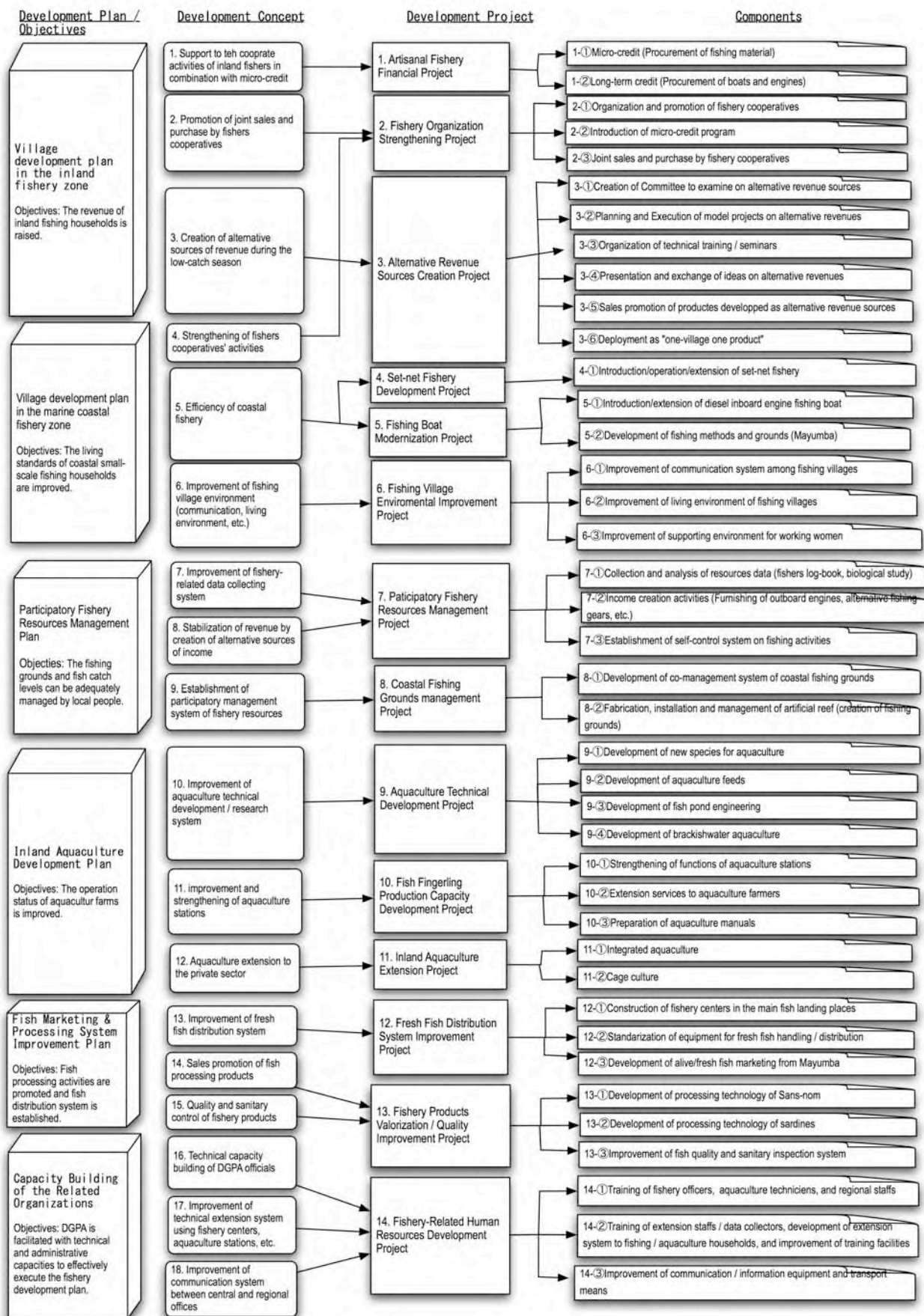


Figure 2.4 Proposed Projects and Components Based on the Development Concept

CHAPTER 3

SCOPE, RESULTS AND EVALUATION OF PILOT PROJECTS

Chapter 3 Contents, Results and Evaluation of Pilot Projects

3.1 Criteria and Selection Method of Pilot Projects

The possibility of carrying out pilot projects (proposal) in this study on condition that they should (1) allow verification of the effectiveness of the Master Plan (pertinence, processes and methods of execution), (2) allow for results within a limited time period (six months), and (3) be manageable by the entity that is to apply them (see table here below).

Table 3.1 Necessity of verification as Pilot Project

Master plan	Development Concept	Priority Project	Parts of Projects	Necessity of verification as Pilot Project
(1) Development Plan of rural communities in inland fishing zones	1. Support of shared activities of inland fishers combined with micro-credit	1 Financing Project for small-scale fishing	1-1 Micro-credit (supply of fishing equipment) 1-2 Long-term Credit (purchase of boats/motors)	Yes (need for fishers high) No (will be done after obtaining results of 1-1 above)
	2. Promotion of collective sales and purchases by fishers organizations	2 Project for the reinforcing of the fishers organizations	2-1 Training of fishers associations 2-2 Introduction of micro-credit 2-3 Collective sales and purchases by associations	Yes (partially, need for fishers high) Yes (need for fishers high) No (will be done after obtaining results of 1-1, 2.1 above)
	3. Creation of replacement income sources for times of low fishing periods	3 Project for the diversification of income sources	3-1 Production of agricultural products and animal raising 3-2 Development of local specialties	Yes (execution within framework of integrated fish farming) No (the development of products takes time)
(2) Development Plan for rural communities in the small-scale ocean fishing zone	4. Increase in the effectiveness of coastal fishing	4 Development Project of set-net fishing	4-1 Introduction and teaching techniques of set-net fishing	Yes (important as source of secondary income)
		5 Modernisation Project for the modernisation of fishing boats	5-1 Introduction and extension of boats with internal diesel motors 5-2 Development of fishing methods and fisheries	Yes (will contribute to a decrease in costs and enlarging of fisheries) No (execution once 5-1 above is going well)
	5. Reinforcing of activities of fishers organizations	2 Project for the reinforcing of fishers organizations	Like 2-1, 2-2 above	No (will be done after having obtained the results from 1-1, 1-2 and 1-3 above)
	6. Environmental Management of Fishing Villages	6 Planning Project for the environment of the fishing villages	6-1 Organization of communication system between fishing villages 6-2 Organization of habitat in the fishing villages	No (6-1 and 6-2 are an organizational project wherein time period and dimensions do not allow execution in a pilot project)
(3) Participative Management Plan for Fishing Resources	7. Collection of fishing data	7 Participative Fishing Resource Management Project	7-1 Collection and analysis of data on resources (fishers logbooks, biological studies)	yes (simultaneous execution of 7-1, 7-2 et 7-3 combined)
	8. Stabilisation of domestic economy through income diversification		7-2 Activities to improve domestic economy 7-3 Establishment of autonomous management of fishing activities	
	9. Establishment of a participative management system for fishing resources	8 Coastal Fishery Management Project	8-1 Organization of a collective surveillance system in the coastal zones 8-2 Fabrication, installation and management of artificial reefs (organization of fisheries)	

(4) Development Plan for inland fish farming	10. Organization of a research and development system for fish farming techniques	9 Fish Farming Technical Development Project	9-1 Development of new species for fish farming 9-2 Development of fish farm feed 9-3 Development of techniques to improve fish farm ponds 9-4 Development of fish farming in estuary water (fresh + salty water)	No (planned in OFCF Project) No (planned in OFCF Project) No (verifiable in 11-1 below) No (execution impossible at the level of the time period and project dimensions)
	11. Enlarging and reinforcing of fish farming Stations	10 Project for the technical improvement of young fish production	10-1 Reinforcing of the role of the Stations 10-2 Extension to fish farms 10-3 Writing up of a fish farming manual	No (planned in the PSPA) No (will be done after 11-1) No (will be done after 11-1)
	12. Extension of fish farming to the private sector	11 Extension Project for integrated fish farming and use of cages	11-1 Extension of integrated fish farming 11-2 Development and extension of fish farming in cages 11-3 Study of the present situation of fish farming and potential	Yes (realization possible at existing ponds; combination of the verification of the extension method) Yes (technical verification) No (execution impossible at the level of the time period and Project dimensions)
(5) Improvement Plan for distribution and transformation of fishing resources	13. Improvement of Distribution system of fresh fish	12 Project for the improvement of the distribution system for fresh fish products	12-1 Organization of Community fishing Centres at the main landing places 12-2 Standardization of materiel for the distribution of products 12-3 Development of the distribution of fresh products from Mayumba	No (12-1 is an infrastructure organization project; realization impossible) No (legal organization and establishment of standards are necessary; realization impossible) No (will be done after establishment of resource management system)
	14. Promotion of the transformation of fishing products and distribution of the transformed products	13 Project for the valorisation and improvement in the quality of fish products	13-1 Technical Development of the transformation of Sans-Nom 13-2 Technical Development of the transformation of sardines 13-3 Reinforcing of the quality inspection system and health safety of fishing products	Yes (possible continuation of results of activities of short-term JICA expert) No (will be done after having obtained results of 13-1) No (an infrastructure organization project; realization impossible)
	15. Quality Management and Health Security of Fishing Products			
(6) Training of Human Resources of concerned entities	16. Technical Capacity Building of the DGPA Personnel	14 Human Resource Training Project in the area of fishing	14-1 Capacity building of the DGPA personnel (technical agents, fish farming technicians, local agents) 14-2 Training of Extension personnel (training for technical extension instructors and data collectors, organization of training structures) 14-3 Organization of communications system (including computers and means of transportation)	No (onsite training possible only through pilot projects) No (execution impossible since 14-2 and 14-3 are infrastructure organization projects)
	17. Organization of the bases for technical extension activities			
	18. Organization of the communication system between the capital and provinces			

On the basis of the above study, ten pilot projects were proposed and established. Their order of priority according to (1) the high extension rate in the other zones (possibility of expansion), (2) the continuation of activities, by the entity carrying out the project, is possible (continuity), and (3) the farmers – fish farmers are the direct beneficiaries (farming and fishing villages), has been established in the table here above.

Table 3.2 Study of the order of priority for the execution of the pilot projects (proposal)

Pilot Projects	Possibility of Expansion	Continuity	Beneficiaries	Degree of priority	Results of the Study
1) Introduction of set-net fishing	⊙	⊙	⊙	A	Will be done.
2) Development of coastal fishing	⊙	⊙	⊙	A	Will be done.
3) Micro-credit	⊙	⊙	⊙	A	Will be done.
4) Integrated fish farming	⊙	⊙	⊙	A	Will be done (will be done by integrating 8) Market Gardening).
5) Development of aquaculture feed	△	○	△	C	Excludes pilot projects since the beneficiaries are limited to the fish farmers in the Libreville area, and that the continued development of the OFCF project is possible.
6) Aquaculture in cages	○	△	⊙	B	Will be done (but before the beginning of the pilot project, the conception of a well-adapted cage and a prior study of the installation method are necessary).
7) Valorisation of the Sans-Nom	○	○	○	B	Will be done (but before the beginning of the pilot project, a prior study of the spreading of fish consumption and sales promotional methods will be carried out).
8) Movement « One village, one product » (market gardening)	△	○	⊙	C	Renunciation as an independent project, but it will be included in 4) Model Project for integrated fish farming
9) Experimental transportation for alive and fresh fish	△	△	○	C	Execution postponed because of risk of leading to excessive catch of defined resources. It is advisable to do it together with resource management activities on the basis of the results 10) Model Project for participative resource management.
10) Participative Resource Management	⊙	○	⊙	A	Will be done.

3.2 Criteria and selection method of targeted villages

(1) General Criteria and Methods

Since the purpose of the pilot projects is to clarify the effectiveness of the Master plan, we must select the zones wherein the involvement will be easiest (the rate of success high). From this viewpoint, the degree of general adaptation by province has been compared on the basis of six criteria here below:

Table 3.3 General Evaluation of the Execution Capacity of the Pilot Projects in each province

Criteria for selection	ES	OM	NY	MO	NG	HO	OL	OI	WN
i) Base for the increase in the effectiveness of the Master plan	Technical Development	Coastal fishing	Coastal fishing	Inland fishing	Inland Aquaculture	-	Inland Aquaculture	Inland Fishing	Inland Aquaculture
	2	2	2	2	2	1	2	2	2
ii) Base for future development	Rich human resource	Rich fishing Resource	Rich fishing Resource	-	-	-	-	Rich fishing Resource	Rich Human Resource
	3	3	3	2	2	2	2	3	3
iii) Degree of maturity of the related entities	AS	AS	AS	AS	-	-	-	-	AS
	3	3	2	2	1	1	1	1	2
iv) Market access	⊙	○	△	○	△	○	△	△	○
	3	2	1	2	1	2	1	1	2
v) Willingness of Governmental entities to the regional	⊙	⊙	○	○	○	○	○	○	○
	3	3	2	2	2	2	2	2	2
vi) Level of organization of the related infrastructure	CT(1) ST(1)	CT(2)	ST(1)	CT(1)	ST(3)	-	ST(1)	-	ST(4)
	3	3	2	3	2	0	1	0	3
Total points	17	16	12	13	10	8	9	9	14
Order	1	2	5	4	6	8	7	7	3

ES: Estuary, OM: Ogooué-Maritime, NY: Nyanga, MO: Moyen-Ogooué, NG: Ngounie, HO: Haut-Ogooué, OL: Ogooué-Lolo, OI: Ogooué-Ivindo, WT: Woleu-Ntem, AS: Association, CT: Fishing Centre, ST: Aquaculture Station

As indicated in the above table, it was decided that the Estuary, Ogooué-Maritime, Woleu-Ntem, Moyen-Ogooué and Nyanga provinces possessed the conditions that were favourable for the execution of the pilot projects.

(2) Technical Criteria and Methods for Selection by Sectors

1) Fishing technique

i) Pilot project for introducing a small set-net fishing

This project is the first trial for introducing a new fishing method, which has not been practiced in Gabon, yet. This fishing method has a condition that the fishing ground, where the net is to be fixed, is limited only an area which is inshore and calm area, not directly affected by waves and current of the open sea. In addition, this project requires following work by fishers, 1) make and installation of a set-net, 2) operation of the net and management of sales and expenses of the operations, 3) maintenance of the net. The project therefore needs a management organization such as the fishery center, capable of managing the work, directing the fishers to conduct this first trial in Gabon.

In order to obtain advantages of this fishing methods, that is, to have production in a shorter time and less cost than other fishing, it also necessary to select a place for installation the net in an area close to the fishing village and a fish-market to land and sell the catches.

These conditions are the criteria for selection of the project site. With the criteria, coastal fishing villages areas were evaluated as shown in the following table.

Table 3.4 Result of selection of the project site for introduction of a small fix-net fishing

Areas		Natural condition (to be inshore area)	Organization for managing the project	Fishing villages along coast	Access to fish-market	Facilities for landing and selling fish	Points (Number of the mark ☉)
ES	Libreville	☉	☉ (CT)	○	☉	○ (CT)	3
	Other areas	△	△	△	△	△	0
OM	Port-Gentil	☉	☉ (CT)	☉	☉	☉ (CT)	5
	Other areas	△	○ (CT)	△	△	○ (CT)	0
NY	Mayoumba	△	△	☉	△	△	1
	Other areas	△	△	△	△	△	0

ES: Estuaire, OM: Ogooué-Maritime, NY: Nyanga CT : Fishery Center

In Libreville, Owendo Fishery Center is in operation as a base for landing, marketing and processing for the local fishers and merchants/fish-venders. It was however evaluated lower than the fishery center in Port-Gentil because of poor condition of the landing area. Moreover, due to expansion of industrial areas around the Owendo center, the fishers live in towns away from the center.

There are fishing villages along shores in Coco-beach. They have less point than others because of no fishery center in the area and distance to markets in Libreville.

With the results shown above, Port-Gentil was selected as the project area. In the northern areas of Port-Gentil, the sea conditions around Cape Lopez are affected by the open sea and severe for the small set-net. Considering calm sea conditions and short distance from the Port-Gentil Fishery Center, an inshore area in the southern part of Port-Gentil was finally selected for setting the small set-net. The area is also close to the fishing villages in south area of the city.

A fishers group of the fishing village, Irenikongo, was selected to work for the project by the Inspector Office of Ogooué-Maritime Province. Through an interview with the chief fisherman of the group, it was confirmed that the group has fishing ability and experiences enough to work for the project (see the table 3.5).

Table 3.5 Fishers group selected for the project

Name of the chief	Members of the group	Fishing boats of the group	Fishing gears	Fishing areas	Landing place
Mr. GAGNONTO Germain	7 persons (Gabon: 1, Benin: 6)	3 wooden canoes (Length: 12m, 11.5m, 11m Outboard engine: 40hp. x 3 sets)	Gill nets Large gill nets (called "Ranbo")	Rainy season : Ozori Dry season : POG	POG

ii) Pilot project for development of coastal fishery

This project is to examine possibility of operation of a new fishing boat in the coastal areas within three miles and offshore areas for development of the coastal fisheries. It includes following activities;

- 1) Introduction of a small fishing boat equipped with an inboard diesel engine, capable to sail in the open sea (herein after called "the project boat"),
- 2) Instruction on operation of the project boat to the fishers group selected for the project,
- 3) Trial fishing operations in the coastal and offshore areas,
- 4) Maintenance of the project boat,
- 5) Sales of catches, management of sales and expenses,
- 6) Keeping records of the fishing/sales and evaluation on operation of the project boat.

An organization (such as the fishery center) is necessary for execution and management of this project, instructing the fishers group. Since this is the first trial to introduce a fishing boat equipped with an inboard diesel engine in Gabon, it is essential to provide technical instructions and support by the project management body for operation and maintenance of the project boat.

Considering the aforementioned matters, the project base for operation of the project boat should have the following conditions.

- An organization capable of managing the project is existed.
- The same organization has a function/ability for maintenance of diesel engines in addition to instruct in operation and management of the project boats.
- There are landing facilities with a wharf or jetty suitable for the project boat.
- There is a major fish-market with an easy access for the project boat.

With the above-mentioned criteria, major bases for the coastal fisheries were evaluated as shown the results in the following table.

