

Chapter II
MASTER PLAN

II. MASTER PLAN

1. Development Goals

The development goal of the Master Plan is to attain quantitative and qualitative enhancement of fish production in the artisanal fishery sector as well as to contribute to a rise in income and improved living conditions in the northern fishing areas of the Republic of Senegal.

2. Development Strategies

In order to achieve the development goals, the Master Plan considered the following three development strategies.

- (1) Develop an optimum structure of institution and infrastructure for self-sustainable development in the northern fishing areas, which are characterized by the dynamic fishing activities of the migrant fishermen moving from north to south throughout the areas.
- (2) Establish fishing and fish marketing bases and a system of networking through the modernized fishing activities.
- (3) Promote effective use of fishery products through modernized fish marketing, processing and quality control activities.

3. Development Approaches

For the successful performance of the development strategies, two approaches: (the sectoral and zonal development approaches) were taken by the Master Plan as shown below.

3.1 Sector Plan

The sectoral development approach aimed to develop the fishery and fishery-related sectors by focusing on sector-oriented expertise, needs and potentials of the entire northern fishing area. The Sector Plan, composed of the following six sectors, was prepared in order to complete this approach.

- Sector 1 : Fishery Resources and Production
- Sector 2 : Fish Marketing and Distribution
- Sector 3 : Artisanal Fish Processing and Quality Control
- Sector 4 : Fishing Community Development
- Sector 5 : Education and Training
- Sector 6 : Institution and Organization

3.2 Zone Plan

The study area which covered the northern fishing areas is divided into the four zones according to zonal development approach, is based on the existing functions and conditions of the infrastructure, institutional development, as well as fish production, marketing and distribution, and artisanal processing activities. The zonal development approach attempted to develop the fishing community in each of the zones in order to meet their respective needs and potentials.

The Zone Plan was formulated for each zone in order to realize this approach. The Zone Plan consists of four Zone Projects, including various Sub-Projects (SP) that aim to overcome the constraints and improve the infrastructure. The four Zones are indicated below and the location of the Zones are shown in Fig. II-1.

- Zone 1 : Saint Louis (fishing areas centered in Saint Louis)
- Zone 2 : Kayar (fishing areas centered in Kayar)
- Zone 3 : Dakar (ten fishing villages in the Dakar region)
- Zone 4 : Satellite (small fishing villages including Gandiol, Potou Lompoul and Fass Boye, located between Zone 1 and Zone 2)

4. Sector Plan

4.1 Sector 1: Fishery Resource and Production

1) Goals

The goals will be to:

- Increase fish production
- Establish effective fishing and fish landing system

(2) Strategies

The strategies will be to:

- Introduce an effective resource management system
- Enhance the safety conditions of fishermen before fish landing
- Transfer landing activities from the current landing sites scattered in the traditional villages to the proposed fishing complex

(3) Education and Training

Education and training will consist of the following.

- Promote and encourage the activities of CRODT, CAEP and PSPS
- Training in fishing techniques, fish resource management and fishermen's organization
- Out-of school education for adult (literacy class etc.)

(4) Institutional Strengthening

Institutional strengthening will consist of the following.

- Close linkage and better coordination with the CRODT, CAEP, and PSPS regulations
- Regulations for facilities and equipment use
- Promote fishermen's organizations
- Establish an operation and maintenance system of the facilities and equipment
- Credit system application
- Fishery information system on fish landing

4.2 Sector 2: Fish Marketing and Distribution

(1) Goals

The goals will be to:

- Establish an effective and efficient fish marketing system
- Promote equal opportunities to all beneficiaries in fish marketing activities

(2) Strategies

The strategies will be to:

- Centralize the fish marketing system at the new fishing complex
- Organize a fish distribution and transport system
- Improve fish freshness and quality for export promotion
- Promote fish a marketing information system
- Establish a proper cleaning and sanitation system in marketing

(3) Education and Training

Education and training will consist of the following.

- Training in understanding the regulated marketing system
- Training in new marketing complex regulations
- Training in management and use of the facilities and equipment

(4) Institutional Strengthening

Institutional strengthening will consist of the following.

- Close linkage with the DOPM regulations
- Fish marketing regulations
- Organize users' association
- Establish an operation / maintenance system of the facilities and equipment
- Credit system application
- Fish marketing information system

4.3 Sector 3: Artisanal Fish Processing and Quality Control

(1) Goals

The goals will be to:

- Increase income and improve working conditions of traditional fish processors
- Develop modernized fish processing techniques
- Strengthen the quality control and inspection system for high price fish

(2) Strategies

The strategies will be to:

- Organize the traditional fish processing system
- Improve working and marketing conditions through infrastructure improvement and training
- Establish a demonstration plant to promote modernization and export
- Enhance the quality control system and internal quality inspection system in the close linkage with the DOPM

(3) Education and training

Education and training will consist of the following.

- Training on improved fish processing techniques
- Training to support DOPM/CAEP activities
- Training to strengthen group activities
- Out-of school education for adult

(4) Institutional strengthening

Institutional strengthening will consist of the following.

- Close linkage with the DOPM and CAEP regulation
- Regulations to effectively use the fish processing area
- Rules and management to operate and maintain the facilities and equipment
- Strengthen the fish processors' association
- Credit system application
- Fish marketing/processing information system

4.4 Sector 4: Fishing Community Development

(1) Goals

The goals will be to contribute to improved living conditions in the fishing villages.

(2) Strategies

The strategies will be to:

- Support primary and literacy education
- Support primary health care services
- Support the retail market
- Improve community infrastructure

(3) Education and Training

Education and training will consist of the following.

- Training to promote CAEP and UOPAGC activities for women's training
- Out-of school education for adult (literacy class, primary health care, nutrition etc.)
- Training on sanitation and environmental protection
- Promote a resettlement program

(4) Institutional Strengthening

Institutional strengthening will consist of the following.

- Close linkage of the CAEP regulation
- Strengthening women's union
- Rules and management to operate and maintain facilities and equipment
- Credit system application

4.5 Sector 5: Education and Training

(1) Goals

The goals will be to enhance the education and training system for the following target groups.

- Fishermen
- Wholesalers and micro-wholesalers
- Artisanal fish processors
- Community leaders and members
- Women
- Staff of the management body of the proposed project

(2) Strategies

The strategies will be to provide general training and specialized training by sector for beneficiaries and staff of the management body of the proposed projects

(3) Education and Training

Education and training will consist of the following.

- Trainer's training
- Training on technical and institutional aspects including management, operation, and maintenance of the training facilities and equipment
- Training on planning and management of training courses

(4) Institutional Strengthening

Institutional strengthening will consist of the following.

- Develop training and education program and curriculum
- Prepare and distribute training materials
- Human resources development: project staff and leaders of beneficiaries

4.6 Sector 6: Institution and Organization

(1) Goals

The goals will be to establish the proper organization and institution for effective and sustainable management, operation, and maintenance of the proposed projects.

(2) Strategies

The strategies will be to:

- Improve the credit system
- Enhance the fish marketing information system
- Strengthen the sanitary and environmental control system
- Strengthen the administration system of the proposed projects

(3) Education and Training

Education and training programs will provide training in the project management, operation and management.

(4) Institutional Strengthening

Institutional strengthening will consist of the following.

- Organizing the committees and management body
- Formulate fisheries development policy in the north coast
- Develop various types of regulations
- Application of a feasible credit system
- Establish operation, maintenance, and up-to-date system on fish production and marketing information

An outline of the six sector development plans is summarized in Table II-1.

5. Zone Plan

5.1 Zone 1: Saint Louis Project

Saint Louis had a population of 115,000 in 1995 and 30,600 persons were living in the proposed project site located on the overpopulated sandbar along the Senegal River.

In order to reduce the congestion in the fishing village of Guet N'dar, the municipality tried to move this population to the northern part of the sandbar by constructing a fish collection point. However, the project has not fully attained its goal. This is because it did not take a comprehensive approach and did not receive the consensus of the community. The facilities which were improved by the project were not sufficiently attractive to induce the fishermen and their families to move to the newly developed area.

A 350 lot housing complex for fishing communities is being developed near the DOPM-owned land and the need for a fishing center complex for fishing village development has been growing.

Establishing a fish marketing and distribution base and developing fishing communities were major improvements that were required to resolve the unfavorable fish landing, marketing and living conditions of the fishing village inhabitants.

(1) Objectives of the project

The proposed project aimed to contribute to the establishment of the largest and the most attractive fishing and fish marketing base in the northern fishing areas of Senegal. In order to achieve this goal, it is necessary to integrate existing landing, marketing and distribution facilities, which are currently scattered along the three kilometers sand beach located in the western part of Guet N'dar, into the newly established complex on the public land owned by DOPM. The objectives of the project are as follows.

- Make the marketing and distribution system of the fish landing site more effective.
- Promote modernized fishing and fish resource management at the local level.
- Integrate fishery-related institutions at the local level.
- Support efforts to organize fishermen, processors and traders.
- Provide indirect support to improve living environment of fishing villages.

(2) **Outline of the project**

Approximately 52,271 tons of fish were projected to be landed by artisanal fishery in Saint Louis in 2010, in contrast to about 37,952 tons which were landed in 1995.

The main components of the project are institutional strengthening of the project management organization and improved facilities and equipment.

In the area of institutional strengthening, DOPM, the leading agency, the existing fishery-related functions of CAEP, PSPS, CRODT etc. will be integrated into a local autonomous body to operate and manage the Saint Louis Project, which will have the functions in administration, technical extension, resource management, fish marketing and distribution, support in credit operation, statistics and sanitary environment.

A Management Committee will be established as a decision maker of the management organization, while the central Coordination Committee will determine the management policies of the project and supervise the management organization.

The new facilities will be built on the existing DOPM regional office site and will serve as an integrated fish marketing complex. On the beach side, there will be an apron. Adjacent to the apron, a fishermen storage for the fishing gears and a market hall for fish sorting, packing and marketing will be created.

The truck berth faces the market hall for easy and efficient handling and transport of fish. An ice plant, cold storage, workshop and repair facilities will be constructed. Workshop and technical service shops, toilets, washing facilities for the fishing gear, and canteen will be attractive for the fishermen's needs. The conceptual design of the Zone 1 Project is shown in the Figure II-2..

Administration and Training offices and laboratory for quality control and testing will be provided. The offices will be for management, statistics, credit, meeting, extension and training. Equipment will be provided for marketing, administration, training and fishermen assistance function. Fish container boxes, hand carts and push trolleys will assist in moving the fish within the complex. Multipurpose trucks will be used for transport to and from the existing fishing village. Training boats and gears to train fishermen in modern techniques and equipment will be included.

5.2 Zone 2: Kayar Project

Kayar had a population of approximately 9,000 in 1995, of which an estimated 1,680 permanent resident fishermen are included. In addition to population of the permanent residents, Kayar accepts a large number of transmigrant fishermen

and their families during the peak-fishing season which doubles its population. Kayar is one of the major artisanal fish processing areas in Senegal and it is located close to Dakar.

In order to promote smooth development of the project, amicable relations between the permanent residents and the transmigrant fishermen and their families are key factors as well as improvements to facility and equipment as proposed. A participatory development approach needs to be introduced from the project planning stage.

(1) Objectives of the Project

The proposed project aims to establish a major supply base of fresh and processed fish for the Dakar market in domestic consumption and export. The objectives of the project are as follows.

- Strengthen the existing system of harmonious community relations between the permanent residents and transmigrant fishermen and their families
- Relocate existing facilities and to establish an effective fish marketing complex
- Improve living conditions of the transmigrant fishermen and their families

(2) Outline of the Project

Approximately 23,389 tons of fish are projected to be landed by artisanal fishery at Kayar in the year 2010, in contrast to the 16,898 tons landed in 1995.

The main components of the project are institutional strengthening of project management organization and improvement of facilities and equipment.

In the area of institutional strengthening, DOPM, the leading agency and the existing fishery-related functions of CAEP, PSPS, CRODT etc. will be integrated as a local autonomous body for the operation and management of the Kayar Project, which will have the functions of administration, technical extension, resource management, fish marketing and distribution, support in credit operation, statistics and sanitary environment.

A Management Committee will be established as a decision making body responsible for managing the project, while the central Coordination Committee will determine the management policies of the project and supervise the management organization.

An integrated marketing complex incorporating the existing ice plant and DOPM office will be established. In order to rationalize the activities of this new complex, the existing local retail market will need to be relocated to make way for truck access and berth, additional administrative and training offices, laboratory,

workshop and technical service shops, and other service facilities. The conceptual design of the Zone 2 project is shown in Figure II-3.

As in the case of Zone 1, the administrative and training functions will be comprised of management, statistics, credit, meeting, extension and training. A laboratory for quality control and testing will be established. Service facilities such as toilets, washing facilities, fish gear storage, canteen will be available.

Equipment for marketing, administration, training and fishermen assistance activities, fish container boxes, hand carts and push trolleys to handle and move fish within the complex, will be improved. Multipurpose trucks will be used for transport to and from the existing fishing village. Training boats and gears to upgrade the skills and techniques of the fishermen and the use of modern equipment will be included.

5.3 Zone 3 : Dakar Project

Dakar region had a population of about 1,939,636 in 1995 according to the population projected in the 1988 census. The zone is located next to the large consumer market of the Dakar region, and the sea conditions are relatively calm. It is assumed that the income of the fishermen is relatively high mainly due to production and sales of high priced fish. Fish export has increased due to the devaluation of Franc CFA, which has benefited fishermen especially in Dakar.

The largest fish landing center is located in Hann, and small and medium-scale landing sites are scattered along the Cape Vert. Various bilateral and international development projects are concentrated in these limited fishing sites, where effective and efficient management of these projects are promoted. Urban development, factory construction, and resort development are being implemented near the fishing in order to develop the surrounding areas of Dakar. Complaints about the sanitary environment have been made by urban inhabitants living in close proximity to these sectors.

Due to the circumstances mentioned above, the improvements in the fish marketing infrastructure, credit system and living environment have been promoted. Establishing a well-organized marketing system which will enable to access the wholesale market in Dakar and the export market is one of the major issues for fishermen; and time and cost saving and reduction of quality loss need to be achieved.

Less than 20 percent of the total volume of the fish demand which is consumed in the Dakar region is sold through the Dakar Central Fish Market (CFM). This means of handling the fish products which are not currently passing through the CFM is the important issue that must be resolved. Increasing the volume marketed through the CFM will contribute to development of a rationalized fish marketing and

distribution system and proper pricing mechanism, which will lead, in turn to a modernized the fish marketing and distribution system.

In order to improve fishery-related infrastructure and institutional strengthening at the fish landing sites, technical extension activities mainly for fishermen, female artisanal fish processors and traders will be strengthened using the existing infrastructure and systems, instead of constructing new infrastructure at each fish landing sites.

(1) Objective of the Project

The overall objective of the entire zone is to strengthen the CFM in Dakar. The functions of fishing, trading and processing have been comprehensively improved at Rufisque serve as a will serve a base for technical extension to the other target fishing villages. Rufisque will be developed as a base where effective use of existing facilities and environmental improvement measures will be developed.

(2) Outline of the Project

The main components of the project are institutional strengthening of the project management organization and improvement of facilities and equipment.

In the area of institutional strengthening, DOPM the leading agency, and the existing fishery-related functions of CAEP, PSPS, CRODT etc. will be integrated into an autonomous body that will operate and manage the Dakar Project. It will have the functions of administration, technical extension, resource management, fish marketing and distribution, support in credit operation, statistics and sanitary environment.

A regional Coordination Committee will be established as a decision making body responsible for managing the project, while the central Coordination Committee will determine the management policies of the project and supervise the management organization.

A major training center in modernized fishing will be located at the CAEP head office and practical training will be provided at Rufisque and the projects under DOPM. In order to monitor fishing and marketing activities and to strengthen the training function of Zone 3, training facilities at Rufisque, monitoring and training equipment and a communication system will be provided to all DOPM/CAEP offices in Zone 3.

In addition to the training facilities at Rufisque, a workshop and fishing gear storage facility for fishermen will also be established. The use of these facilities, training equipment and workshop tools will be incorporated into the training program

aimed at modernizing the skills and technique of fishermen.

A computer and data collection system and communication equipment will be used to create a network to exchange information and data to monitor fishing and marketing activities.

The conceptual design of Zone 3 is shown in Fig. II-4.

5.4 Zone 4: Plan for Satellite Areas

(1) Objective of the Project

Supplementary facilities and equipment necessary for a satellite will be supplied to each fish landing site of villages targeted as satellites located between the Zone 1 (Saint Louis) and the Zone 2 (Kayar). In addition, mobile facilities and equipment will be provided for Saint Louis and Kayar, which are the bases for the northern fishing areas. These facilities and equipment will be moved to the satellite villages, if it is necessary.

(2) Outline of the Project

The main components of the project are institutional strengthening of the project management organization and improvement of facilities and equipment.

Each satellite will have a chief, a staff member for technical extension and a staff member for fishery-related statistics to operate and manage the project.

In order to improve the communication linkage between the satellite villages to the other zones, communication equipment will be installed. Navigation lighting on the shore will assist fishermen to land at night and thereby improve safety conditions. Fishing gear storage and fishing gear, well, handling carts, and maintenance tools will be included to improve the amenities of the fishing community. The conceptual design of Zone 4 is outlined in Figure II-5

6. Integration of the Sector Plan and the Zone Plan

The Sector Plan and the Zone Plan relate to each other as illustrated in the Figure II-6. The development of Sector-1 (fishery resource and production), Sector-2 (fish marketing and distribution), Sector-3 (artisanal fish processing and quality control) and Sector-4 (fishing community development) are closely related to one another, while Sector-5 (education and training) and Sector-6 (institution strengthening) are the nucleus linking these four sectors.

The inside of the smaller circle with the thick border line implies the scope of each zone project. A well integrated zone project proposed by the study with related projects and programs outside the scope of the zone project, will lead to the

comprehensive development for the targeted zone.

Tables II.6-1 and II.6-2 illustrate the specific relationship between the Sector and Zone plans with the sub-projects. A summary of the project cost for the four zones is shown in Table II.6-3.

7. Education and Training

(1) Development Goals and Concept

1) Development goals

The development goals of education and training are to develop human resources using the physical infrastructure, facilities and equipment of the project in order to ensure sustained management of the Project.

- Improve the consciousness, attitude and activities of beneficiaries such as fishermen, fish processors and wholesalers.
- Transfer technology on the institution and project management.

2) Development concept

General training system will be introduced as well as training on the specialized technology according to sector. Education and training will be implemented in the classroom, while on-the-job-training will be implemented in each sector. Teachers and trainers will be assigned from DOPM, PSPS, CRODT, CAEP and relevant agencies according to the training program.

In future, the training program will be developed by the project management body following initial staff training in the project. Education and training on modernized technology will also be implemented in donor countries and/or third countries, and experts will be dispatched for training by donor countries.

