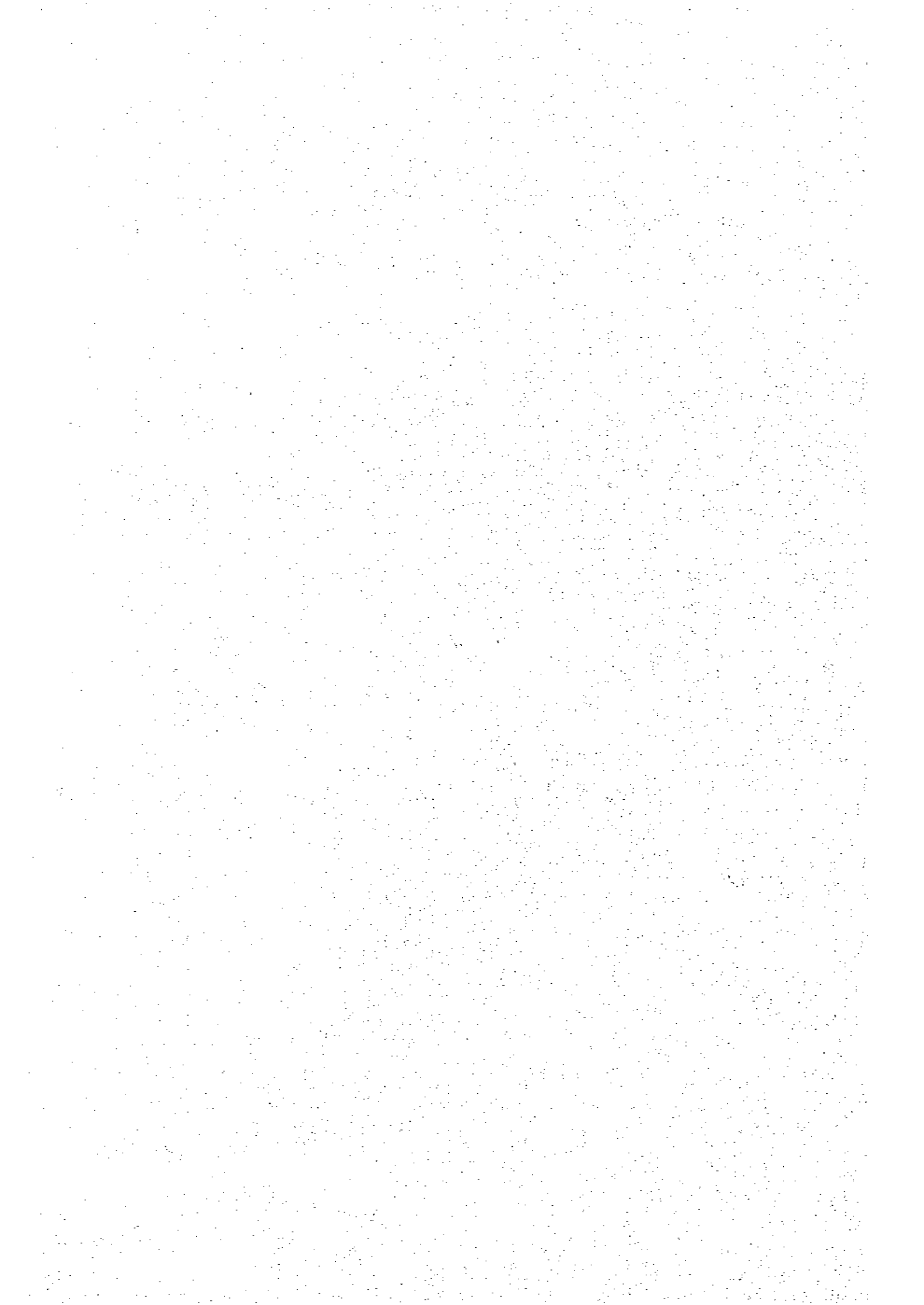


2. EXISTING CONDITIONS IN THE STUDY AREA



2. EXISTING CONDITIONS IN THE STUDY AREA

2.1 Outline of the Study Area

(1) Saint Louis Region

Saint Louis region covers a surface area of 44,127 km² (about 22.4% of the country) with three departments (Dagana, Matam and Podor). The region has about 500 km of the Senegal River which plays an important role. Therefore, there are three natural zones, namely the River Valley, the Delta and the Forestry & Cattle breeding zone.

The population of Saint Louis region has grown from 661,791 in 1988 to 689,886 in 1990 and 763,673 in 1995. The regional population density is about 17 persons/km² (national density is about 41 persons/km²). The population of Saint Louis city is estimated as 135,440 in 1995 based on the population census in 1985.

The regional economy is essentially dominated by agricultural activities which are also very much dependent on climate. Even in the irrigated areas for rice production, the cultivation area has decreased due to several constraints such as the high maintenance costs of irrigation works and its rehabilitation, high cost of fertilizers and credit conditions (high interest and short period for repayment). The industries in the region are oriented towards the processing of agricultural products : sugar cane, tomatoes, and rice.

In the Perspectives and Strategies of Development for Saint Louis the following points, which are in line with the zonal development strategy in this study, have been outlined for the fisheries sector.

- 1) Study and realization of a project for a breakwater in front of Saint Louis to calm the waters for easy landing of fish and also to ensure security of boats and fishermen
- 2) Make operational the existing fishing jetty or port
- 3) Create a "real" wholesaling center having all the necessary facilities with complete paving of the parking area, drainage network, electrification, water storage, stores for ice and boxes, etc., accessibility by roads, toilets, etc.
- 4) Establish ice making centers (storage and supply)
- 5) Ensure sufficient ice supply
- 6) Processing - to carry the following measures for processing
 - Provide better facilities to increase treatment and storage capacity for processing in Guet Nader until the ones in Goxou and Gandiol are set up
 - Paving the processing area and shelters
 - Equipment in drying riddles and treatment sinks

- Diversification of treatment techniques (construction of ovens for smoking)
 - Setting up protection walls around drying areas
 - Electrification of the sites
 - Setting up toilets
- 7) Access to credit for equipment and other expenses
 - 8) Training to improve fishermen's abilities in fishing (fishing using big boats and more fishing days per trip, use of modern equipment, etc.)
 - 9) Regional cooperation - in terms of fishing in the Mauritanian waters

(2) Thies Region

Thies region covers a surface area of 6,601 km² and it has three departments (Thies, Mbour and Tivaoane). The population of this region is the second largest after Dakar, with 1,144,958 in 1995 with a density of 169 persons/km². Migration concerns mainly rural population which moves towards urban and semi-urban centers in Thies, Dakar, Mbour, Kayar, etc. seeking jobs during the dry season. Another form of migration is also directed to foreign countries (Italy, France, USA), and this migration represents a serious constraint in the development of agriculture.

Agriculture plays a major role in the economy of the region with cultivation of ground nuts, millet, beans, etc., market gardening and tree cultivation. Market gardening is generally practiced in the Niayes and Thies departments which supply about one third of the national production.

Thies region has a coastline of about 135 km, and contributes to about half the national fish production. Fishing activity is mainly dominated by artisanal fishery and Thies region has contributed a substantial quantity to the 70 percent of the national artisanal fish production. This sector has huge possibilities and needs modernization of fishing technology and installation of preservation technology in Thies region.

In the Regional Development Strategy of Thies Region, it has been indicated that the following development strategies for the fisheries sector are necessary to ensure a rational management of the resources, a better control of production, and consumer satisfaction of fish.

- 1) Improvement of the layout of landing areas as well as areas for drying and processing of products
- 2) Setting up of cold storage facilities
- 3) Application of measures to conserve and preserve demersal species
- 4) Availability of fishing gears at affordable prices and adoption of appropriate fishing gears

(3) Louga Region

Louga region covers a surface area of 29,188 km² (about 15% of the country) with three departments (Kebemer, Linguere and Louga). The region has a agro-sylvo-pastoral activity (agriculture/forestry/livestock) mainly characterized by a traditional development dominated by extensive cattle breeding and exploitation of forestry resources.

The population of Louga region is estimated at 530,780 in 1995. The rural population represents about 77 percent and the urbanization rate (19%) is one of the lowest or weakest in the country. The region has strong out-migrations due to the persisting drought and severe condition in the rural.

The regional economy is mainly based on agriculture and cattle breeding, and these two activities are dependent on rainfall (average annual rainfall of 300 mm). Market gardening is developing in the coastal fringe (Niayes zone), the arid zone of Keur Momar Sarr (in the north Louga Dept.) and around the major irrigation works. Fishing has become one of the activities to revitalize the regional economy and it has a coastline of 50 km.

In the Ninth Plan (1996-2001), the following projects are outlined as development strategy for the fisheries sector in the Louga Region:

a. Short term projects

- The rehabilitation of the road Kébémér - Lompoul
- The building of the slip road Potou - Taré and the section from Potou to the seaside
- The building of a drying area in Potou and related facilities
- Setting up stores to sell spare parts and out-board engines
- Establishment of a lighthouse in Potou and Lompoul to guide fishermen

b. Medium term projects

Establishment of a regional inspection and checkpoint in Potou to consolidate the fishery administrative structure in Louga Region.

c. Long term projects

- Construction of a road along the seaside linking Lompoul and Taré, which would thus give access to coastal villages and relieve them from isolation
- Creation of a CNCAS (Agricultural Bank) branch in Louga so that fishermen no longer have to go to Saint Louis to get credits
- Creation of a research unit in Potou by CRODT to provide all the necessary information for the exploitation of marine fisheries

(4) Dakar Region

Dakar region is on the Cap Vert peninsula, the westernmost part of the African continent. Dakar region comprises three departments namely Dakar, Pikine and Rufisque. The total area is about 550 km² with a estimated population of 821,900 in Dakar department, 946,414 in Pikine and 243,989 in Rufisque in 1995.

Dakar region has several fishing landing sites located in its three departments. Major landing sites located in Hann and Rusfique. Dakar region is a major consumption area; it has a central fish wholesale market located in Pikine and several other retail markets, and almost 90 percent of the fish processing plants (about 49 plants in Senegal). There are also about 19 ice plants in Dakar region with a production capacity of about 647 tons per day; of which about 77 percent is used for self-consumption, 20 percent for fish marketing and 3 percent for bakeries, restaurants, etc. Fish are regularly supplied to markets and processing plants in Dakar by wholesalers and intermediaries in consumption and production areas.