Table 3.6 Results of the evaluation for selection of the project base

Area		Organization for managing the project	Function for maintenance of diesel engines	Availability of landing facilities	Accessibility to a major fish-market	Points (Number of the mark ☉)
ES	Libreville	☉ (CT)	△ (CT)	△ (CT)	☉	2
OM	Port-Gentil	☉ (CT)	☉ (CT)	☉ (CT)	☉	4
NY	Mayoumba	△	△	△	△	0

ES: Estuaire OM: Ogooué-Maritime NY: Nyanga CT: Fishery Center

With the results shown above, Port-Gentil was selected for the project base and the Port-Gentil Fishery Center was selected for management of the project.

Two groups of fishers applied for the project. As a result of the interview with the fishers groups and checks on their fishing boats, fishing gears and fishing experiences of demersal fish, Mr. Prosper Akakpo's group was selected for the project.

Table 3.7 Comparison of the fishers groups

Name of the chief	Members of the group	Fishing boats of the group	Fishing gears	Fishing areas	Landing place
Mr. SAM	9 persons (Gabon:5, Ghana:2 Benin: 1, Togo:1)	1 boat (Length: 10m, Outboard engine: 40hp. x 2 sets)	Gill nets Large gill nets (called "Ranbo")	All year round : Ozori	POG
Mr. Prosper Akakpo	7 persons (Benin:1, Ghana:6)	2 boats (Length: 12m, Outboard engine: 40hp. x 2 sets)	Gill nets Large gill nets (called "Ranbo") Hand lines for demersal fishing	Rainy season : Ozori Dry season : Open sea	POG LBV

2) Inland Aquaculture

i) Integrated fish farming project

In the pilot project, it is desirable to use an aquaculture station which should serve as a base of aquaculture promotion. In other words, every aquaculture station plays a role of model farm, and disseminates the aquaculture techniques to the aquaculture farmers of the vicinity. When selecting the aquaculture station which becomes a responsible organization, the following bases of selection were used. Evaluation was performed by way to give the points from 1 to 3 (refer to following table).

Table 3.8 Criteria of selection of the aquaculture stations and results of the selection

Province	Station	No of ponds, size	Depth of the ponds	State of the ponds	Quality of water	Volume of water	Drainage	Storage	Total
Estuaire	Libreville (Peyrie)	1	3	2	3	1	1	3	14
Nyanga	Tchibanga	33	2	2	3	3	3	3	19
Ogooué - Lolo	Koulamoutou	1	1	1	2	1	1	2	9
Ngounie	Lebamba - Moukoundou	1	1	1	1	3	1	2	10
	Lebamba Moakombo	1	1	1	1	3	2	2	11
	Mimongo	-	-	-	-	-	-	-	-
	Mbigou	-	-	-	-	-	-	-	-
Woleu - Ntem	Oyem	2	1	2	2	3	2	3	15
	Mizic	2	2	2	2	1	1	3	13
	Bitam	1	1	1	2	1	1	2	9
	Minvoul	2	1	2	2	1	1	1	10

- : Not visited.

Meaning of the notation

- No of the pond, size: Are there appropriate ponds for the experiment?
- Depth of the pond: Is the water depth of the pond 80 cm or more?
- State of the pond: Can ponds be used without rehabilitation?
- Quality of water: Is water transparent through a year? Isn't drainage from the house hold etc. mixed?
- Volume of water: Is the volume of water sufficient (is the pond able to be filled within 3 days)?
- Drainage: Is drainage of each pond possible?
- Storage: Is there a cabin of storage for the material?

ii) Cage culture project

The pilot project of the cage culture is conducted in the province of the Moyen-Ogooue, in order to verify the validity as one of the additional income creation measures of small-scale fishers. As part of the fishery activity, catfish and tilapia are cultivated in a cage during a certain fixed period, using a by-product and free time. Since cage culture technology is not established, the fishery center conducts all activities under the lead of DGPA and PDDI.

- As the selection of the site, the following things were considered,

- Daily management is easy for the center,
- Water quality is good for fish farming through a year and water depth is more than 3m in the dry season,
- Easy to obtain permission to install cages.
- Then the lake 'Sirène' was selected

3) Transformation and Distribution

i) Project for the valorisation of Sans-Nom

The zone of Lambaréné where the Sans-Nom are landed in big quantities and the SQIS where the development of the transformation techniques was carried out in the past, was studied as a pilot project site. The Fishing Center of Lambaréné was felt to be ideal for the development and sustainability of the project as a future transformation and distribution base, and to assure experienced workers for transformation activities.

The selection of groups of workers was made on the basis of the following criteria: (1) those having good experience in transformation of fishing products, including the Sans-Nom, (2) groups of at least five people, (3) people having the experience of abundant meals at home, etc., (4) people interested and active to try something new, and (5) the possibility of creating confidential relationships with the Fishing Centre which is expected to be the workplace. One transformation group (5 people) using the Fishery Centre of Lambaréné as the work base, introduced themselves as candidates and were accepted upon the evaluation based on the criteria here above.

4) Management of domestic economy of fishers / fishing

i) Microcredit

In the microcredit program, DGPA provide necessary fishing materials and equipments for fishers' groups to solve their most important problem, 'lack of fishing gears and equipments'. In practice, fishers' groups repay the purchase cost from the profit of fishing activities every month. The main purpose of the pilot project is to confirm whether artisanal fishers can utilize / manage their revolving funds properly. The management style of artisanal fisheries in Gabon is roughly classified into three types such as coastal fisheries, lagoon fisheries, and inland fisheries. The pilot project evaluates whether the microcredit scheme can be introduced into artisanal fishing communities in each fisheries type. As to a management organization for microcredit scheme, the pilot project evaluates two management systems, coordinated by fishers' centers or by fishers' association (implementation system in the regions where there isn't any fishers' center).

In our field survey, we confirm that there are fishers' associations for villages or regions in four provinces, Ogooue-Maritime, Moyen-Ogooue, Wolue-Ntem and Nyanga. According to the survey result, we regard those provinces as target areas of the pilot project, and select proper villages, which can cooperate on the project, in those provinces. The characteristic of fisheries activities of each province is as follows.

Table 3.9 Characteristics of fisheries activities of target provinces

Province	Fisheries type	Fisher's nationality	Fund management organization
Ogooue-Maritime	Coastal fisheries	Foreigner: Beninese, Nigerians, etc.	Artisanal Fishers' Center
	Lagoon fisheries	Gabonese	Artisanal Fishers' Center
Nyanga	Lagoon fisheries	Gabonese	Fishers' Association
Moyen-Ogooue	Inland fisheries: Lakes and Rivers (lower and middle reach)	Gabonese	Artisanal Fishers' Center
Wolue-Ntem	Inland fisheries: Rivers (upper reach)	Gabonese	Fishers' Association

Selection criteria of fishers' groups

At first, the following criteria are set as pre-condition of participation in the pilot project.

- Form a group consists of more than 5 fishers,
- Submit a list of material and equipment which can be purchased in the maximum amount 300,000 FCFA

(1,000,000 FCFA for coastal fisheries),

- Take comparative quotations of material and equipment at local stores / dealers by a fisher's group.

Secondarily, the following criteria are set as capacity of fisher's groups.

1. Are they full-time fishers (fishing activity is a main income source)?
2. Is there any organization / association of local fishers?
3. Do they work for fishing for more than 3 days per week?
4. Do they have enough fisheries incomes to repay 20,000 FCFA per month (for coastal fisheries, 50,000 FCFA per month)
5. Are they easy to access the market for the sale of captured fish?
6. Do they have high will to participate in the pilot project?

Based on the criteria above-mentioned, the credibility of fisher groups is evaluated by each 3 points for the criteria 1 to 5, and 5 points for the criteria 6 'Participation Will'. Finally, the fishers' groups, which get more than 14 points, 70% of total point 20, are selected as target groups.

Selection of fishers' groups in Moyen-Ogooue Province

In the province, we selected some fishers' groups engaged in fishing activities at River Ogooue and lakes around the river. After the mini-workshop held in June, more than 10 fishers' groups applied for the project participation to the DGPA provincial office. According to the contents of application documents, finally, we selected 8 groups including 2 groups of Nengue-Ntogolo village in Lake Onangue, 1 group of Iguendja village in River Ogooue, 2 groups of a fisher's association in Lambarene, and 3 groups of a fishers' association of Ebel Abanga village.

We interviewed a representative of those groups to evaluate the capacity of the project implementation on the criteria above-mentioned.

Table 3.10 (1) Evaluation of fishers' groups participating in the microcredit program (Moyen-Ogooue)

Village name (Group name)	No. of groups	Full-time Fishers	Fisher's Organization	Fishing Activity	Fishery Income	Market Access	Participation Will	Total
Nengue-Ntogolo	2	3	1	3	3	2	5	17
Iguendja (CPRI)	1	3	2	2	2	1	5	15
Lambaréné (Vision)	2	1	2	2	3	3	4	17
Ebel-Abanga(UPEA)	3	3	3	3	3	2	4	18

As the table shows, all fishers' groups gain more than the standard point (14 points) in total point. It means that all groups have enough capacity to participate in the project. However, the fisher's groups in Lambarene 'Vision' consists of only part-time or leisure fishers, and doesn't cooperate with the activities led by the fisher's center. Therefore, by consultation with DGPA officials, we decided to exclude 'Vision' from the target groups. Because other groups usually work for fishing at full-time basis, we consider that they have enough capacity of credit repayment. Finally, 6 groups remain as target groups of the project in Lambarene areas.

Selection of fishers' groups in Woleu-Ntem province

In the province, we select some fishers' groups engaged in river fishing in River Woleu and River Ntem. After the mini-workshop with fishers held in July, 8 fishers' groups of 4 villages applied for the project participation to the Oyem Aqauculture Station. The groups applying for the project are each 1 group of Angone II, Mbolenzok and Elop village near Oyem, and 2 groups of Bitoga village near Mivoul, where a fisher's association has been established.

We actually visited each fishing village and interviewed each representative of a fisher's group with DGPA officials. On the criteria above-mentioned, we evaluated the capacity of each group and association as follows.

Table 3.10 (2) Evaluation of fishers' groups participating in the microcredit program (Woleu-Ntem)

Village name (Group name)	No. of groups	Full-time Fishers	Fisher's Organization	Fishing Activity	Fishery Income	Market Access	Participation Will	Total
Bitouga (APNKK)	2	2	3	3	2	2	5	19
Angone II	1	1	2	2	2	3	4	15
Mbolenzock	1	2	1	2	3	3	3	15
Elop	1	2	1	2	3	3	3	15

Because all groups gain more than the standard point (14 points), we consider that all groups have enough capacity of the project participation.

Selection of fisher's groups in Ogooue-Maritime province

In the province, we selected some groups engaged in coastal fishing in Port-Gentil and lagoon fishing around Omboue as target groups.

In Port-Gentil, 10 fisher's groups applied for the participation to the DGPA provincial office. By the preliminary screening in the DGPA office, 7 groups are selected as candidates of target group. Based on the interview with representatives of fisher's groups with DGPA officials at the Port-Gentil Fisher's Center, all groups have enough capacity of the project implementation on the selection criteria above-mentioned.

Table 3.10 (3) Evaluation of fishers' groups participating in the microcredit program (Port-Gentil, Ogooue-Maritime)

Village name (Group name)	Full-time Fishers	Fisher's Organization	Fishing Activity	Fishery Income	Market Access	Participation Will	Total
Ntchangwanongo (Odembet et Associe)	3	3	3	3	3	4	22
Lip-1 (Bendje Peche)	3	2	2	2	3	4	19
Ozori (Mboumba)	3	2	3	3	3	4	21
Gongoue-Sangatamga (Merveilles de L'Ocean)	3	3	2	2	3	4	20
Lip-1 (SOTOPE)	3	3	3	2	3	4	20
Ntchangwanongo (Gnangue Peche - PIOLA)	3	3	3	3	3	3	21
Cap Lopez	2	3	2	3	3	3	16

In Omboue, 10 groups (village) applied for the project participation. The Fisheries Inspection Office screened all groups in advance on the following condition.

- Fishers have to be members of the Etimboue Fisher's Association,
- Fishers have fisher's registration licenses and paid registration fee in past 3 years,
- Fishers have canoes and fishing gears
- Fishers land captured fish at Omboue
- Fishers work for fishing at full-time basis

According to the preliminary screening, only 5 groups were selected as target groups. We interviewed all representatives of those fisher's groups with DGPA officials, and decide that all groups have enough capacity of the project implementation.

Table 3.10 (4) Evaluation of fishers' groups participating in the microcredit program (Omboue, Ogooue-Maritime)

Village and Group name	Full-time Fishers	Fisher's Organization	Fishing Activity	Fishery Income	Market Access	Participation Will	Total
Ayile	2	3	2	3	2	5	17
Omboué Centre I	2	3	3	3	2	5	18
Olandogolo II	3	3	3	3	2	5	19
Tchongaville	2	3	3	3	2	4	17
Kongo	2	3	3	2	2	4	16

Selection of fisher's groups in Nyanga province

In the province, 5 fisher's groups were selected as target groups engaged in lagoon fishing in Lake Banio. According to the document screening to each group, we confirm that all groups satisfy the participation standard as the table shown below.

Table 3.10 (5) Evaluation of fishers' groups participating in the microcredit program (Mayumba, Nyanga)

Village name (Group name)	Full-time Fishers	Fisher's Organization	Fishing Activity	Fishery Income	Market Access	Participation Will	Total
Kouangu (PACKA)	3	1	3	3	3	3	16
Tchibila (Yane Jire)	3	3	2	2	2	4	16
Yoyo	3	2	3	2	2	3	15
Tchianzi (Tchianzi Pêche)	3	2	3	3	2	4	17
Nkoka (Mbila)	3	1	3	3	2	3	15

ii) Model project for participative management of fishing resources

The conditions for the selection of the sites for the model project of participative management are as follows:

- 1) Fishers are conscious of the decrease in the volume of the catch.
- 2) It is possible to limit the resource management to certain useful fish species and to a given waterway.
- 3) The fishers association exists, or the fishers organization is possible.

An onsite visit showed that the zones wherein the fishing resources were felt to have decreased were as follows:

Table 3.11 Zone where the fishers confirm a decrease in fishing resources

Zone	Concerned species	Aquatic Zone	Situation	Estimated Cause
Mayumba	Langouste	Coastal Zone of Mayumba (20-30 m in depth)	There is no regulation nor limits of fishing periods or size limits of fish to be caught	Fishing by illegal fishing boats. Catching of pregnant females.
Kango	Crayfish (freshwater shrimp)	Catching Zone for crayfish around Kango	An average of about 5 kg are fished each day now, but seasonal variations are significant and income stabilization from fishing is desired in different aspects.	Natural Phenomenon Excessive fishing. Low sales price.
Lambaréné	All fish species	Small ponds/marshes around the city of Lambaréné	Since the catch are very low these days, they fish in other ponds or marshes.	Excessive fishing on small semi-closed waterways.

Among the preceding, the concerned fish species and waterways are clearly for the Kango and Mayumba zones, and given groups of fishers fish and use the waterways continuously today. Moreover, the fish species concerned are not identified for the Lambaréné zone, and since other fisheries are used today, it is difficult to identify the group concerned for the pilot project. The Kango zone shall therefore be the site of the model project for resource management of crayfish (inland fishing), the Mayumba zone will be the site for the model project of resource management of langouste (ocean fishing).

(3) Results of the selection of sites per project and targeted groups

Le table here below indicates the sites of the various pilot projects and the numbers of groups participating (numbers of fishers) on the basis of the results here above.

Table 3.12 Sites per project and number of participating groups (number of fishers)

Project	Form of execution	Estuary	Ogooué-Maritime	Nyanga	Moyen-Ogooué	Woleu-Ntem	Total
Introduction Project for set-net fishing	Commissioned (Fishing Centre)	-	POG : 1 (7)	-	-	-	1 (7)
Coastal fishing development Project	Commissioned (Fishing Centre)	-	POG : 1 (7)	-	-	-	1 (7)
Micro-credit project	Managed directly by the Study Group	-	POG : 7 (35) OMB : 5 (25)	MYB : 5 (23)	LMB : 5 (26) EBA : 3 (27)	OYE : 3 (15) MVL : 2 (10)	30 (161)
Integrated fish farming Project	Commissioned (Fish Farming Station)	-	-	TCH : 2 (2)	-	OYE : 4 (4)	6 (6)
Fish farming Project using cages	Commissioned (Fishing Centre)	-	-	-	LMB : 2 (6)	-	2 (6)
Valorisation Project for Sans-Nom	Commissioned (Fishing Centre)	-	-	-	LMB : 2 (10)	-	2 (10)
Participative Management Project for fishing resources	Commissioned (NGO)	KAN : 7 (50)	-	MYB : 5 (15)	-	-	12 (65)
Total		7 (50)	14 (74)	12 (42)	12 (69)	9 (29)	54 (262)

LBV: Libreville, POG: Port-Gentil, OMB: Omboué, LMB: Lambaréné, OYE: Oyem, TCH: Tchibanga, MYB: Mayumba, KAN: Kango, EBA: Ebel-Abanga, MVL: Minvoul

3.3 Contents, results and evaluation of pilot projects

3.3.1 Introduction of Set-net Fishing

(1) Project Objective and Scope

Overall goal: To increase incomes of the artisanal coastal fishers by prevailing small set-net fishing.

Project objective: To verify that set-net fishing is a useful means for the artisanal coastal fishers to earn additional incomes.

Activities:

- ① To install a model of a small set-net and to make one set of the set-net with materials available in Gabon and install it.
- ② To operate and maintain the set-net, recording data of the operation/sales of catches.
- ③ To settle and share the sales money and deposit a part of the sales money as a fund for management of the project.
- ④-1 To train counterparts (C/P) to conduct the activities of the project.
- ④-2 To explain on the set-net fishing to other fishers who are interested in the fishing.