(2) Education and Training Plan

1) General education and training

Reduction of illiteracy rate

Fishermen and fish processors have not been educated in the past, and their illiteracy rate is rather high. In order to resolve this problem, the management body will develop an education program in close linkage with the interest of beneficiaries, fishermen, processors and women. The management body will also support program implementation on reducing illiteracy rate prepared by the communities and/or the government.

Technology transfer

Youth/apprentice fishermen will be given the opportunity to use the project facilities and equipment through on-the-job-training programs.

2) Specialized education and training

Sector 1 - Fishery resource and production

a. Project staff training course

Project staff will be provided basic knowledge and technology will be transferred on the information system of fish production, fish resources, operation and maintenance of modernized boats, equipment and fishermen's organizations.

b. Private professional course

Fishermen will be trained in fish resource management, modern fishing technology, fish handling, fishermen's association, safety control, market regulations and mechanics.

Sector 2 - Fish marketing and distribution

All users (professionals) and staff will be provided with knowledge on the new marketing regulations as well as operation and maintenance of market facilities.

Sector 3 - Artisanal fish processing and quality control

a. Project staff training course

Staff training will be implemented for supervisors, technicians and the extension staff for fish processing.

b. Private professional course

Leaders of fish processors group like GIE will be trained to acquire advanced technology, marketing, sanitary control as well as the use of facilities and equipment.

Sector 4 - Fishing community development

The major purpose of this training program is to improve living standards of the beneficiaries. Education and training in this sector will provide a support function to the existing system by agencies concerned.

a. Health improvement

Leadership training is implemented for leaders of GIE groups and

others on the promotion of community activities. Family health care training will be provided to women of reproductive ages (15 - 49 years) on Primary Health Care (PHC), hygiene, environmental protection, Maternal and Child Health (MCH), child care, nutrition and Expanded Programme of Immunization (EPI).

b. Resettlement

Seminar on resettlement is held for the community members to provide information on resettlement activities to other areas. Community members are provided with information on the infrastructure development and institutional arrangement provided by the municipal government, communities and management body of the project.

c. Employment opportunity

Community members will be provided with information on employment opportunities and training. Market gardening techniques and management methods are transferred to community members.

d. Community activities

The project will support community activities such as sports, recreation, festival and other social activities.

8. Project Coordination and Management

8.1 Coordination Committee

(1) Function

The Coordination Committee chaired by the Minister of Marine Transportation and Fisheries decides basic policies on project development and management, supervises and monitors the effectiveness and efficiency of development projects implemented on the northern coast. Each project will be organized into the following Zones and will be identified according to their socio-economic and fisheries related structure.

- 1) Zone 1 : Saint Louis
- 2) Zone 2 : Kayar
- 3) Zone 3 : Fish landing sites in Dakar
- 4) Zone 4 : Satellites Zone (Gandiol, Potou, Lompoul, Fass Boye, Mboro)

Basic policies will be aimed at increasing production and quality control of fish landed in each zone, increasing fishermen's income, promoting exports, developing employment opportunities, and improving the living environment.

(2) Coordination Committee Members

The Minister of Marine Transportation and Fisheries will form the Coordination Committee for the Northern Coast Fisheries Development at the state level. This Coordination Committee will be organized with the representatives of the following organizations.

- 1) Ministry of Marine Transportation and Fisheries
- 2) Ministry of Finance and Economic planning
- 3) Ministry of Environment
- 4) Ministry of Basic Education and Promotion of local languages
- 5) The Regional Governor
- 6) The President of the Regional Council
- 7) The Director of Local Collectivities
- 8) The Mayor or President of the Rural Council
- 9) The Representatives of Professional Organizations

(3) Ad-hoc Committee

The Coordination Committee will organize an ad-hoc Committee on the promotion of education and training and fishermen village development. The Committee members will be composed of:

- 1) Representatives of Relevant Ministries
- 2) Representative of Regional Council
- 3) Representatives of Municipal Government
- 4) Representative of Rural Council
- 5) Representative of Beneficiaries

8.2 Management Committee

(1) Functions

The Management Committee supervises and monitors the activities of the autonomous body of each zone.

(2) Management Committee

The Management Committee will be composed of the following members.

- 1) DOPM Director, President of the Committee
- 2) Mayor and/or the Representative of the Rural Council
- 3) Representatives of beneficiaries such as fishermen, processors, wholesalers, mechanics, boat builders and women
- 4) Representative of mutual fund for credit

8.3 Autonomous Body

(1) Role and Function

The autonomous Body is the management body of the project in each zone. It will be responsible for extending effective and efficient management of the project to all the beneficiaries. The project which will be managed by autonomous body will compose of the following sectors.

- Sector 1 : Fishery Resources and Production
- Sector 2 : Fish Marketing and Distribution
- Sector 3 : Artisanal Fish Processing and Quality Control
- Sector 4 : Fishing Community Development
- Sector 5 : Training and Education
- Sector 6 : Institution and Organization

(2) Board members

The Board members of the autonomous body will be appointed by the Minister of Fisheries and Marine Transportation.

(3) Director

The director of DOPM will propose the director of the autonomous body.

(4) Financial management

- 1) The director is responsible for managing revenues and expenditures of the project. Income produced by project activities will be used exclusively for project operation and investments in facilities and equipment.
- 2) The director will submit a budget proposal for subsidies to the management committee. The budget proposal is limited to investment and renovation of the facilities and equipment, if there is a shortage of funds. However, it will not be used as an operational fund.
- 3) The autonomous body is eligible to receive subsidies for the initial operation fund for the first two years after the operations of the complex have commenced.

8.4 Sector 1 : Fishery Resources and Production

- (1) *Sub-Project 1-1 (Safety Control) and Sub-Project 1-2 (Modernized Fishing)*
All of the facilities are managed by the autonomous body for all fishermen who will benefit from the project. Equipment is rented to fishermen who are willing to improve their safety conditions through proper training programs provided by the autonomous body.

- (2) *Sub-Project 1-3 (Fishing gear storage), Sub-Project 1-4 (Workshop), Sub-Project 1-5 (Ship building yard), Sub-Project 1-6 (Apron), and Sub-Project 1-7 (Service Jetty at St. Louis):* Users' association is organized by the users of the facilities and equipment and is responsible maintaining the facilities and equipment properly and to control stock. The autonomous body monitors and orders changes in operational conditions according to the reports submitted by the association. Fishermen, mechanics, and ship builders are the anticipated users.

8.5 Sector 2 : Fish Marketing and Distribution

- (1) *Project Management:* All of the facilities and equipment are managed by the autonomous body. It controls the facilities and equipment to enable the users to use them effectively according to fish marketing regulations. Users' association of these facilities and equipment will be created by all beneficiaries such as fishermen, processors, and wholesalers.

- (2) *Sub-Project 2-1 (Fish Market) and Sub-Project 2-3 (Fish Collection Points):*

1) Management

The manager of the fish market will be appointed by the General Manager of the autonomous body. The autonomous body is responsible for managing the Fish Market and fishermen's associations at collection points.

2) Functions

The fish market located at the fishing complex will function as a wholesale market in the fish production zone. The fish collection points provide services to promote the newly organized fish collection system and function as re-packing and transit places from fish landing sites to the complex.

3) Qualification of the market users

The autonomous body issues marketing licenses. The license is effective as long as the applicant qualifies under the regulation. The license is issued for the following professionals.

- a. Wholesalers and exporters
- b. Processing industries
- c. Intermediaries
- d. Fishermen as suppliers
 - Representatives of fishermen's group
 - Individual fishermen
- e. Fish processors as buyers of fresh fish for processing and suppliers of processed fish
 - Representatives of processors group for raw materials and processed fish
 - Individual processors

- 4) **Tariff**
 - a. A marketing fee is paid at the entry gate of the market by fish suppliers and at the exit gate of the market by wholesalers.
 - b. Rental fees and leasing charges of the facilities and equipment will be paid by the users periodically and/or on a contract basis.
 - 5) **Allocation of market space**

Market space will be allocated by type of fish, such as "high priced fish", "sardinelles", "other fish", and "processed fish".
 - 6) **Security control**

The autonomous body controls market security in conjunction with the municipal police.
 - 7) **Sanitary control**

The autonomous body will supervise the sanitary conditions of the market. Sanitary control will be managed by users association. Garbage collection will be conducted by the municipal government or the local council.
 - 8) **Fish marketing information**
 - a. Fish marketing volume/quality and fish price are recorded at the entrance and exit of the market.
 - b. Fish marketing information will be processed by a computerized system and disseminated to users.
 - c. Fish marketing information at the Daker wholesale market will be made available everyday for the users.
- (3) *Sector 2-2 (Ice Plant and Cold Storage):*
- 1) **Functions**

The ice plant will supply a sufficient volume of ice regularly and the cold storage facility provide storage for stock control of fresh and processed fish.
 - 2) **Management**

The manager of the ice plant and cold storage will be appointed by the general manager of the autonomous body. The manager employs the staff and manages the revenue and cost of the ice plant and the cold storage. The manager is responsible for reporting the financial and technical results of the management to the autonomous body.

- (4) *Sub-project 2-4 (Storage room for the processed fish):* Fish processors are able to use the storage rooms at the complex for stock control of the processed fish and salt. Fish processors association has a responsibility to manage the storage room.

8.6 Sector 3 : Artisanal Fish Processing and Fish Quality Control

- (1) *Sub-Project 3-1 (Improvement of Sanitary and Working Infrastructure of Fish Processing Area):* The fish processors' association maintains the infrastructure of the fish processing area and borrows the new processing equipment from the autonomous body to improve their traditional fish processing. Stock control of the equipment is conducted by the users' association and supervised by the autonomous body. The garbage collection system is linked to the existing system developed by the municipal government or the local council.
- (2) *Sub-Project 3-2 (Demonstration Plant for Export Promotion):* The facilities and equipment will be managed and maintained by the autonomous body. Fish processors and private sectors who are willing to introduce this method are able to join the operation as a part of the training program on modern technology. The autonomous body may be able to buy raw materials for processing and to sell the processed products.
- (3) *Sub-Project 3-3 (Quality Inspection System for High Prices Fish and Direct Fish Export):* The autonomous body will issue export certifications through the quality inspections of DOPM according to the existing laws and regulations.
- (4) *Sub-Project 3-4 (Quality Control System):* Quality tests will be conducted by the autonomous body for DOPM according to the existing laws and regulations. The autonomous body will maintain the facilities and equipment.

8.7 Sector 4 : Fishing Community Development

- (1) The autonomous body prepares development plans for inhabitants in the fishermen villages based on community participation.
- (2) The municipal government or the rural community council is responsible for operating and maintaining public infrastructure, such as a primary school/health post (*Sub-Project 4-2*) and a retail market (*Sub-Project 4-1*).

The plan on community support infrastructure (*Sub-Project 4-2*) such as water supply, electricity service extension and road rehabilitation are prepared under the technical assistance which is provided by the autonomous body, the relevant ministries, and private bodies.

- (3) An ad-hoc committee for coordination committee decides participation measures of community members for the effective and efficient use of the infrastructure developed by the project. According to the decision, community members are qualified to use the infrastructure on improving the living conditions of fishermen' families.

8.8 Sector 5 : Education and Training

- (1) The autonomous body will submit education and training programs to the coordination committee.
- (2) The autonomous body will manage the facilities and equipment of education and training .
- (3) The beneficiaries will maintain the rooms, facilities, and equipment in good conditions.
- (4) The teachers will be according to fields and topics by the relevant agencies and/or by donor countries.
- (5) Training on modernized technology will be conducted in the foreign countries.

8.9 Sector 6 : Institution and Organization

- (1) *Credit System:* The autonomous body will provide support for an effective and efficient operation of mutual fund system according the laws and regulations of the credit system.
- (2) *Fish Marketing Information System:* The autonomous body will collect and disseminate information on marketing volume and price according to fish species and destination. This system will be applied to the DOPM statistical processing method.
- (3) *Sanitary and environmental control:* The autonomous Body will supervise the sanitary and environmental control of the project and users' association is responsible for garbage disposal and drainage conditions of the facilities. The autonomous body will coordinate to promote the linkage between the users' association and municipal or rural sanitary management bodies.

- (4) *Administration:* Administrative work of the project will be managed by the autonomous body. The administrative section is responsible for legal matters, accounting, and clerical works of the project.

8.10 Users' Association

(1) **Function**

The users' association will manage and maintain the facilities and equipment which are rented or leased by the autonomous body and it will manage sanitary and working conditions.

(2) **Organization**

The users' association will be organized according to the following sectors. The head of the association will be selected by the association members. The head is responsible for submission of a periodical report on stock control, conditions of facilities and equipment, and financial statement.

1) Sector 1

- a. Sub-project 1-3 : Fishing gear storage*
- b. Sub-project 1-4 : Workshop*
- c. Sub-project 1-5 : Boatbuilding yard*
- d. Sub-project 1-6 : Apron*
- e. Sub-project 1-7 : Service jetty at St. Louis*

2) Sector 2

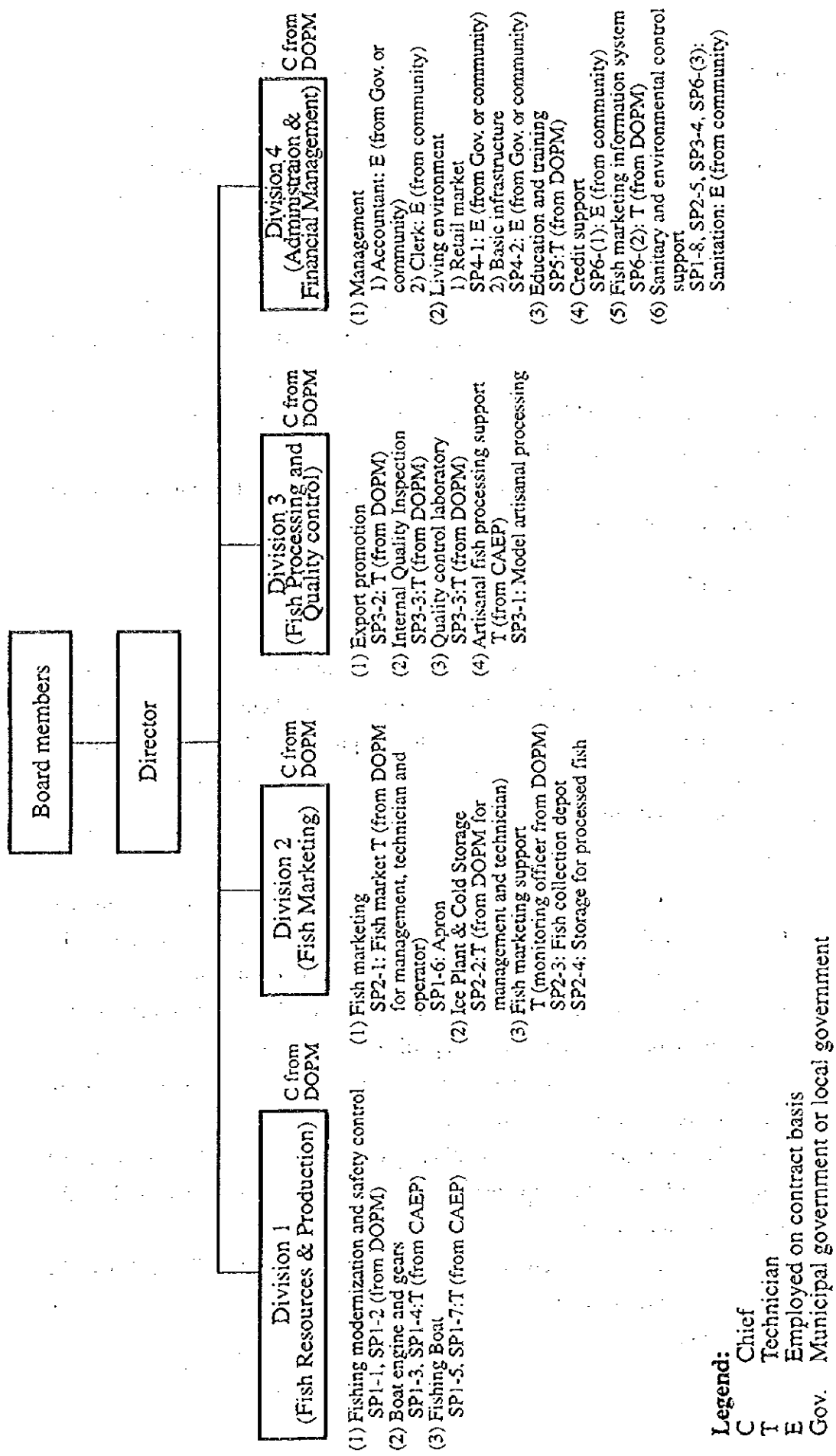
- a. Sub-project 2-1 : Storage room for the processed fish*
- b. Sub-project 2-3 : Collection points*

3) Sector 3

- Sub-project 3-1 : Fish processing area*

(3) **Financial management**

The users' association will manage like the autonomous body. The association is responsible for guarantee of payment by the association members and for establishing accounting system.



Legend:
 C Chief
 T Technician
 E Employed on contract basis
 Gov. Municipal government or local government

Organization Chart of Autonomous Body (Saint Louis and Kayar)

9. Selection of priority Zones for Feasibility Study

The Study selected Saint Louis (Zone 1) and Kayar (Zone 2) as the priority zones for the implementation of the Master Plan. These two zones are in the most suitable and needed conditions for implementing the integrated, comprehensive program because of the following reasons:

- (1) Both of the zones are the major fish landing sites in the northern fishing areas.
- (2) Both of the zones have a significant need for modernized fishing techniques and effective marketing, distribution, and artisanal processing system.
- (3) Both of the zones have a high potential of achieving effective decentralization and integrated management by relevant organizations.
- (4) Both of the zones need to implement countermeasures against population growth and resettlement of migrant fishermen and their families.

10. Action Plan

(1) 1997

A Coordination Committee for the Development of Northern Fishing Areas of Senegal will be organized to formulate basic policy, fish marketing regulations and a management system for each zone. Any fisheries project in the northern coast of Senegal should take into consideration the results of the study including the master plan and feasibility study for implementation.

(2) 1998

- 1) Management Committees for each zone will be organized by the Coordination Committee and an autonomous body for the project management will be established under the supervision of the Management Committee.
- 2) Community agreement will be authorized by the municipal government or the rural council on land acquisition and participation of project management.
- 3) Beneficiaries or users of the project will organize an users' association to use and manage the facilities/equipment.
- 4) Financial and technical cooperation provided by the donors will be implemented according to the development program prepared by the Coordination Committee.
- 5) Human and financial resources of the project will be allocated by the ministries concerned to municipal government / rural council and users' association.

(3) 1998 - 2000

- 1) Construction of the first priority project.
- 2) Education and training for staff and users of the first priority project.
- 3) Institutional strengthening for the autonomous body and users' association in the first priority project.