2.2 Fish Production

(1) Saint Louis Region

Saint Louis region has eight fish landing sites; of which Saint Louis is the major landing site dealing with about 95 percent (36,055 tons) of the total landings of 37,952 tons in the region. About 15,000 fishermen operate 2,660 motorized and 140 non-motorized boat in 1995. These boats spread their landings over the 3km open beach.

In general, landing sites are different according to the type of fishing, i.e. line fishing at Gohonbatch, gill net fishing at northern part of Guet Ndar, and purse seine fishing at Guet Ndar.

Fish landed can be categorized into the following groups: sardinelle, high-price fish and other species. The landed quantities in 1995 of these three groups were 23,714 tons (62%), 6,035 tons (16%) and the 8,203 tons (22%), respectively.

In 1995, Saint Louis accounted for 1,641 tons of dorade (55%), 691 tons of thiof (35%) and 1,342 tons of sole (30%) of the whole national artisanal production in 1995. The large production of these high-priced fish at Saint Louis makes it an attractive production site for exporters, in spite of its long distance from Dakar.

Line fishing

There were about 600 boats of 8-12 m length equipped with 15-25 HP out-board engines in 1995. In most cases, there are 3 fishermen on board operating a daily fishing routine.

The productivity is estimated at 9.3 tons/boat/year, 20-50 percent of the catch being high-price fish mainly consisting of dorades, thiofs and pageots.

Fishing is highly dependent on the export market that particularly requires fresh fish of very high quality. Fishermen responded to the demand for high quality product by introducing polystyrene boxes with ice, using hand line rather than long line and operating daily.

A number of large boats (15-18m) operate for daily and long distance fishing. The use of poor insulation boxes allows only a maximum of five days for a fishing trip. With limited ice use, even a 3-4 day fishing trip results in the decline of quality which is not acceptable for export and that accounts for about 40 percent of the catch. In the case of the smaller size boats, they only operate on a daily basis, therefore their fish catch is of high quality.

Gill net fishing

In 1995, there were 462 boats of 8-12 m length equipped with 15-25 HP out-board engines. In most cases, the boats are manned by 3-5 fishermen and operate on a daily fishing basis.

The productivity is estimated at 18.7 tons/boat/year, of which about 37 percent are high-price fish such as soles and cuttlefishes.

In the gill net fishery, the catches are usually in the process of deterioration, because the fish have been in the net for a considerably long period. This is more conspicuous in small pelagics which meet rapid death in the net. These fishes are therefore consumed in the local market. In contrast, soles which are high-price fish and are the main target of this fishery still retain adequate quality for exportation at landings. It was observed that about five percent of soles of the total weight were rejected by wholesalers at collection points. This explains in part the reason why ice is not necessary on the boat.

Purse seine fishing

There are 94 boats 18-25m in length and equipped with 40HP out-board engines in 1995. In most cases, 20-25 fishermen are on board and they operate daily fishing. The productivity is estimated at 252 tons/boat/year; the major species caught are sardinelles. For fishing operation two boats are used in Saint Louis, one for the transportation of fishermen (9-12m in length) and the other for the fish (16-22m in length). The devaluation of CFA franc in 1994 resulted in a serious impact to the purse seine fishery because of the high investment cost for imported equipment such as seine (FCFA 7 million), 2 boats (FCFA 4 million) and 2-3 out-board engines (FCFA 3.5 million). Recently in Petite Côte, some fishermen have employed a one-boat method operating in near offshore waters in order to cope with the rising cost. Economic performance of this new method has not yet fully evaluated. The purse seine fishing in Senegal is in need of detail review of its boats, gear and operation systems.

(2) Thies Nord (Northern Thies)

Kayar is the major landing site in Thies Nord with two nearby minor landing sites, Fass Boye and Mboro. The total fish landing in Thies Nord amounted to 19,724 tons in 1995, contributing 16,898 tons (86%), 2,363 tons (12%) from Fass Boye and 463 tons (2%) from Mboro.

In Thies Nord, the numbers of fishermen and fishing boats show marked seasonal fluctuation. In 1995, the monthly mean number of boats during the lean season (June - December) in Kayar was 244. It increased to 649 during the peak

season (January - May) with incoming of 373 migrant boats mainly from Saint Louis.

The fish landed at Kayar is categorized into three groups, i.e. sardinelle, high-price fish and other fish. In 1995 the landing of sardinelle was 9,020 tons (53% of the total landing), high-price fish 2,435 tons (14%) and other species 5,445 tons (33%). Because of easy accessibility from Dakar (50km), Kayar is a typical urban-suburb production market, characterized by higher fish prices and a large number of micro-wholesalers. Backed by strong daily demand, Kayar fishermen are having an initiative in the price through the control of daily production since 1993.

Line fishing

The mode of fishing operation are basically similar to those in Saint Louis. In 1995 there were 393 boats comprising 226 Kayar and 167 migrant boats. The productivity is estimated to be 18.5 tons/boat/year, high-price fish accounting for 20-50%. Kayar is known as the largest landing site of pageot (sea bream), one of the important species for export, supplying 32 percent of the whole production of the species through artisanal fishing (1995). A daily quota of up to three boxes (45kg) has been given to the dorade/pageot line fishing in the area since 1994.

Gill net fishing

The use of gill net in Kayar is very limited, only 18-46 migrant boats operating the gear seasonally.

Purse seine fishing

The mode of fishing operation are basically similar to those in Saint Louis. There are 24 boats on the annual average. The productivity is estimated at 369 tons/boat/year and the most part of the production consist of sardinelles.

(3) Louga Region

The Louga region, with two relatively small landing sites, Potou and Lompoul, produced only 0.6 percent of the national total production of artisanal fisheries. The landing quantities in 1995 at Potou and Lompoul was 664 tons and 1,079 tons respectively. There are 312 fishermen using 64 fishing boats with engine and 25 boats without engines.

The gill net fishery using net of large mesh (more than 100mm) is the most popular practice in the region. The kinds of fish caught in the Louga region are catfishes, rays and sharks, which accounted for 31 percent, 30 percent and 22 percent of the regional production, respectively in 1995. Because there is little demand for these fishes in the local market, a large part of the catch is processed into salted dried product and exported to the African market. There is no purse seine fishery in this

region. Poor accessibility from Dakar limit fresh fish trading, even though there was 252 tons of sole production in 1995. There is potential for further production increase.

The fish landed in the Louga region are categorized into the following groups: coastal demersal 1,277 tons (73%), sardinelles 42 tons (2%), and other coastal pelagics, mollusks and crustaceans.

(4) Dakar Region

Dakar region has about ten fish landing sites located in its three departments, Dakar, Pikine and Rufisque. Hann and Rufisque are comparatively major fish landing sites in the region, 13,130 tons and 6,422 tons, respectively, out of the total landings of 27,763 tons in 1995. There are 1,315 boats and 10,100 fishermen in the region.

Dakar has the landing base of long distance fishing boats which are oriented to the capture of high-priced fish destined for export markets as the export facilities are located here. There were 163 long distance boat in Dakar in 1995. These long distance boats are operated in Casamance and as far as in Guinea-Bissau for 8 to 14 days in one fishing trip. Therefore, the fishery requires relatively high investment in order to obtain large-sized boat with sophisticated navigation and fish boxes. The modernized equipment such as compass, echo-sounder and diesel out-board engine has come into wider use in this fishery.

The fish landed in the Dakar region are categorized into the following groups: sardinelle was 16,322 tons (59%), coastal demersal 4,924 tons (18%), other coastal pelagics 3,689 tons (13%), mollusks and crustaceans.

Table I.2.2-1 Number of Boats, Fishermen, Processors and Wholesalers (1991-1995)

	1991	1992	1993	1994	1995
THIES NORD					
Fishermen	5,114	5,895	5,865	5,313	5,453
Processors	750	795	873	974	1,118
Wholesalers	248	288	281	335	588
Boats	835	914	931	929	939
Production (tons)	13,710	16,918	18,768	21,625	19,724
Productivity (tons/boat)	34	38	46	52	50
LOUGA REGION					
Fishermen		236	244	316	312
Processors	199	209	437	689	860
Wholesalers	4	4	4	5	6
Boats	40	25	22	44	89
Production (tons)	1,190	1,192	1,901	2,338	1,744
Productivity (tons/boat)	30	48	86	53	20
ST. LOUIS REGION					
Guet Nader (Sine)					
Fishermen	13,500	14,000	14,200	14,200	15,000
Processors	700	700	730	900	1,000
Wholesalers	60	70	85	100	70
Boats	1,690	1,870	1,900	1,970	2,800
Production (tons)	24,026	29,998	34,820	38,690	37,952
Productivity (tons/boat)	14	16	18	20	14
Gandiol is included in Guet Nader.					
DAKAR REGION					
Fishermen *	6,044	7,803	8,138	9,021	10,017
Processors *	719	1,016	1,085	1,190	1,300
Wholesalers *	66	159	183	213	260
Boats *	1,182	1,460	1,417	1,497	1,982
Production (tons)	21,133	24,856	14,447	25,288	27,763
Productivity (tons/boat)	18	17	10	17	14

Remarks: * Incomplete for 1991 as data not available for Yoff and Ngor.

Source: Data sheets of Regional Service Offices of DOPM

Study Area Total					
Fishermen	24,658	27,934	28,447	28,850	30,782
Processors	2,368	2,720	3,125	3,753	4,278
Wholesalers	378	521	553	653	924
Boats	3,747	4,269	4,270	4,440	5,810
Production (tons)	60,059	72,964	69,936	87,941	87,183
Productivity (tons/boat)	16	17	16	20	15

Remarks: * Incomplete for 1991 as data not available for Yoff and Ngor.