Target group: One group of coastal artisanal fishers (five or more number of fishers)

Target area: An area about 1km off from the fishing villages (Matanda, Irenicongo, Lip) in Port-Gentil

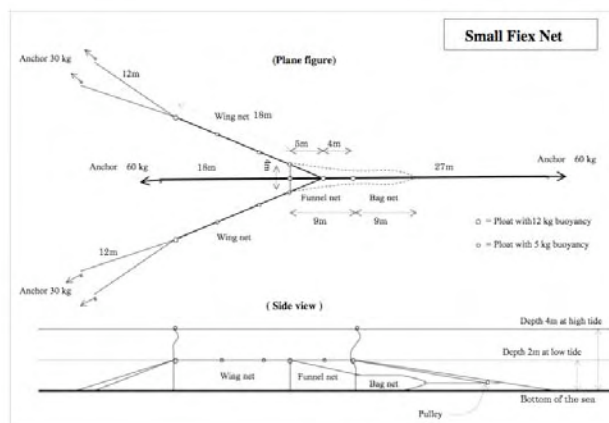
Implementation organization: Port-Gentil Fishery Center = CCPAP (Subcontract)

Implementation period: From May 13, 2008 to October 28, 2008

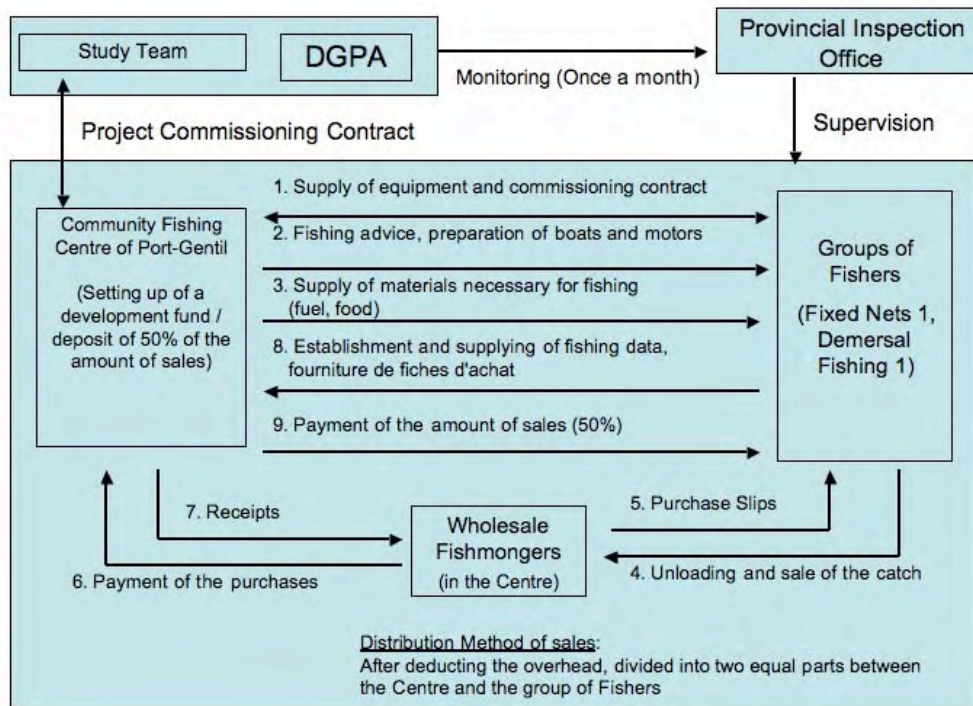
Inputs: (Materials) Small set-net : 2 sets (= 1 set : made in Japan 1 set : to be made in Gabon)
FRP boat (7m, with an outboard engine, 40 hp.) : 1 set, High pressure washer: 1set, Seawater pump: 1set

(Personnel) Fishers (for making/installing the net : 10 persons x 30 days, for operation : 10 persons x 10 days/month x 5 months)
Coordinator (C/P) (for making/installing the net : 2 persons x 30 days, for operation : 2 persons x 5 days/month x 5 months)

Plan of the small set-net for the project :



Implementation structure :



(2) Results of Monitoring and evaluation

1) Results of Monitoring

Monitoring points	Results	Notes
(Condition of the nets) Damages of the nets Cleaning of the nets Condition of frame ropes	Tears have been mended. No damages. Cleaning of the net was made once a month. The frame ropes of both the nets were re-tightened once in July. The fishers group and C/P have no difficulties in maintenance work of the nets.	
Operation of the net	Operation of the net has been conducted twice a week as decided by DGPA, CCPAP and the fishers group. The fishers group and C/P have no difficulties in operation of the nets.	Cooperation extended by the JOCV member, working for CCPAP, encouraged C/P and the fishers group in operation of the net.
Management of Sales money and expenses	With records of the operations/sales, settlement of expenses and sales money and management of money for the project are properly carried out.	The records of the operations/sales were made and confirmed by the chief of the fishers group, C/P and Vice-manager of CCPAP.
Demonstration of the operation	C/P explained the set-net (structure of the net and how to make, install, maintain, operate the net and the results of the operation) to the fishers being interested in the set-net fishing.	Because of poor catch, a mini-seminar on the set-net fishing was made by C/P and the JOCV member for other fishers, instead of the demonstration,

2) Results of Evaluation

Outcome expected (1) : The fishers group becomes able to make, install, maintain and operate the set-net.

Way to evaluate	By observing the operation and the condition of the nets in the field and checking the operation records.
Criteria for evaluation (criteria)	The number of cleaning of the net: One time or more per month. The number of re-tightening of the frame ropes: One time or more in the period of the project.
Results	The nets were cleaned once per month. The frame ropes were retightened one time each for No.1 and No. 2 net in July
Notes	

Outcome expected (2) : The fishers group obtain catches by maintaining and operating the net.

Way to evaluate	By checking the catches, sales, expenses and the fishers share on the records of the operation/sales																																				
Criteria for evaluation (criteria)	The fishers receive their share of profit in every month.																																				
Results	According to the rule, the fishers received their share of profit after settlement of the sales money and expenses every month except October. In October, they had no share of profit because the sales fell below the expenses.																																				
Notes	Due to poor catch after July, the fishers had little share of profit. The project had to pay allowances (3,000 CFA/person/time) to the fishers for their work from late August. <ul style="list-style-type: none"> The average catch was 62kg/time in June. It decreased to 4kg/time in late of the project period, though 40kg/time had been expected. Monthly data of the operation: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>June</th> <th>July</th> <th>August</th> <th>September</th> <th>October</th> </tr> </thead> <tbody> <tr> <td>Catch (kg)</td> <td>817</td> <td>318</td> <td>53</td> <td>127</td> <td>31</td> </tr> <tr> <td>No, of operations</td> <td>13</td> <td>9</td> <td>9</td> <td>9</td> <td>7</td> </tr> <tr> <td>Sales (F.cfa)</td> <td>707,800</td> <td>368,800</td> <td>94,300</td> <td>126,800</td> <td>31,950</td> </tr> <tr> <td>Expenses (F.cfa)</td> <td>27,680</td> <td>55,775</td> <td>36,000</td> <td>61,450</td> <td>52,700</td> </tr> <tr> <td>Share (F.cfa)</td> <td>340,060</td> <td>156,510</td> <td>29,150</td> <td>32,675</td> <td>0</td> </tr> </tbody> </table>		June	July	August	September	October	Catch (kg)	817	318	53	127	31	No, of operations	13	9	9	9	7	Sales (F.cfa)	707,800	368,800	94,300	126,800	31,950	Expenses (F.cfa)	27,680	55,775	36,000	61,450	52,700	Share (F.cfa)	340,060	156,510	29,150	32,675	0
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Outcome expected (3) : A fund is made for the project

Way to evaluate	To check the records of the operation/sales and balance of the fund, managed by CCPAP.
Criteria for evaluation (criteria)	The balance of the fund managed by CCPAP is to be increased in every month.
Results	CCPAP has managed the share of the profit for the fund. The balance of the fund increased in every month, except October.
Notes	CCPAP received the shares of profit up to September, though they were small amounts due to decrease of the catches after July. But, because of the loss in October, the fund was slightly decreased.

Outcome expected (4) : The C/P learned how to install, maintain and operate the small set-net.

Way to evaluate	By conducting a demonstration of the operation for other fishers.
Criteria for evaluation (criteria)	The C/P is to be able to explain how to install, maintain and operate the small set-net to other fishers.
Results	A mini-seminar on set-net fishing was held for fishers interested in the fishing at CCPAP on November 11. The C/P explained well the construction of the small set-net, introduced in the project and how to install, maintain, operate the net to the fishers participated.
Notes	It proved that the C/P acquired the knowledge on the small set-net and it

	was a good practice for him to instruct fishers on the set-net fishing.
--	---

(3) Lessons learnt from the pilot project

1) Technical matters

Although the fishers recognized that the set-net is useful as a fishing gear, the net introduced in the project was not as effective as we expected.

It is essential for this type of fishing to locate a way which fish passes through for installing the net. Since the place, selected for the project has a widely flat bottom without topographical features, the way of fish spread out. Considering that fish may be used to the net and pass the area, keeping away from the net, it may be necessary to change the place of the net in the interval of a certain period.

It is necessary to select fishing areas and make more effective nets, fit for conditions of the fishing areas.

2) Management

For reduction of the operation cost and maintenance of the net, it is advantageous to locate the fishing grounds (the set-net) near to the fishing village and also to the markets.

All the operations were conducted by the C/P based on the Fishery Center. This way of conducting the operations worked well to manage the project and the equipment, while the C/P had to bear heavy loads every time.

By this way, the fishers could carried out the operations without stops, even though litter catch for them. Direction of DGPA/Inspection Office, the functions of the Fisheries Center and efforts of the C/P are essential to the execution of the project.

There were no stealing, destruction of the net during the project. It is provably attributed to the following points.

- The project was informed well to all the fishers in the project area by DGPA/ the Inspection Office
- The chef of the fishers group has a good relationship with the people of the villages.
- Since the net was fixed in front of the fishing villages, it was kept watch on by the people.

(4) Points to be considered for future activity / program

- It is necessary to conduct detailed surveys on fishing grounds together with the fishers of the project area.
- The C/P had to spend extra time and effort in such jobs as preparation of the boat/engine and storing them after the operation, taking the fishers to and from the Fishery Center and their village. It is better that the operation is conducted independently by the fishers from their village under close monitoring and instructions by the C/P. For this way of operation, it is necessary to consider ways of sales of catches, management of sales money as well as management of the equipment.

(5) Perspectives in the Master Plan

It is useful to take the following results of the pilot project into consideration for introduction of the small set-net fishing, though the fishers could not earn much with the net introduced in the project.

1) Pertinence (technical, profitability and socio-economic)

Technical matters: The C/P and the fishers group have learned to make, install, maintain and operate the small set-net introduced for the project. They have no difficulties in operating and maintaing the net.

The net was not as effective as we expected. It is necessary to make more effective net, fitting to the conditions of fishing grounds.

Profitability: The fishers could not earn much due to little catches in the pilot project, but their shares can be raised when the net is improved.

Socioeconomic aspect: There were no troubles such as distructions of the net and disputes with other fishers during the projet. It is ,however, necessary to prepare regulations of the set-net fishing so as not to raise any troubles with other fishing and activites such as water transportation.

2) Implimentation process and methods

Since this attempt is in a stage that needs many trials both in technical and economic aspects, an experimental project is necessary to make effective net suitable to fishing grounds through trial operations and technical transfer. Depending on the outcomes of the experimental project, the efforts will be continued to prevail the fishing method through the following phase.

3) Implementation structure

This pilot project was conducted based on the Fishery Center under the direction of DGPA/the Inspection Office of the province. This system worked effectively to manage the pilot project and it will be also useful to execute the new experimental project. The way of the fishing operation may be reconsidered so that the fishers worked more independently. For this, the C/P and the Fishery Center needs to conduct the monitoring and instructions to the fishers more carefully.

3.3.2 Coastal Fishery Development

(1) Project Objective and Scope

Overall goal: To increase the number of the new boats to promote the coastal fisheries.

Project objective: To confirm the possibility to operate a new fishing boat equipped with an inboard engine by local fishers for exploitation of the coastal areas.

Activities:

- i) To give technical instructions to operate the boat and equipment.
- ii) To conduct fishing operations and keep recording of the fishing operations and sales of catches.
- iii) To manage expense/sales money and deposit a part of the profit of the fishing operations as a fund for the project.
- iv)-1 To give the technical practice to the C/P.
- iv)-2 To teach how to operate the new boat to other fishers interested in the project.

Target group : One group of fishers in the coastal area (More than five fishers in the group)

Target area : Port Gentil and southern coastal areas of Gabon

Implementation organization: Port Gentil Fishery Center (Sub-contractor)

Implementation period: From May 13, 2008 to October 28, 2008

Inputs: (Material) One set of canoe type fishing boat, made of FRP with length approx. 12m, equipped with an inboard diesel engine: approx. 30 hp.
Fishing material (bottom long-lines, hand-fishing lines), Line-hauler, Echo sounder,
Small portable GPS

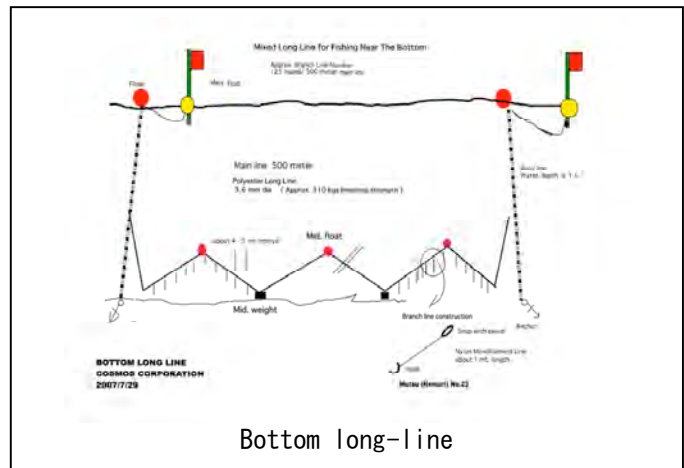
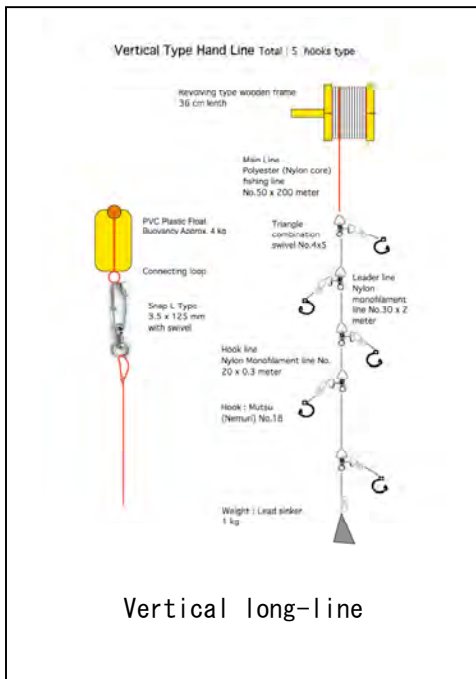
(Personnel) Fishers: For preparation of fishing gears and training: 10 persons x 10days,
For fishing operation: 10 persons x 20 days/month x 5 months

Counterpart (C/P): For preparation of fishing gears and training: 2 persons x 5 days

For fishing operation: 2 persons x 5 days/month x 6 months

(*) The fishing boat equipped with an inboard diesel engine was built by a boat building company in Gabon. Excepting the South Africa, Gabon is one of the few countries that produce FRP boats of reliable quality among the countries in the Sub Sahara.

Plans of the fishing material:



Implementation structure: Same as the system shown in the aforementioned project (3. 3. 1).

(2) Results of Monitoring and evaluation

1) Results of the monitoring

Monitoring points	Results	Notes
Conditions of the boat (hull, engine)	There are no damages on the hull. The engine and other equipment were checked and maintained before and after the voyage every time. Lubricant oil of the engine was change in every 250 hours as instructed by the manufacturer. The engine is thereby kept in good condition.	The JOCV member (engineer), working for CCPAP contributed very much for maintenance of the engine, equipment of the boat.
Fishing operations	Records of the fishing operation were made in every voyage. Total number of voyages: 7 times Total number of operation days: 46 days Both of them are less than those expected. .	The master fisherman had to be changed to a young and little experienced member of the group after the third voyage.
Management of sales and expenses	Settlement of expenses and sales, share of profit and management of fund were properly made according to the records of operation/sales of catches.	
Demonstration of the boats	The chief of the group taught other fishers how to operate the engine, equipment and handle the boat. He conducted a trial navigation to the Cap Lopez for their practice.	

2) Results of the evaluation

Outcome expected (1) : The new fishing boat is properly managed and operated.

Way to evaluate	By checking the operation records of the boat and the conditions of the boat and engine.
Criteria for evaluation (criteria)	Number of voyages is to be 2 times or 12 days or more per month. The boat and engine are maintained in a good condition.
Results	Total number of voyages: 7 times (= in average 1.4 times/month) Total number of operation days: 46 days (= in average 9.2 times/month) Both number were below the criteria. In the beginning of the project, the fishers group made the voyages at a pace of three times per month, but after the third voyage, the pace had been down. The major factor in causing this result was the unexpected incident that made the chief of the group unable to conduct the operation as the skipper on board for a long time, and had to leave the position to a young and less experienced member of the group. Despite of the less number of the voyages than expected, it can be highly appreciated that they operated the fishing boat for the first time in Gabon and landed catches safely. The boat and engine are maintained in good conditions.
Notes	The JOCV member working for CCPAP in training local mechanics for maintenance of engines largely contributed to the maintenance of the engine and equipment of the boat. He also assisted much the staff of CCPAP keep the records of the fishind operation and sales.

Outcome expected (2) : The fishers land demarsal fish in the coastal open sea.