(4) 2001 - 2003

- 1) Construction of the second priority project and Zone 3 (Dakar).
- 2) Education and training for staff and users (beneficiaries) of the second priority project and Zone 3 (Dakar).
- 3) Institutional strengthening for the autonomous body and users' association of the second priority project and Zone 3 (Dakar)

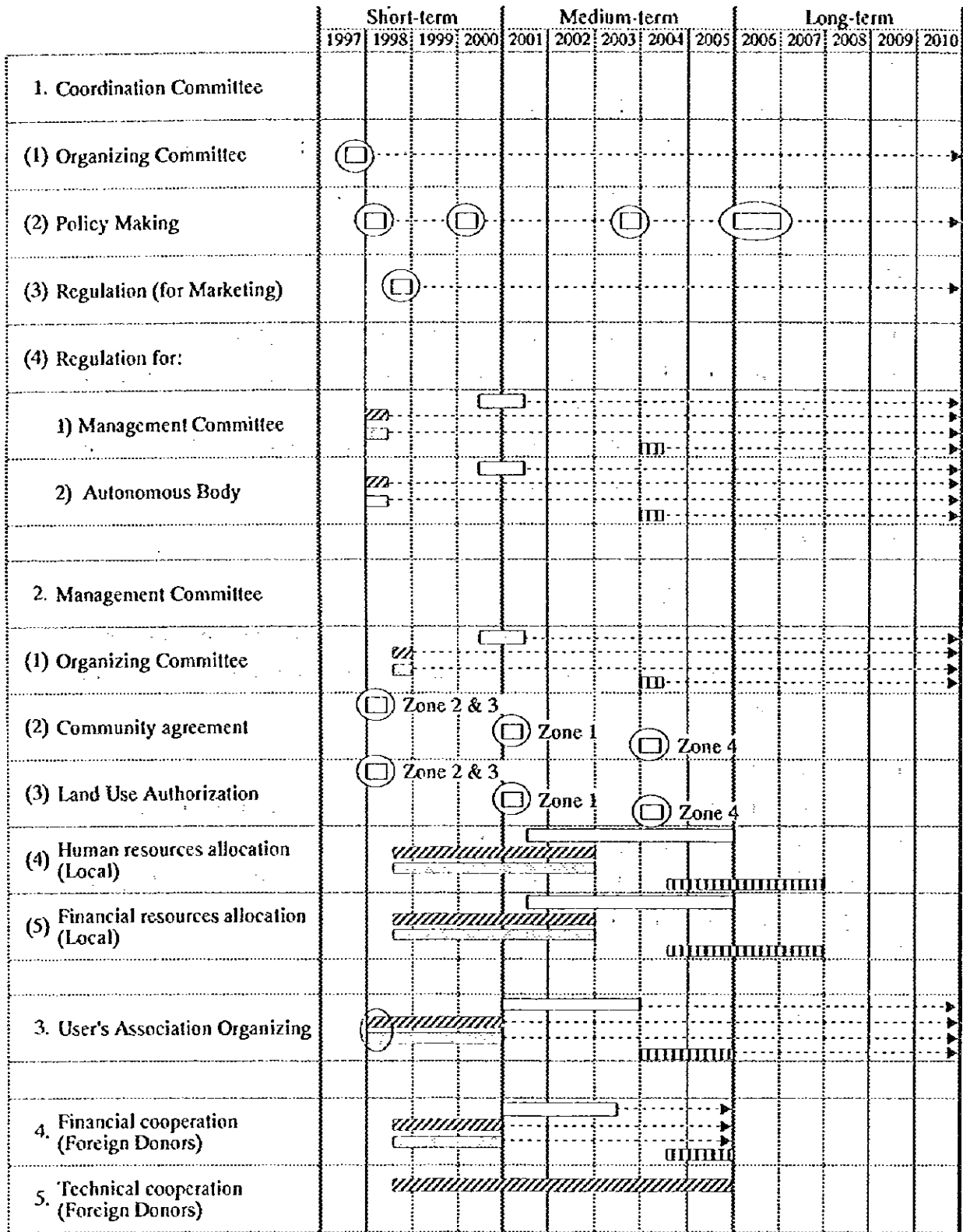
(5) 2004 - 2005

- 1) Construction of the Zone 4 project.
- 2) Education and training for staff and users (beneficiaries) of the Zone 4 project.
- 3) Institutional strengthening for the autonomous body and users' association of the Zone 4 project.

(6) 2005 - 2010

Sustainable development will be implemented by the autonomous bodies and users' association operating under the Management Committee. Through this sustained effort, the Coordination Committee will complete the model for modernized fishing and improved fish marketing/processing. Project management will be fully decentralized among the municipal and rural governments and the users.

Action Plan (1/3)



Legend:

- Zone 1 (St. Louis)
- ▨ Zone 2 (Kayar)
- ▨ Zone 3 (Dakar Region Fish Landing Sites)
- ▨ Zone 4 (Gandiol, Potou, Lompoul, Fas Boye, Mboro)
- Approval by government and community is necessary condition for the project implementation

Action Plan (2/3)

	Short-term			Medium-term			Long-term						
	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
6. Project Component													
6.1 Sector 1													
(1) Sub-Project 1-1 (Security Control)		Phase 1a	Phase 1b							Sustainable development by PSFS			
(2) Sub-Project 1-2 (Fishing modernization)					Phase 2a	Phase 2b				Expansion by Fishermen Association			
(3) Sub-Project 1-3 (Fishing gear storage)										Expansion by Fishermen Association			
(4) Sub-Project 1-4 (Workshop & Equipment)										Rehabilitation by Users Association			
(5) Sub-Project 1-5 (Ship-building yard)										Rehabilitation by Local Government			
(6) Sub-Project 1-6 (Service Apron)										Rehabilitation by Local Government			
(7) Sub-Project 1-7 (Service Facilities at S.L. riverside)										Rehabilitation by Local Government			
(8) Sub-Project 1-8 (Research Post)										Sustainable development by CRODT			
(9) Sub-Project 1-9 (Sanitation facilities/equipment)										Expansion by Users Association			
6.2 Sector 2													
(1) Sub-Project 2-1 (Market Hall, truck berth & office)										Rehabilitation by Autonomous Body			
(2) Sub-Project 2-2 (Ice plant, cold storage, sorting, packing)										Rehabilitation by Autonomous Body			
(3) Sub-Project 2-3 (Fish collection depot)										Rehabilitation by Users Association			
(4) Sub-Project 2-4 (Storage for processed fish)										Rehabilitation by Users Association			
(5) Sub-Project 2-5 (Sanitation facilities / equipment)										Sustainable Development by Users Association			
6.3 Sector 3													
(1) Sub-Project 3-1 (Model artisanal fish processing area)										Rehabilitation by Users Association			
(2) Sub-Project 3-2 (Export promotion material/equipment)										Rehabilitation by Autonomous Body			
(3) Sub-Project 3-3 (Quality inspection / control laboratory)										Rehabilitation by Autonomous Body			
(4) Sub-Project 3-4 (Sanitation facilities / equipment)										Expansion by Users Association			
6.4 Sector 4													
(1) Sub-Project 4-1 (Facilities & equipment for retail market)										Sustainable development by Local Government			
(2) Sub-Project 4-2 (Basic infrastructure services)										Rehabilitation by Local Government			

Remark: Local Government is Municipal Government or Rural Council depending on the project zone

Action Plan (3/3)

	Short-term				Medium-term					Long-term				
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
			Phase 1a	Phase 1b		Phase 2a	Phase 2b		Phase 3					
6.5 Sector 5 (Sub-Project 5)														
(1) General Education/training														
(2) Specialized Education/training by Sector														
6.6 Sector 6 (Sub-project 6)														
Administration and monitoring equipment														
(1) Credit System (Model development)														
(2) Fish Marketing Information System (Model development)														
(3) Sanitary and environ. control (Model development)														
(4) Administration														
6.7 Miscellaneous Site Facilities & Equipment														

- Legend:
- Zone 1 (St. Louis)
 - ▨ Zone 2 (Kayar)
 - ▩ Zone 3 (Dakar Region Fish Landing Sites)
 - ▧ Zone 4 (Gandiol, Pato, Lempoul, Fas Boye, Mboro)

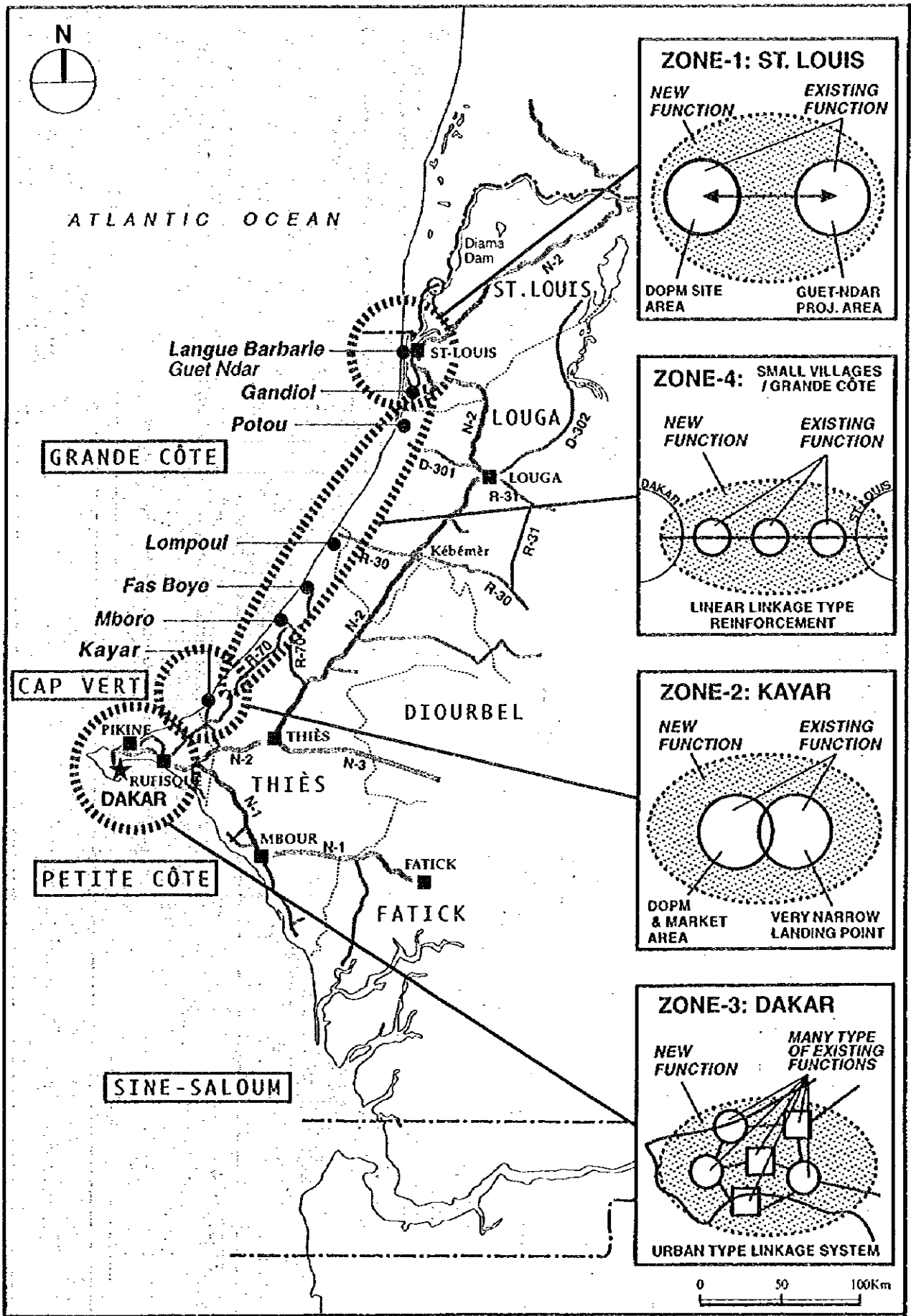
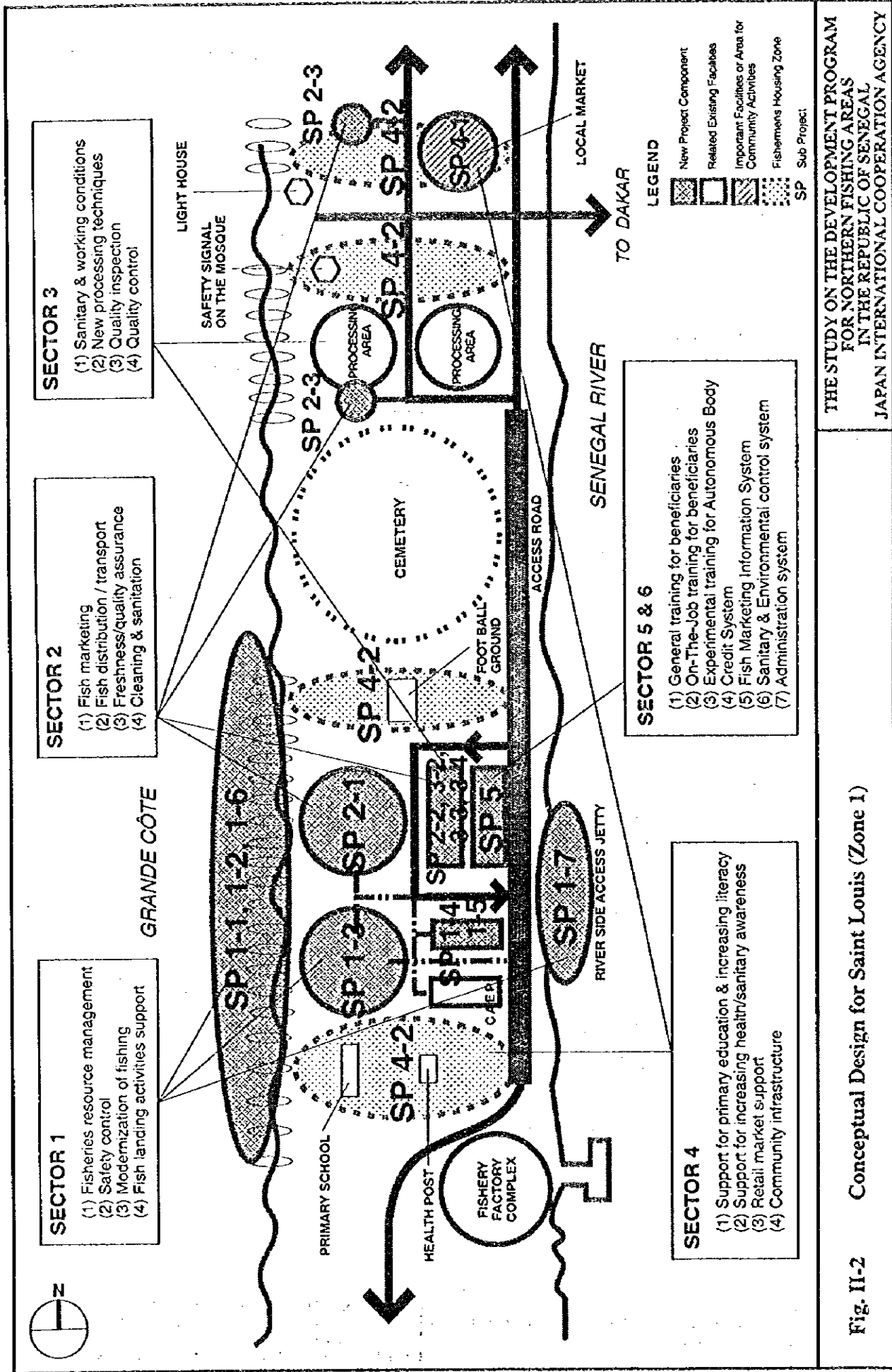
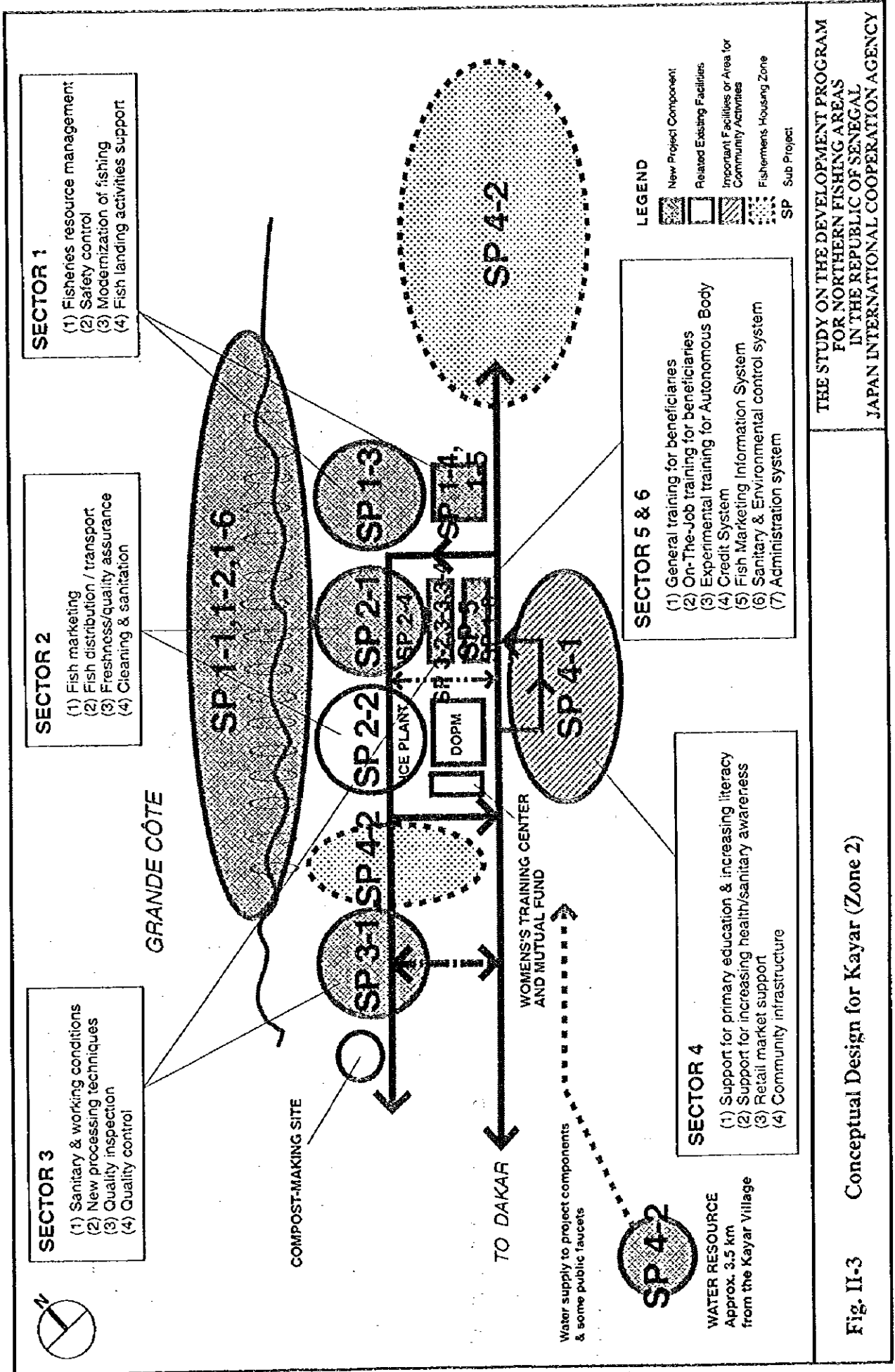