Source: Data sheets of Regional Service Offices of DOPM

2.3 Fish Marketing and Distribution

(1) Fish Marketing and Distribution

The total production of fish in the study area amounted to 89,775 tons in 1995 (Table I.2.3-1, of which 87,183 tons (97%) were from artisanal fish production and the remaining three percent (1,781 tons from industrial fishing and 811 tons of imported fish landed in Dakar). Of the 87,183 tons of artisanal production, Saint Louis region contributed 44 percent (37,952 tons), the Dakar region 32 percent (27,763 tons), Thies Nord 23 percent (19,724 tons) and the Louga region two percent (1,744 tons). Of the total 89,775 tons of fish in the study area, about 38,061 tons (42%) were marketed in fresh form, 32,198 tons (36%) were consumed locally in the fish production area, 16,151 tons (18%) were utilized for artisanal processing and 3,340 tons (4%) were used in industrial processing in Dakar.

The origin and destination of fresh fish and processed fish production in the study area is shown in the Table I.2.3-2. Of the total supply of 89,775 tons in the study area, about 78,597 tons (88%) were consumed domestically (64,619 tons in fresh form and 13,158 tons in processed form), and the remaining 11,178 tons or 12% (8,185 tons of fresh and frozen fish and 2,993 tons in processed form) were exported. About 35,649 tons (46%) were consumed in the production area (32,222 tons in fresh form and 3,427 tons in processed form), and the remaining 42,128 tons (54%) were marketed in fresh and processed form to Dakar (16,448 tons) which is a major destination (13,871 tons in fresh form and 3,397 tons in process form); 3,981 tons to and Kaolack (a major fish transit center), and 21,699 tons to the other regions.

The fish distribution and marketing patterns of the major landing sites (Kayar, Saint Louis and Hann in Dakar region) in the study area are shown in Figures. I.2.3-1 to I.2.3-5, and Tables I.2.3-3 and I.2.3-4.

As shown in Figures I.2.3-1 and I.2.3-2, Saint Louis landed 37,952 tons of fish, of which 10,375 tons (27%) were marketed to Dakar, and 8,811 tons (23%) were marketed to Louga, Diourbel, Thies and other regions. Local consumption of fresh fish were 5,984 tons (16%) in Saint Louis and its environs and 6,690 tons (18%) in the interior (Dagana, Matam, Podor) of Saint Louis region. About 6,108 tons (16%) were used for artisanal processing. The export quantity was estimated at 1,820 tons in fresh form and 1,710 in frozen form.

As shown in Figures I.2.3-3 and I.2.3-4, Kayar landed 16,898 tons, of which 33 percent (5,672 tons) were marketed to Dakar, and 23 percent (3,906 tons) were marketed to Kaolack, Diourbel and other regions. Fresh fish consumed locally in Kayar, its environs and Thies town were 2,384 tons (14%); and about 4,936 tons (29%) were used for artisanal processing. The export quantity was about 975 tons.

Hann fishing village (Fig. I.2.3-5), a major fish landing centre in Dakar region, landed about 13,130 tons of fish, of which 9,734 tons (75%) were marketed to Dakar by local retailers, 2,680 tons (20%) were collected by collectors and wholesalers for processing plants, and 716 tons (5%) were used for artisanal processing.

(2) Fish Marketing System

In a typical fish marketing system from the production area and to the consumption area, there will be various stages from fishing, landing, negotiation & purchase, icing and packing, to transport, etc. Two main marketing systems observed (for sardinelles caught using purse seines and high value fish caught by line and gill nets are briefly described below.

Marketing system for sardinelle

The marketing system for sardinelle as observed in St. Louis is shown in Fig. I.2.3-6. A crew of about 20 fishermen are normally involved in fishing using purse seines. Preparation for fishing takes about an hour to purchase fuel, food and to prepare nets. Cruising to the fishing grounds while searching for fish takes about two to three hours; and the fishing operation is about an hour and cruising back to land takes about two hours. These boats usually land about 3 tons of fish per boat.

Sardine boats begin arriving usually between 13:00 to 18:00 PM, which is the marketing hours, and peak arrivals are about 17:00 PM. The landings of these boats are concentrated along the congested beach of about 100 meters.

When the boat has beached, one fisherman takes the role of "captain" and negotiates with wholesalers, who have been waiting and observing the arrival of other boats, and have an idea of the fish quantity available and the price. In the meantime, the fish is still in the boat (in the case of Kayar, the fish is unloaded on the sandy beach and then negotiated), and once the price has been negotiated, the fish is unloaded by the fishermen. The wholesalers proceed to transport the fish using human carriers from the beach to trucks parked about 100 meters away from the beach. The whole process from negotiation to transport to the trucks takes about one hour to one and half hour depending on the distance. The payment to fishermen is made the next day if the fishermen and the wholesalers are known to each other or the same day if the wholesalers are from outside.

The assistant and the driver employed by the wholesaler proceeds to pack the fish in ice. The wholesaler has already bought the number of ice blocks he requires. Ice blocks are either brought by the wholesalers or purchased at the landing sites where ice blocks are stored under a thick coat of saw dust. Fish icing is entrusted to

two or three workers including an ice breaker who breaks the ice block with a wooden club. The broken ice is spread at the bottom of baskets made of "ronier" leaves; followed by layers of fish and more ice is added to fill. When the basket is full a last coat of ice is set on the fish, and then loaded in the trucks. The process takes about an hour, and usually a truck will transport about three to four tons of fish.

The wholesalers do have their own transport with drivers and workers, and those without trucks hire a driver and employ his own workers. In the case of a hired truck, he pays FCFA 50,000 - 80,000 per trip excluding the fuel depending on the destination. Trucks destined for Dakar leave late at night around 20:00 - 21:00 PM and arrive before 06:00 AM at the Central Fish Market.

The process above takes place on the beach, which is very congested due to processing and other activities, and is without any marketing facilities under unhygienic conditions.

Marketing system for high priced fish

The marketing system for line fishing as observed in St. Louis is shown in Fig. I.2.3-6. High value fish are mainly demersal fish and are caught using hook and lines and gill nets. The boats for this fishing have ice boxes, and carry a crew of three fishermen. Preparation for fishing (fuel, ice, food, water) takes about an hour due to the scattered location of the fuel station and ice supply. The boats usually depart very early in the morning as they have to spend a longer time in fishing and have to arrive in time for the marketing. Cruising to the fishing grounds takes about 2-3 hours; fishing about 5-6 hours and cruising back another 2-3 hours.

These fishing boats usually arrive between 15:00-18:00 PM and their landing sites are scattered over a distance of 3 km along the beach. The volume of fish catch is small around 50 to 100 kg a boat. The fishermen usually sell their catches to wholesalers or commission agents who have already financed them for fishing inputs. The wholesalers or collectors (commission agents) employed by processing factories visit each landing site to purchase fish while their insulated trucks wait about 100 meters away from the beach. Purchased fish are carried in fish boxes to the waiting truck where the fish are neatly arranged in insulated boxes with ice and loaded on to the truck. Since the quantity of catch per boat is small, the collection and transfer of fish from different sites on the 1.5 km beach is time consuming and it takes a long time to fill a two-ton truck. The time taken for handling the fish of a line fishing boat from landing, purchasing, transferring, packing and loading is approximately 30 to 75 minutes depending on the distance.

The wholesalers or commission agents have their own transport or they are provided by the processing factories, and also provide their own ice block. They also

provide ice to fishermen for fishing and storing fish.

(3) Fish Marketing Regulations

There is a decree for the regulations of fish wholesaling in general; however there is no marketing regulations covering the whole country, except for the internal regulations for daily operations in Dakar Central Fish Market (CFM) with 19 Articles covering the management and administration of the market, the activities of the market and tariffs to be collected for various services, access to the market by defining users and conditions of users, security and discipline in the market; sanitary control by the Bureau of Control and Sanitary Officials, organization of sales, storage of fish, rental of fish boxes and crushing of ice.

According to the stipulated regulations, the CFM functions daily from 5:00 AM to 11:00 AM, closes for 14 days a year and one day a month for maintenance. The tariffs in force currently have been deliberated and fixed on October 20, 1992 by "Le Comite de la Communaute Urbane de Dakar" after an open debate and discussion with the professionals, and approval by the Minister of Interior Affairs. The tariffs are levied for:

- Access rights depending on the profession of the user
- Rental of space of the hall fixed by square meter
- Rental of fish boxes and the fish storage (26 tons capacity)
- Sales and crushing of ice

The users of the CFM are the wholesalers and their associates, the intermediaries, the carriers and scalors, and the occasional buyers or professionals. The wholesalers get blue cards that allows them to enter and conduct their activities inside the market, and also allows them to receive the benefit of the services available in the market. Their associates receive rose colored cards and they can convey fish and work under the wholesaler authority. The intermediaries have yellow cards, and they can depend on a wholesaler or work independently. The carriers have green cards; and their activities are confined to helping load and unload products of sellers and carrying products of buyers who have free access to the market. Currently there are 2,769 users comprising 432 wholesalers, 144 associates, 521 porters and nine scalors, and the intermediaries. These users pay an annual license fee to obtain permits to deal in the market, while the fish buyers and retailers may be having free access.

(4) Fish Marketing Information System

A formal fish marketing information system does not exist in Senegal except for the DOPM's statistical data gathering; however, there is an informal exchange of information for landing quantity and fish price of certain fish species between the wholesalers/intermediaries in the production area and wholesalers/intermediaries of fish processing factories in the consumption areas. Information is not exhibited in the fish landing facilities or in wholesale market in the consumption area, though daily information on the origin and destination of fish are compiled the consumption and production areas for statistical purpose.