Way to evaluate	By checking the records of the fishing operations.																								
Criteria for evaluation (criteria)	Quantities of demersal fish are to be recorded in the records of the landed fish.																								
Results	Quantities of demersal fish were recorded.																								
Notes	Averaged quantities of the catch was 324kg per voyage, except No.7 voyage, It was below the original estimate, 400kg/voyage. Data of catches: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No. of voyage</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> </tr> </thead> <tbody> <tr> <td>Catches in total (kg)</td> <td>372</td> <td>442</td> <td>354</td> <td>321</td> <td>300</td> <td>157</td> <td>5</td> </tr> <tr> <td>Demersal fish</td> <td>50</td> <td>216</td> <td>229</td> <td>72</td> <td>118</td> <td>90</td> <td>5</td> </tr> </tbody> </table> <p>Surface/mid layer fish accounts for a major part of the catches. (Demarsal fish=40%、 Surface/mid layer fish=60%)</p>	No. of voyage	1	2	3	4	5	6	7	Catches in total (kg)	372	442	354	321	300	157	5	Demersal fish	50	216	229	72	118	90	5
No. of voyage	1	2	3	4	5	6	7																		
Catches in total (kg)	372	442	354	321	300	157	5																		
Demersal fish	50	216	229	72	118	90	5																		

Outcome expected (3) : A fund is made for the project

Way to evaluate	To check the records of the operation/sales and the balance of the fund, managed by CCPAP.																																								
Criteria for evaluation (criteria)	The fund managed by CCPAP has a balance in every month.																																								
Results	The fund was made with the share of the profit for CCPAP and is managed by CCPAP. The fund has a balance in every month. CCPAP received the share of the profit in June, July and August, so the fund increased. But it decreased in September and October, due to the aforementioned circumstance.																																								
Notes	Sales, expenses and shares for the fund: (Unit : 1,000 F.Cfa) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No. of voyage</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> </tr> </thead> <tbody> <tr> <td>Sales</td> <td>557</td> <td>562</td> <td>497</td> <td>452</td> <td>399</td> <td>235</td> <td>8</td> </tr> <tr> <td>Expenses</td> <td>278</td> <td>251</td> <td>251</td> <td>233</td> <td>252</td> <td>248</td> <td>137</td> </tr> <tr> <td>Share for fishers</td> <td>140</td> <td>156</td> <td>123</td> <td>109</td> <td>73</td> <td>0</td> <td>0</td> </tr> <tr> <td>Share for CCPAP</td> <td>140</td> <td>156</td> <td>123</td> <td>109</td> <td>73</td> <td>-13</td> <td>-129</td> </tr> </tbody> </table>	No. of voyage	1	2	3	4	5	6	7	Sales	557	562	497	452	399	235	8	Expenses	278	251	251	233	252	248	137	Share for fishers	140	156	123	109	73	0	0	Share for CCPAP	140	156	123	109	73	-13	-129
No. of voyage	1	2	3	4	5	6	7																																		
Sales	557	562	497	452	399	235	8																																		
Expenses	278	251	251	233	252	248	137																																		
Share for fishers	140	156	123	109	73	0	0																																		
Share for CCPAP	140	156	123	109	73	-13	-129																																		

Outcome expected (4) : The fishers group acquire the ability to operate the new fishing boat.

Way to evaluate	By conducting a demonstration of the operation of the boat for other fishers
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Criteria for evaluation (criteria)	The fishers group is to be able to explain how to operate the boat and equipment.
Results	The chief of the group taught other fishers how to operate the engine, equipment and handle the boat on October 16. He conducted a trial navigation to the Cap Lopez for their practice.
Notes	The new team of the fishers mentioned above safely carried out their first fishing with the boat from October 19 to October 24.

(3) Lessons learnt from the pilot project

- With the good performance of the boat, including fuel efficiency, seaworthiness in the open sea, the fishers could operate the boat safely in the coastal area, extending their fishing areas and time.
- The fishers do not have difficulties in operating the engine/equipment and handling the boat. The chief of the group got used to handling the boat in a short time, owing to his experience of fishing, operating boats for many years. In the case of the young member, who undertook the skipper of the boat from the fourth voyage, despite of his little experience in operation of fishing boats, he could acquire the ability to operate the boat through the initial training and the first three voyages and an additional training on the echo sounder and GPS. He conducted four voyages safely and landed good catches for a learner in the first half of his operations. As this case, it is possible even for young fishers with little experience to acquire the ability to use the equipment and handle the boat through proper instructions and practical training on board, though the ability to fish is different from this case.
- Surface/mid layer fish accounts for a large part of the catches. It is advantageous to include surface/mid layer fish as the target fish, not limiting to demersal fish, for development of the fisheries.
- The management system of the project lacked a measure to financially support the fishers when they have a poor catch. This is one of the factors causing the members' leaving the group.
- The engine has been maintained in a good condition through proper operation and maintenance of the engine, according to the maintenance manuals.

(4) Points to be considered for future activity / program

- It is difficult for the fishers to conduct experimental fishing in their unknown areas every time. DGPA therefore needs to lead the experimental fishing, development of fishing methods/gears by the boat financially supported by DGPA for exploitation of new fishing grounds.
- Training of local mechanics is necessary for maintenance/repair of engines of the boats.
- DGPA is required to make necessary arrangements to supply the fishing boats with fuel oil at the price given to the industrial fishing boats.

(5) Perspectives in the Master Plan

Based on the following points of the results, it is verified that the fishing boats equipped with inboard diesel engines are useful to exploit the coastal/offshore areas for development of the coastal fisheries, while the profitability needs to be studied through actual fishing operations.

1) Pertinence (technical, profitability and socio-economic)

Technical matters: It was verified that the project boat has high fuel-efficiency, seaworthiness as well as a long sailing radius and confirmed the possibility to exploit the resources in the coastal areas including the southern part of the country. There were no difficulties for the fishers to learn how to operate the boat and equipment. It is thereby possible to operate the new fishing boats equipped with inboard diesel engines by the fishers and exploit the fishery resources in the coastal and offshore areas with the boats.

Profitability: Through the fishing operations, the project made a gross profit after settling direct fishing expenses and the fishers received shares of the profit accordingly. It is however severe to consider repayment for the boat due to its high value. According to the chef of the fishers group, it is possible to continue the fishing with the boat, if they make three voyages per month with same catches and sales of the first or the second voyage.

It is also necessary to ascertain the profitability of fishing with the boat operated by young fishers. Socioeconomic aspect: The new boats are to be operated outside of the traditional fishing areas and their operation is not to depress the existing fishing of the coastal fishers. In order to promote the fishery which attracts young persons to work, fishing work needs to be more effective with reduction of labor. Introduction of the new boats is also one of the trails to support this purpose.

2) Implimentation process and methods

Although it is confirmed that the new boat is technically effective for fishing in the coastal/offshore areas, the profitability seems severe due to high value of the boat. It is necessary to increase catching efficiency and to ascertain the profitability through fishing operations in a new experimental project. In the pilot project, the operation of the boat was conducted by the fishers group under management by the Fishery Center and instructions of DGPA/Inspection Office. The new project will be executed with a management system, basically same to the pilto project. For raising the fishing efficiency, the project includes the experimantal activities such as research of new fishing grounds, development of fishing methods. These activities shall be conducted by an experimental fishing boat, that is one of the project boats, provided with fishing material, crew as well as necessary finance for the experiments. To evaluate profitability of the boat, the fishing operations shall be conducted by the fishers through the project period.

3) Implementation structure

Port Gentil Fishery Center carried out the management of the pilot projet, including maintenance of the boat, sales of the catches, management of the sales money and the fund. The new project is to be managed with the same system by the Fishery Center under control and supervision of DGPA. For operation of the experimantal fishing boat, which is one of the boats to be introduced for the project, DGPA is to perpare budgets enough for the operation. Full-time staff need to be stationed at the Fishery Centers for managing the operation of the boats.

3.3.3 Microcredit

(1) Project Objective and Scope

Overall goal:

The credit system for artisanal fishers is distributed to main fishing communities in the Gabon.

Project objective:

1. The sustainable credit system is established, and the financial status of fishers' households is made stable.
2. The consciousness of business management of artisanal fishers is improved, and the DGPA's capacity of data collection is also improved.

Activities:

1. Collect repayment money from fishers' groups once a month, and save them into particular accounts of revolving funds.
- 2-1. Distribute record books to fishers, and explain how to record their daily fishing activities,
- 2-2. Collect / confirm their record books from fishers once a once, and advise them how to improve their records of fishing activities.
3. Make credit contracts with fishers' groups, and provide fishing gears to them.
4. Conduct regular monitoring to fishers' groups once a month.

Target group:

Artisanal fishers' groups in coastal and inland areas (each group is composed of more than 5 persons, and a president, a vice-president and a accountant are appointed.)

Target areas:

Port Gentil (coastal fisheries) : 7 groups
Ombue (lagoon fisheries) : 5 groups
Mayumba (lagoon fisheries) : 5 groups
Lambarane (inland fisheries) : 6 groups
Oyem (inland fisheries) : 5 groups

Implementation organization:

Entrustment to artisanal fisheries centers and aquaculture stations

Implementation period:

May 19 to November 3, 2008 (Port Gentil)

May 23 to November 1, 2008 (Omboue)

June 9 to November 10, 2008 (Lambarene)

May 26 to October 19, 2008 (Oyem)

June 3 to October 24, 2008 (Mayumba)

Inputs:

Equipment: fishing gears, camping goods, record sheets, calculators, scales

Personnel: Study team members and DGPA officials

Credit Condition:

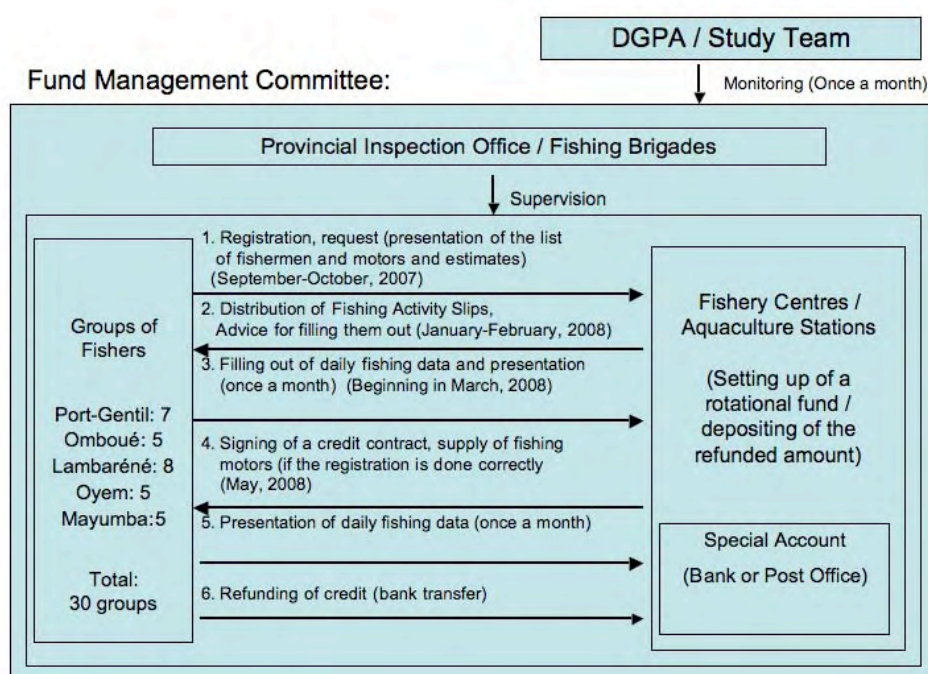
Limit of credit: Coastal fisheries: 1,000,000 FCFA per group

Lagoon and Inland fisheries: 300,000 FCFA per group

Repayment period: 3 months

Interest: 1% / month (first 3 months), 2% / month (after 4th month)

Implementation structure:



(2) Result of Monitoring and Evaluation

i) Results of the monitoring

Indicator	Results				
Condition of credit repayment	Results of credit repayment of each site, confirmed in the final evaluation are as follows;				
	Port Gentil	Omboue	Mayumba	Lambarene	Oyem
Repayment Rate	49%	73%	87%	76%	74%
No. of groups completed all repayments / total no. of groups	1 / 7	3 / 5	2 / 5	2 / 6	3 / 5

Until, a leak accident of oil pipe-line was occurred in May, and it polluted fishing ground Olende. Therefore, 2 fishers' groups couldn't operate regular fishing

	<p>activities, and stopped them until the middle of October. Other groups were faced on some troubles / failures of out-board engines and fishing boats. For those reasons, the repayment rates become low in Port Gentil. In other sites, fishers' groups also had various problems for credit repayment, such as dispute in a group, earlier close of peak fishing season than the normal year, school expense of the new school term, unexpected expense for hospitalization and funeral of family and relative and so forth. However, the repayment rate exceeds 70% in those areas. It indicates that the condition of credit repayment, except Port Gentil, is quite good.</p>																		
Submission / collection of fishing record sheets	<p>Submission / collection of fishing record sheets in 4 months (from June to 2008) is as follows;</p> <table border="1"> <thead> <tr> <th></th> <th>Port Gentil</th> <th>Omboue</th> <th>Mayumba</th> <th>Lambarene</th> <th>Oyem</th> </tr> </thead> <tbody> <tr> <td>Submission / collection rate of fishing record sheets</td> <td>39%</td> <td>75%</td> <td>100%</td> <td>92%</td> <td>95%</td> </tr> <tr> <td>No. of groups submitted all sheets / total no. of groups</td> <td>0 / 7</td> <td>3 / 5</td> <td>5 / 5</td> <td>4 / 6</td> <td>4 / 5</td> </tr> </tbody> </table> <p>Port Gentil, because fishing operation was interrupted by an oil leak accident, fishing activities were made into trouble / failure, or the record sheets were left at fishing camps, the submission of their record sheet submission has not reached to a satisfied level. In other sites, fishers' groups also have problems, such as lack of understanding of record sheet's content, mistake / omission of necessary figures, or forgetfulness of sheet submission. However, the submission rates of record sheets reach nearly high level.</p>		Port Gentil	Omboue	Mayumba	Lambarene	Oyem	Submission / collection rate of fishing record sheets	39%	75%	100%	92%	95%	No. of groups submitted all sheets / total no. of groups	0 / 7	3 / 5	5 / 5	4 / 6	4 / 5
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	In Oyem, 2 groups, composed of fisher's association leaders, participated in this credit program in Bituga village. However they stopped regular activities of the fishers' association, because they have priority of this credit program rather than the association. In Lambarene, 3 groups of a fishers' association in Ebel Abanga village participated in this program. Because the association president individually collected repaid money and record sheets from every member, the assignment between association activity and credit group activity doesn't become clear.
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ii) Results of the evaluation

Expected output (1) : Fishers' groups can repay their credit on the plans.

Evaluation Method	<ul style="list-style-type: none"> - Confirmation of the credit repayment record - Evaluation workshop with fishers' groups
Evaluation Indicators	<ul style="list-style-type: none"> - Can fisher's group finish total repayment within a regulated period? - Is the repayment period and interest appropriate? - Is the 15 days' grace period for preparing fishing gears is appropriate?
Result	<ul style="list-style-type: none"> - Except Port Gentil (coastal fisheries), a half of fishers' groups (lagoon and inland fisheries) finished repaying total amount of the credit in 3 – 4 months. In Port Gentil, the repayment rate was only 50%. But, it attained 70 – 80% in other areas. - Fishers' groups can repay the credit totally in 3 months, when the repayment period falls on the peak fishing season of the areas. However, because the season gap is often caused, for example, the rainy season comes earlier and later, it is too difficult to estimate the peak fishing season. In Lambarene, the rainy season had started earlier in the repayment period unexpectedly. Therefore, the sudden rise of water level in rivers and lakes causes the decrease of quantity of captured fish and delayed the repayment from some fishers' groups. In addition, there are some expenses unexpected in advance in fishers' groups, such as expenses of hospitalization and funeral, costs of fishing gears' assemble, and additional purchases of lacking materials. Moreover, a group delayed its repayment because the repaying money collected in the group had been stolen (Bitouga, Ebel Abanga). For those reasons, many groups request to extend the repayment period up to 5 – 6 months. - Most groups didn't think that 1% monthly interest (12% per year) is not a burden. In case of the increase of credit interest, they answer to raise monthly interest up to 3 – 5%. - Even though the interest portion is monthly fluctuated in accordance with a credit remainder, we had not found the case that the next month's repayment was corrected by lack of amount of repayment in a certain month. - The groups which can assemble fishing nets by themselves, had prepared their fishing nets in 15 days and started to utilize new gears for actual fishing operation. However, the number of the groups, which depend on other fishers for assembling fishing nets, is not small. They have to wait for the completion of their fishing gears in about 1 month.

Expected output (2) : Fisher' groups can report their fishing activity's records properly.

Evaluation Method	<ul style="list-style-type: none"> - Confirmation of fishing activity records collected from fishers' groups - Evaluation workshop with a fisher's group
Evaluation Indicators	<ul style="list-style-type: none"> - Are fishing record sheets submitted / collected every month? - Are fishing record sheets filled in properly?
Results	<ul style="list-style-type: none"> - Except Port-Gentil, the submission / collection rate of record sheets reach 70 – 90 %. In the site that a DGPA provincial office or a fisheries inspection office regularly contacts fishers' groups, it seems that the submission rate of record sheets tends to be higher. - At Bitouga village, Oyem, even though each member filled in record sheets every month, the group leader often forgot to submit them to the DGPA office. At Ebel Abanga, Lambarene, only a fishers' association president collected record sheets from each member of 3 groups (11th every month), and submitted them to DGPA offices. - At first, a fishing activity is put on record every boat unit. Some groups arranged to aggregate fishing records of all members on a record sheet, and submitted only an

	<p>aggregated sheet every month.</p> <ul style="list-style-type: none"> - Through a preliminary mini-workshop, fishers' groups had mostly understood how to fill in the record sheets. Though some omissions / mistakes on the record sheet were found, it was not happened that any members cannot fill in the record sheets in a group at all. - The condition of data records widely vary between the groups. In special, it is related with the education standard of a fisher's group. The fishers who cannot understand the letter are not a few. Each group took measure to take records smoothly; for example, they taught a record method each other, and a group leader filled in instead of a member. - Being very tired just after returning from fishing, many fishers often forgot to measure the weight of captured fish. In case that each member has a different landing place, it is difficult to smoothly use a scale in a group and sometime measure it individually.
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Expected output (3) : The fishing activity of fishers' groups is improved.

Evaluation Method	<ul style="list-style-type: none"> - Evaluation workshop with a fisher's group - Confirmation of monitoring sheets
Evaluation Indicator	<ul style="list-style-type: none"> - Are the catch quantity, fishing operation days, fishery income and saving amount increased? - Do fishers' groups utilize their purchases fishing equipments properly? - Do fishers' groups start any new activities?
Result	<ul style="list-style-type: none"> - The credit program was not effective to catch quantity and fishing operation days. It is because this credit does not aim to extend the fishing scale of artisanal fishers, but to renew only their existing fishing nets. Moreover, the credit amount is not enough to buy an outboard engine and a FRP boat, and difficult to explore new fishing grounds. - In Oyem and Mayumba, some groups raise their catch quantity through the renewal of their fishing nets by this credit program. Those groups purchased / introduced cotton trammel nets as replacement of their used mono-filament nets, and answered that their fishing activities were more effective. - As well as catch quantity, fishers' groups did not have any direct effect to their fisheries income. However, through their daily recording activities, most groups can understand their fisheries revenue and expenditure every month. Each group considered various ideas for improving the fisheries account, such as started a traditional saving activity for repayment preparation, opened an saving account in a post office, saved some fuel and ice expenses, and so forth. Some groups reconsidered the fresh fish sale by measuring the weight of captured fish every time, because the fish sale is currently heavy dependant on middlemen. - In Port Gentil, some fishers' groups have not used the purchased materials yet. In groups of lagoon / inland fisheries, however, most groups utilized the purchased materials for actual fishing operation. Moreover, in lagoon / inland areas, there are many fishers who cannot assemble fishing nets by themselves. It is observed that some groups had trouble on the first repayment, because their fishing nets had not been prepared within 15 days. - By daily recording of fishing activities, most lagoon / inland groups answered to be aware of proper catch quantity of each fishing ground. Even though a few groups tried to estimate the catch quantity of rainy / dry season, they do not attain concrete arrangement for their fishing operation as group.