Fig. II-1 Project Zoning & Improvement Aspects for Each Zone

THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
 JAPAN INTERNATIONAL COOPERATION AGENCY



THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
 JAPAN INTERNATIONAL COOPERATION AGENCY



THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. II-3 Conceptual Design for Kayar (Zone 2)

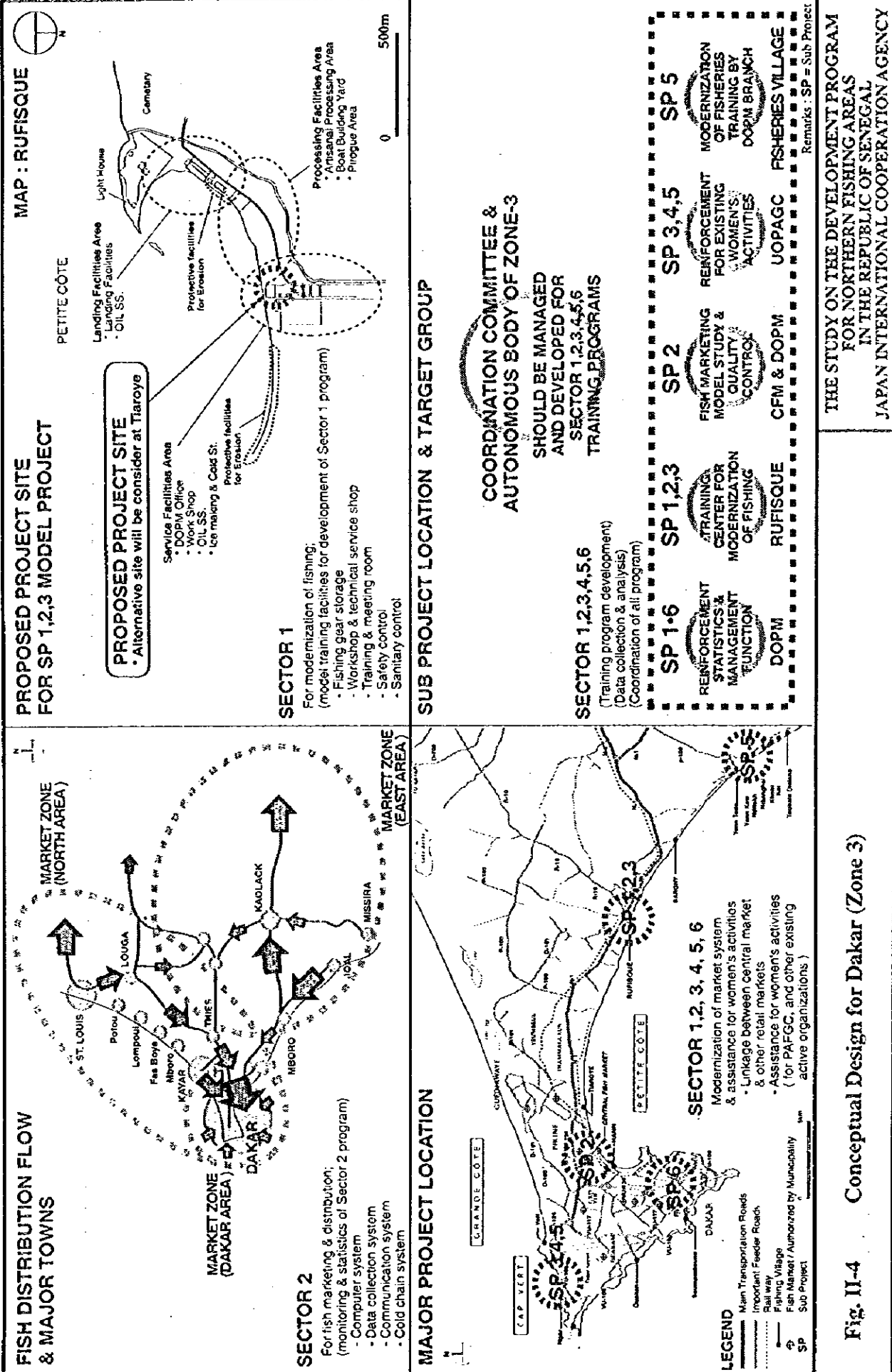
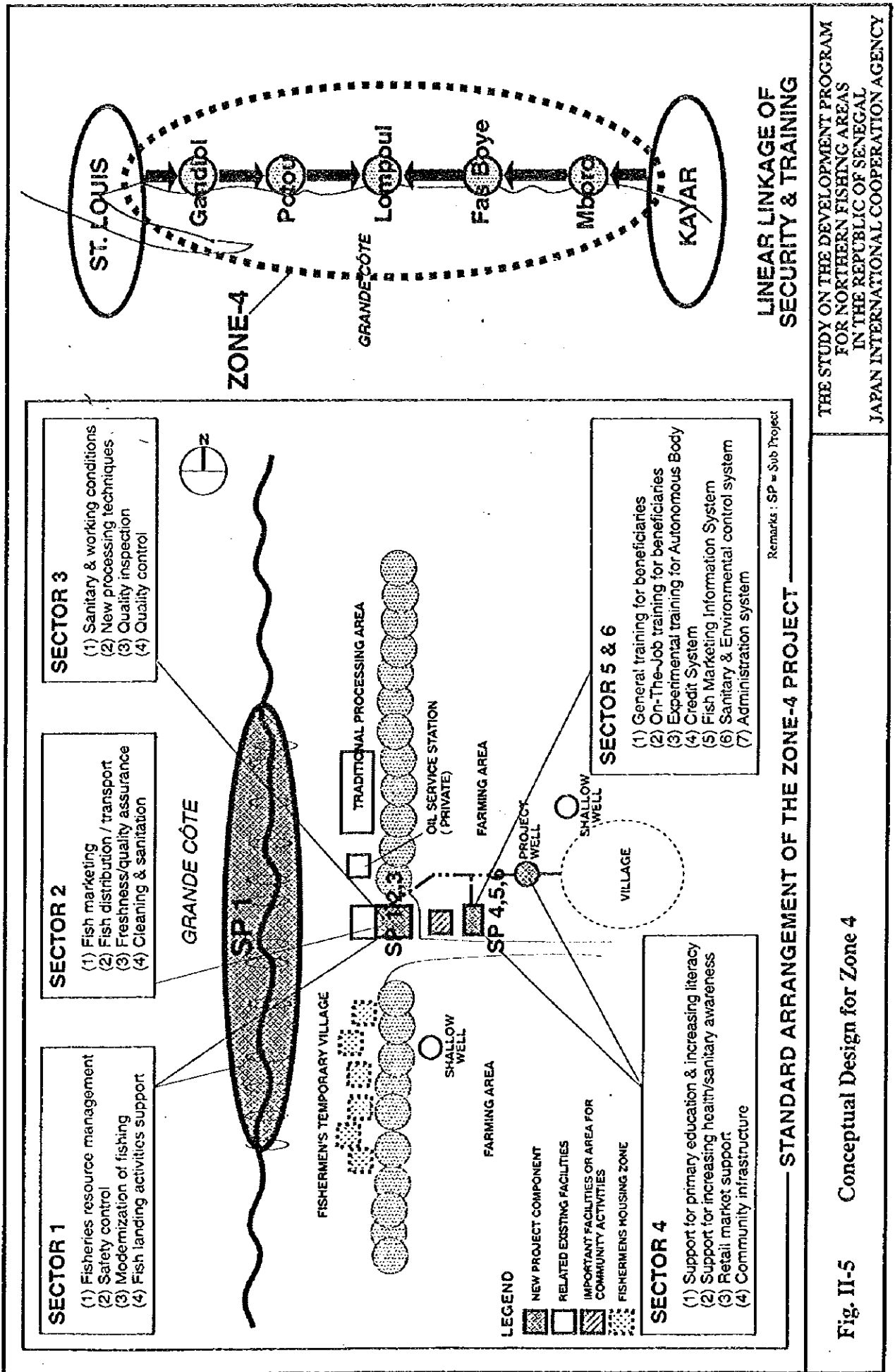


Fig. II-4 Conceptual Design for Dakar (Zone 3)



THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. II-5 Conceptual Design for Zone 4

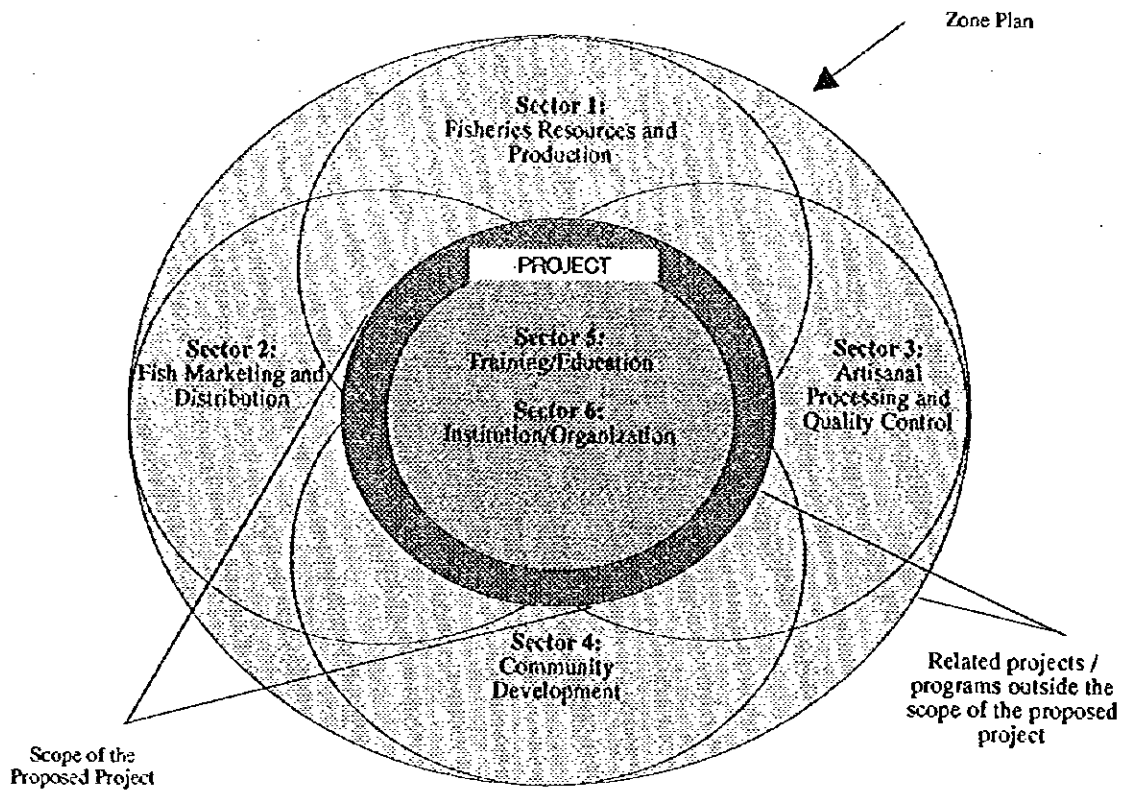


Fig. II-6 Relationship Between Sector Plans and Zone Plans

Table II.6.1 Relationship between Zone / Sector Plans and Facilities / Equipment

Sector Plan Facilities	Zone - 1 : Si Lufis				Zone - 2 : Kayar				Zone - 3 : Dakar				Zone - 4 : Serethle village										
	SP1.1	SP1.2	SP1.3	SP1.4	SP1.5	SP1.6	SP1.7	SP1.8	SP1.9	SP1.10	SP1.11	SP1.12	SP1.13	SP1.14	SP1.15								
Project Facilities & Equipment	Perumahan Mbangun, safety gear, motor	Wood boat/year	Plasma Cow Shanty	Workshop & Equipment	Shrimp-holding yard	Service Area	Service Facilities for Revenue	Research Post (Measurements equipment)	Sanitation facilities/equipment related to production	Market Hall, Fresh Berris, & Office	PPCS, Sprinkler, Trucking	Fish Collection Depot	Storage for Processed Fish	Sanitation facilities / equipment related to marketing	Model A/Manual Processing Area	Export Processing subsector/department office	Quality Inspection/Control Laboratory & Equipment	Sanitation facilities / equipment related to processing	Facilities / equipment for Retail Market	Basic infrastructure services	General Education & Training Facilities & Equipment	Administration & monitoring equipment	Mariculture Support Facilities & Equipment
1. SECTOR 1																							
(1) Fish resource management								○															
(2) Security control	○																						
(3) Modernization of fishing		○	○	○	○		○			○	○	○									○	○	
(4) Fisheries land activities support			○	○	○	○			○	○		○									○	○	○
2. SECTOR 2																							
(1) Fish marketing										○		○									○	○	
(2) Fish distribution / transport										○		○									○	○	
(3) Freshness/quality assurance										○							○	○			○	○	
(4) Cleaning & sanitation													○								○	○	
3. SECTOR 3																							
(1) Sanitary & working conditions													○		○						○	○	
(2) New processing techniques															○	○					○	○	
(3) Quality inspection																○	○				○	○	
(4) Quality control													○				○				○	○	
4. SECTOR 4																							
(1) Support for primary education & increasing literacy																					○	○	
(2) Support for increasing health/sanitary awareness										○											○	○	
(3) Retail market support																					○	○	
(4) Community infrastructure										○											○	○	
5. SECTOR 5																							
(1) General training for beneficiaries	○						○														○	○	
(2) On-the-Job training for beneficiaries	○	○					○									○					○	○	
(3) Experiential training for Autonomous Body	○	○		○			○			○	○	○				○	○				○	○	
6. SECTOR 6																							
(1) Credit System										○											○	○	
(2) Fish Marketing Information System										○											○	○	
(3) Sanitary & Environmental control system										○											○	○	
(4) Administration system	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Legend:
 ○ Directly Related
 ○ Indirectly Related

Table II.6-2 Outline of the Six Sector Plans (1/2)

Sector plan	Outline of the Plan			
	Purpose	Main target groups	Main functions	Inputs (Sub-Project in the Zone Max)
1 Fish resource and production	To increase fish production To establish effective fishing and fish landing system	Officers of fishery-related government agencies Artisanal fishermen of permanent resident and transmigrant (boat-owners, engine-owners, fishing gear owners, and employed fishermen)	To introduce effective resource management system	To establish research posts
			To modernize fishing technology	To promote model boats and gears
			To enhance safety conditions of fishermen before fish landing	To set up navigation lights, sign To promote safety gear To construct a safety control office
			To transfer landing activities from the current landing sites scattered in the traditional villages to the proposed fishing complex	To construct a fishing and fish marketing complex including fishing gear storage, workshop, ship-building yard To improve sanitation facilities To set up fish collection depot
2 Fish marketing and distribution	To establish effective and efficient fish marketing system To promote equal opportunity to all beneficiaries in fish marketing activities	Artisanal fishermen of permanent resident and transmigrant Artisanal fish processors Artisanal traders	To centralize fish marketing system to the new fishing complex	To construct a fishing and fish marketing complex including market hall, truck berth and management office
			To organize the fish distribution and transport system	To improve the marketing hall, truck berth, ice plant, cold storage, sorting and packing space, and fish collection depot
			To improve fish freshness and quality for export promotion	To construct ice plant, cold storage, sorting and packing space in the complex Quality inspection/control laboratory and equipment
			To promote fish marketing information system	Technical transfer in development of fish marketing information system To improve administration and monitoring equipment
			To establish a proper cleaning and sanitation system in marketing	To improve sanitation facilities and equipment related to marketing
3 Improvement plan for fish processing sector	To increase income and to improve working conditions of traditional fish processors To develop the modernized fish processing technique To strengthen the quality control and inspection system for high price fish	Artisanal fish processors of permanent resident and transmigrant	To organize the traditional fish processing system	To construct model artisanal processing area
			To improve working and marketing conditions through infrastructure improvement and training	To construct storage To construct model artisanal processing area To improve sanitation facilities and equipment related to marketing
			To establish a demonstration plant for modernization and export promotion	To construct quality inspection and control laboratory and equipment
			To enhance the quality control system and internal quality inspection system in the close linkage with the DOPM system	To construct quality inspection and control laboratory and equipment

Table II.6-2 Outline of the Six Sector Plans (2/2)

Sector plan	Outline of the Plan			
	Purpose	Main target groups	Main functions	Inputs (Sub-Project in the Zone Plan)
4 Improvement plan for fishing communities	To contribute to the development of living conditions in the fishing villages	Government officers Permanent residents and transmigrants in the fishing villages (artisanal fishermen, processors, traders, farmers, cottage industries, house-wives, and children)	To support primary education and literacy education	To improve basic infrastructure and services To improve education and training facilities and equipment
			To support primary health care services	To improve basic infrastructure and services To improve education and training facilities and equipment
			To support retail market	To improve facilities and equipment for the retail market To improve basic infrastructure and services To improve education and training facilities and equipment
			To improve community infrastructure	To improve facilities and equipment for the retail market To improve education and training facilities and equipment
5 Improvement plan for education and training sector	To enhance the education and training system for the target groups including fishermen, wholesalers, artisanal fish processors, community members, staff of the management body	Fishermen, wholesalers, artisanal fish processors, community members, staff of the Autonomous Body	To provide general and specialized training by sector for beneficiaries and staff for the management body of the proposed projects	To improve education and training facilities and equipment To improve administration and monitoring equipment
6 Improvement plan for institution building sector	To establish the proper organization and institution for effective and sustainable management, operation, and maintenance of the proposed project	Central government organizations Local government organization Private sectors (artisanal fishermen, processors and traders) Mutual fund	To improve credit system	To improve administration and monitoring equipment
			To enhance fish marketing information system	To improve administration and monitoring equipment
			To strengthen sanitary and environmental control system	To improve education and training facilities and equipment To improve administration and monitoring equipment
			To establish administration system of the proposed projects	To improve education and training facilities and equipment To improve administration and monitoring equipment

Table II.6-3 Summary of Project Cost of the Four Zones

Facilities & Equipment	Unit: FCFA			
	Zone 1	Zone 2	Zone 3	Zone 4
SP1-1 Navigation lights/sign, safety gear, office	46,292,000	44,000,000	7,333,000	33,000,000
SP1-2 Model boat/gear	451,458,000	376,979,000	48,125,000	-
SP1-3 Fishing Gear Storage	343,750,000	171,875,000	24,750,000	58,667,000
SP1-4 Workshop & Equipment	208,542,000	155,833,000	54,083,000	-
SP1-5 Ship-building yard	75,625,000	61,875,000	-	-
SP1-6 Service Apron	412,500,000	206,250,000	-	-
SP1-7 Service Facilities for Riverside	183,333,000	0	-	-
SP1-8 Research Post	80,208,000	80,208,000	-	-
SP1-9 Sanitation facilities / equipment related to production	146,667,000	146,667,000	36,667,000	-
SP2-1 Market Hall, Truck Berth, & Office	1,450,625,000	1,026,667,000	-	-
SP2-2 Ice Plant & Cold Storage	462,229,000	233,063,000	-	-
SP2-3 Fish Collection Depot	178,750,000	0	-	-
SP2-4 Storage for Processed Fish	43,542,000	34,375,000	-	-
SP2-5 Sanitation facilities / equipment related to marketing	358,875,000	180,125,000	-	-
SP3-1 Model Artisanal Processing Area	45,833,000	643,958,000	-	-
SP3-2 Export Promotion Services	148,958,000	93,958,000	-	-
SP3-3 Quality Control Laboratory & Equipment	68,750,000	43,542,000	-	-
SP3-4 Sanitation facilities / equipment related to processing	917,000	116,417,000	-	-
SP4-1 Facilities / equipment for Retail Market	27,500,000	96,250,000	-	-
SP4-2 Basic infrastructure/services				
For Community	165,917,000	165,917,000	-	-
For Complex	237,417,000	699,188,000	-	27,500,000
SP5 General Education & Training Facilities & Equipment	248,417,000	145,292,000	73,792,000	-
SP6 Administration & monitoring equipment	476,758,000	328,900,000	31,213,000	-
SP7 Miscellaneous Support Facilities & Equipment	732,417,000	577,958,000	33,917,000	-
Cost of Project	6,595,280,000	5,629,297,000	309,880,000	119,167,000

Chapter III
FEASIBILITY STUDY

1. SAINT LOUIS PROJECT

III. FEASIBILITY STUDY

1. Saint Louis Project

1.1 Sector 1: Fish Resources and Production

1.1.1 Projection

(1) Projection of Fish Production in the Study Area

Basic consideration

Fishery production is influenced and restricted by the abundance of resources. In this study, two scenarios in the production target for each group of fishes were determined on the basis of the exploitability of the resources available; the first scenario considered the available resources, and the second scenario is based on the increase fishermen population (Table III.1.1-1). The following assumptions were used in the projection of fish production.