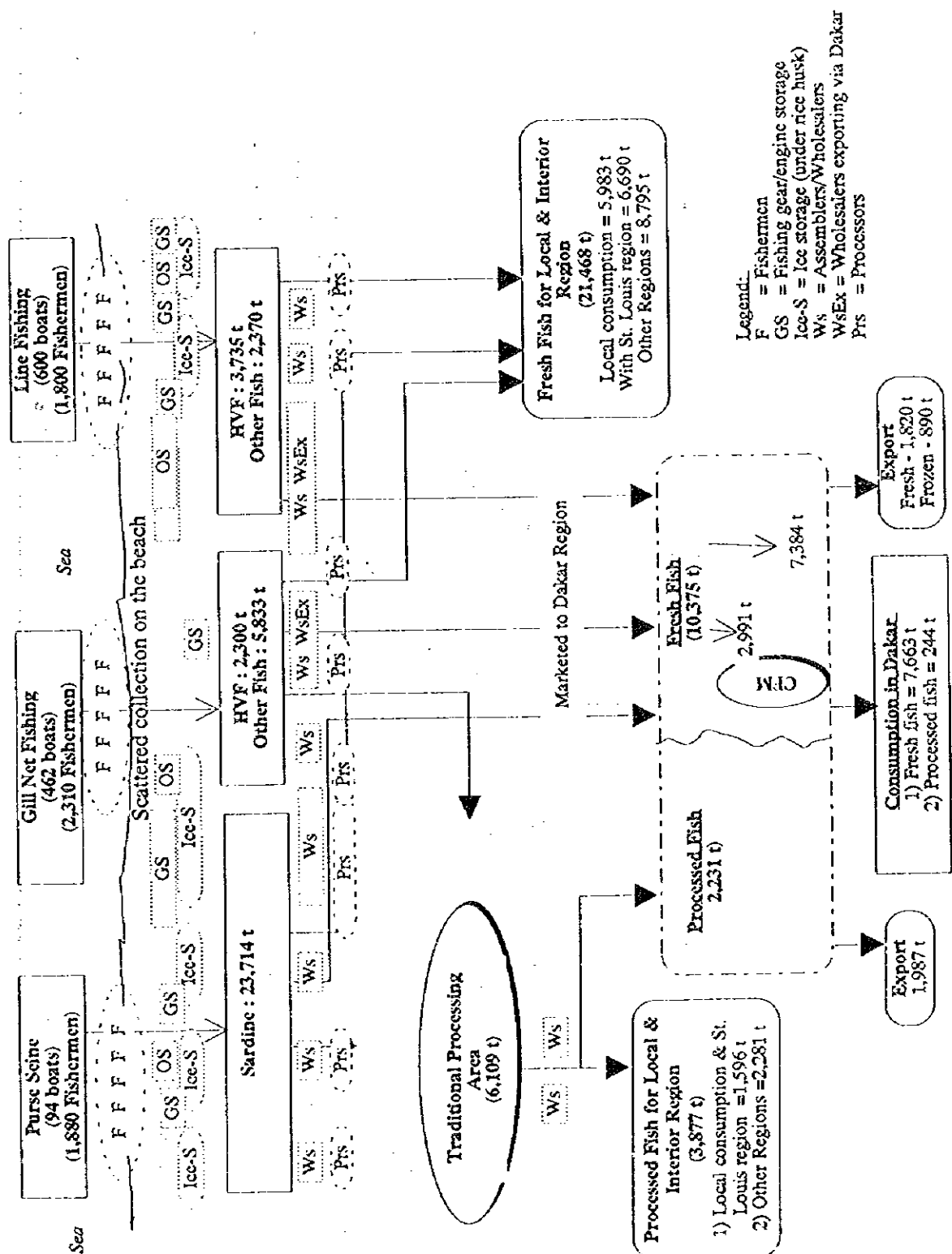
Fishermen do not have any access to marketing information except the wholesalers. The following information system is noted during the survey (Fig. I.2.3-6).

Professionals

- Wholesalers in the production area get collection order for specific fish species and quantity by certain time.
- Wholesalers then instruct fishermen to go fishing by providing fishing inputs such as ice, fuel, food, etc.
- Wholesalers (independent) telephone processors in Dakar for orders or inform the quantity and species he has collected.
- Wholesalers in need of transport, call Dakar for rental of trucks.
- Fishermen's access to any information is through wholesalers in the production area or friend and relatives in the consumption area.
- Fishermen, do in some instances, contact wholesalers in the consumption area during the glut seasons.

DOPM Regional Office

- DOPM records daily quantity of fish transported by wholesalers, who are obliged to report to the DOPM inspectors to receive quality certification for each shipment of fresh fish and processed fish.
- Data obtained during this process are quantity and species by destination.
- Daily data is compiled to monthly report and sent to Dakar DOPM office for statistical purpose.
- Data obtained through process only indicates the marketed volume of fish and not the landed volume of fish.
- Regional DOPM office works with two inspectors with minimum office facilities without any automation such as computers, etc.



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

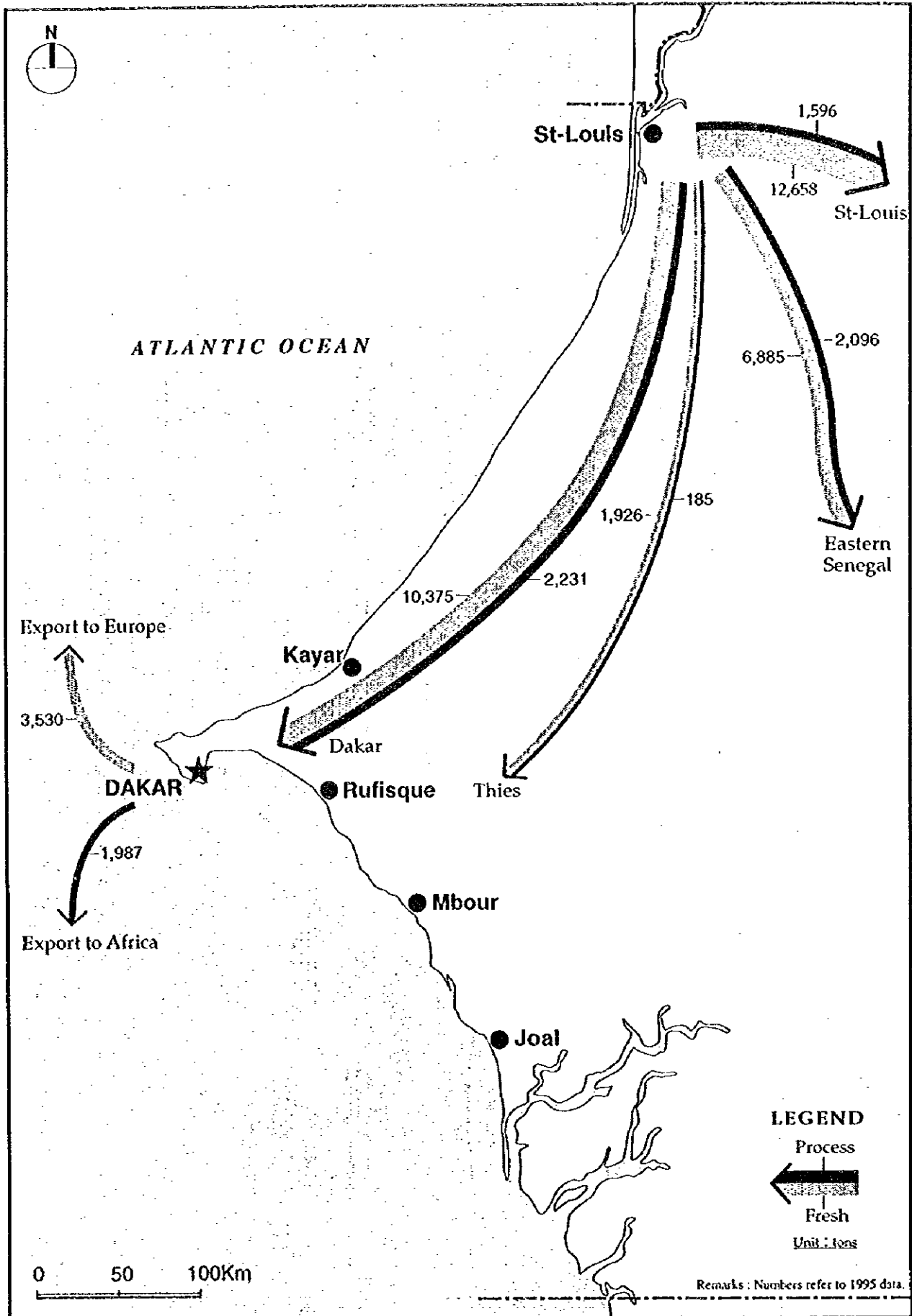
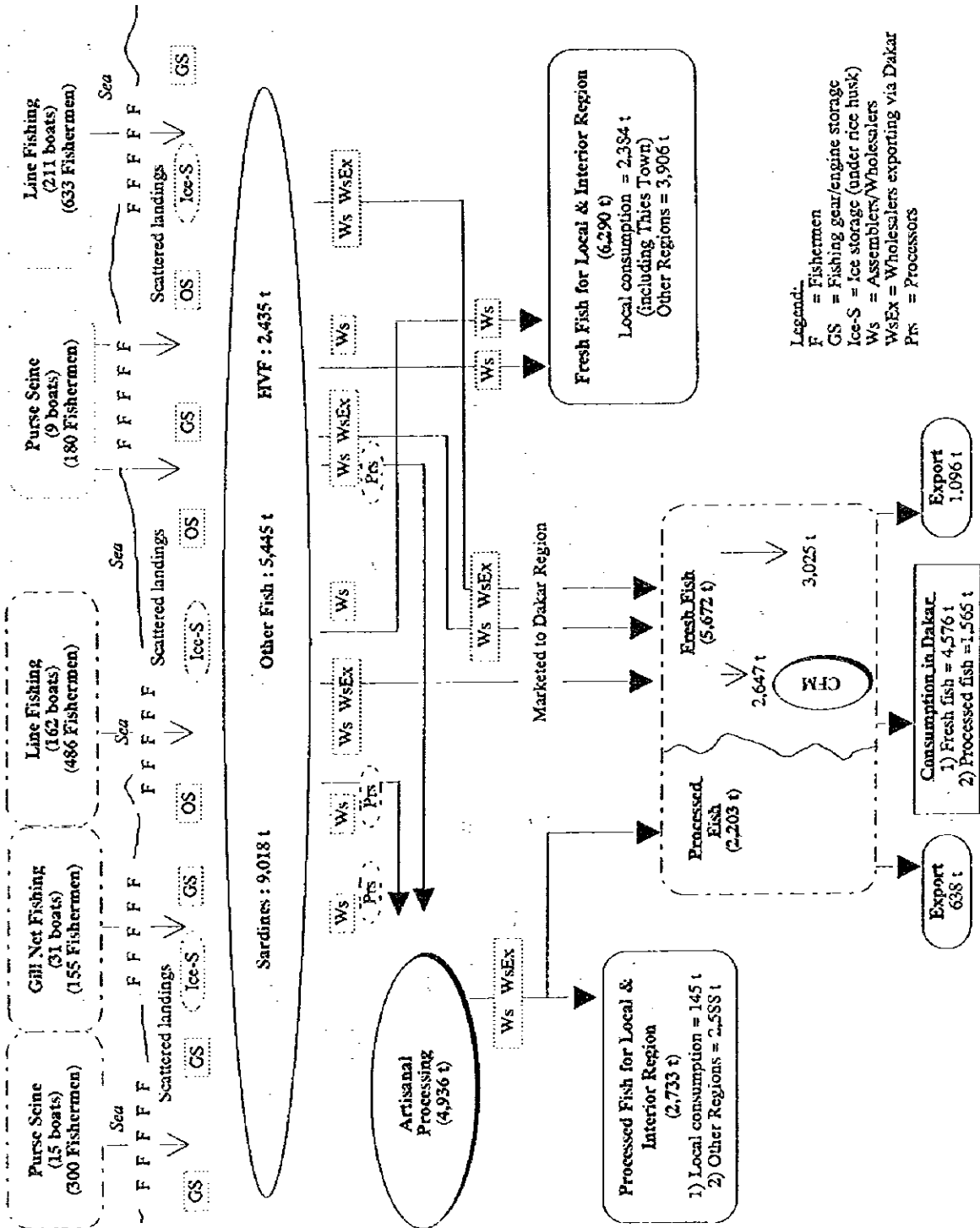