Expected output (4) : The DGPA's advice system for the credit program is established.

Evaluation Method	<ul style="list-style-type: none"> - Interview to officials belonging to DGPA provincial offices and fisheries inspection offices - Confirmation of monitoring sheets
Evaluation Indicators	<ul style="list-style-type: none"> - Do DGPA offices carry out monthly monitoring and intermediate / final evaluation as planned? - Do DGPA offices make data analysis of fishing record sheets smoothly? - Do DGPA offices make proper advices in fishing activities to fishers' groups?
Results	<ul style="list-style-type: none"> - Though the evaluation date was sometime delayed by other assignments and some reasons of fishers' groups, the intermediate evaluation was nearly carried out on the initial plan.

	<ul style="list-style-type: none"> - Except Port-Gentil, the monthly monitoring activities were carried out on the plan. In Port-Gentil, we have not found any traces whether the DGPA provincial office did not regularly contact fishers' groups. It affected that the collection rate of fishing record sheets became low. - In general, the collected repaid money was managed under good condition. The repayment condition was well understood for each group, and the deposit certificate of banks and post offices were also well stored. - Only Wolue-Ntem provincial office (Oyem) and Mayumba inspection office had analyzed the collected data of fishing record sheets before the final evaluation. Moreover, only Wolue-Ntem provincial office (Oyem) and Omboue inspection office had well arranged record sheets and related documents properly by file holders. Except the Oyem office, we consider that there are many issues to be improved in data analysis and document arrangement. - According to regular visit to fishing communities, the advices for fishers' groups were well conducted. Especially, the recording advice of fisheries accounting for credit repayment is very effective, and most fishers answered that its advice is favorable and useful.
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(3) Lessons learnt from the pilot project

i) Credit System

The amount of credit is not enough to prepare necessary fishing materials for a group of more than 5 fishers. In the case that the repayment period departs from the peak fishing season in inland fisheries, we consider that 100,000 FCFA is one of standards for monthly repayment, for that reasons why a half of groups can repay the total amount and other half cannot do in the planned period. In case of coastal fisheries, we consider that 300,000 FCFA is a little high as monthly repayment, because it is difficult to repay 300,000 FCFA per month when the repayment period departs from the peak fishing season.

When the repayment period falls on the peak fishing season, fishers' groups could repay total amount of credit for this program within 3 months. In case of increasing the amount of credit, it is appropriate to extend the repayment period rather than increase the monthly amount of repayment.

1% monthly interest did not cause any troubles to fishers. Many fishers answered to agree on increasing the interest, if the larger amount of credit per group will be provided. In the future, the increase of interest should be considered to grow the credit capital effectively.

As a time for preparing fishing gears, 15 days' grace period of repayment was introduced in the pilot program. Many fishers answered that it was difficult to prepare their fishing gears in that period, and the situation caused a burden for their regular repayment. Because most of them requested at least 1 month for preparing their fishing gears, it is appropriate to set up 1 month as a grace period after the provision of fishing materials.

There are separated hopes of credit provision, whether the credit is provided by cash or material. In practice, robbery cases of repaying money were occurred in the program. Hence, it is too difficult for artisanal fishers to manage a large amount of cash properly. Moreover, in the cases that some unexpected expenses were occurred by hospitalization and funeral, the cash on hand was often spend for other purposes out of the plan.

ii) Group activity

Many fishers' groups replied that 5 members are appropriate for a group. However, they also had negative opinions to increase the number of group's members, because it is more difficult to control their activities in larger groups. Moreover, many fishers considered to continue their group activities from now on. In consequence, we confirm that the microcredit program is effective to organize small-member's groups.

In a short period, 3 months, there were not many cases of particular group activities in the program. However, some groups tried to make new group activities, such as they considered organizing a fishers' women association by calling women living at surrounding areas, and made a rule to utilize the same fishing ground and gears by turns in a group. Even though those group activities have not made concrete achievement yet, it indicates the possibility to start various social / economic activities in fishing communities by the introduction of the credit program.

The credit program was also introduced in the fishing villages where local fishers' association had been established (Bitouga, Ebel Abanga). However, those efforts sometime caused some disputes and confusions among credit groups, and not generate multiple effects between existing associations and new credit groups. In the case that a fishers' association have been existed in a community, we don't push to form new groups for managing a credit scheme, but utilize the existing association as a target organization for credit scheme, in order to avoid any structural confusion in a community.

iii) Utilization of fishing gears

The fishers' groups which switched from mono-filament nets to cotton trammel nets on credit (Mbolenzock, Elop) are satisfied easy operation and fishing effect of trammel nets. The renewal of fishing gears on credit like this offers opportunity to introduce proper fishing gears instead of prohibited gears like mono-filament.

Because many fishers cannot repair fishing nets by themselves, a lot of broken / torn fishing nets are abandoned without repairmen. In order to utilize the fishing nets bought on credit for a long time, it is necessary to give technical advices of assembling / repairing fishing nets for artisanal fishers.

iv) Fishing activity record

Thanks to teaching how to record daily fishing activities by regular visits to fishing communities, many fishers' groups could understand the importance of keeping record and improve the credibility of recorded data gradually. In addition with the monitoring for fishing activity record, DGPA officials had chances to exchange opinions of fishing activity and management with fishers. That situation is very effective to support the fishers' group activities.

The regular advice for recording fisheries accounting is so effective that fishers were aware of importance of daily saving. A fisher participating in the program opened his saving account at local post office by this credit chance. Most fishers intend to continue taking note of fishing activities from now on.

(4) Points to be considered for future activity / program

According to the results of the pilot program, we suggest that the following points should be considered for future credit programs;

- The amount of credit should be decided by reviewing actual fisheries incomes (the submission of fisheries account record is obligated for fishers' groups). However, we may consider raising the amount of credit up to 2 – 2.5 times of the pilot program, in order to support fishers' groups preparing their whole necessary materials.
- We should allow fishers' groups to utilize a part of their credit as an operational cost, when they have to request someone to assemble fishing nets and hire someone to build small dams in rivers. The amount of operational cost is up to 10% of total amount of credit. However, that is a limited case only when the special necessity is admitted.
- We should consider that the repayment period falls on the peak fishing season, and set the amount of credit up to 12 months. 200,000 – 300,000 FCFA for coastal fisheries groups and 100,000 FCFA for lagoon and inland fisheries groups are appropriate as appropriate as monthly repayment.
- The credit interest should be set up individually in accordance with the amount of credit. 2 – 3 % is appropriate as monthly interest for microcredit.
- We should set the grace period for fishing equipment preparation up to 30 – 45 days with some free times. It should be sufficient to prepare fishing gears, even though fishers ask someone to make them.
- In principle, the credit should be provided as materials / equipments, not as cash. In the purchase of materials and equipments, fishers' groups prepare their quotation and submit the quotation to DGPA offices, or groups' leaders come to Libreville to directly purchase materials and equipments together with DGPA officials.
- In case of purchasing materials and equipments for rural villages far from Libreville and transporting them to the villages, we should add a transport fee and commission on the amount of credit.
- It is desirable that the credit scheme should target to small fishers' groups consisted about 5 members. In case of lending credit to family's groups, we have to request additional guarantors of other families as the security of credit repayment. However, in the aspect of strengthening fishers' organizations, we should not admit to lend credit to individual.

- When fishers' association have existed in communities, we should consider not forming new small groups for credit programs, but modify the credit program for existing associations. In those cases, all members of the fishers' association have to be obligated to repay total amount of their credits and receive monthly account audits and management advices serviced by DGPA.
- The fishers' groups receive the credit are obligated to take records of fisheries accounts and catch quantities. According to their fishing record activities, the consciousness of savings for credit repayment is formed in a group. In order to disseminate their recording activities widely, we should consider making / distributing fishers' books.
- DGPA provincial offices and fisheries inspection offices visit fishers' groups every month, and make effort to collect fisheries record sheets and repaid money from the fishers.
- Because many fishers don't have skills of assembling / managing / repairing fishing nets, we should consider such special condition for receiving credit as fishers have to receive trainings and seminars of fishing gears' assembling and repairing.

(5) Perspectives in the Master Plan

i) Pertinence (technical, profitability and socio-economic)

Artisanal fishers cannot receive loans from banks, because they cannot prepare a security of loans. Therefore, fishers always struggle to collect sufficient money to purchase fishing gears. Because it is difficult to obtain fishing gears, many fishers purchase them from middlemen at high prices. Under those situations, artisanal fishers long for a credit service for purchasing fishing gears with low interest. All fishers participating in this pilot project ask for continuing the credit services from now on.

With regard to small-scale inland fisheries in upper reach of rivers like Wolue-Ntem (Oyem), the credit amount of this pilot project is enough for fishers to renew their fishing gears. However, with regard to coastal, lagoon, and wide inland areas (like River Ogooue, Lake Onangue), in case that the fishing scale of a fisher's group was large, the credit amount of this pilot project was not enough. Even though the credit amount is enough to renew all fishing gears and expand their fishing scale, fishers could purchase / obtain new fishing gears on low-interest credit. Many fishers' groups highly evaluate that this situation contributes to continue their sustainable fishing activities in the future.

This pilot project indicates that the renewal of fishing gears increased catch quantity and improved fisheries income for the fishers' groups, which were engaged in small-scale gill-net fishing in Wolue-Ntem province. However, as a whole, it is too difficult to indicate the economic effect to their catch quantities and fisheries incomes by credit schemes as numeral values, for those reasons why the repayment period is so short like 3 months, the catch quantity is largely fluctuated by fishing seasons, and the interruption of fishing activities by an oil-leak accident. However, purchased fishing gears remain on fishers' hands after their completion of repayment, and fishers' groups continuously use the gears for their fishing activities. Therefore, the future effect to their fisheries incomes by credit schemes is not small at all.

In terms of improving their fishing activities and management, it is effective to organize small groups for credit repayment. There are many opinions that fishers' groups start their savings for repayment as group activity. The introduction of credit schemes and the record of fishing activities make good opportunities for improving the management consciousness of fishers' groups. In addition, we found several cases that fishers' groups have started new activities, such as organizing women association and starting agricultural activities. It shows that the introduction of credit scheme is also effective to vitalize the social activities of fishing communities.

ii) Implementation process and method

Beside interviews and questionnaires, we made screenings to subjective approaches of fishers' groups, such as submitting quotation of necessary equipments and fishing record sheets in advance. The screening process is effective to confirm the credibility of each fisher's group. Because it is too difficult to obtain any asset security for microcredit, the screening method and procedure for the credibility of fishers' groups is especially important. Actually, no fishers' groups became bad debt in this pilot project. All fishers' groups made effort to repay their credit by communicating with DGPA provincial offices and fisheries inspection offices.

The monitoring to fishers' groups, conducted by DGPA provincial offices and fisheries inspection offices, is not only effective to promote smooth credit repayment, but also make good opportunities for

guiding fishing activities / management of fishers' groups. Many fishers are impressed with the regular monitoring. For those reasons, it is dispensable to conduct monitoring and guidance of DGPA offices for credit programs.

The record of fishing accounts is effective for fishers to understand rough saving amounts by calculating own fisheries incomes. It is not deniable that the recording activities promote their credit repayment. In addition, the daily measurement of catch quantities is effective for fishers to estimate rough quantity of fish catch at each fishing ground in each season, and know actual catch quantities by scale before captured fish are sold to middlemen. In order to improve the management of fishers' households, it is important that fishers are obligated to record their fishing activities.

iii) Implementation structure

Because the support and advice of local level is important for microcredit, DGPA provincial offices and fisheries inspection offices in target areas are the implementing organizations for field activities in the pilot project. The credit management committee, established in the DGPA head office, took roles of guiding and auditing the activities of those DGPA local offices. In spite of several problems of fisheries data analysis, DGPA provincial offices and fisheries inspection offices regularly monitored fishers' groups' activities. The monitoring of local offices made credit repayment of fishers' groups smoother. According to the results of the pilot project, the credit program is effectively conducted, if DGPA local offices take responsibilities and budgets of monitoring activities.

For those reasons, in order to clarify the implementing structure and the responsibility of local offices, it is important to establish local credit management committees coordinated by DGPA local offices. To consider / implement credit schemes which are appropriate for the necessity of local fishers, it is necessary to give authority of implementing budgets and program management to the local credit management committees.

Additionally, in the areas of the Artisanal Fishers' Community Center (Port-Genil and Lambarene at present), we should consider that the microcredit scheme also become one of functions of the fishers' centers. Since the fishers' centers have their bank accounts and are familiar to manage large amounts of funds, we can entrust the management of credit funds to them without anxiety. At the same time, the fishers' centers can take important role of purchasing and storing fishing equipments as key places for local fishers. Moreover, in order to return centers' benefit to local fishers, local credit management committees should consider keeping a part of their profits as credit funds for local fishers.

iv) Reflection to suggested projects

The results of the pilot project above-mentioned can be useful for project planning of microcredit and long-term loan, when we consider loan system, loan management, implementing structure, and etc. for 'Financial Loan Project for Artisanal Fisheries' listed on the prior projects. Especially, it indicates that the credit scheme may be sufficiently implemented / managed by local authorities at provincial and district level. It also achieves the reinforcement of the functions of DGPA provincial offices and fisheries inspection offices.

In addition, DGPA local offices made their regular monitoring to fishing villages to give proper guidance to fishers. It raises the credit repayment rate up to high standard. Those results also shows the possibility of adapting the microcredit scheme to the establishment of new business for fishing communities.

'The Project for Alternative Income Sources' is expected to establish new business as alternative income sources for fishers' groups, such as agriculture, livestock, food processing and forth on. Therefore, the result of this pilot project is useful to form the process / structure making of capital funds and necessary equipments. On 'The Project for Improvement of Fish Distribution System', the result of this pilot project is useful, when it is necessary to purchase the equipments for food processing such as smoked fish and fish hamburger.

Moreover, the pilot project clarified that the microcredit schemes promote the organization of artisanal fishers and the establishment of joint activities. It indicates that it is useful to introduce a microcredit scheme as a tool for 'The Project for Strengthening Fishers' Organization'.

3.3.4 Integrated Fish Farming

(1) The project purpose and contents

Overall Goal: To stabilize the managing status of small-scale aquaculture farmers and to increase their income.

Project objective: To improve appropriate aquaculture techniques and dissemination method for small-scale aquaculture farmers.

Activities:

- i) To make the aquaculture farmers understand the difference in the productivity of the ponds (water depth 0.5m and 1.0m) through the culture experiments.
- ii)-1 To conduct the fertilization experiments using different livestock excrements.
- ii)-2 To conduct the experiments of livestock culture.
- iii) To conduct the experiments of vegetable cultivation using the mud of the ponds and the animal excrements.
- iv) To train the staff of the aquaculture stations using OJT system.
- v) To conduct an initial training and an on-the-job-training to the participating aquaculture farmers.
- vi) To rear some broodstocks and to produce some fingerlings in the stations.
- vii) To compare and study the financial balance after selling the harvest.
- viii) To save the half of the profit as the dissemination fund.

TargetGroup: Small-scale fish farmers in inland area. Project Sites: Oyem aquaculture station and Tchibanga aquaculture station. Organism of execution: Same as above (reconsignment).

Project Period: 26th May to 2nd November 2008(Oyem), 16th June to 14th November 2008 (Tchibanga)

Inputs: (equipments)

Aquaculture: 2 seine nets, 4 scoop nets, 4 buckets (10L), 4 plastic containers or buckets (50L), 2 balances, 2 measuring boards, 2 digital thermometers, 2 oxymetres, 2 pH-meters, 2 motor-pumps (for the drainage).

Livestock: Containers to feed (2 for pigs, 2 for poultry), troughs for water (2 for pigs, 4 for poultry and 1 for the sheep), 6 shovels, 6 buckets, 6 brushes.

Agriculture: 2 plastic sheets (6,5 x m 10 m), 2 balances (0 - 20 kg), 6 nylon rope (2,5 mm, 12 m), 2 tape-meters (10 m), 6 sprays, 6 barrows, 6 hoes, 6 small hoes, 6 shovels, 6 rakes, 6 watering-cans 2 .

(facilities)

Animal sheds:

Oyem: pigsty (9x8m), sheepfold (5x2m), henhouse (3x2m), duckhouse (3x2mx2houses), fence for sheep (9x3m) and fence for duck (17x20mx2places)

Tchibanga: pigsty (9x8m), duckhouse (3x4mx2houses), fence for duck (30x30mx2places)

Parcels (fields), 600 m² in Oyem, 300 m² in Tchibanga.

Hangars (4m x 8 m), 1 in Oyem, 1 in Tchibanga.

(personnel)

Participants (fish farmers): in Oyem 4 persons, in Tchibanga 4 persons x 6 months

(staff of the station): in Oyem 2 persons, in Tchibanga 1 person

Monitoring staff (staff of the Station): in Oyem 2 persons x 5 days / month x 6 months)

(staff of the Station): in Tchibanga: 1 person x 5 days / month x 6 months)

Instructor for agriculture and livestock

in Oyem staff of the Peyrie Station (agriculture): 7 days, technician of IGAD (livestock): 7 days, for monitoring x 2 times / month x 6 months

in Tchibanga staff of the Tchibanga Station (agriculture): 7 days, staff of the ministry of agriculture in Tchibanga (livestock): 7 days, for monitoring x 2 times / month x 6 months

(Livestock and fish)

1) Sheep: 1/pond of 100 m², Tchibanga: Oyem: 5 sheep (of which 4 females).