- 1) Base value (1995): The figures of fisheries data of 1995 according to the Annual Fisheries Statistics of DOPM were used as base values.
- 2) Sardinella group: Exploitation of the resource has reached near to the maximum level. The production is projected to be 25,000 tons based on the highest production in the past (1993), because a long-term assessment is difficult due to the great fluctuations of biomass in pelagic group which are influenced by oceanographic and meteorological conditions.
- 3) High-price fish group

Case 1 - The resources are in a state of full or over exploitation. Hence, the production will remain at a level similar to that in 1995, assuming no resources management measures are taken. The projected production for 2010 will be 6,035 tons.

Case 2: Fishing ground will be expanded beyond the present fishing ground limit of 20 nautical mile. Within the 20 nautical mile line, the production will maintain at the current level together with resource management. Off Saint Louis, there is a vast stretch of fishing grounds of 60-100 m in depth outside the 20 nautical mile line. Exploitation of the resources in this zone is possible to a certain level, since fishing pressure has been comparatively low as one-day fishing trip to this zone is impossible.

Based on these observations, it is estimated that 10 percent of the base value will be produced in the zone; the total production in 2010 is projected at 6,600 tons.

4) Other fish group

Case 1: In the case of the other fish group, if no improvement is achieved in productivity and profitability, fishing efforts will not increase. Production of this group as a by-catch in other fisheries will not also increase. Therefore, the projected production will remain at the base value.

Case 2: Among the coastal demersal fish species, some are considered to have potential for further exploitation. In the case where improvement is achieved in productivity and profitability, fishing efforts will increase. The resources are expected to allow an increase of 20 percent of base value, therefore, the production in 2010 is estimated at 9,500 tons.

Comparison of projection of fish production by case

	Unit : Tons		
	Base value	Case 1	Case 2
1) Sardinelle group	23,714	25,000	25,000
2) High-price fish group	6,035	6,035	6,600
3) Other fish group	8,203	8,203	9,500
Total	37,952	39,238	41,100

Projection of fish production in case 2 (adopted by project)

	Unit: Tons			
	Base value	2000	2005	2010
1) Sardinelle group	23,714	25,000	25,000	25,000
2) High-price fish group	6,035	6,218	6,407	6,600
3) Other fish group	8,203	8,617	9,052	9,500
Total	37,952	39,835	40,459	41,100

(2) Projection of Number of Fishing Boats

1) Purse seine boat

The projected production in 2010 is an increase of only about 10 percent of the present level. Based on the present figure of productivity in the purse seine fishery of 504 ton/unit/year, the number of purse seine boats in 2010 is projected to be 49 pairs (98 boats) which is an increase by two pairs from the present figure.

2) Daily fishing boat (line and gillnet)

For day fishing of high-price fish, fishery management will be strengthened and the number of boats will be maintained at the present level, in order to conserve the resources and protect the profitability of the fishery.

In order to attain the projected production target of 1,300 tons for the other fish group, the number of fishing boats should be increased. This increase will be

achieved by the increase of gillnet fishing boats. The average income of the gillnet fishery is currently FCFA 6.9 million/boat/year, which is an equivalent of about 53 tons of fish in the other fish group. However, a considerable portion of the catch of these boats is composed of high-price fish, and hence the actual catch is much less than 53 tons. The improvement of the productivity through the modernization of fishing boats is necessary to maintain the 53-ton level mainly for fishes of the other fish group. In order for the fishing boats to achieve this level of catch, an increase of 25 gillnet fishing boats is necessary to attain the production target.

3) Long-distance fishing boat (line fishing)

The number of fishing boats necessary to attain the projected production increase of 600 tons is estimated as follows. The productivity of this fishery is assumed to be 15 tons/unit/year, which is a break even point of long distance fishing boats based on the production data of Missirah Project. In 1996, the boats of Missirah project produced 20 tons/unit/year mainly in Guinean water. Considering the differences of the fishing ground in Saint Louis project and that of the Missirah project, break even point of modernized long distance boat is used. Consequently, about 40 modernized line fishing boats should be increased.

Projection of number of fishing boat in case 2 (adopted by project)

	Base value	2000	2005	2010
1) Purse seine boats	94	96	97	98
2) Line fishing boats	600	600	600	600
3) Gillnet fishing boats	462	470	478	487
4) Long distance fishing boats	-	12	25	40
Total	1,156	1,181	1,198	1,215

Projection of number of fishermen in case 2 (adopted by project)

	Base value	2000	2005	2010
1) Purse seine boats	1,880	1,920	1,940	1,960
2) Line fishing boats	1,800	1,800	1,800	1,800
3) Gillnet fishing boats	2,310	2,350	2,390	2,435
4) Long distance fishing boats	-	225	345	450
Total	5,990	6,295	6,475	6,645

1.1.2 Development Goals and Concept

(1) Development Goals

The development goals are to:

- Increase fish production through the introduction of a system for effective resources management and modernized fishing technologies;
- Improve safety conditions of fishermen at the fish landing points
- Transfer landing activities from the current sites to the proposed fishing complex.

(2) Development Concepts

Fishing Modernization

Gradual modernization of fishing technologies will be applied for fisheries development in Saint Louis. Initial investment for short term target year should be at a level of pilot scale.

- a. Coastal fishing (within 20 nautical miles from Saint Louis): to maintain the existing level of production for high-price fish group through introduction of efficient fishing technologies considering resources protection. Increase of production will focus on the groups of some other fish species.
- b. Off-shore fishing (outside of 20 nautical miles) : to develop offshore fishing through the introduction of modernized fishing boats, engines and gears.

Safety control

Safety control service will be attractive measure for the fishermen to use the fisheries complex. Security conditions will be improved by training, strengthening of the PSPS function and fishermen's support infrastructure such as lighthouse.

Fishermen support facilities

Workshop, fishing gears and shipyard will contribute to the centralization of fish landing activities from the existing landing sites to the complex in the short term. These facilities and equipment will serve the selected fishermen who have a willingness and good experience in fishing.

1.1.3 Fish Resource Management

Resources management will focus on two principal functions, research and control and monitoring. It is important to consider carefully the inter-relationship between these functions, and also to establish trust and cooperation with fishermen's leaders and organization to promote-community based rational management.

(1) Research Post

The project will strengthen CRODT's research ability in the project area, in order to assess and monitor the impact of modernized fisheries on fishery resources. A research post will be provided as a front-line station for northern Senegalese waters. Research will focus on the exploratory surveys of the coastal demersal fish stock in the area

The research post will be managed by CRODT, staffed with fish resources specialists, and be authorized for implementing the stock assessment program. Its activities should be coordinated through proper liaison (sector manager of Fisheries Complex) between CRODT and Fisheries Complex/DOPM. The expected functions of the research post are summarized below.

- Undertake effective catch monitoring/evaluation, (coastal stock assessment)
- Produce reliable fisheries data base/information
- Enforce CRODT programs (resources, socio-economy ocean-environment)

(2) DOPM

For effective resources management, improvement of data base of fishermen, fishing boat registration and fish landing is an urgent issue. The minimum equipment such as computer and software, and staff training on fishery statistics will be required in the project. The first priority for data base will be given for the line fishing and sole gillnet fishing which exploit high-price fish resources, i.e. dorade, pageot, sole, thiof etc. within the 20 nautical miles zone.

(3) Fishing Control and Monitoring

The objective of this function is to introduce a system for appropriate self-management of resources. "Community management" should involve collective responsibility as well as creation of some forms of regulation of fishing activities such as a system of individual fishing quotas arrangement such as already introduced in Kayar. The project will promote community management through establishing a "community management guideline" and training of fishermen's leader and staff.

Summary of project facility and equipment

Item/purpose	Quantity	Location
Office & wet laboratory	1	CRODT
- Strengthening of CRODT	300m ²	
Motor cycle	4	CRODT
- Strengthening of monitoring/control surveillance		
Computer & software	2	CRODT/DOPM
- Research & data base		
Laboratory equipment	Various	CRODT
- Stock assessment		
Oceanographic equipment	Various	CRODT
- Stock assessment		

1.1.4 Fish Production

The main constraint of this sector is the limitation of production potential in the coastal zone, despite the rapid increase of fish demand caused by the population increase. There may be a need for some limitation of fishing effort in this zone in the near future, in order to maintain sustainable productivity. In the project, fisheries with exploitable resources potentials will be considered for artisanal fishermen, that is fishing of some other fish group in the offshore and coastal waters.

Priority will be on modernizing line and gillnet fishing. An expansion of purse seine is not a core component of the project because further development of purse seine fishing in offshore zone largely depends on industrialization of the boat and its market price. It is considered that industrialization is still too drastic a measure in terms of changes of boat and techniques, and poor existing fishing infrastructure. However, experimental operations and feasibility studies of industrialized boat should be undertaken in the project using demonstration boat.

The past experience in the modernization project indicates the importance of the institutional development of the implementation body as well as effective training of fishermen. In the project, modern equipment newly introduced will be provided for fishermen after selection of the model fishermen for fisheries modernization through evaluation of training result. Equipment will also be provided to fishermen for on-the-job training and under lease contract to ensure the sustainable operation and management.

(1) Modernization of Coastal Fisheries (existing fishing zone)

Production increase of other fish group

The proposed project will take initiatives to increase production of other fish (including some high-price fish) in Saint Louis by 1,300 tons in the year 2010. Increase of production will be in brotula, cuttlefish, sharks, rays etc. through the enhancement of mainly gillnet fishery.

The project will promote efficient operation by introduction of modern equipment, such as echo-sounder, Global Positioning System (GPS) which contribute to locate good fishing ground, and increase the fishing effort per boat. These equipment and some training services will be prepared for 25 fishing boat which is the minimum number to attain the target production at 2010. In the initial stage, experimental fishing is required to decide fishing gear design and fishing operation schedule for fishermen to realize the economically optimum combination of the target species among the low-price other fish and high-price fish, especially cuttle fish which allows further exploitation. Information about fishing grounds and water

currents gathered by the experimental fishing undertaken by project will be available to the fishermen.

Improvement of productivity

Not much production increase of high price fish is expected in this zone. The modernization is regarded as a tool for promoting organization of fishermen to transfer technologies to fishermen on resources management, safety control, marketing, credit, etc. as well as a tool for production enhancement. Introduction of modern equipment such as echo-sounder, compass and GPS will increase productivity through strengthening fishing operation and reducing fish searching time. The present active operational hour of day fishing is expected to expand from 5 hours to 6 hours.

In the project, echo-sounders, compasses and GPSs will be provided under lease for the existing traditional boats. Project will also procure these items through CAEP, and they will be sold to groups of fishermen who can obtain credit under the project. The project will provide 50 echo-sounders and compasses and 10 GPS as experimental basis. This equipment will account for 5 percent of target number in 2010.

(2) Modernization of Offshore Fishing (expanded fishing zone)

The proposed project will take initiatives to increase high-price fish production in Saint Louis by 600 tons, or about 10% of the present production, by the year 2010. Increase of production will be made through the long distance line and gillnet fisheries. This anticipated incremental fish production is based on following the measures.

Increase of fishing effort of traditional boats

Introduction of modern equipment such as echo-sounder, compass and GPS would increase productivity as a result of strengthening of operation and reduction of fish searching time.

Additional long distance fishing boat

The project will introduce fully equipped Senegalese-type FRP canoe, 18m in length, powered with an inboard diesel engine of 45 HP. Such boats have been proven to be economical, particularly in fuel consumption, in the Missirah Project. Better stability of FRP boat will also allow the fishermen to considerably increase the number of fishing days. Ten improved new boats, accounting for 15% of the target number at 2010 will be provided.

Introduction of fishing boats locally constructed and/or imported from adjacent countries

The mid-term aim of the project is the replacement of the existing boats equipped with out-board gasoline engines with boats installed with inboard diesel engines. The new boats can be produced in Senegal and/or neighboring African countries, in view of the existence of two private firms in Dakar and several in Mauritania supplying FRP and aluminum boats. Structures and design of boats and economic performance should be evaluated during the initial two years of the project through technical cooperation of foreign experts.

(3) Demonstration Vessel

Provision of demonstration vessel will greatly expedite artisanal fisheries development, through conducting the following activities:

- Establishing and developing modern technology for artisanal fisheries on the northern coast and promoting the spread of proven economical technology. Example: light fishing, long line, deep sea fishing, purse seine, trammel net, etc.
- Developing new fishing grounds and drawing fishing ground maps especially in off-shore zone.
- Training artisanal fishermen in the operation of semi-industrial boat
- Training artisanal fishermen in safety control

Summary of fish production facility and equipment

Item	Quantity	Location
1) Demonstration vessel (fully equipped). - Inboard engine, FRP, Japanese type, gillnet, line, purse seine - For training & experimental operation	1	Fishery complex
2) Fishing boat, inboard engine, Senegalese type, equipped with gear & echo-sounder, GPS - For OJT and rental to fishermen	10	Model-fishermen
3) Echo-sounder/compass - For OJT and rental to fishermen	50	-ditto-
4) Global Positioning System (GPS) - For OJT and rental to fishermen	10	-ditto-

1.1.5 Fisheries Support Facility

(1) Fishing Gear Storage

The main equipment to be stored is the out-board engine. At present only some fuel stations and workshops provide spaces to store out-board engines, 5-20 sets in each places. However, these places do not satisfy fishermen's requirements for security against theft and fire as well as for space. A storage should be provided in the fishery complex near the landing place to store engines, nets and other tools

with a net repair space beside the storage. Storage space should be provided for all purse seine fishing units, because all the catches by purse seine fishery will be landed at the fisheries complex, and for about 10 percent of the total units of line and gillnet fisheries. The storage should contain 50 large-size compartments (12m² each) to provide each of 50 purse seine fishing units with a space to store two engines and purse seine net, and 100 small-size compartment (6m² each) for other fishing units.

(2) Boatyard

Boatyard for repairing, overhauling and constructing new fishing boats are indispensable facilities for the sound implementation of the project. Boatyard will provide the following services.

- Maintenance of boats and engines
- Studies of the structure of long distance fishing boats.
- Training and demonstration for local boat builder in modern boat building technology
- Safety inspection of fishing boat

(3) Fuel Station

Introduction of in-board engine will not be successful without providing easy access to tax free diesel fuel, which is available at present only in Dakar. Once the fisheries complex comes into operation, the complex will be required to transport diesel fuel from Dakar and supply it for fishermen. The sales of the fuel will be done by private fuel stations, for which the project should provide land spaces. Considering the expected increase in number of long-distance fishing boats and the expected transfer of landing function for purse seine fishery from the existing landing places to fisheries complex, it is anticipated that 524,000 liters of diesel fuel is annually required at fisheries complex together with 3,600,000 liters of gasoline

Summary of fisheries support facility and equipment

Item	Quantity	Location
1) Service apron	1	Fisheries Complex (FC)
2) Office and workshop, including tools and spare parts for inboard engine	1	
3) Private workshop	3	
4) Fishing gear storage		FC
- Large (3x4m) for purse seine fishermen	L:50	
- Small 2x3m) for others	S:100	
5) Fuel station	2	FC
- Only space for private fuel station		
6) Slipway and boatyard	1	FC
- For large and project boat on river bank		
- 3 private boat builder's space		
7) Multi-purpose space	1,000m ²	FC
- Maintenance of net & fishing gears		

1.1.6 Safety Control

Safety control is one of the most important issues for fishermen in the northern coast. The primary constraints are lack of facilities for safe landing/launching operation at the shore, and lack of sufficient skill, equipment and public services. In order to solve these problems, the following countermeasures are considered in the project:

Strengthening government institutional capacities and services

- Study and research on the causes of accidents, and secure boats,
- Communication and information services, i.e. weather information, and VHF radio center,
- Extension/demonstration of safety technology.

Improvement of accessibility to safety equipment

- Effective credit system to obtain equipment at reasonable price,
- Enhancement of purchase chance for safety equipment at landing site such as, lifejacket, tool box, extra engine, first aid, compass, VHF, reflection plate on the boat, luminated buoy of gillnet, signal light.

Security training for fishermen

- On safe operation, reasonable number of crew and permissible heavy load
- On maintenance and inspection of boats and engines

The project will provide a lighting system at the fisheries complex for safe landing of boats at night. Capacity building of PSPS should be promoted for the information services by improvement of facility/equipment as well as by staff training. Support to fishermen will put emphasis on essential safe operation and OJT will be conducted for model fishermen who will be provided with essential safety equipment on board.

Summary of safety control facility and equipment

Item	Quantity	Location
1) Office and communication equipment - Strengthening of PSPS, (existing equipment to be used)	1 200m ²	Fisheries Complex (FC) (PSPS)
2) Light house	3	FC & 2 collection depots(Saint Louis)
3) Search light, speaker	3	FC & 2 collection depots(Saint Louis)
4) Life jacket/essential equipment - For training and fixed to project boat	100	Project boat FC

1.1.7 Training and Technical Assistance

(1) Proposed Training Program for Project Staff

The first priority over the short-term will be focused on orientation training on the management of the new activities to be undertaken in the project. Manager and head of sub-sector will be trained on the role, responsibility and rationale of the project. It will be supplemented with study tours to international fisheries institution and countries that have successful fisheries development program.