Fig. I.2.3-2 Flow Volume of Fresh and Processed Fish by Destination from Saint Louis (1995)

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

Migrant village

Traditional village



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

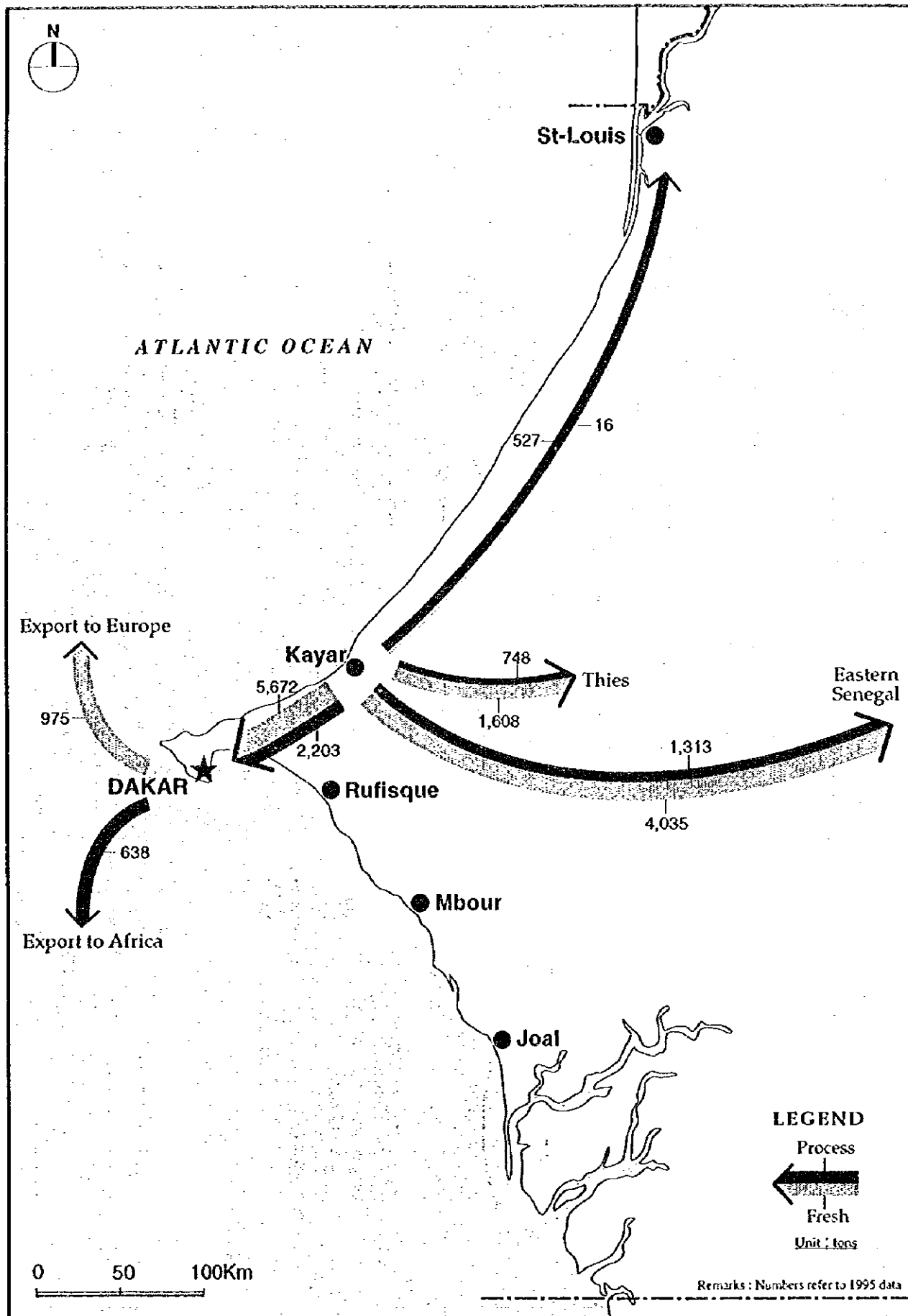
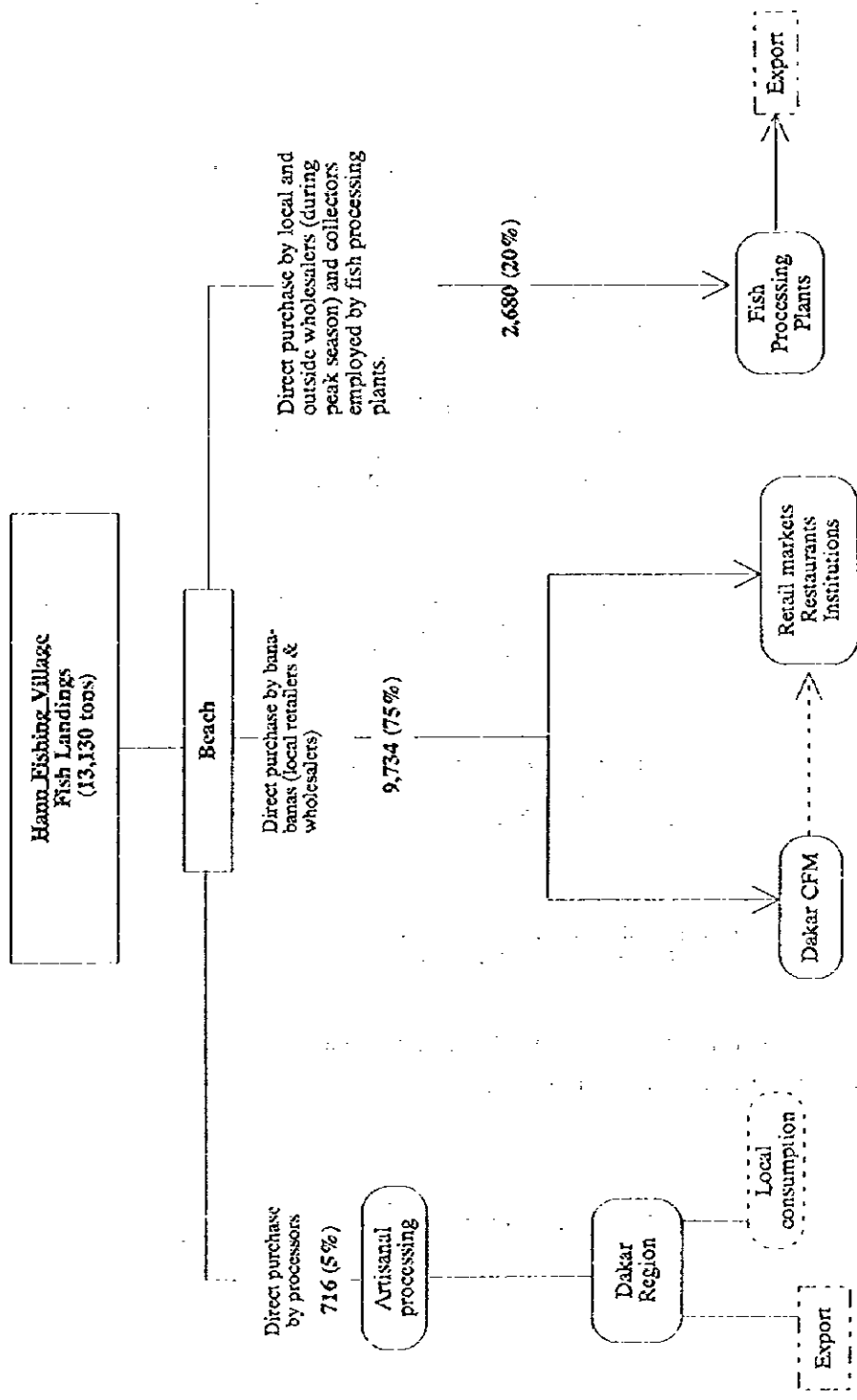