- 2) Ducks: 1/pond of 30 m², Tchibanga: 50 (of which 46 females), Oyem: 24 (of which 22 females).
- 3) Male Tilapias (30 - 50 g) 1/m²: Tchibanga: 3.000, Oyem: 3.500.
- 4) Piglet: Oyem: 3, Tchibanga: 3.
- 5) Hens (local): 1/pond of 30 m², Oyem: 24 (2 cocks, 22 hens).
- 6) Inputs for agriculture

Chemical manures (NPK 50 kg, urea 40 kg, sulphate of calcium 50 kg, triphosphate 50 kg) each 6 bags, lime 25 kg x 6 bags, seeds (tomato 50 g, African spinach 20 g, lettuce 40 g, green pepper 20 g, cucumber 100 g, celery 30 g), pesticides (Coga 1kg x 6 bags, Crptonol 1 l x 6 bottles, Zalang 1 L x 6 bottles).

Overview of the experimental ponds of the Oyem aquaculture station:

1 Duck 351.0m ² Tilapias (males) 350	2 Hens 295.0 m ² Tilapias (males) 250	3 Pig 626.8 m ² Tilapias (males) 530	4 Sheep 225.2 m ² Tilapias (males) 190	5 Leaves of cassava etc. 210.0 m ² Tilapias (males) 180	6 Mixed feed 227.0 m ² Tilapias (males) 190
7 Duck 356.4 m ² Tilapias (males) 300	8 Hens 443.9 m ² Tilapias (males) 380	9 Pig 397.3 m ² Tilapias (males) 340	10 Sheep 280.3 m ² Tilapias (males) 240	11 Leaves of cassava etc. 195.0 m ² Tilapias (males) 170	12 Mixed feed 328.9 m ² Tilapias (males) 280

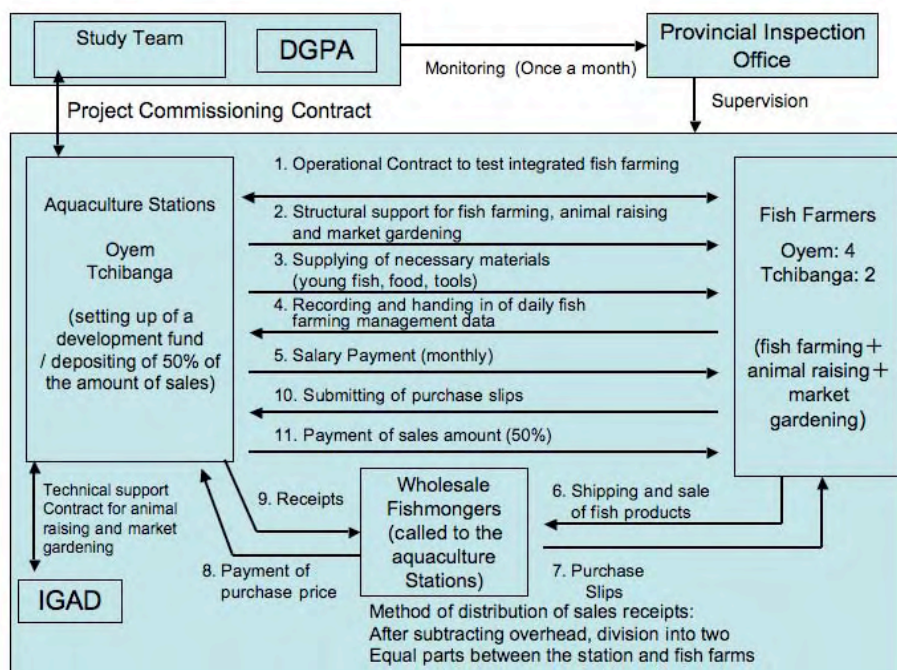
No. of the ponds: 12 ponds, Total area: 3.936,8 m², No. of the necessary fingerlings: 3.350

Overview of the experimental ponds of the Tchibanga Station:

1 Leaves of cassava etc. 367.1 m ² Tilapias (males) 290	2 Duck 684.5 m ² Tilapias (males) 550	3 Pig 417.4 m ² Tilapias (males) 330	4 Leaves of cassava etc. 402.0 m ² Tilapias (males) 320	5 Duck 805.1 m ² Tilapias (males) 640	6 Pig 426.9 m ² Tilapias (males) 340
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No. of the ponds: 6 ponds, Total area: 3.103,0 m², No. of the necessary fingerlings: 2.470

Implementation structure:



(2) Results of monitoring and evaluation

i) Results of the monitoring

Indicator of the monitoring	Results	Remarks
Number of the days where the participants came to the station	95.0%	Including the weekends and the holidays
Filling rate of the data sheets	80~90%	Due to the breakdown of a parameter device, they could not take the parameter concerned during a certain period.
State of the fish growth	In all ponds, a growth expected at first wasn't observed.	It is necessary to pursue a cause and to do a re-examination.
Mortality of the fish	Oyem: lower than 5% for the whole period Tchibanga: a big difference (48,3 to 5,2%) was observed by the ponds	A big gap was observed in Tchibanga, it is necessary to look for the reasons of it.
State of the livestock and huts	With regard to the hens and the ducks, half of them died because of stress due to the bad handling at the time of the transportation, and to the attack by the snake. The half of sheep died because of the attack by the dog and the illness. On the other hand no death was observed at pigs.	It is necessary to learn the good handling of the animals, to identify the reason of illness and to find the remedy, and to take some measures against the dog and the snake.
State of the vegetable cultivation	Oyem: good results for chili pepper and the eggplant Tchibanga: good results for the cabbage, the tomato, salad and gumbo	In Oyem, the soil mixed with sand was observed. This is considered to be a fundamental problem. Therefore it is necessary to retest of vegetable cultivation after improving the soil using the mud of bottom of the ponds.
State of the renting materials	Except the boots, the materials are used in a suitable way.	

ii) Results of the evaluation

Expected output (1): The aquaculture farmers and the staff of the stations can enumerate shortcomings of the ponds.

Method of the evaluation	To conduct hearing investigation from the staff of the stations, as well as the participating aquaculture farmers.
Indicator (standard)	More of half can enumerate shortcomings of the ponds and can propose concrete improvements.
Result	All, 8 participating aquaculture farmers and 3 staff of the two stations, understood the shortcomings of the ponds well and could propose concrete improvements. This objective has been reached.
Remarks	none

Expected output (2): The possibilities of integrated fish farming with livestock is clarified.

Method of the evaluation	To compare the growth (unit) of the fish in the ponds with the excrements of livestock and those of control ponds (only the leaves of cassava).
Indicator (standard)	The livestock husbandry and the aquaculture can continue until the end of the

	project. Then the fish growth of the ponds using the excrements presents a better growth than those of the control ponds (only the leaves of cassava).
Result	The massive mortality of the fish was not seen. However, due to the reduction of the number of the animals and to the leakage of water, some ponds could not acquire effects of the excrements. Therefore the growth of fish in those ponds was less good than the control ponds.
Remarks	It is necessary to retest, after increasing the number of livestock and repairing leak of the pond.

Expected output (3) : The possibilities of integrated fish farming with agricultural products (vegetables) are clarified.

Method of the evaluation	To compare the profitability of the vegetable with chemical manures and the one with by-products of the ponds (aquatic plants, mud of bottom of the ponds, etc.).
Indicator (standard)	Good, if the profitability of the vegetable with organic manures is better than the one with chemical manures.
Results	The beginning delayed of the vegetable cultivation didn't permit this comparison. With regard to the organic vegetable cultivation, the profitability in Oyem wasn't good because of the problems of soil. However, in Tchibanga, with good results, it was clarified.
Remarks	none

Expected output (4): The capacities of the station staff about the experiments are reinforced and the necessary knowledge for the dissemination of the integrated fish farming is transferred to them.

Method of the evaluation	To value the proposition of new experiments presented by the staff. To value their procedure and methods of workshop for dissemination which the staff organized.
Indicator (standard)	Good, if the staff can elaborate a program of aquaculture experiments and can give necessary explanations for the dissemination of the integrated fish farming.
Result	The staff can enumerate the improving points of the experiments and can give sufficient explanations on the integrated fish farming at the time of the workshop. Although more experiences are needed, it is to say that the staff of stations reinforced their knowledge on the procedure of execution of the tests and on the integrated fish farming, as well as their techniques on the subject.
Remarks	none

Expected output (5): Techniques of integrated fish farming are introduced to the existing aquaculture farmers.

Method of the evaluation	To value if the expected results are obtained without massive mortality of fish and livestock.
Indicator (standard)	Good, if the participating aquaculture farmers can take care of livestock, fish and vegetable.
Results	Although a big number of livestock died because of the bad handling and to the attack by the predators, there was little mortality of fish. On the other hand, in spite of the growth rate of the fish didn't reach the expected results, the participating aquaculture farmers could take care of livestock, fish and vegetable. Although more experiences are needed, it is to say that they acquired the technical knowledge on the integrated fish farming.
Remarks	none

Expected output (6): The feasibility of production of the fingerlings in the station is clarified (only in Tchibanga)

Method of the evaluation	To weigh and to count some fingerlings
Indicator (standard)	Good, if a sufficient number of fingerlings are securable for the pond of recommendation size (225 to 400m ²).
Results	The production of 2.1 fish /m ² was observed though the number of fingerlings was different by the pond. It was clarified that fingerling production can be conducted at the same time as the table fish culture.
Remarks	Since it was conducted to the beginning of a breeding season, the size of the fish was very small. Therefore, if time is changed, the production of sufficient fingerlings is possible.

Expected output (7): The profitability of the integrated fish farming is clarified.

Method of the evaluation	To calculate the balance of payments of each types of aquaculture (by the species of animals)
Indicator (standard)	The incomes generated by the integrated fish farming present at least 20% of the yearly incomes of aquaculture farmer's household.
Results	Due to the leakage of water of the ponds and to the deaths of livestock, the growth of fish was slow and for this reason, any believable values were not obtained. However, the livestock husbandry using the leftovers of the restaurants and the organic vegetable cultivation are useful means to create a source of secondary incomes. The aquaculture integrating these elements quite has the potential to constitute a source of secondary incomes for the aquaculture farmers.
Remarks	It is desirable to continue the project in order to collect more detailed data.

Expected output (8): The fund for dissemination of the integrated fish farming is established in the each aquaculture station.

Method of the evaluation	To verify the opening of an account and its balance.
Indicator (standard)	Good, if the savings of the fund for dissemination is conducted.
Result	The staffs of the two stations understood the necessity of this fund and were preparing the opening of an account.
Remarks	Since they have already begun sale of the vegetables, it is desired to open an account as soon as possible.

Expected output (9): The impact and sustainability of the project is clarified.

Method of the evaluation	To ask the participants of the workshop for their interest
Indicator (standard)	Good, if more than one third of the participants are interested in this project and want to participate in a project.
Results	15 participants (37.5%) out of 40 showed their interest to this project and expressed the wish to participate in the project.
Remarks	non

(3) Lessons learnt from the pilot project

a. Selection of the participants

Considering the fact that some participants withdrew before the end of the pilot project, it will be important to use some more time for the selection of the participants. On the other hand, in order to make it understand better the contents of the project, it will be necessary to review the length and the contents of the training.

b. Functional enhancement of the station

In Tchibanga, since the number of the staff was insufficient and many staff was not able to participate to the project, the project was not able to train many staff. Such a situation won't

contribute to the functional enhancement of the station.

c. Motivation of the staff

In Oyem, by having assigned each personnel the pond in its duty, the staff's motivation went up and it led to activation of the station. Considering that, it will be important to respect each and to assign some tasks to all staff. On the other hand, collaboration between the staff is also conducted by performing the person-on-duty system of a holiday.

(4) Points to be considered for the future program / activity

a. Manipulation of the facilities and materials

Due to the delay of the repair of the motor pump, it was not able to be used at the monitoring. It is necessary to conduct the repair of the facilities as quickly as possible and to maintain them always in operational state.

b. Fingerlings

Since fingerlings are needed also for a next project, it is always necessary to prepare the seed production at each station.

c. Feed for livestock

If the compound feed is not available, means of provision in feed for livestock must be identified there.

d. Establishment of the continuous fund management system for continuation of the activity.

A unit of management should be instituted in order to manage the fund of aquaculture, and to elaborate a plans of activities and to execute it.

(5) Perspectives in the Master Plan

The results of this pilot project can be utilized in the projects relevant to the dissemination of the aquaculture in the future. The following things became clear by implementation of the project.: 1) a realization success of the integrated fish farming can constitute a source of secondary incomes, 2) the knowledge and the techniques of the participating aquaculture farmer is reinforced undoubtedly, and their incentive to the activities of aquaculture is reinforced, and 3) The aquaculture station was activated and it became clear that the staff's motivation increases. For these reasons, it seems that the procedure and the methods used for this pilot project can be applied to the similar projects in the future. The system of execution could apply if the system of communication is reinforced.

3.3.5 Cage Culture

(1) Project objective and scope

Overall goal: To create the secondary income of the small-scale fishers in land area by the introduction of the cage culture.

Project objective: To clarify the possibilities of cage culture using some capture fishes.

Activities:

- i) To conduct the hearing investigation from local fishers and to perform the possibility investigation of seeds acquisition.
- ii) To conduct the aquaculture experiments using the cheap feed (small fish, viscera of wild animals, rests of transformation of local edible fish etc.) which can be obtained there.
- iii) To train the staff of the center using OJT system.
- iv) To analyze the data of the project and to study the profitability.

Target Group: Small-scale fish farmers in inland area.

Target site: Lake Sirènes in Lambaréné city.

Organism for implementation: Communal center of the peaches of Lambaréné (sub-contract).

Implementation period: 16th May to 8th November 2008 (6 months).

Inputs: (equipments)

100 tubes of bamboo for the capture of the fingerlings, 15 cages (1,0m x 1,0m x 1,2 m / unit), 3 buckets (10 L), 2 containers or plastic buckets (50 L), 2 scoop nets, 1 balance, 1 measuring

boards for fish size, 1 digital thermometer, 1 oxymetre, 1 pH-meters.

(Personal)

Participants (staff of the center): 3 persons x 6 months.

Monitoring staff (staff of the center): 2 persons x 3 days / month x 6 months).

Night guard: 1 person x 8 months

Laborer: 1 person x 2 days / month x 6 months

(Fingerlings)

mâchoirons: 50 (100 to 200 g) / cage (captured to the tube of bamboo).

Silure (Clarias spp.): same as above

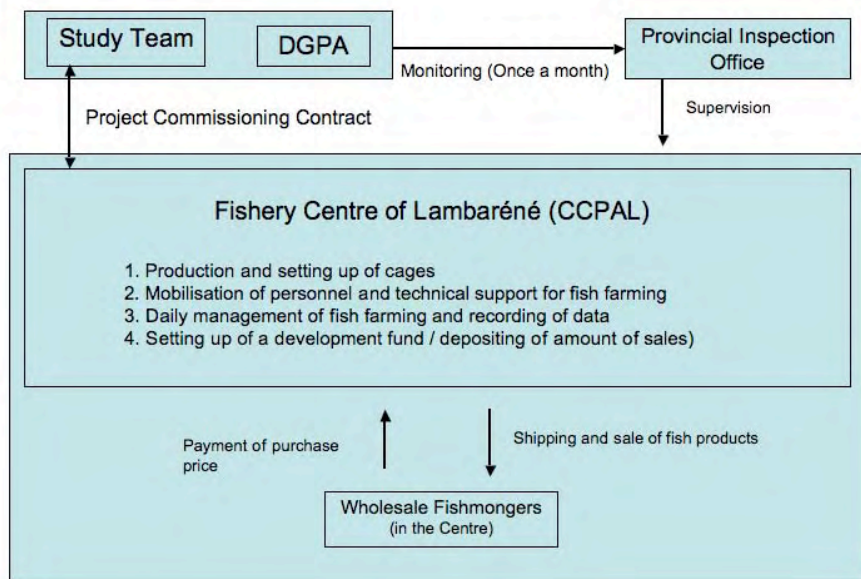
Silurid (Schilbe spp.): same as above.

Tilapia (niloticus and cabre (indigenous species)): same as above

Overview in the cages:

1 Mâchoiron A 50	2 Mâchoiron B 50	3 Mâchoiron C 50	4 Silure 50	5 Silurid 50	6 Tilapia (indigenous species) 50
7 Mâchoiron A 50	8 Mâchoiron B 50	9 Mâchoiron C 50	10 Silure 50	11 Silurid 50	12 Tilapia (indigenous species) 50
13 Tilapia niloticus 100 (male)	14 Tilapia niloticus 100 (male)	15 Tilapia niloticus 100 (female)			

Implementation structure:



(2) Results of monitoring and evaluation

i) Results of the monitoring

Indicator of the monitoring	Results	Remarks
Filling rate of the data sheets	98.0%	The data are mentioned every day except the days of heavy rains
State of the fish growth	Although the expected growth was not observed, it was clarified that the	In particular at the mâchoiron, a difference of growth in the same

	mâchoiron could also grow in the cage.	species was observed. Those that got used to feed presented a remarkable growth.
Mortality of the fish	Except the mâchoiron C, the mortality is equal or lower than 10%.	The valued reason is that the mâchoiron C didn't get used to feed at the beginning.
Appreciation of the feed by fish	Among the three species of mâchoiron, the mâchoiron C comes close to the surface and eat food.	
State of the cages and rafts	The cages themselves are always strong and don't present a damage. However, the rust has been observed on the nails and hinges. On the other hand, a tendency of submersion of the rafts was observed.	Continuous observation is needed in order to value the decay resistance of the cages, as well as of the rafts.
State of the materials	The materials, including the devices of parameter are used in a suitable way.	

ii) Results of the evaluation

Expected output (1): The means of fingerling procurement is identified.

Method of the evaluation	To ask the staff of the Center for the means of fingerling procurement and to study the feasibility.
Indicator (standard)	Good, if the fishers can get fingerlings by themselves in sufficient quantity (100 pieces / cage) for a cage culture.
Results	The season, as well as the methods of fishing are different by the species, a programmed procurement is necessary. On the other hand, it proved to be that the capture of mâchoiron was relatively easy.
Remarks	Procurement of fingerlings of yara is extremely difficult.

Expected output (2): The feed for the fish is obtained in same area.

Method of the evaluation	To verify the number of times of feeding from data sheets.
Indicator (standard)	Good, if the feed is assured at least for five days in the week.
Results	A sufficient feed collection is assured during the dry season. However, during the peak of the season of rains (November), it arrives that they could only get the half of the quantity required for one day.
Remarks	It is needed to survey the alternative feed and the means of storage.