Technical training for the staff on the five courses particularly on modern equipment and technology would need to be upgraded, preferably at the local training institution (Table III.1.1-3). However, CAEP has not been able to institutionalize in-service training programs to keep up with new fishing technologies. This may require the training by national and foreign technical assistance and provision of essential equipment to fishery complex. The staff training would be essentially completed by the 2nd year of the project implementation in each site. Various manuals, on fishing operation, data collection, etc. would be in place by the end of training.

The technical assistance provision includes, fisheries technology (24 month), Ship captain (12 month), fisheries mechanics (12 month), shipbuilding (6 month), resources management (12 month). Fisheries technology expert will be responsible for organizing fishermen and their OJT training on modern technology and equipment. Ship captain expert will assist to operate the demonstration ship, fisheries mechanics expert will conduct the workshop and assist mechanics in upgrading technologies for diesel engine and other new equipment.

(2) Private Professionals - Model Fishermen's Organization

The project will take initiative to form model fishermen's organization. Then on the job training will be conducted to strengthen this organization, that is on resources management, fishing technology, fish handling and marketing and safety control (Table III.1.1-3). The opportunity of using modern equipment that is rented by the project will be strong incentives for fishermen to promote organization. The member comprising the leader and crew would be selected through education and training for the fishing mobilization. Lecture and seminar training will be accessible to all interested fishermen. Project should also assist in educating fishermen on financial skill and applying for credit as well as fishing technologies through the daily extension work.

1.1.8 Institution and Organization

(1) Staffing

1) Fisheries Complex (autonomous body)

Title	Qualification	Number		Task/Role	Source
		ES	W/P		
Professional staff					
- Chief of division	B.Sc.	0	1	- Coordination	DOPM
- Extension staff	B.Sc.	0	1	- Modernization of fishing and safety control	DOPM
- Mechanic	Fishery school	0	1	- Work shop	CAEP
- Boat building technician	Fishery school	0	1	- Boatyard	CAEP
Support staff					
Boat crew		0	3	- Demonstration boat	Contract
Watchmen		0	2	- Workshop and shipyard	
Total		0	9		

2) DOPM

Professional Staff					
- Regional director	B.Sc.	1	1		DOPM
- Technical staff	fishery school	2			
Total		3	1		

3) CAEP

Professional staff					
- Mechanics	fishery school	1	0		
- Accountant		1	1		
- Store keeper	fishery school	1	1	sales of spare parts & equipment	
Total		3	2		

4) PSFS

professional staff					
- Technical staff	fishery school	3	3		
Total		3	3		

Remarks : ES = Existing staff, and W/P = with the project

Title	Qualification	Number		Task/Role	Source
		ES	W/P		
5) CRODT					
<u>Professional staff</u>					
- Researcher	B.Sc.		1		CRODT new
- Assistant researcher	B.Sc.		1		CRODT new
<u>Support Staff</u>					
- Interviewer	Secondary	2	2		
- Assistant	school	2	2		
Total			4	6	
Remarks : ES = Existing staff, and W/P = with the project					

(2) Technical assistance: Saint Louis

Title	Duration	TOR/technology transfer
1) Fisheries technology	24MM	Management of project fishing activity, develop new tech. to be adopted locally, organize fishers. - Management guideline & staff training manual
2) Boat captain	12MM	Operation & maintenance of demonstration ship and shipyard. - Operation manual
3) Resources management	6MM	Community management guideline
4) Boat building	12MM	Building prototype improved boat
5) Engine mechanics	12MM	Repairmen and maintenance of diesel engine - Operation manual
Remarks : MM = Man-months		

Table III.1.1-1 Projection of Fishermen Population and Fish Production

1. Population and Fishing Boat

Year	1995			2010		
	Tradition	New Devel.	Total	Tradition	New Devel.	Total
1.1 Total Population	34,000	800	34,800	39,293	8,000	47,293
- Resident	21,204	800	22,220	21,204	8,000	29,204
- Migrant	12,796	-	12,580	12,796	-	12,796
- Resettlement	-	-	-	5,293	-	5,293

1.2 Number of Fishermen (active)

- Resident	9,605	-	9,605	11,100	2,260	13,360
- Migrant	5,990	-	5,990	5,990	2,260	8,250
- Resettlement	3,615	-	3,615	5,110	-	5,110

Fishermen by type of boat (SL landing)

Line	No. of fishermen/boat			Ratio of fishermen by boat category		
Line	1,800	-	1,800	1,800	679	2,479
Gill net	2,310	-	2,310	2,310	872	3,182
Purse seine	1,880	-	1,880	1,880	709	2,589
Total	5,990	-	5,990	5,990	2,260	8,250

Fishermen by type of boat (Migrant and settlement)

Line	No. of fishermen/boat			Ratio of fishermen by boat category		
Line	1,425	-	1,425	2,014	-	2,014
Gill net	1,510	-	1,510	2,135	-	2,135
Purse seine	680	-	680	961	-	961
Total	3,615	-	3,615	5,110	-	5,110

1.3 No. of wholesalers	70	-	70	70	27	97
-------------------------------	-----------	----------	-----------	-----------	-----------	-----------

1.4 No. of processor	1,000	25	1,025	1,150	250	1,400
-----------------------------	--------------	-----------	--------------	--------------	------------	--------------

1.5 No. of fishing boats

(1) Total No. of boats						
Saint Louis landing	1,156	-	1,156	1,156	436	1,592
Migrant	811	(10)	811	811	-	811
Total	1,967	-	1,967	1,967	436	2,403

(2) Saint Louis landing

Line	600	(10)	600	600	226	826
Gill net	462	-	462	462	174	636
Purse seine	94	-	94	94	35	129
Total	1,156	-	1,156	1,156	435	1,591

(3) Migrant and resettlement

Line	475	-	475	671	-	671
Gill net	302	-	302	427	-	427
Purse seine	34	-	34	48	-	48
Total	811	-	811	1,146	-	1,146

2. Fish Landing

Sarnelles	23,714	-	23,714	23,714	8,947	32,661
High-priced fish	6,035	-	6,035	6,035	2,277	8,312
Other fish	8,203	-	8,203	8,203	3,095	11,298
Total	37,952	-	37,952	37,952	14,319	52,271

Source : Resultats Generaux de la Pêche Maritime Senegalaise, DOPM, 1995

Table III.1.1-2 Revenue and Expenditure of Modernized Boat

(1) Revenue and expenditure

Unit : FCFA 1000/year

Modernized Boat (18 m)	
1. Revenue	31,732
2. Expenditure	11,334
a. Operation cost	7,484
b. Maintenance cost	1,650
c. Interest	
d. Depreciation	2,200
3. Net income	20,398
4. Income before depreciation	22,598

(2) Operation cost

Unit : FCFA 1000/year

Modernized Boat (18 m)	
1. Fuel	1,919
2. Ice	1,898
3. Others (bait, food, etc)	3,667
Total	7,484

Remarks : Fuel consumption = 17,870 liters
Ice consumption = 79 tons

(3) Fishing operation conditions

Modernized Boat (18 m)	
1. Number of fishermen per boat	14
2. Number of trips per year	18
3. Fish catch per year (tons/year)	21.6
4. Unit price of the catch (FCFA/kg)	1500
Total	53.6

(4) Investment and depreciation

Unit : FCFA 1000/year

Modernized Boat (18 m)	
1. Investment	
Fully equipped boat	33,000
2. Life span (years)	
Fully equipped boat	15
3. Depreciation	2,200

(5) Profit of fishermen and boat owner

Unit : FCFA 1000/year/person

Modernized Boat (18 m)	
1. Fisherman	1,250
2. Boat owner	
Net profit	5,248
Profit before depreciation	7,448

Remarks :

Profit of traditional boat fishermen FCFA 738,000 - 1,099,000 a year
and boat owner, FCFA 345,000 - 474,000 a year.

Table III.1.1-3 Summary of Project Training Courses and Equipment

1) Project staff

Name of course	Contents	Target/Beneficiaries	Period/frequency	Instructor	Type of training	Equipment/material
Orientation training	Role and responsibility planing, evaluation	Sector manager, head of sub-sector	3 days	DOPM	Lecture	Guideline
Fisheries information	Methodology of data collection	Interviewers of DOPM,CRODT	1 week 2 times a year	DOPM,CRODT staff in Dakar	Study tour Lecture at Dakar H/O	Data collection manual
Stock assessment/Monitoring control survey	Stock assessment	CRODT researcher	1 month	Training in the institutions in abroad		
Boat operation	Boat operation and new fishing technology	Crews of experimental boat	-	Fishing technology expert	OJT technical assistant	Experimental boat
Mechanics	New technology, inboard engine	CAEP mechanics	1 month	Training by maker and provider. OJT/mechanical expert of tech. assist.		tools and spare parts
Fishermen's organization	How to organize fishermen and its management	Extension worker	1 month	Training in African project which has advantage in the sector. OJT/market expert of technical assistant.		Class room
2) Private professionals course						
Fish resource management	Fishing regulation		1 day / month	DOPM staff	Lecture	Class room AV.
Modern fishing technology	Use and maintenance of modern fishing equipment	To be a member of modernization project, leader of the boats are required to take a series of training course.	3 days / month	Fishing technol. expert / CAEP mechanics	Lecture & OJT	Class room Experimental engine & boat
Fish handling	Prevention of quality loss	About 100 leaders. + All fishermen with motivation.	1 day / month	Fish marketing expert	Lecture & OJT	Improved fish box
Fishermen's organization	Establishment of fisherman's association and its management.		1 day / month	Fish marketing expert	Lecture & OJT	
Security control	Boat operation, rescue		1day / month	Fish.tech.expert	Lecture	
New market regulation	Sales of fish at FC		1day / month	Extension worker		
Mechanics	Repairing of new type of engine	Private mechanics		CEAP mechanics	OJT	Workshop tools

1.2 Sector 2 Fish Marketing and Distribution

1.2.1 Existing Conditions and Future Prospects

(1) Landing and Marketing Condition

Currently there is no complex or marketing facilities catering for the fish landed in Saint Louis. Under the traditional landing and marketing system, fish is landed along the 3 km beach; from landing, negotiation and purchasing conducted on the beach. The fish transferred to trucks and collection points by human carriers and horse carts. Icing, packing and loading on to trucks are conducted in a narrow, crowded and congested area (decentralized manner). The whole process takes place in a very congested and unhygienic conditions without any marketing facilities. Wholesalers wait for the arrival of boats along the 3 km beach from early morning to evening. Fish trucks wait along the public roads causing nuisance to the public.

The fish marketing pattern and distribution volume of Saint Louis in 1995 is shown in Fig. III.1.2-1 and Fig. III.1.2-2, where a total volume of 37,952 tons of fish were landed by 5,990 fishermen, and marketed by 70 wholesalers and unknown number of micro-wholesalers in the traditional village (Guet Ndar and Gokhou Mbathe). There were also 1,150 artisanal processors.

As explained in section II.2.3.4 on the fish marketing information system, formal fish marketing information system do not exist in the study area or nationwide, except for the DOPM's data gathering by the regional centers for statistical purposes. However, an informal exchange of information on the fish landing volume and fish prices of certain fish species exist between wholesalers in the production area and wholesalers and intermediaries of fish processors in the consumption area. Fishermen do not have access to marketing information from public agencies except from professionals.

Under these circumstances, there is a need to centralize the marketing activities (i.e. from landing to marketing in the production area) through the establishment of the marketing facilities such as market hall, ice plant and cold storage, truck berth, etc. Marketing regulations need to be introduced for smooth operation and management and use of the facilities and equipment. Further fish marketing information system need to be introduced to achieve a modernized fish production and distribution system, to attain free competition among fishermen, wholesalers and consumers.

(2) Ice Demand and Supply

An estimation of the supply and demand of ice in Saint Louis was done in this survey as shown in Table III.1.2-1. There are four existing ice plants (all are block ice

except one built this year for a plate ice) with an installed capacity of about 70 tons per day (tpd); the annual average operational capacity is about 67 percent (or 47 tpd). Approximately 95 percent of the ice produced in Saint Louis is used for fisheries and the rest is used for bakery, restaurants and households.

The estimated total ice demand was about 77 tpd in 1995 (24 tpd for gill net and line fishing and 53 tpd for marketing) at ice fish ratio of 1:0.5. The existing ice plants produced about 47 tpd, and there was a shortfall of about 30 tpd, which was covered by supply from Dakar, Touba and Louga. With the incremental fish production envisaged under the project by the year 2010, the demand of ice is expected to increase to 106 tpd (33 tpd for gill net and line fishing and 73 tpd for marketing). As of now there is no plan for installation of new ice plant by the private sector except the new plate ice plant which is expected to expand its capacity to another 10 tpd. Therefore, the installed capacity is expected to increase to 80 tpd and the operational capacity is assumed to be 67 percent. The ice production in 2010 is projected to be about 54 tpd and the supply from other regions is assumed to be 30 tpd, and the ice deficit is about 22 tpd.

The general complaint by the fishermen and wholesalers during the workshop and field survey was that the supply of ice is unstable and not available when they are in need of ice. The unstable supply of ice is attributed to simple economics; that is the price of ice during lean season may decrease because of low demand while the production cost may slightly increase because of low operational ratio of ice plants, and the price may increase because of high demand while the production cost may decrease during glut season. The private ice manufacturers may regulate the production of ice and this may be the cause of unstable supply of ice.

The factory gate price of ice to ice wholesalers is FCFA 600 a block (25 kg), and the selling price to fishermen varies from FCFA 800 to FCFA 1000 a block during lean season and glut season, respectively. The fishermen has to pay high price because of price control by the existing ice marketing system.

An ice plant of 25 tpd could be desirable to make up for the shortfall in order to provide stable supply of ice to target beneficiaries (fishermen and wholesalers).

(3) Storage of Fish

Fresh fish storage

There are two cycles of landing in a day by gill net and line fishing boats, which land mainly the high priced fish and other fish (by catch). Some boats land in the morning hours and some in the late afternoon. The high priced fish landed in the morning hours are purchased by wholesalers and in the meantime the fish are kept in boxes with ice in their houses or on road sides till the arrival of trucks in Dakar in the

afternoon. As a result there are some quality loss due to non-availability of proper storage facilities. Fresh fish storage of about 20 tons capacity could be considered for the benefit of the wholesalers.

Frozen fish storage

Frozen fish processing is extremely limited in Saint Louis. Limited quantities are processed by a private company, Delta Plus, for the European market. Currently in Senegal, the frozen fish destined for export are mainly caught and frozen by industrial fishing boats and exported from Dakar. In Saint Louis freezing of fish is not considered because of low demand for frozen produced in Saint Louis, the cost and limited quantities.

1.2.2 Sector Plan

(1) Development Goals and Concept

Development goals

The development goals are to:

- Centralize the currently scattered wholesale activities along the 3 km beach Guet Ndar & Gokhou Mbathie by establishing the proposed new complex in the Hydrobase area and the collection point in the traditional area (Guet Ndar & Gokhou Mbathie)
- Establish suitable price mechanism
- Increase fish supply to Dakar, interior area and for export

Development concept

Under the traditional landing and marketing system, fish is landed along the 3 km beach; from landing, purchasing, transferring to trucks, icing and loading on to trucks are conducted in a narrow, crowded and congested area (decentralized manner). Wholesalers and assemblers wait for the arrival of boats along the 3 km beach. Truck wait along the public roads causing nuisance to the public.

With the incremental production in the year 2010, the fish landing and marketing pattern without the project is shown in Fig. III.1.2-3 and Fig. III.1.2-4. It is envisaged there will be two landing sites, the existing traditional village (Guet Ndar and Gokhou Mbathie) and the newly developing village in Hydrobase. Without the project there will be further congestion and chaos in the landing and marketing activities.

The development concept is to centralize the marketing activities (i.e. from landing to marketing in the production area) through the establishment of the proposed components in the newly developing village (Hydrobase) and collection

points in the traditional area (Guet Ndar & Gokhou Mbathie) as shown in Fig. III.1.2-5. All sales transaction are proposed to take place under one roof in the new complex except for some quantity of other fish (by catch) landed in Guet Ndar & Gokhou Mbathie. High priced fish collected in Guet Ndar & Gokhou Mbathie will be transferred by the fishermen using the multipurpose truck provided in the project (charged at a nominal fee) to the proposed complex with market hall in Hydrobase.

Fish marketing information system will be introduced on a short term basis as shown in Fig. III.1.2-6, and on a long term basis as shown in Fig. III.1.2-7. Currently, the informal flow information among wholesalers exist without any access to fishermen and DOPM's data collection is mainly for statistical purpose. With the project there will be daily collection, compiling and transmission of data between production and consumption areas for the benefit of fishermen, wholesalers and consumers.

Regulated marketing system will be introduced through implementation of marketing regulations, and also the management and use of the facilities and equipment will be implemented by the fishermen and wholesalers through formation of associations. In this regard education and training programs are also envisaged.

(2) Facilities and Equipment

The project facilities and equipment proposed are as follows for the newly proposed complex in Hydrobase, and collection points in Guet Ndar and Gokhou Mbathie.

The objectives are to:

- Locate in the newly developed village in Hydrobase
- Locate the collection points in Guet Ndar and Gokhou Mbathie
- Centralize landing and marketing activities
- Ease congestion in the traditional area (Guet Ndar and Gokhou Mbathie)

The complex is expected to handle an estimated quantity of 44,093 tons in the year 2010; the daily handling quantity is about 147 tons which comprises 109 tons of sardines, 28 tons of high price fish and 10 tons of other fish. The collection depots are expected to handle an estimated quantity of 6,035 tons a year of high priced fish (or about 20 tons a day); these collected fish are to be transferred to the complex at Hydrobase using the multipurpose truck. The project will contain the following facilities and equipment.

Fishery complex

- 1) Market hall
- 2) Ice plant
- 3) Ice & fish storage
- 4) Quality control & inspection room
- 5) Wholesalers room
- 6) Storage area for processed fish
- 7) Truck berth
- 8) Fish marketing information system

Collection point

- 9) Collection shed
- 10) Ice storage (Guet Ndar and Gokhou Mbathie)

- 1) Market hall

Objective

The objective are to:

- Centralize marketing in an orderly manner
- Transact sales of fish between fishermen and wholesalers under one roof

Capacity

The study area is expected to handle 147 tons of fish a day and it will be used for receiving the landed fish, sorting, icing, packing and loading on to trucks. The following assumptions are used in the estimation of space.

- Daily about 82 tons of fresh fish will pass through the market hall
- About 50% of sardine landed will be directly loaded to trucks from landing
- About 41 tons will be landed in the morning hours
- About 14 tons of fish will be utilized for artisanal processing area

Staffing

Required staff will be a total of three; market hall manager or supervisor two workers.