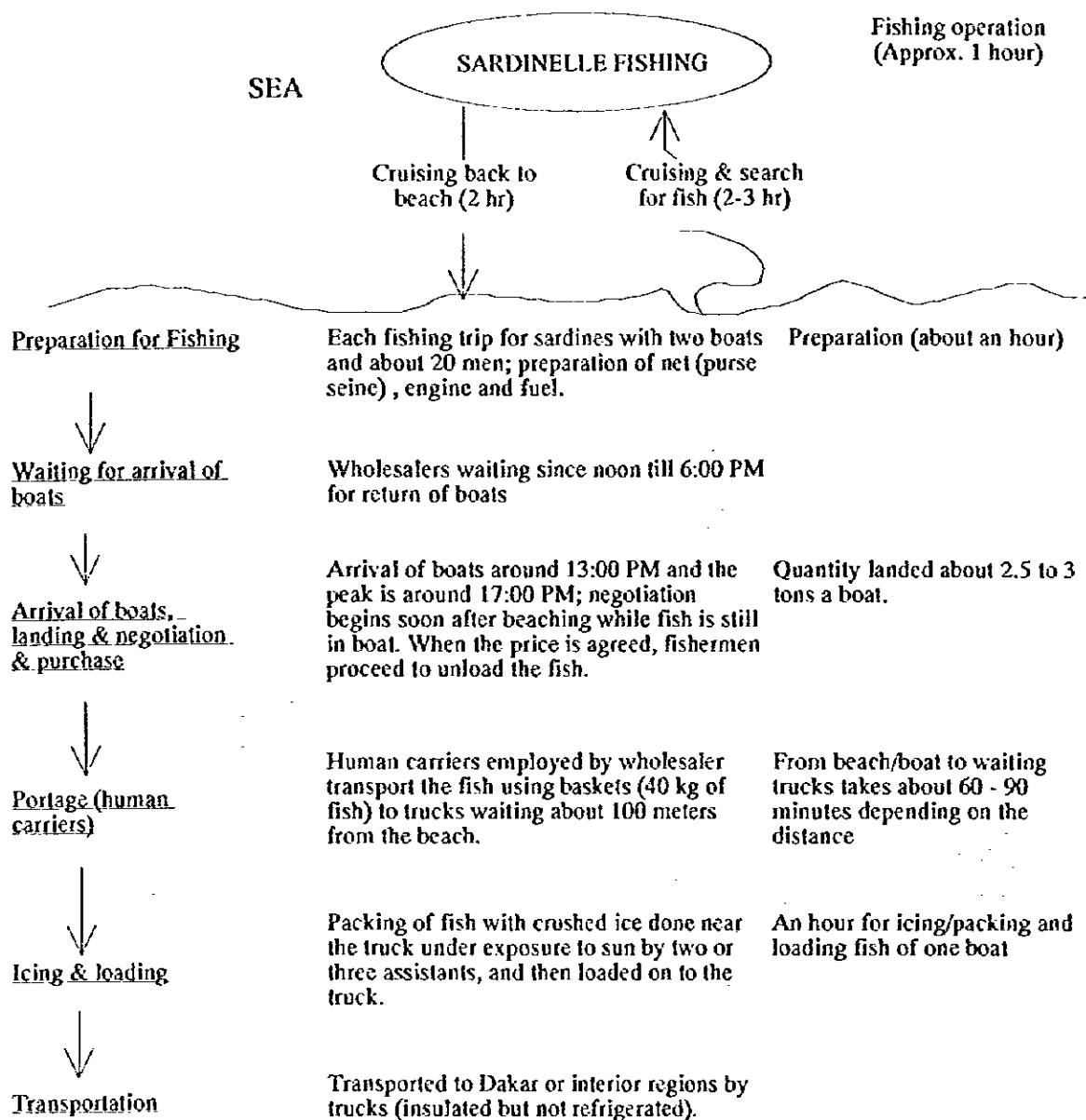
Fig. I.2.3-4 Flow Volume of Fresh and Processed Fish by Destination from Kayar (1995)

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



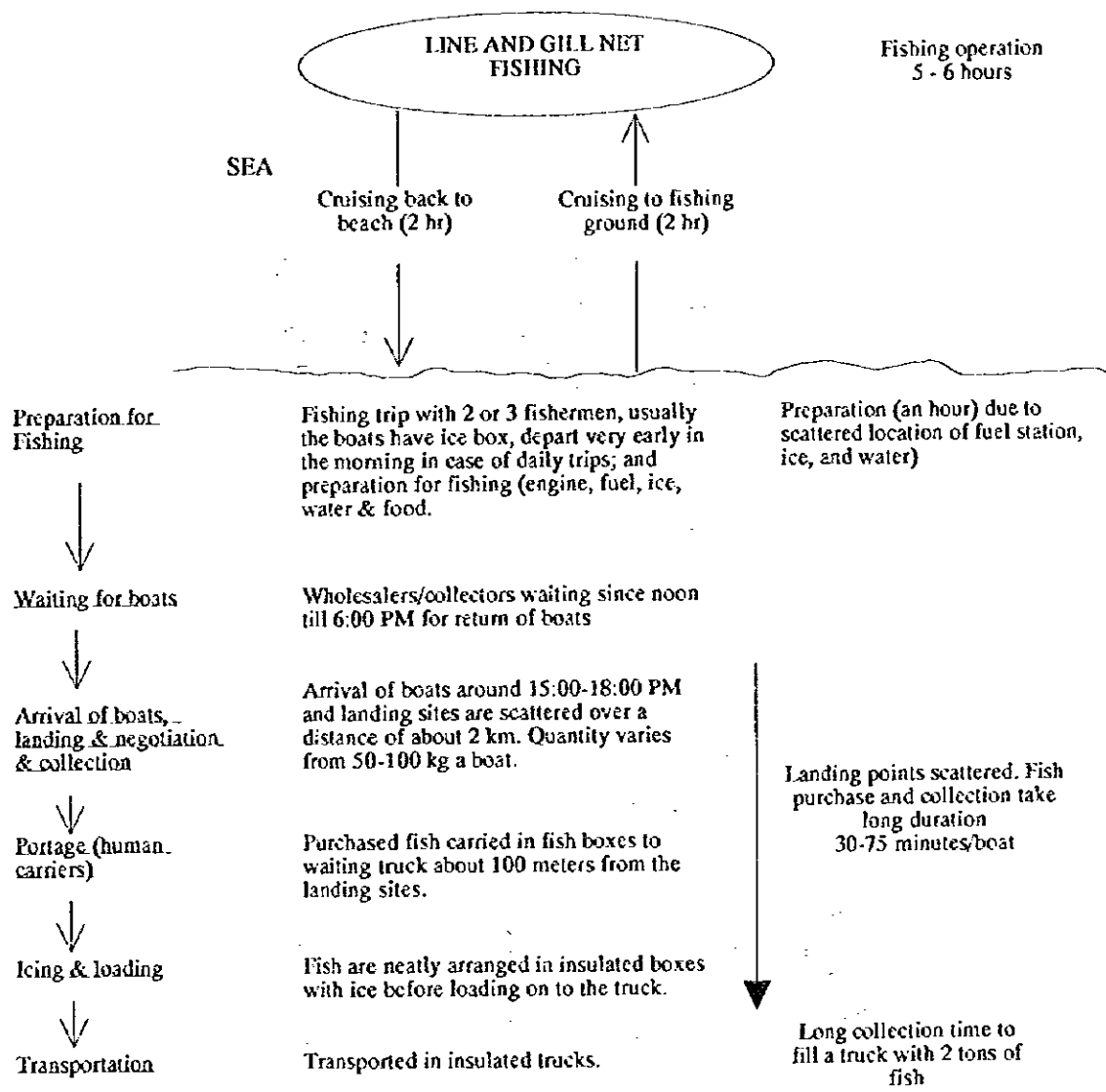
Remarks: Figures refer to 1995 data in tons.
 Source: Field Survey of Phase I (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct-Dec, 1996

Fig. I.2.3-5 Fish Marketing Pattern and Quantity Flow of Hann (1995)



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

Fig I.2.3-6 Marketing System for Sardinelle Fishing



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

Fig. I.2.3-7 Marketing System for Line and Gill Net Fishing

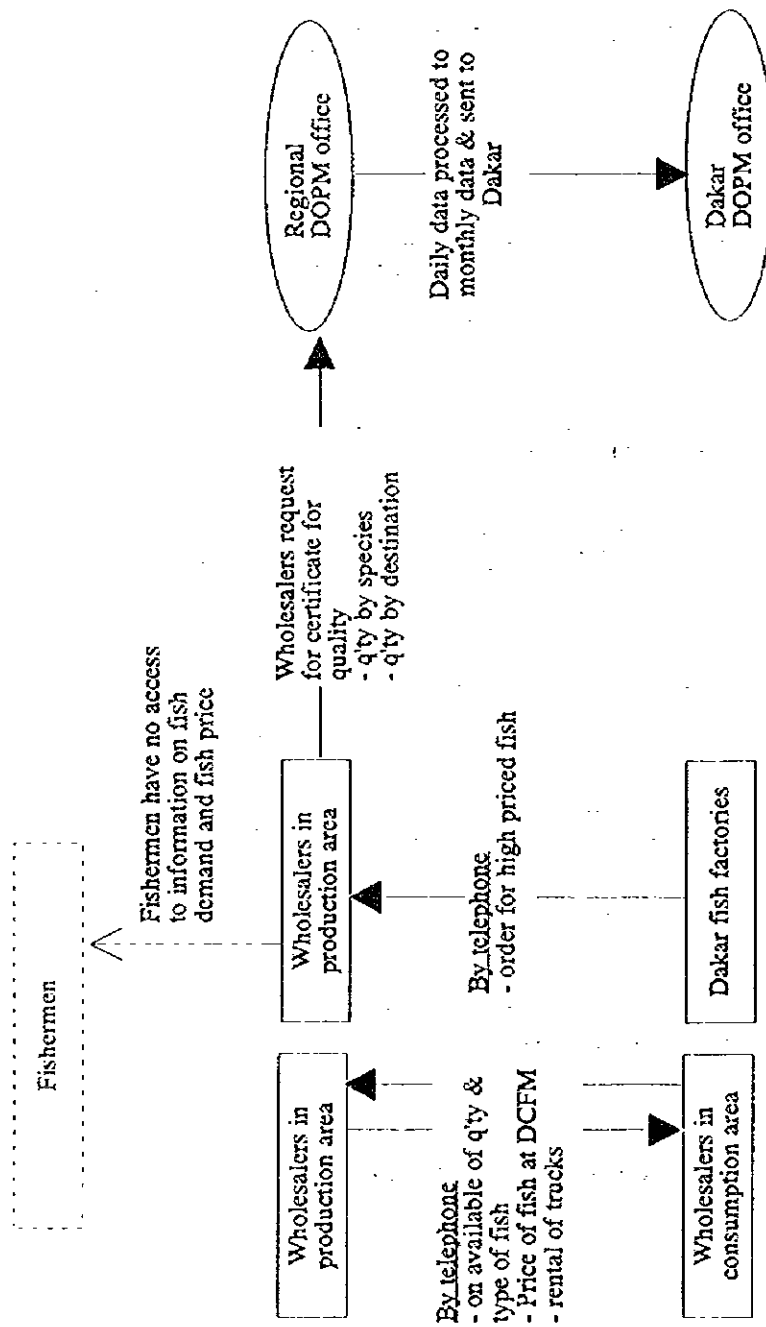


Fig.1.2.3-8 Fish Marketing Information System

Table I.2.3-1 Artisanal Fish Production in Study Area and Its Consumption (1995)