Expected output (3): The technique of management is transferred to the staff of the Center.

Method of the evaluation	To value the proposition of a new experiments presented by the staff.
Indicator (standard)	Good, if the staff can elaborate a program of experimentation simplified.
Results	The staff of the center can enumerate the points to improve of experiments and they could give necessary explanations on the cage culture at the time of the workshop. Although more experiences are needed, it is to say that the staff of the center reinforced their technical knowledge on the procedure of execution of the experiments and on the cage culture.
Remarks	none

Expected output (4): The relevance as the source of secondary income of the fishers is clarified.

Method of the evaluation	To study the profitability of the cage culture.
Indicator (standard)	The incomes generated by the cage culture present at least 20% of the yearly incomes of fisher's household.

Results	It was clarified that rearing in cage of the fingerlings of mâchoiron captured in the natural habitat was feasible. However, the fingerlings were too small so that they didn't reach to the market size. If an examination is repeated and a required rearing period will be clarified, this method will be able to demonstrate its potential to constitute a source of secondary incomes for the small-scale fishers.
Remarks	It is necessary to study the quality of feed, the method of feeding, the ways of rearing, etc., in order to develop the appropriate method of aquaculture.

Expected output (5): The impact and sustainability of the project is clarified.

Method of the evaluation	To ask the participants of the workshop for their interest.
Indicator (standard)	Good, if more than one third of the participants are interested in this project and want to participate in a project.
Results	10 participants (43%) out of 23 showed their interest to this project and expressed the wish to participate in a project.
Remarks	none

(3) Lesson learnt from the pilot project

The problem of land ownership

Due to a lack of the direct access to the lake, we used a path which passes the land belonging to a hotel. Then it also conflicted more often with the owner of the hotel as the time passed. Therefore, it is necessary to establish an access path original before a experiments start.

(4) Points to be considered for the future program /activity

- a. Positioning of the cage institution used in this project.
The cages institution will be used for the experiments of the DGPA, and for the training of the fishers who want to start cage culture. However, it is necessary to elaborate a plan of concrete activities.
- b. Environmental measure of the lakes
Since the number of cages is few, it is thought that it won't provoke a major problem now. However, if the number of cages increases in the future, the expert fears that there is too much load to the lakes. Therefore, it is necessary to limit the number of cages to allow, taking into account the environmental influence.

(5) Perspectives in the Master Plan

The results of this pilot project can be utilized in the projects relevant to the dissemination of the aquaculture in the future. The following things became clear by implementation of the project: 1) a realization success of the cage culture can constitute a source of secondary incomes, 2) the knowledge and the techniques of the participating staff of the centre is reinforced undoubtedly, and 3) inspired by the project, and some already started their cage culture. For these reasons, it seems that the procedure and the methods used for this pilot project can be applied to the similar projects in the future. The system of execution could apply if the system of communication is reinforced.

3.3.6 Sans-Nom Valorisation

(1) Project Objective and Scope

Overall goal: Increase the consumption of transformed Sans-Nom products in the urban centres.

Project objective: Develop and extend good quality transformed products based on Sans-Nom

- Activities:**
- i) Form groups of transformers concerning quality and hygiene management
 - ii) Organise a transformation and equipment room, and give advice on management and adequate maintenance.
 - iii) Teach transformation techniques of the Sans-Nom to the groups of transformers.

- iv) Periodically produce transformed products and promote sales in Libreville.
- v) Invent new transformed products based on Sans-Nom and organise tasting events.
- vi) Install an improved oven and compare its performance with that of existing ovens.
- vii) Advise in adequate methods for processing products being transformed as well as conservation of products.

Target group:

- (transformation)** Groups of transformers (smoking, drying/salting) in the villages around the lakes (from 2 to 3 people / group).
Groups of transformers in the area around Lambaréné (from 5 to 10 people /group).
- (sales promotion)** Groups of transformers and sales people around Libreville.

Target areas: City of Lambaréné, Moyen-Ogooué province.

Organization for implementation: Community Fishing Centre of Lambaréné (Commissioned).

Implementation period: from May 16 to November 13.

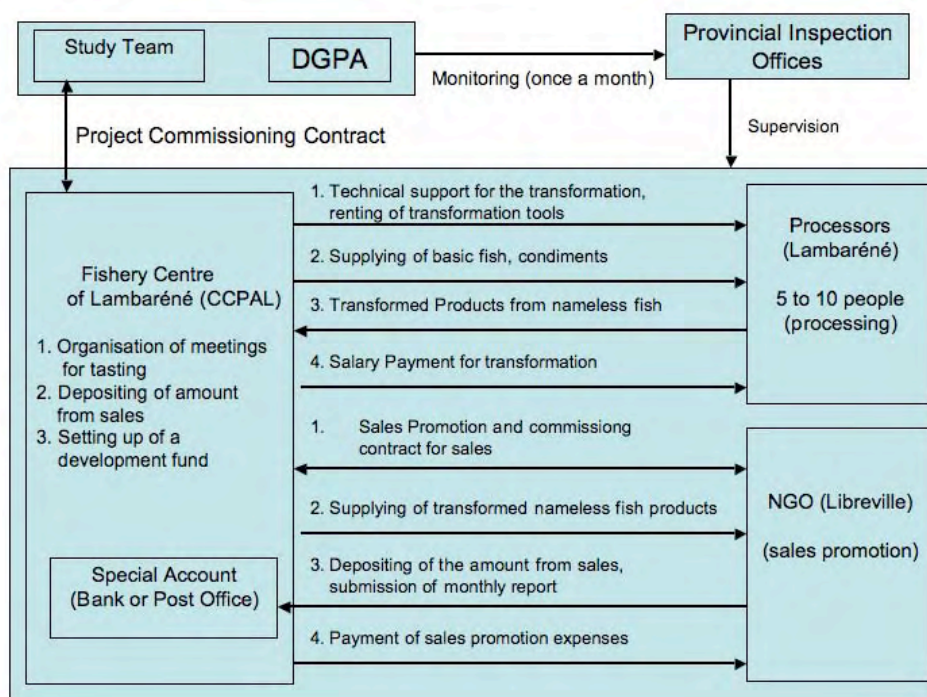
Inputs: (equipment) Vacuum-packed packaging equipment (bags included), air conditioner, freezing compartment or chest, platform truck, chopper, other transformation equipment (cutting board, kitchen knives, kitchen weighing scales, trays, aprons, gloves, rubber boots, hair bonnet, etc.), one transportation boat (length of 7,5 m, outboard motor of 40 Horse Power).

(personnel) Processors (10 people x 2 days/month x 6 months).

For monitoring (1 agent of CCPAL x 2 dayss/month x 6 months).

Sales Promoter (One NGO agent x 5 days/month x 6 months).

Implementation structure:



(2) Results of Monitoring and Evaluation

i) Results of the monitoring

Monitoring Indicators	Results	Observations
1. Collection rate of data sheets	Data sheets were written up for each activity at the collection rate indicated in (); 4 productions of fish pads (100%), 2 promotions de its sale (100%) and 2 smoking sessions (50%).	

2. Tasting Results	A study by questionnaire was done among the participants (55 people) when there was the tasting in July (33 valuable responses).	
3. Evolution of sales	Four faithful customers	
4. Condition of equipment	In good condition, except the mixer that broke down	We will buy a new one.
5. Description of use of improved oven	Two tests were done in August and November. The force of the fire was weak, due to the pieces of wood (10kg /piece) used for smoking that were wider than the entrance, the big fish cannot be smoked in it	The wood entrance will be enlarged.
6. Duration of fabrication of filets to the freezer	The duration was reduced from 13 hours and 30 minutes (in July and August) to 10 hours (November)	
7. Production per kilo of Sans-Nom	Between 0,31 and 0,35kg per kilo of fish	
8. Homogeneousness of weight and form	The homogeneity of the weight and form is practically guaranteed; Simple Hamburger 140g/piece, Hamburger with vegetables or with shrimp 100g/piece.	
9. Condition of the products when distributed	Each piece is vacuum-packaged and frozen for distribution.	

ii) Results of the evaluation

Expected output (1) : Improve the consciousness of quality and health controls of transformed fishing products

Method of evaluation	Verify onsite if the group of transformers proceeds to processing while considering quality and hygiene control
Indicator of evaluation (Criteria)	Good, if the quality and hygiene control is taken into consideration appropriately during the processing,
Results	The processing est done in a hygenic environment. In addition, following the instructions given by the SQIS agents, the women are obligated to wash their hands before beginning the processing, they must also wear an apron, a hair bonnet, a mask and boots. Consequently, health considerations are complied with.
Observations	

Expected output (2) : Maintain and use appropriately the equipment and material related to the processing of the fishing products

Method of evaluation	Analyse the data sheets (condition of the equipment) each month
Indicator of evaluation (Criteria)	Good, if the condition of the equipment before and after transformation is correct.
Results	Since each piece of equipment is cleaned and arranged in the space provided for it after each usage, the condition of the equipment is good.
Observations	A mixer broke down in September, 2008. A mixer with a bigger capacity will be purchased very soon..

Expected output (3) : Improve transformation techniques of the Sans-Nom (duration of transformation, yield)

Method of evaluation	Analyse the data sheets (duration of transformation, yield) for each month
Indicator of evaluation (Criteria)	1. Good, if the duration from the beginning to the end is shortened 2. Good, if the yield is better
Results	1. The quantity produced per hour and per transformer was improved from 0,19kg (July) to 0,37kg (November). 2. The yield is stable between 0,31 and 0,35kg per kilo of fish.
Observations	No appreciable comment

Expected output (4) : Fish pads made with Sans-Nom are recognised because of the sales promotion

Method of evaluation	Analyse the data sheets (duration of transformation, yield) for each month
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Indicator of evaluation (Criteria)	1. Good, if the volume sold is increased. 2. Good, if the time between processing and distribution is shortened
Results	1. All products produced during the project are already sold. However, during the execution of this project, the sale is in an experimental stage. Moreover, since the volume sold was proportionate compared to the volume produced, there was no variation at the level of volume sold according to the month. 2. The first sale required four days before finding wholesale purchasers to resell. Beginning with the second sale, delivery was made to these four customers already identified during the first distribution, the period between processing and distribution was reduced.
Observations	No appreciable comment

Expected output (5) : Correct the weak appreciation observed until present of the Sans-Nom.

Method of evaluation	Organise a tasting session for participants to do a product study with a questionnaire.
Indicator of evaluation (Criteria)	Good, if over half the participants respond favourably (good).
Results	Among the 33 participants who returned the questionnaire, 19 replied 'Delicious' (58%) and 11 Good (33%). Moreover, 27 replied that they would like to buy some at the market. Consequently, we can say that there was a high appreciation of the fish pads based on the Sans-Nom.
Observations	No appreciable comment

Expected output (6) : Reduce the smoking time. Reduce the quantity of wood used for smoking.

Method of evaluation	Analyse the data sheets concerning the smoking process for each month.
Indicator of evaluation (Criteria)	1. Good, if the smoking time is reduced. 2. Good, if the quantity of wood used for smoking (per product unit) is reduced.
Results	1. The smoking time was reduced from forty hours with a conventional oven, to twenty hours, or half the time, with an improved oven. 2. The quantity of wood used for smoking was reduced from 40kg with a conventional oven to around 15kg with an improved oven.
Observations	Since the quantity of fish to be smoked was limited, the test was not done with the oven filled up.

Expected output (7) : Make it possible to produce good quality transformed products with Sans-Nom.

Method of evaluation	Receive validation of sanitary control of food products carried out by the Gabonese Government.
Indicator of evaluation (Criteria)	Good, if the validation certificate for sanitary control is obtained.
Results	The fish pads made with Sans-Nom were sold in vacuum-packed bags with a stamp indicating SQIS recognition.
Observations	No appreciable comment

(3) Lessons learnt from the pilot project

The objective of this project was the sales promotion of fish pads made with Sans-Nom, the sales price was established without taking into consideration profitability studies. In addition, due to the low level of production efficiency, the chapter on personnel expenditure, in the cost of production, is quite high. Today it is necessary to reduce production costs and reconsider the sales price based on production costs.

(4) Points to be considered for future activity / program

- i) In the Lambaréné zone, the Sans-Nom are already being distributed, the transformed products, such as smoked Sans-Nom is only one means of conservation in the fishing villages while waiting for the fishmongers who pass by. Consequently, the comparison of price per weight between fresh fish and the transformed product, represents no increase in value tied to the transformation process. Because of this, it will be necessary, if the Sans-Nom is to be valorised by transforming it, to develop vacuum-packed products for sale in super markets and to promote the development of semi-smoked products.

- ii) The catching of fish, including therein the Sans-Nom, in the rivers and streams in the hinterlands and lakes and marshes, is voluminous in the dry season, but low in the rainy season. During the period wherein the catch is weak, since the price of fish to be transformed and fresh fish increases, it is difficult to get big quantities of fish. Moreover, in the coastal zone, the catching of pelagic fish is higher during the rainy season. Consequently, a request will be made to identify, according to the site, the season of good catch and the fish species concerned, in order to increase the value added margin achieved through processing.
- iii) As for the range of processed products, there is no reason to be limited to fish pads. It will be interesting to carry out promotional sales of products of chopped fish or fish filets which can be vacuum-packed, frozen or in a simplified package.

(5) Perspectives in the Master Plan

i) Pertinence (technical, profitability and socio-economic)

It should be stated that techniques concerning the various transformations of the Sans-Nom and the sanitary control have been generalised through this pilot project. Moreover, finished products are appreciated by consumers and their redistribution network has already been identified, although the sales are still in an experimental stage. Moreover, at the level of profitability, these activities could make up a small seasonal industry, on condition that production costs should be reduced by improving work efficiency, and a reasonable price should be determined after the sales promotion.

ii) Implementation process and method

Within the context of this pilot project, the development of a processing method of the Sans-Nom, the transfer of technology in the subject with the local processors and the sales promotion activities for these products were carried out, and they have practically attained their objectives. Today we are being asked to develop these activities, with similar procedure and means of execution, by setting up other means of transformation and by using other fish species wherein the catch is voluminous.

iii) Implementation structure

Today this project constitutes one of the activities of the fishing Centre in collaboration and under the direction of the SQIS. The Centre hires local transformers for the processing and takes care of the promotional sales in collaboration with a local NGO in Libreville. It appears possible to continue these activities with the same system.

3.3.7 Participatory Fishery Resources Management

(1) Project Objective and Scope

Overall goal: Joint resource management by the inhabitants and the administration

Project objective: Create an activities model for participative resource management

- Activities:**
- i) 1 - Distribute a fishing activities sheet to the fishers and explain and structure things for signing up (meeting);
 - i) 2 – Collect and verify the activities sheet once a month, and analyse the data;
 - ii) 1 – Carry out a biological study of the crayfish and langouste zones (measure the length and weight, existence or not of incubation) (once a month);
 - ii) 2 – Carry out a quality study of the fishing waterways (measure at predetermined place the water temperature, pH, OD (once a month);
 - ii) 3 – Carry out fish catching tests with fish cages (Mayumba only);
 - iii) 1 – Supply to fishers groups equipment that will contribute to the diversification of income sources and the improvement of the working environment, and check the use of this equipment;
 - iii) 2 – Create and implant replacement income sources;
 - iii) 3 – Carry out activities for the improvement of the fishers working environment;

- iii) 4 – Carry out surveillance of the coastal zone through the small-scale fishers activities (Mayumba only);
- iii) 5 – Set up a resource management unit to discuss the need for management measures (workshop for final evaluation)

Target groups: Seven groups of small-scale fishers catching crayfish (Kango);
Five groups of small-scale fishers catching langoustes (Mayumba).