- 2) Ice plant

Objective

The objective of the ice plant is to provide stable supply of ice.

Capacity

The proposed ice plant is expected to produce 25 tons of block ice. The

assumptions used for the estimation of the demand are as follows (refer table III.1.2.1).

- Ice fish ratio is 1:0.5.
- Purse seine boats (sardine boats) do not carry ice for fishing.
- Gill net and line fishing boats carry ice for fishing.
- Fish allocated for processing do not need ice.
- High priced fish and other fish need ice for marketing.
- Existing four private ice plants are old (except for one new plate ice plant), and are not expected to fully operate even after rehabilitation in future.
- Currently ice is brought from Dakar, Touba and Louga to meet the deficiency of ice (estimated ice brought into St. Louis is about 30 tpd)

The estimated ice demand in 2010 is 110 tons per day (tpd). With the renovation of the existing private ice plants, it is assumed it would produce about 54 tpd; and also the 30 tpd of ice are brought from Dakar. The ice deficit is expected to be about 22 tpd, and the ice plant capacity is based on this deficit, that is 25 tpd capacity.

Staffing

Required staff will be one technician and some workers.

3) Ice and fish storage

Objective

The objectives are to :

- Stock ice in order to have stable supply
- Store temporarily high priced fish and other fish
- Be used primarily by wholesalers

Capacity

The volume of ice storage to be stored is estimated based on two days supply; that is two times the daily production (50 tons of ice). For the storage of high price fish, it is based on the daily landing cycles of gill net and line fishing boats. The estimated landed volume of high price fish in the morning hours is about 15 tons and the departure of this high price fish is in the late evening. Therefore, the fish has to be kept in cold storage to maintain stable quality or reduce quality loss. The fish storage capacity required is about 15 tons. The total ice and fish storage is about 65 tons.

Staffing

Required staff will be two workers to assist in ice sales and fish storage.

4) Wholesalers Room (Traders Room)

Objective

The objectives are to :

- Serve the wholesalers particularly dealing in high priced fish
- Control purchase, storing and meet the order from Dakar

Capacity

- Daily quantity of high priced fish is about 28 tons.
- Handling capacity of a wholesaler is about 3 tons daily.
- Wholesaler room for about 10-15 persons is required.
- Rooms will be equipped with desk, tables and communication facilities.

Staffing

No staff required.

5) Quality inspection room

Objective

The objective is to conduct quality inspection of the fish marketed to Europe

Capacity

Appropriate space and necessary facilities and equipment will be provided.

Staffing

Required staff will be a total of three; one technician and two assistants.

6) Storage space for processed fish

Objective

The objectives are to keep the keep processed fish in sheltered area to prevent contamination of soil, etc. and to prevent from insects, worms, etc.

Capacity

The processed quantity of fish in the year 2010 estimated to be around 8,418 tons or 2,806 tons of product weight; the daily processed quantity is about 9 tons. It is desirable to consider a storage space for one week supply in the complex for the benefits of the processors (users association) and wholesalers in the complex. The required space will be about 63 tons.

Staffing

Required staff will be one worker.

7) Truck berth

Objective

The objectives are to centralize the marketing and transporting, to ease the chaotic parking for trucks in the public area or main roads, and fish trucks are to wait and load fish at designated truck berth.

Capacity

- Estimated daily handling of fresh fish is about 134 tons (67 tons per cycle)
- Estimated loading of a truck is about 4-5 tons
- Number of truck required per cycle is about 15 trucks
- Truck berth space required is for 15 trucks with ample space for maneuvering and waiting trucks.

Staffing

Required staff is one worker.

8) Fish marketing information system

Objective

The objectives are to :

- Collect and compile data/information on landing volume by species, fish flow volume by destination and origin, fish price by species, fish quality and meteorological data in the production (Kayar) and consumption area (Dakar) by regional DOPM offices
- Process the collected and compiled data by autonomous body using a computer for use by the users association in the short term
- Achieve a modernized fish production and distribution system.
- Attain free competition among fishermen, wholesalers, and consumers.
- Provide the marketing information to its beneficiaries by displaying at appropriate places by users association

Capacity

- A computer system with necessary facilities will be provided in the project to process the data in the short term. (refer Fig. III.1.2-6)
- A main frame computer system will be provided and it will be connected to production area computer system to received and transmit data and information in the long term (Fig. III.1.2-7).

Staffing

Required staff will be one person with computer knowledge.

9) Collection sheds (Guet Ndar & Gokhou Mbathie)

Objective

The objectives are to:

- Centralize the collection of high priced fish of line and gill net fishing in the traditional landing area
- Transfer collected high priced fish collected to the new complex by the fishermen association using multiple truck of the project

Capacity

- Annual collection volume is about 6,035 tons of high price fish.
- Daily landed volume is about 20 tons.

Staffing

Required staff will be two workers.

10) Ice storage (Guet Ndar & Gokhou Mbathie)

Objective

The objective is to cater stable supply of ice to fishermen preparing for fishing.

Capacity

- Daily landed volume is about 20 tons of high priced fish and 27 tons of other fish (by catch)
- Ice required daily is about 25 tons (ice fish ratio is 1:0.5)

Staffing

Required staff will one worker.

(3) Education and Training

Education and training on the understanding of regulated marketing system, on regulations of the new marketing complex, and on the management and use of the facilities and equipment and other topics related to fish marketing is proposed in order to conduct the marketing activities smoothly.

1) Purpose and contents

The beneficiaries and users have to have an awareness and understanding of the need and the benefits of the regulated marketing system, marketing regulations and management and use of the facilities and equipment. An educational and training programme should include the following points.

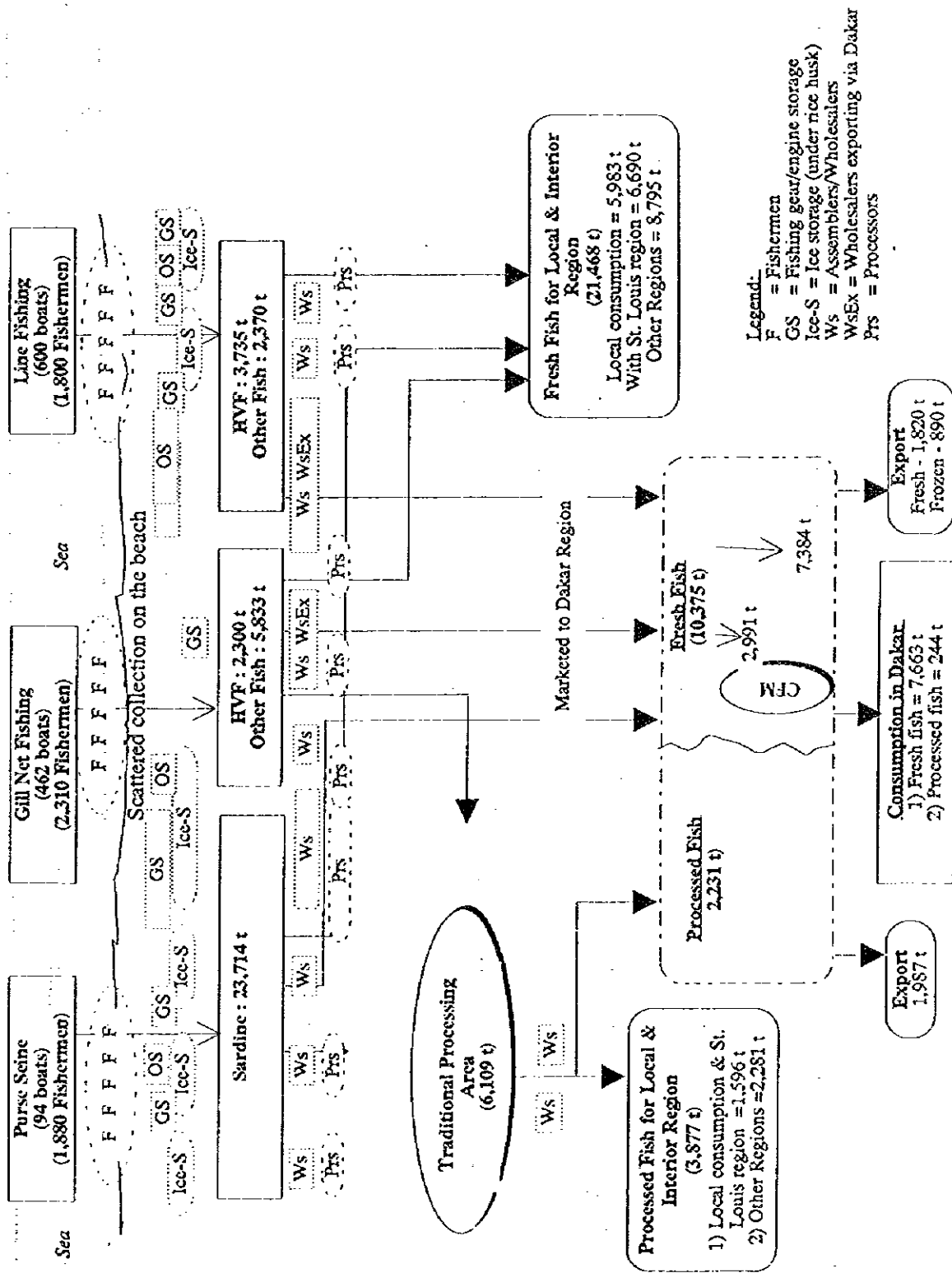
- Centralized marketing and transaction under one roof will save time
- Maintenance of fish quality and decrease of loss
- Provision of fair price to producers as well as wholesalers
- Fish handling during icing, packing and loading and transport.
- Need to pay users fee for the use of the provided service and facilities
- Use of the collected users fee in the operation and maintenance of the facilities and equipment
- Registration of the local wholesalers and outside wholesalers
- Transaction between fishermen and wholesalers to be conducted in the stipulated marketing area
- Fishermen are to transfer the fish to the new marketing complex.
- Icing, packing loading to be conducted in the designated area.
- Use of the facilities and equipment and other services.

2) Target beneficiaries

- Mainly wholesalers
- Fishermen
- Transporters
- Truck owners
- Fish carriers

3) Timing and staffing

Educational and training programme should be conducted once in three months using the education & training room in the complex, and the required staff is one staff knowledgeable in fish marketing, marketing regulations, and fish quality.



Source: Field Survey of Phase I (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct.-Dec., 1996

Fig III 1 2-1 Fish Marketing Pattern and Volume of Saint Louis (1996)

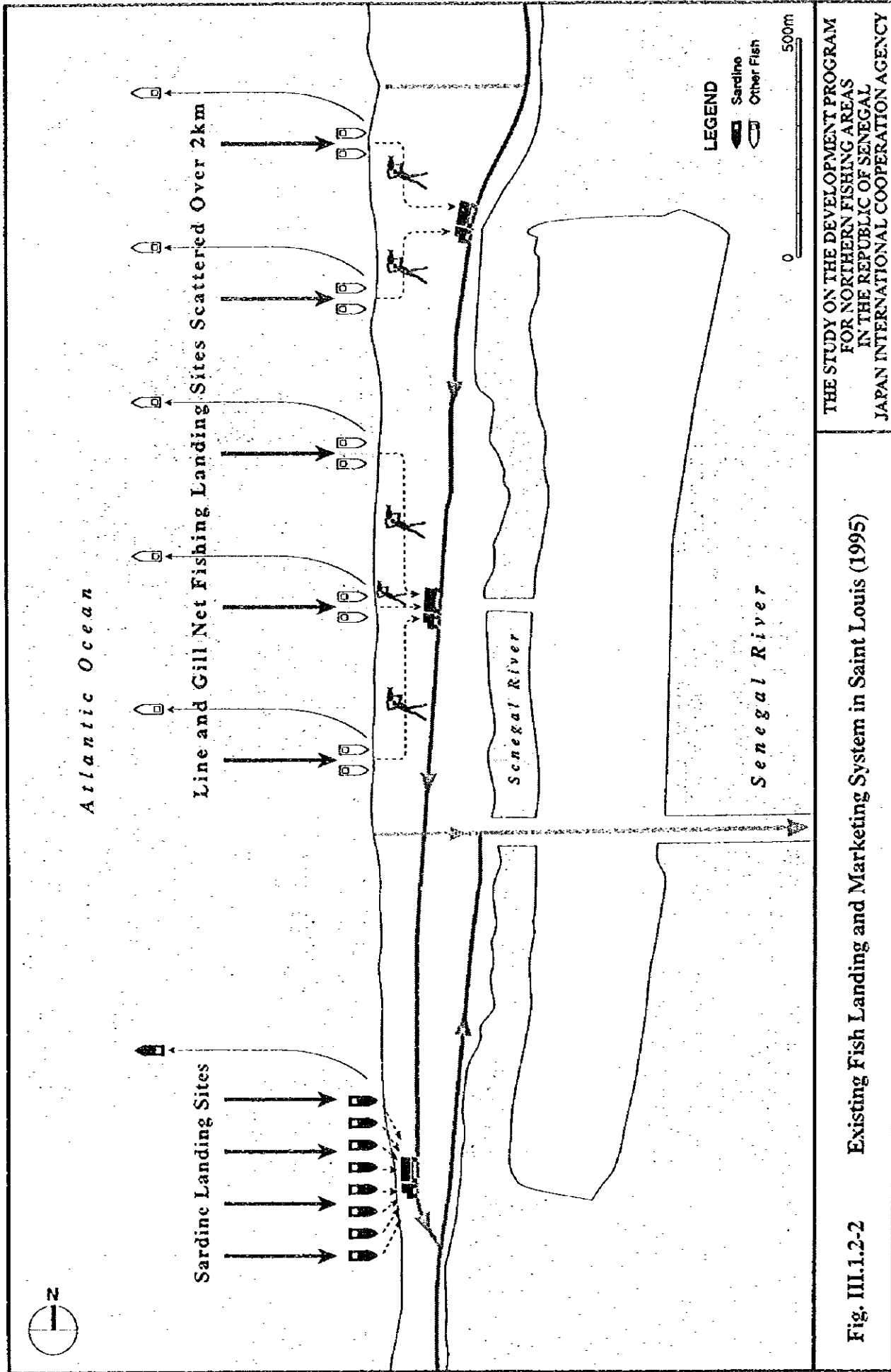


Fig. III.1.2-2 Existing Fish Landing and Marketing System in Saint Louis (1995)

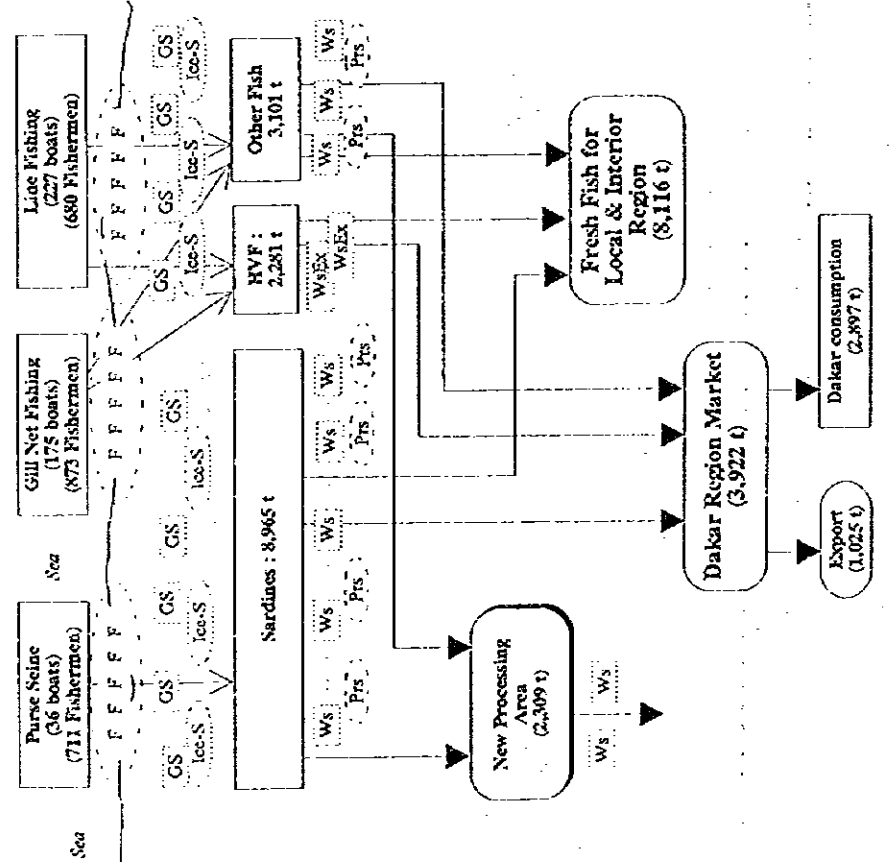
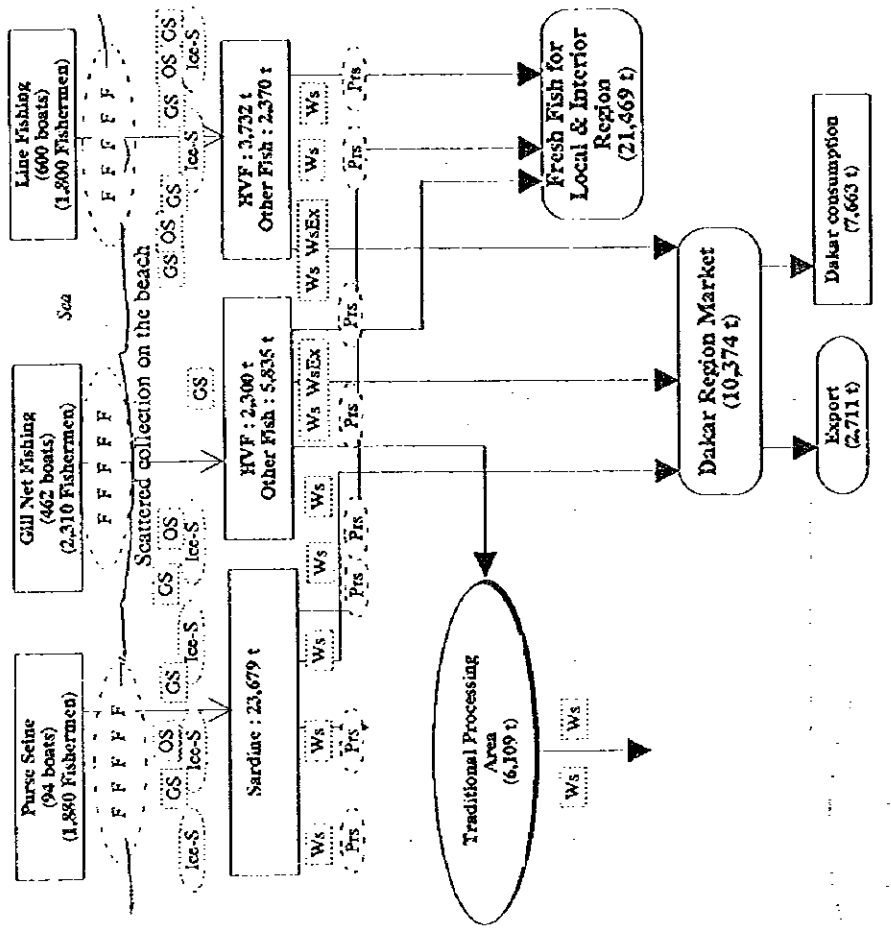