Unit: Tons

	Production	Share of study area	Type of Consumption			Industrial Processing
			Local Consumption	Marketed Fresh	Artisanal Processing	
1. THIES NORD	19,724	23%	2,400	11,391	5,933	
1) Kayar	16,898	19%	1,872	9,960	4,936	
2) Fass Boye	2,363	3%	265	1,200	903	
3) Mboro	463	1%	263	231	94	
2. LOUGA REGION	1,744	2%	80	314	1,350	
1) Potou	664	1%	32	80	549	
2) Lompoul	1,080	1%	48	234	801	
3. ST. LOUIS REGION	37,952	44%	12,658	19,186	6,108	
1) Guet Nader (Sine)	36,054	41%				
2) Gandiol	1,898	2%				
4. DAKAR REGION	27,763	32%	14,493	7,170	2,760	3,340
1) Ngor	218	0%	49	145	25	
2) Yoff	2,403	3%	1,598	20	125	
3) Hann	13,130	15%	8,839	895	716	
4) Rufisque	6,422	7%	2,597	2,894	931	
5) Bargny	1,370	2%	146	616	608	
6) Pikine	316	0%	302	7	7	
7) Soumbédioune	3,570	4%	816	2,465	289	
8) Yenne	333	0%	145	129	59	
Sub-total	87,183	100%	29,631	38,061	16,152	3,340
5. Industrial fishing	1,781		1,781			
6. Import (Mauritania)	811		811			
Total	89,775		32,223	38,061	16,152	3,340

Remarks :

- 1) Data of Oukam is included in Ngor.
- 2) Data of Thiaroye is included in Pikine.
- 3) Data of Toubab Dialano is included in Yenne.
- 4) Approximately 1,781 tons of fresh fish from industrial fishing and 811 tons of imported fresh fish are consumed locally in Dakar.

Source :

- 1) Compiled from monthly records of Service Regional Stations of Kayar and Saint Louis, 1995, and DOPM Statistics, 1995
- 2) Compiled from daily records of Dakar Central Fish Market, CFM 1995

Table I.2.3-2 Origin and Destination of Fresh Fish and Processed Fish in the Study Area (1995)

ORIGIN	DESTINATION										TOTAL	SHARE	
	DOMESTIC CONSUMPTION												EXPORT
	Local Consumption	Dakar Region	Kaolack Region	Other Regions	Sub-Total	Dakar Region	Kaolack Region	Other Regions	Sub-Total	EXPORT			
Thies	2,400	6,156	2,115	2,145	12,816	975	13,791	70%					
Nord	325	2,005	235	2,730	5,295	638	5,933	30%					
Sub-total	2,725	8,161	2,350	4,875	18,111	1,613	19,724	100%					
St. Louis	12,658	7,665	469	8,342	29,134	2,710	31,844	84%					
Process	1,596	244	-	2,281	4,121	1,987	6,108	16%					
Sub-total	14,254	7,909	469	10,623	33,255	4,697	37,952	100%					
Louga	80	50	-	-	130	265	395	23%					
Process	100	1,148	-	102	1,350	-	1,350	77%					
Sub-total	180	1,198	-	102	1,480	265	1,745	100%					
Dakar	17,084	-	1,094	5,181	23,359	4,235	27,594	91%					
Process	1,406	-	68	918	2,392	368	2,760	9%					
Sub-total	18,490	-	1,162	6,099	25,751	4,603	30,354	100%					
Total	32,222	13,871	3,678	15,668	65,439	8,185	73,624	82%					
Process	3,427	3,397	303	6,031	13,158	2,993	16,151	18%					
Total	35,649	17,268	3,981	21,699	78,597	11,178	89,775	100%					
Share	40%	19%	4%	24%	88%	12%	100%						

Remarks :

- 1) Local consumption refers to consumption in the region.
- 2) Approximately 1,781 tons of fresh fish of industrial fishing and 811 tons of imported fresh fish are included in the local consumption of Dakar region.
- 3) Export refers to fresh fish export; estimated at 30 - 40% of exportable fish landed.
- 4) Weight of processed products is expressed in whole weight (wet weight).
- 5) Study area refers to Kayar, Fass Boye & Mboro in Thies Nord, Guet Nader & Gandiol in St. Louis region, Potou & Lompoul in Louga region, and 10 fishing villages in Dakar region.

Source : Compiled from monthly records of Service Regional Stations of Kayar and Saint Louis, 1995, and DOPM Statistics, 1995

Table L.2.3-3 Distribution of Fish Landings by Category of Saint Louis (1995)

	FRESH FISH				PROCESS FISH				TOTAL
	Domestic Consumption		Export		Domestic Consumption		Export		
	Dakar	Others	EU	Africa	Dakar	Others	EU	Africa	
High Price Fish	3,325	-	2,710	-	-	-	-	-	6,035
Other fish	2,755	1,703	-	-	244	2,388	-	1,987	9,077
Sardinelle	1,585	19,765	-	-	-	1,490	-	-	22,840
Total	7,665	21,468	2,710	-	244	3,878	-	1,987	37,952

Unit: Tons

Remarks: 1) Total fish landings and quantity flow to Dakar and other regions, including local consumption from DOPM statistics.

2) Export of fresh fish and processed fish from DOPM statistics, 1995.

3) Classification of fish by category is based on the retail price.

4) Quantity flow of sardine to Dakar compiled from the daily record of CFM of 1995 & 1996 (Jan.-Nov.)

5) Sardinelle and other fish are not exported fresh.

6) About 30% of the high-priced fish (of St. Louis region) are assumed to be exported.

a) National average of export of fresh fish is about 35-40%.

b) Quality of high value fish is low; quality drops due to distance from Dakar and long duration for collection.

However, the quality is adequate for export as frozen fish.

Table L.2.3-4 Distribution of Fish Landings by Category of Kayar (1995)

	FRESH FISH				PROCESS FISH				TOTAL
	Domestic Consumption		Export		Domestic Consumption		Export		
	Dakar	Others	EU	Africa	Dakar	Others	EU	Africa	
High Price Fish	1,460	-	975	-	-	-	-	-	2,435
Other fish	1,657	1,073	-	-	1,565	2,077	-	638	5,445
Sardinelle	1,580	5,217	-	-	-	656	-	-	9,018
Total	4,697	6,290	975	-	1,565	2,733	-	638	16,898

Unit: Tons

Remarks: 1) Total fish landings and quantity flow to Dakar and other regions, including local consumption from DOPM statistics.

2) Export of fresh fish and processed fish from DOPM statistics, 1995.

3) Classification of fish by category is based on the retail price.

4) Quantity flow of sardine to Dakar compiled from the daily record of CFM of 1995 & 1996 (Jan.-Nov.)

5) Sardinelle and other fish are not exported fresh.

6) About 40% of the high value fish (of Kayar) are exported.

a) National average of export of fresh fish is about 35-40%.

b) Quality of high value fish is low; quality drops due to distance from Dakar and long duration for collection.

However, the quality is adequate for export as frozen fish.

c) About 40% is assumed for export of high value fish due to closeness to Dakar region.

2.4 Artisanal Fish Processing

(1) Production

The production volume of artisanal fish processing in the study area is shown in the Table I.2.4-1.

In 1995, about 6,108 tons of processed artisanal fish products were produced in Saint Louis, including Guet N'dar and Gandiol which formed about 38 percent of the total production volume of artisanal fish processing in the study area; and Kayar produced 4,936 tons of products, which was 31 percent of the total production volume. These figures are very large in comparison to other fishing villages in the study area. Therefore, Saint Louis and Kayar are the two largest production centers of artisanal fish processing in Grande Côte.

Tables I.2.3-2 show a comparison of the distribution of fish landing of the two artisanal fish processing centers of Saint Louis and Kayar.

The total amount of fresh fish in Saint Louis (37,952 tons) was much larger than Kayar (16,898 tons). But the ratio of fresh fish utilized for artisanal fish processing in Kayar (29%) was almost double that of Saint Louis (16%). Of the 4,936 tons of artisanal processed fish produced in Kayar, 4,298 tons (87%) were destined for domestic consumption, of which 35 percent (1,565 tons) were consumed in Dakar. In Saint Louis, about 4,122 tons (68%) were consumed domestically and 94 percent (3,878 tons) was consumed in the interior regions of Senegal. Kayar is the center of artisanal fish processing for Dakar and Saint Louis is a center for the interior regions and neighboring African countries.

As for the species used for fish processing, about 26 percent of the total artisanal processed products from Saint Louis were of sardinelles, and none were marketed to Dakar. The remaining of 74 percent were made of species categorized as *other fish* which included ray and shark. In Kayar, about 45 percent of the raw materials of *ketiakh* were sardinelles, of which 71 percent were distributed to Dakar. High priced fish were not used for artisanal fish processing. In both regions, *other fish* were used for export and sardinelle products were not included for export.

In Kayar, *ketiakh* is was one of the most popular products. In Saint Louis, the ratio of *ketiakh* products was relatively low, due to the smoking process which gives the processors very limited working space to select the processing of other products. *Saly* has become more popular using the species of "other fish" in both Kayar and Saint Louis because the products can be sold at a high price in the African countries. Major processed artisanal fish products are introduced in chapter "I.1.4 Artisanal Fish Processing" of this report.