Target areas: Kango in the Estuary province, Mayumba in the Nyanga province

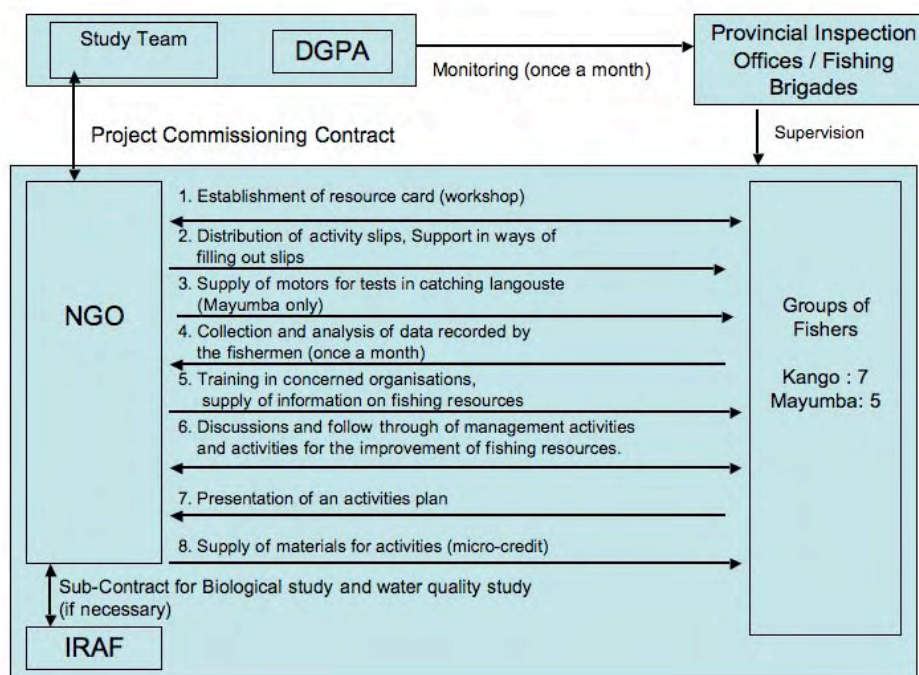
Implementation organization: NGO (commissioned: But the water quality study and the biological study have been confided to the Agronomical and Forestry Research Institute (IRAF))

Implementation period: From May 19 to October 24, 2008 (Kango)
From May 26 to October 31, 2008 (Mayumba)

Inputs: (equipment): 2 digital thermometers, 2 oxy-meters, 2 pH-meters, 2 electronic weighing scales, 2 jar testers (15 cm x 2, 30 cm x 1), 20 recipients for samples (300 ml), equipment for activities to improve financial conditions (outboard motors, gil nets, coolers, raincoats, first aid kits), fishing equipment for tests in catching langouste (bottom gill nets and traps), surveillance equipment (six binoculars, six mobile radio-telephones);

(Personnel): Monitors (2 NGO employees x 10 days / month x 6 months in both Kango and in Mayumba)

Implementation structure:



(2) Results of Monitoring and Evaluation

i) Results of the monitoring

Monitoring Indicators	Results
1. Data collection rate(%)	Kango : average of 53%, Mayumba : average of 72%
1. Number of fish caught per outing, Number of outings per month	a. Kango Captures par sortie à la pêche : crevettes 2,2kg, poissons 6,4kg Nombre de sorties par mois : 4,4 sorties (de 2,6 à 7,1 fois/pêcheur) b. Mayumba Captures par sortie à la pêche : langoustes 0,71kg, poissons 59kg Nombre de sorties par mois : 5,27 sorties (de 2,6 à 6,5 fois/groupe)
3. Profits (receipts minus expenses), amount (or	a. Kango Profits : 33.200FCFA/fisherman/month on average,

3. Profits (receipts minus expenses), amount (or rate) of savings	a. Kango Profits : 33.200FCFA/fisherman/month on average, Savings : 11.012FCFA/fisherman/month on average, b. Mayumba Profits : 112.230FCFA/fisherman/month on average, Savings : 32.360FCFA/fisherman/month on average,
4. Growth curve for crayfish and langouste	Growth curve by sex was set up based on size and weight data taken on all samples collected during the pilot project.
5. Size, weight and maturity rate (for all samples by place and by sex)	a. Kango (crayfish) : 61% of the samples measured at least 11cm, whereas the size in the market is equal or above 11cm. Size : With eggs : 9,8cm on average, minimum of 5,6cm Size : without eggs: 10,1cm on average, minimum of 5,2cm Weight : with eggs: 16,4g, Without eggs: 15,1g (on average) b. Mayumba (langouste) : 78% of the samples weighed at least 500g and only 8% of the total had eggs. Size : With eggs : 25,6cm on average , minimum of 18,0cm Size : Without eggs : 24,2cm on average, minimum of 15,0cm Weight : With eggs: 413g, Without eggs: 376g (on average)
6. Characteristics of water quality	a. Kango : Beginning in the month of July, the ocean water begins to enter the crayfish zones and its influence is most noticeable in August (rate of saltiness on the riverbanks: between 0,2 and 0,3%). This phenomenon lowers the catching of crayfish. b. Mayumba : The water temperature drops to around 20°C in July where the water is under the influence of the Bengal current, and progressively goes up to 23° to 28°C in the month of August. The correlation between the evolution of number of langouste caught and this phenomenon is not yet understood up to the present.
7. Use of equipment	a. Kango : All the equipment is generally used appropriately.

ii) Results of the evaluation

Expected results (1) : Confirm the actual state of crayfish and langouste catch

Evaluation method	Analyze the data sheets for each month
Evaluation Indicator (Criteria)	The number of fish caught per outing, profits (receipts minus expenses)
Results	a. Kango : The quantity of fish caught is voluminous in the remote zones of Kango, whereas the catch of crayfish is voluminous in the zones near Kango. The number of fish caught per outing increased from 2.1kg to 6.4kg on average, and those of crayfish dropped from 3.4kg to 2.2kg compared to the catch before the project. This shows the effectiveness of diversification in fishing methods. As for profits, for lack of data before the project, a comparison is not possible; The profits were high because of big quantities caught between June and August. However, due to the arrival of the saltwater, the quantities of shrimp and fish dropped, also brining on a drop in profits from September to October. b. Mayumba : Langouste represent only 1% of the total catch and 3.6% of receipts (secondary products when there are demersal fish). The catching of langouste is active from July to Octobre, and attains their peak in the month of September.
Remarques	No appreciable comment

Expected Results (2) : Clarify the habitat environment of the crayfish and langouste

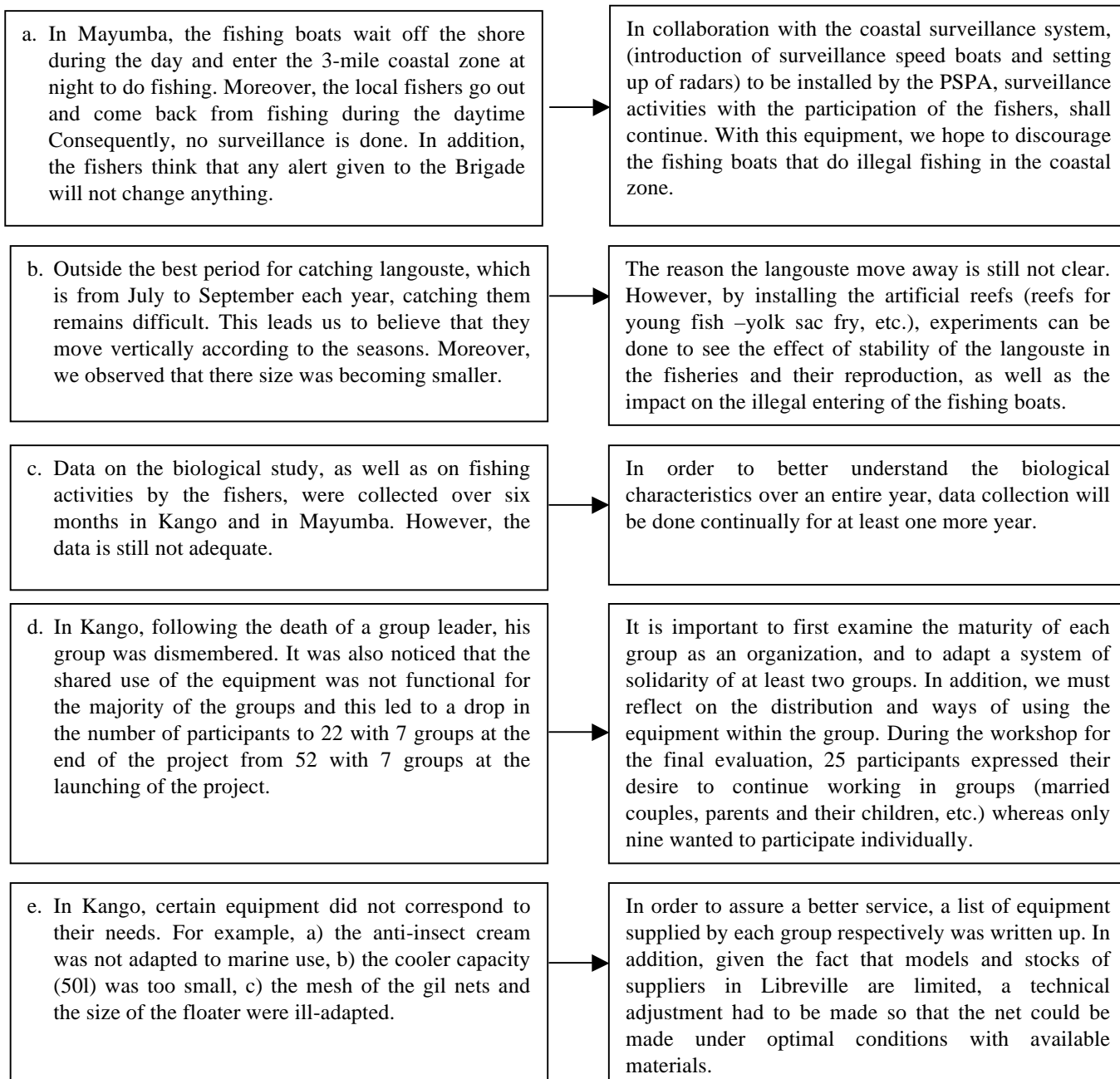
Evaluation Method	Analyze the data sheets of the biological study for each month and prepare a resource map
Evaluation Indicator (Criteria)	Growth curve for crayfish and langouste, description of size and maturity rate (in general, by fishing zone and by month), characteristics of water quality, and resource map
Results	By setting up growth curves, as well as histograms by sex for crayfish (Kango) and langouste (Mayumba), the minimum size for maturity was clarified (see the attached documents). Moreover, no phenomenon of pollution was observed when analyzing the quality of the water, so it seems that the habitat conditions of the targeted species varies seasonally because of the water temperature and the rate of salinity. In addition, because of lack of sufficient data, a resource map has not yet been prepared. It will be essential to produce one synthetically after another six months study.

Observations	
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Expected Results (3) : Develop different activities concerning crayfish and langouste resource management by the fishers

Evaluation Method		<ol style="list-style-type: none"> 1. Listen to the groups of fishers and write up a report 2. Analyze the recorded data and report in order to reach concrete results of activities creating secondary incomes. 3. Analyze the recorded data and report in order to reach concrete results of activities that can improve working conditions. 4. Verify , through the warning reports on the fishing boats doing illegal fishing, the effectiveness of coastal surveillance with the participation of the inhabitants.
Evaluation Indicator (Criteria)	Kango(Missala)	<ol style="list-style-type: none"> 1. Good, if the report is written up. 2-1. Good, if the introduction of the outboard motor contributed to the enlarging of the fisheries, to the creation of free time and physical recuperation. 2-2. Good, if the rate of fish caught has increased through the use of the gil net. 2-3. Good, if the volume of fresh fish delivered has increased because of the cooler. 2-4. Good, if the number of fishing outings has increased through the use of a first aid kit and raincoats.
	Mayumba langouste)	<ol style="list-style-type: none"> 1. Good, if a report has been written up. 2-1. Good, if the rate of fish caught has increased through the use of the gil net 2-2. Good if the catching of langouste and crabs was done because of the cages 2-3. Good, if marine security has been assured because of the installation of the radio. 2. Good, if the number of warning reports and that of boats reported by the fishers increases concerning the fishing boats doing illegal fishing.
Resultss	Kango (Missala)	<ol style="list-style-type: none"> 1. We listened to each group each month in order to better understand their state of activities and the problems confronting them, and a report was written up. 2-1./2-2. Because of the introduction of the outboard motor and gil net allowing the boats to go to several fisheries, the species and fisheries have been diversified. In addition, the quantity of fish caught has considerably increased, whereas the number of shrimp caught has remained stable (slight decrease due to the salinity of the water in the dry season). It seems that the target is changing from shrimp to fish. 2-3. Because of the introduction of coolers, the great majority of fish, including that caught when camping over several days, is delivered quite fresh. 2-4. Because of the introduction of first aid kits and raincoats, women who fish can benefit from prevention and first aid (malaria, insect bites and colds) and they appreciate them. On the other hand, there was no influence of this added equipment upon the quantity of fish being caught.
	Mayumba (Langouste)	<ol style="list-style-type: none"> 1. We listed to each group each month in order to better understand their activities and the difficulties facing them, and a report was written up. 2-1. This project supplied only the mesh for the nets, so that each group of fishers had to buy floaters, lead weights and cords necessary to assemble the nets. Consequently, the nets were finally ready just before the end of the pilot project. For this reason, we did not observe an impact upon the quantity of fish caught because of the gil nets. 2-2. Two types of traps, big and small, were introduced. The small traps were set up in the estuary zone of the lagoon where the salt water meets the freshwater, and this allowed for the catching of mangrove oysters popular with the fishers. However, concerning the big traps for the langouste, no results were observed during the project because of the big ocean currents. We decided to recuperate the big traps and to install them in the lagoon. 2-3. In spite of the introduction of the mobile VHF radio, because of lack of power, communication was impossible because of poor quality. An earth radio station was set up with a 25w radio after the final evaluation, which improved the communication of up to 10 km. The possibility of setting up a coastal surveillance system with the participation of the fishers was clarified, on condition that there should be an earth station with several coastal sites. 3. After listening to the fishers, we were informed of between two and four fishing boats doing illegal fishing every evening. However, no report had been presented by the fishers. The reason given was that the fishers thought that even if they reported the incident, nothing would be done to change things. It will be necessary to sensitize the fishers to encourage them to continue with these activities through he fish resource management committee of Mayumba..
Observations		No appreciable comment

(3) Lessons learnt from the pilot project



(4) Points to be considered for future activity / program

- i) Examine the maturity of the group of fishers and their projected activities in view of clarifying the priority in their participation in activities
 - Examine the maturity of the group as an organization and its projected activities, its priority in the participation of activities shall be determined, or the contents of their participation shall be differentiated.
- ii) Establish a sustainable fund management system in view of pursuing activities
 - Set up a resource management committee (composed of representatives of the local authorities, the DGPA, representatives of the fishers, representatives of the fishmongers, etc.) in view of managing the funds and elaborating and executing the action plan and writing up the bye-laws.

- Open a bank account reserved for the project in the name of the management committee and as a regional fish resource management fund, manage the fund financed by the reimbursement of equipment supplied.

(5) Perspectives in the Master Plan

The results of this pilot project shall allow for the definition, considering the viewpoints here below, in the Master plan: a) Project for participative fish resource management, and b) project for the management of the coastal fisheries.

i) Pertinence (technical, profitability and socio-economic)

In the execution of the study activities, there is no technical problem. Concerning the manipulation of equipment, training with the fishers was organised according to their needs, and the equipment was being used appropriately. As for profitability, in general, funding is needed to carry out a good scientific study on resources. However, for this specific case, one method, giving maximum value to information supplied by the fishers and collecting samples for the biological study in cooperation with the fishers, facilitates the continuity of these study activities. On a socio-economic level, there was a certain impact in the fishers working conditions, as well as in the diversification of the fish species and fisheries, because of the introduction of equipment and fishing materials. The reimbursing by the fishers of the credit for the purchase of fishing equipment and material supplied, does not pose a problem in general. A continual system of activities to improve income and the fishers living conditions is being prepared having a fund financed by the reimbursing of the fishers loans.

ii) Procedure and means of execution

Resource management requires an application that takes into consideration the fishing characteristics and the socio-economic which are variable according to the regions. From this viewpoint, for this pilot project there was a sharing between the administration and the private sector of information coming from the analysis of the data collected through the intermediary of the sheets filled out by the fishers and the scientific data obtained in the biological study. Today the administrative party and that of the fishers have understood these results and they have agreed to set up a regional fish resource management committee whose objective shall be to discuss and decide upon measures to be taken for fishing resource management. Now the administration and the fishers in the same region are being asked to work together in this committee to assure a sustainable exploitation of the fishing resources within a dimension wherein the two parties have given their respective agreement.

iii) System of application

Through the participation of a local NGO and an IRAF researcher, the two types of activities: socio-economic which is indispensable for the application of resource and management, and biological, have been carried out effectively. Moreover, the DGPA supplied the administrative service. Based on this, it was decided that a three-party system of application; that is, the local NGO, IRAF and the DGPA, would be optimal to develop similar fishing resource management activities.

3.3.8 Experiments on the Long-tailed Motor

(1) Project objectives and contents

Overall goal: Increase the small-scale inland fishers income.

Project objective: Introduce a motor having a low initial investment and low operations costs for the fishers.

- Activities:**
- Install the long-shaft motor on the model boat (a boat in FRP of CCPAL) and carry out test navigation.
 - Verify the way of handling the motor.
 - Organise test navigation with the local fishers interested in the motor
 - Compare the amount of investment and the operational cost of the long-shaft motor.

- v) Based on the results of the above activities, examine the possibility to extend the use of the long-shaft motor and establish an activity plan.

Target groups: Groups of fishers from the Village of Nengue-Ntogob on Lake Onangué.

Target areas: Fishing villages around Lambaréné (Lake Onangué).

Implementation organization: Managed directly by the OAFIC (in collaboration with CCPAL).

Implementation period: From June 10 to 13, 2008.

Inputs: (equipment) One long-shaft gasoline motor (13 HP)
(personnel) Monitor (one mechanic x 5 days).

(2) Results of the Evaluation

Expected Results (1) : Install the long-shaft motor on a typical boat in the region.

Evaluation Method	Verify the stability when installing the motor on a boat made locally and carry out experimental navigation
Evaluation Indicator (Criteria)	Good, if a stable navigation is achieved.
Results	A stable navigation was achieved with a 7-meter FRP boat.. However, it will be necessary to improve the support structure for installing the motor (If the attachment gets loose, the motor can fall off the boat while navigating). Moreover, with a wooden dugout canoe (length from 6 to 7m), due to its narrow width, even if straight navigation does not pose a problem, the boat still risks turning over if the bar of the rudder pivots from the right to the left.
Observations	No appreciable comment

Expected Results (2) : Learn how to manipulate the long-shaft motor.

Evaluation Method	Verify onsite if the mechanic of the Fishing Centre, as well as the local fishers, can manipulate the long-shaft motor.
Evaluation Indicator (Criteria)	Good, if the local fishers can install, start and navigate with the motor, and fill it with fuel and oil by themselves. .
Results	It was noticed through the training of the CCPAL mechanic and fishers, that there was a problem at the level of the use of this motor, concerning the installation, starting it up, navigating with it and doing the maintenance on it.
Observations	No appreciable comment

Expected Results (3) : Increase the number of local fishers interested in this motor.

Evaluation Method	Verify, through demonstrations, the number of fishers who want to use it (results of use)
Evaluation Indicator (Criteria)	Good, if five or more fishers use it.
Results	A group of fishers from Lake Onangué, the village of Nengue-Ntogolo, were designated to carry out demonstrations. However, since the timing coincided with the busiest activity period, the motor was not used at all. Since today the support system of the motor is being improved, demonstrations shall be organised within the next three months.
Observations	Up to November, 2008, five fishers have expressed their desire to buy this model motor.

Expected Results (4) : Obtain more economical results than with the traditional motor.

Evaluation Method	Compare the fuel consumption of this motor compared to the 40 HP Kerosene outboard motor.
Evaluation Indicator (Criteria)	Good, if the fuel consumption and cost of fuel per hour of this motor is lower than the 40 HP kerosene motor.
Results	The long-shafted motor presenting fuel consumption of 2.0 to 2.2 litres/hour (around 1.200 FCFA/hour) is 75% more economical than the 40 HP kerosene outboard motor which is 19.5 liters / hour (around 4.800FCFA/hour).
Observations	The navigational speed is half that of a 40 HP kerosene outboard motor.

Expected Results (5) : Write up a generalized programme.

Evaluation Method	Verify if a generalized programme has been written up.
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Evaluation (Criteria)	Indicator	Good, if a generalized programme has already been written up.
Results		Since the expected results (3) were not obtained, no programme has been written up.
Observations		Write up a programme after the three months of demonstrations.