Fig. III 1 2.2 Fish Marketing Patterns and Volume Without Project of Saint Louis (2010)

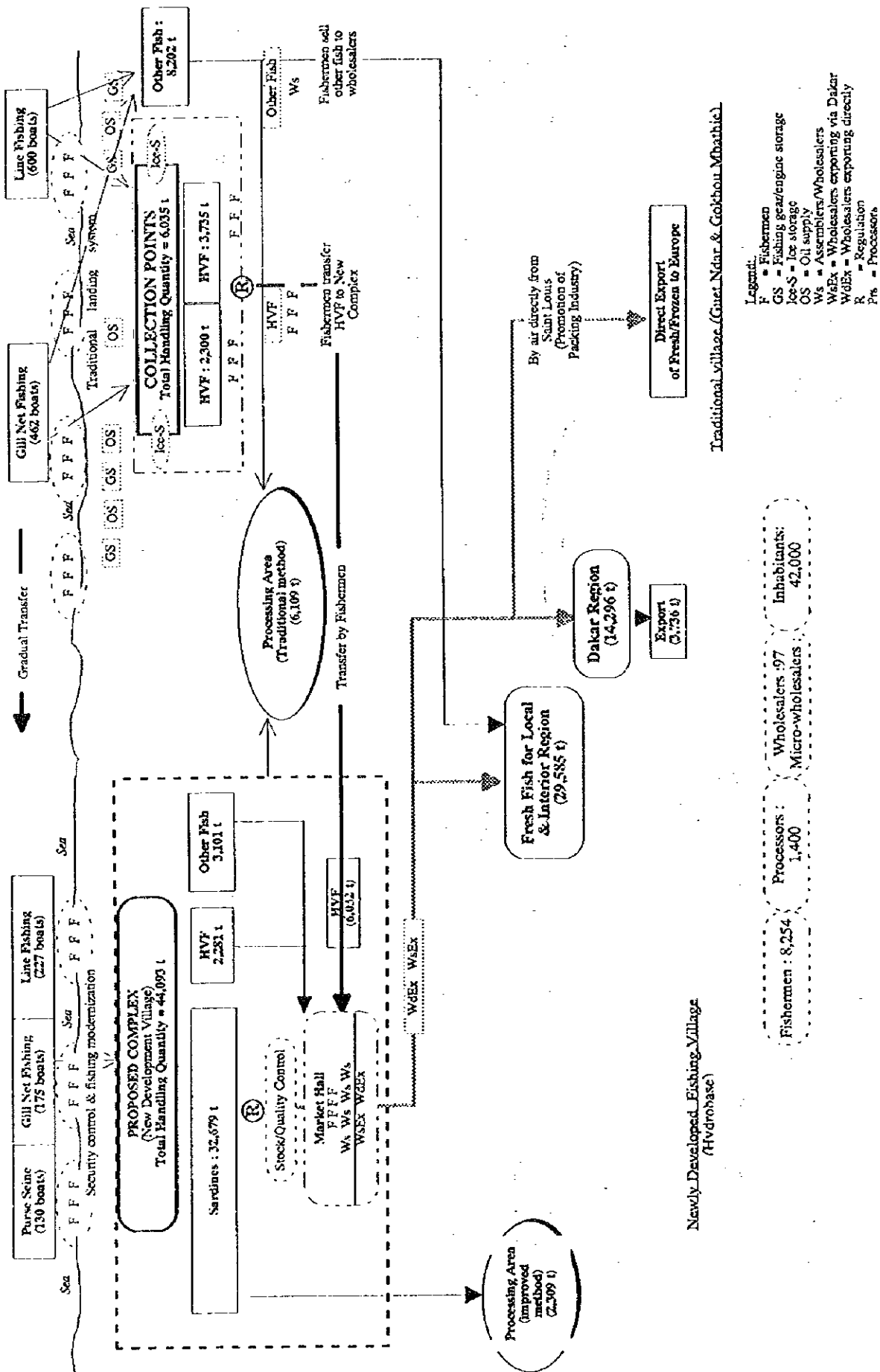


Fig. III.1.2-4 Fish Marketing Pattern and Volume With the Project of Saint Louis (2010)

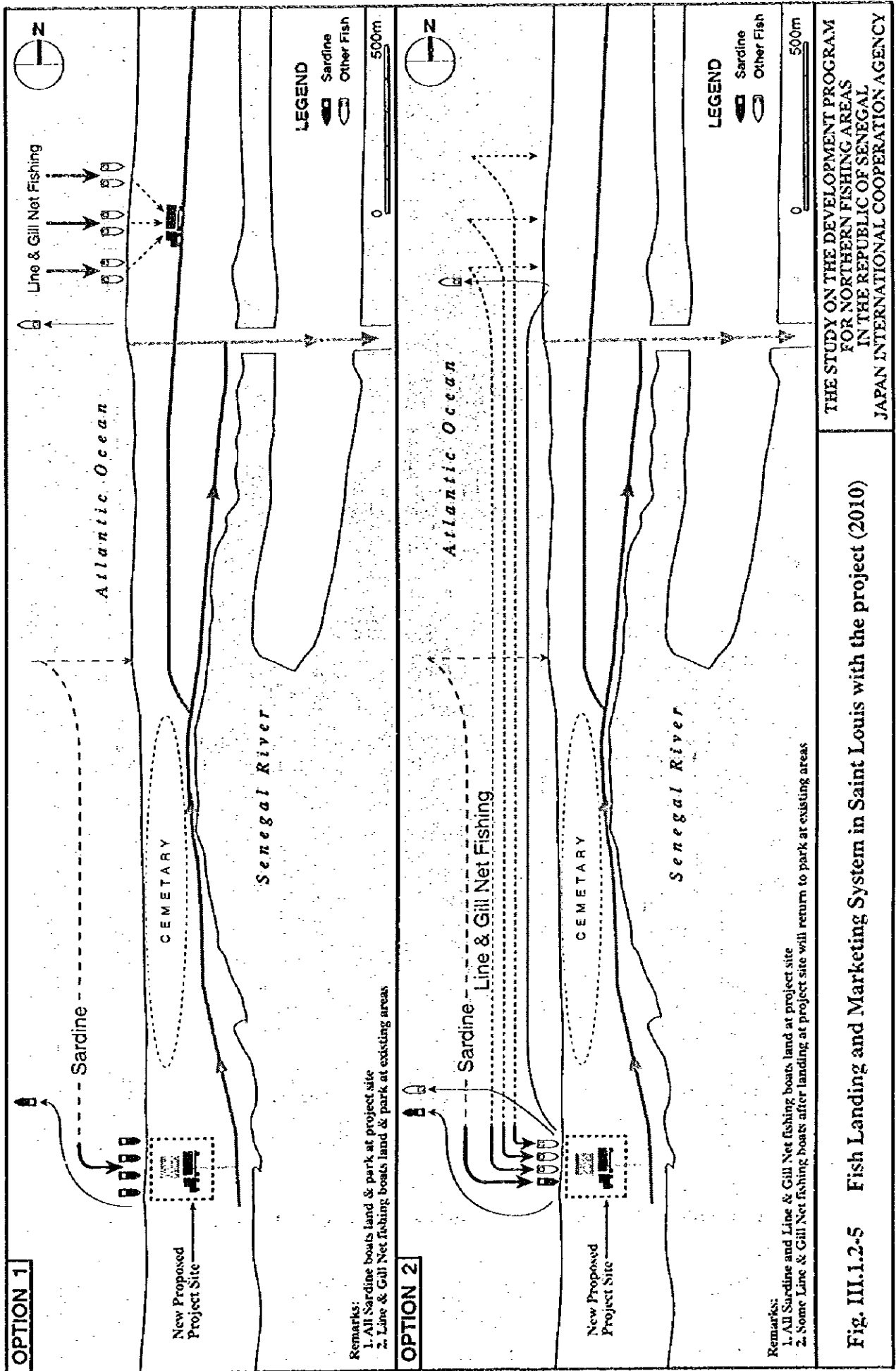
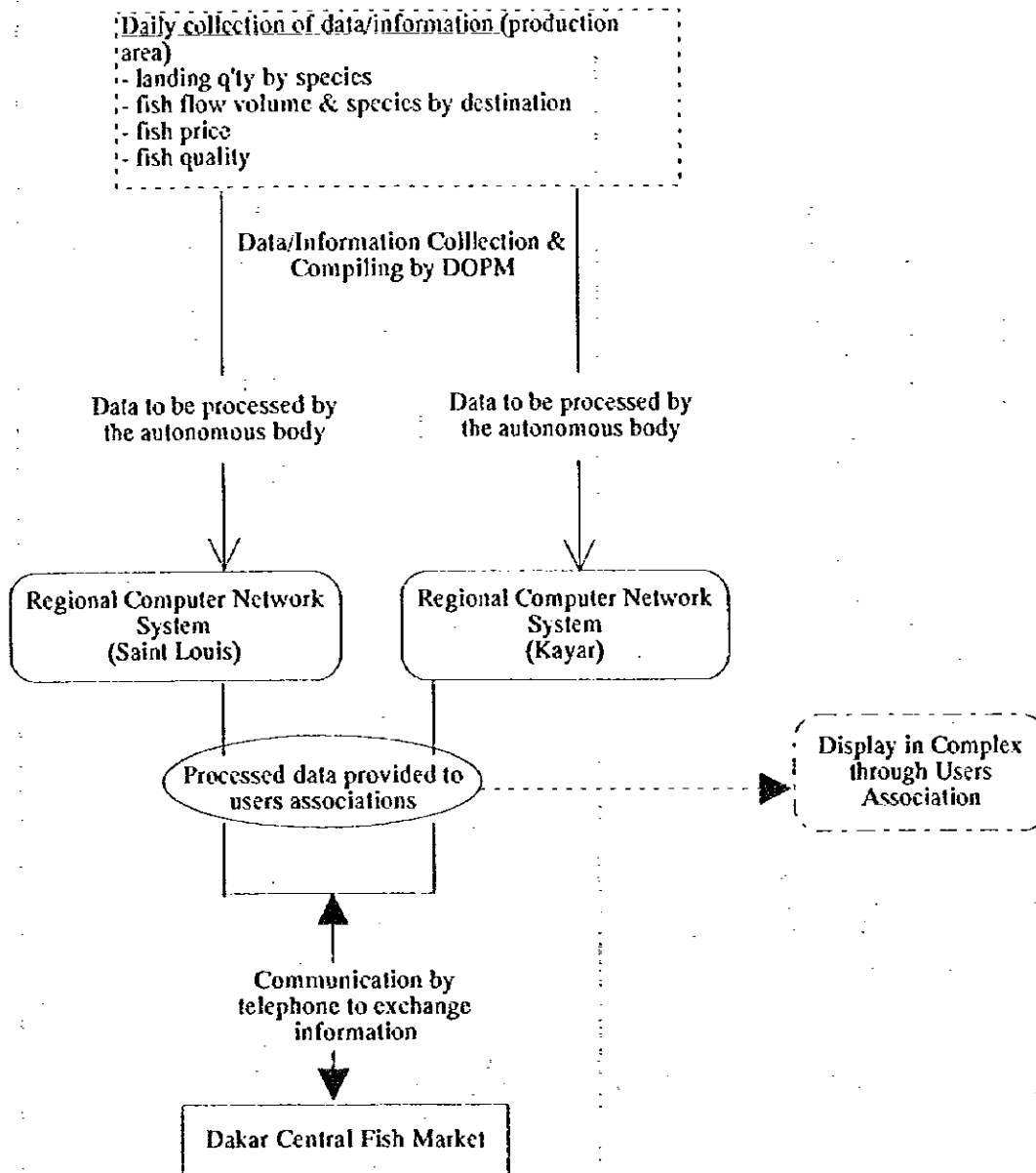
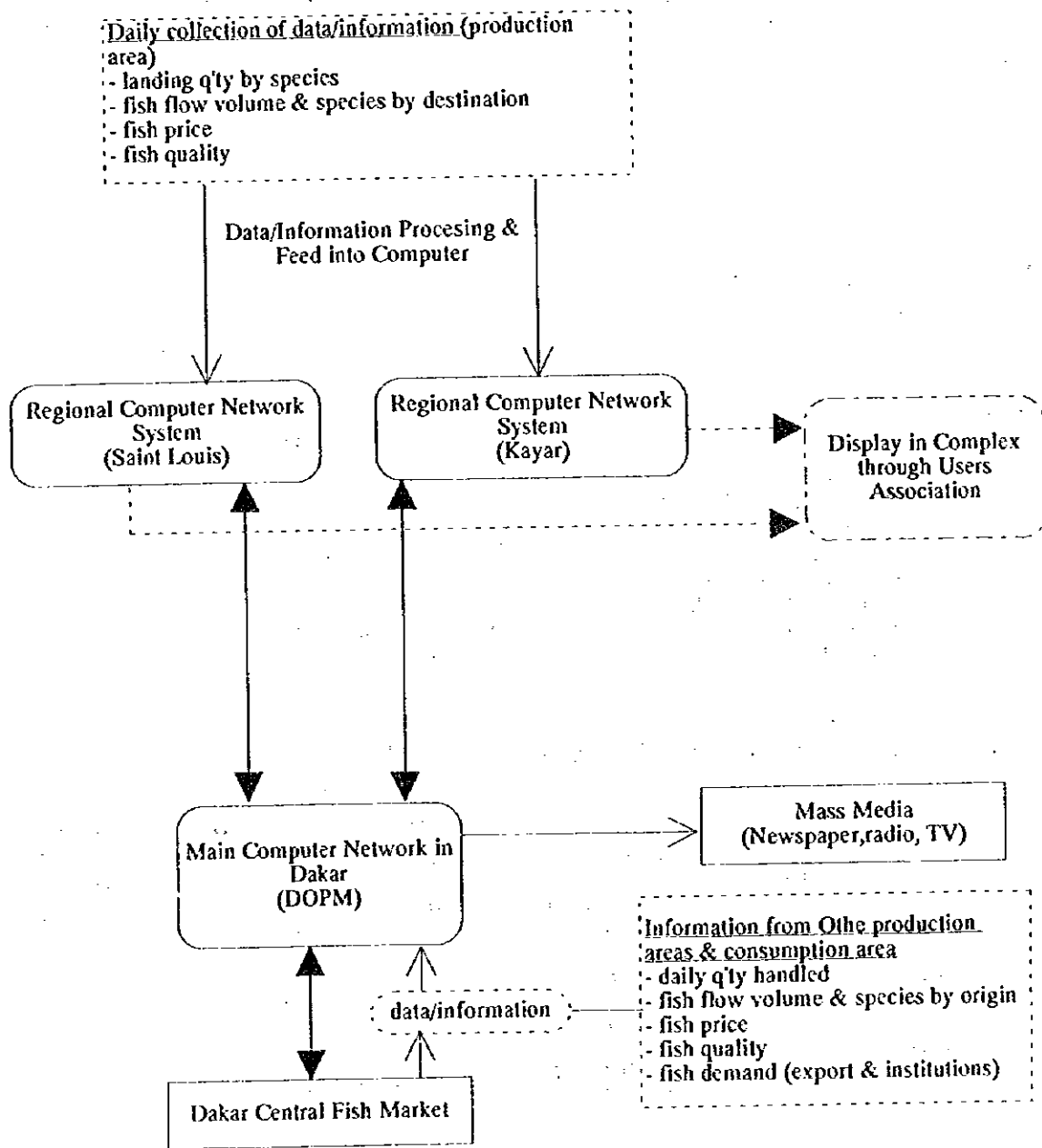


Fig. III.1.2-5 Fish Landing and Marketing System in Saint Louis with the project (2010)



Source: Field Survey of Phase I (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct.-Dec., 1996

Fig. III.1.2-6 Fish Marketing Information System with the Project (short term)



Source: Field Survey of Phase I (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct.-Dec., 1996

Fig. III.1.2-7 Fish Marketing Information System with the Project (long term)

Table III.1.2-1 Estimation of Ice Demand and Supply in Saint Louis (1995)

A. Ice Demand							
	Fish Production in (1995)	Daily Fish Production (1995)	Ice required daily (fishing) (tpd)	Ice Required daily (marketing) (tpd)	Ice Demand (tpd)	Max. Ice Demand (tpd) in March	Min. Ice Demand (tpd) in August
1. High Value Fish	6,035	20	10		10	15	13
a. Processed							
b. Fresh	6,035	20		10	10	15	13
2. Other Fish	8,203	27	14		14	9	7
a. Processed	4,502	15		No ice			
b. Fresh	3,701	12		6	6	4	3
3. Sardine	23,714	79	No ice				
a. Processed	1,607	5		No ice			
b. Fresh	22,107	74		37	37	73	7
Total	37,952	127	24	53	77	116	43
B. Ice Supply							
1. Ice production in St. Louis of 4 existing plants (at 67 % operational capacity)					47	53	35
2. Ice from other regions					30	30	8
Ice surplus/deficit in Saint Louis					0	-33	0

- Remarks: 1) Fish ice ratio is 1:0.5 for both fishing and marketing.
 2) Operational capacity of 4 ice plants in St. Louis is about 67% of the rated capacity of about 70 tons per day (tpd).
 3) Three of the ice plants are old.
 4) About 25 tpd of ice from other region are assumed to be brought into St. Louis (15 tons from Dakar and 10 tons from Louga and Touba) by fish wholesalers.

Table III.1.2-2 Estimation of Ice Demand and Supply in Saint Louis (2010)

A. Ice Demand							
	Fish Production in (2010)	Daily Fish Production (2010)	Ice Required daily (fishing) (tpd)	Ice Required daily (marketing) (tpd)	Average Ice Demand (tpd)	Max. Ice Demand (tpd)	Min. Ice Demand (tpd)
1. High Value Fish	8,316	28	14		14		
a. Processed							
b. Fresh	8,316	28		14	14		
2. Other Fish	11,304	38	19		19		
a. Processed	6,204	21		No ice			
b. Fresh	5,100	17		9	9		
3. Sardine	32,679	109	No ice				
a. Processed	2,214	7		No ice			
b. Fresh	30,464	102		51	51		
Total	52,299	174	33	73	106	150	65
B. Ice Supply							
1. Ice production in St. Louis of 4 existing plants (at 67% operational capacity)					54	70	35
2. Ice from other regions					30	30	30
Ice surplus/deficit in Saint Louis					-22	-50	0

- Remarks: 1) Fish ice ratio is kept the same.
 2) Cofrinord has rehabilitated its ice plant and Igloo Afric (new plant) has expanded its capacity to 20 tpd; the total rated capacity is 80 tpd in 2010.
 3) The operational capacity is 67 percent.
 4) Ice from Dakar, Touba and Louga is about 30 tpd.