(2) Processing Activities

In Saint Louis, the main production activities were conducted in the Guet N'dar area. Approximately 900 processors were actively working in the limited processing areas located along the Saint Louis River and the coastal area. Most of them are fishermen's wives working independently in small scale businesses, who buy fish directly from fishermen, including their husbands and sons or from middlemen; and they sell fish to wholesalers who come to the processing areas to collect their products.

The work environment including sanitary and security conditions in the processing area is very poor and there is no water supply, electricity, drainage, cement floor, etc. The Saint Louis municipality has implemented a project to improve the sanitary and security conditions in the processing area.

GIEs have been formed by the processors in order to use the formal credit system, however, accessibility to formal credit is very limited. The number of processors in each GIE is 50 to 300 members. The GIE processors have good access to the mutual fund, however, they seldom use the formal credit system provided by CNCAS due to its complicated procedures and stringent requirements.

In Kayar, Lompoul, and Fass Boye, artisanal fish processing activities are actively carried out by the permanent women villagers and by the transmigrants' wives. The fishermen and their wives from Saint Louis introduced artisanal fish processing skills to these areas. The sanitary and security conditions in the processing area of these three fishing villages and accessibility to formal credit systems are major issues.

According to data provided by the PAFGC project, a high level income of a processor in Kayar in 1994 was about FCFA 139,000 a month, a middle level income was FCFA 100,000 a month and a low level income was FCFA 50,000 a month. In Fass Boye, a high level income was FCFA 150,000 a month, a middle level income was FCFA 100,000/ a month and a low level income was FCFA 25,000 a month. These income levels were not lower than fishermen's income.

In the Dakar Region, artisanal fish processing activities are limited. In Bargny, there were about 300 artisanal fish processors working in the processing facilities constructed through a municipal project. Their work environment has improved, but they have difficulties in getting raw materials and selling their products in the fresh fish market.

There are also fish processors employed by exporters. They process and pack raw materials provided by employers into boxes according to their instructions. They sometimes re-dry the products processed in Saint Louis to meet the quality levels

required for export. Payment to these processors in Yoff was FCFA 50/kg. In Yoff and Thiaroye, there are a few groups of employed processors.

(3) Important Issues to be Resolved

In order to improve the current condition in artisanal fish processing in the study area, the following issues needed to be considered in the planning.

Effective utilization of fishery resources

Artisanal fish processing has contributed to effective utilization of fishery resources by using surplus fresh fish mainly due to lack of preservation facilities. However, a shortage of raw materials and the low quality of fresh fish available for artisanal fish processing are the major problems.

Improvement of processing method and environment

Artisanal fish processing provides income opportunities for women and is a source of protein to the interior. However, the work environment needed to be improved to allow processors to work under effective and safe conditions. In addition, if the quality of processed products is improved through the following approach, it will increase the potentiality of the activities as a source of income and protein.

- Relocate the processing areas from the beach to the concrete covered areas in order to prevent the products from mixing with impurities, particularly sand
- Provide the processing areas with water supply, drainage facilities and toilets
- Provide a facility for waste materials (fish head, entrails, etc.)
- Provide light for working at night
- Provide storage facilities to keep the products at room temperature as well as from theft or moisture
- Provide roofs to protect processors from direct sunlight and rain excluding the drying area
- Provide nursery and kindergarten facilities near the processing areas

Institutional reform

Processor organizations have been promoted through various projects to enhance the empowerment of women. If these projects are well coordinated according to the following approach, they will function efficiently and effectively.

- Promote cooperative activities to buy raw materials and sell products to wholesalers
- Establish and strengthen the local union of GIEs and processor groups and

promote networking between them

- Improve accessibility to credit, especially a mutual fund system, which will be managed and operated by community members by employing a staff member in credit and hiring an accountant when as needed, and to assign qualified personnel from the private sector or DOPM officer, and to educate community members through on-the-job training (OJT)
- Improve the training system for women in the fields of literacy education, income generating processing skills, marketing, accounting, credit utilization, sanitation and hygiene, home economics
- Training for group activities, leadership training
- Provide basic information about their rights and duties, civil code and fishery regulations

Table I.2.4-1 Production of Artisanal Fish Processing in Study Area (1995)

Study Area	(Unit: Tons)	
	Production of Artisanal Fish Processing	Share in the Study Area
1. North Thies		
(1) Kayar	4,936	6%
(2) Fass Boye	903	5.6
(3) Mboro	94	0.6
Sub-total	5,933	36.8
2. Louga region		
(1) Potou	549	3.4
(2) Lompoul	801	4.9
Sub-total	1,350	3
3. St. Louis Region	6,108	37.8
4. Dakar Region	25	0.2
(1) Ngor	125	8
(2) Yoff	716	4.4
(3) Hann	931	5.8
(4) Rufisque	608	3.8
(5) Bargny	7	0.04
(6) Pikine	289	1.8
(7) Sountbédioune	59	0.3
(8) Yenne	*1	
(9) Thiaroye	*2	
(10) Toubab Dialano		
(11) Ouakam	*3	
Sub-total	2,760	17.1
Total in the Study Area	16,151	100.0%

Remarks: *1: Ouakam data may be included in Ngor.
 *2: Thiaroye data may be included in Pikine.
 *3: Toubab Dialano data may be included in Yenne.

Source: Compiled from monthly records of Regional Service Stations of Kayar and Saint Louis, 1995, and DOPM Statistics, 1995

Table II.2.4-2 Distribution of Fish Landing by Category of Saint Louis & Kayar (1995)

(Unit: Tons)

	Fresh fish	Artisanal fish processed products						Total
		domestic consumption			export		total	
		Dakar	others	sub-total	EU	Africa		
1. St. Louis								
High price fish	6,035	-	-	-	-	-	-	6,035
Other fish	4,458	244	2,388	2,632	-	1,987	1,987	4,619
Sardinelles	21,350	-	1,490	1,490	-	-	-	1,490
Total	31,843	244	3,878	4,122	-	1,987	1,987	6,109
(Share)	(83.9%)	(0.6%)	(10.2%)	(10.9%)	(0.0%)	(5.2%)	(5.2%)	(16.1)
2. Kayar								
High price fish	2,435	-	-	-	-	-	-	2,435
Other fish	2,730	-	2,077	2,077	-	638	638	2,715
Sardinelles	6,797	1,565	656	2,221	-	-	-	2,221
Total	11,962	1,565	2,733	4,298	-	638	638	4,936
(Share)	(70.8%)	(9.2%)	(16.2%)	(25.4%)	(0.0%)	(3.8%)	(3.8%)	(29.2%)

Source:

- 1) Total fish landings and quantity flow to Dakar and other regions, including local consumption from DOPM statistics.
- 2) Export of fresh fish and processed fish from DOPM statistics, 1995.
- 3) Classification of fish by category is based on the retail price.
- 4) Quantity flow of sardinelle to Dakar compiled from the daily record of CFM of 1995 & 1996 (Jan.-Nov.).
- 5) Sardine and other fish are not exported fresh.
- 6) About 30% of the high price fish of Saint Louis region and about 40% of those of Kayar assumed to be exported.
 - a. National average of export of fresh fish is about 35-40%.
 - b. Quality of high value fish is low; quality drops due to distance from Dakar and long duration for collection. However, the quality is adequate for export as frozen fish.
 - c. About 40% is assumed for export of high price fish due to closeness to Dakar region.

2.5 Fish Quality and Pricing Mechanism

(1) Fish quality

In order to identify the present condition of fish quality, a freshness test was conducted. As an indicator of fish freshness, K-value and body temperature were measured at each stage of fish distribution from landing to market in order to identify problems in freshness of fish and the appropriate method to control freshness. K-value means to measure the cbb and flow of ATP (Adenosine Triphosphate) which indicates autolysis in the muscles. K-value is determined by the test paper method (FTP-III-EAC Corporation) and it is expressed as a percentage index. A lower index means a fresher quality fish.

The freshness test was carried out on sardinelles sampled in stages of two areas:

- Rufisque in Dakar region (Landing site ---> CFM---> Retail Market
- Saint Louis (Landing site --->Collection/Packing/Loading -----> CFM)

The results of the freshness test of sardine fish sampled at Rufisque and Saint Louis are plotted and shown in Fig. 1.2.5-1, which indicates the quality change at different stages. The K-value at Rufisque landing site ranged between 5.5 to 8 percent, at the central market 5.5 - 15.5 percent, and at the retail market from 10 - 23 percent; this indicates that despite relatively high quality at the Dakar Central Fish Market (CFM), the quality at the retail market dropped, due to less ice being used during transport to and at the retail market.

As in the case of fish landed at Saint Louis, the fish quality was relatively high (K-value was less than 10%). However, the quality dropped to about less than 15 percent during the period of collection, portage, packing, storing, and loading until departure, due to a long waiting time before leaving Saint Louis. The K-value at CFM was around 23 percent indicating the quality had dropped, and more or less maintained the same quality until the Dakar Central Fish Market (K-value ranged between 13 - 23%).

It can be surmised that fish quality has been rather well controlled on board during fishing; and ice is being used effectively depending upon the length of stay at the fishing ground and temperature by season. Major problems of fish quality control and on the use of ice have been during the stage from fish landing sites to consumption areas. At the production area, it takes much time from landing, purchasing, collection in small quantities from scattered landing points, portage to truck parking area, packing, and marketing at the fish landing sites because of a poor marketing infrastructure. In addition to the sanitary conditions prevailing, handling is

not effective, and it may give rise to quality loss. This means that cost for ice and labor and time loss are the major constraints to be solved at the fish landing sites.

The changes in K-value of sardinelles exposed to ambient (air temperature fluctuated between 24.8-28.2 degree centigrade) and iced conditions kept under shelter (without exposure to sun) are plotted and shown in Fig. I.2.5-2. The K-values increased from less than 10 percent to about 12 percent in 8 hours, 20 percent in 12 hours and to 50 percent in 20 hours, without ice, while the K-value was below 10 percent for 20 hours in iced condition. It can be surmised that with proper handling and storage facilities, the quality loss of fish can be reduced.

(2) Fish Pricing Mechanism

1) Current fish price

The classification of major fish by retail price in 1995 is shown in Table I.2.5-1 and its summary of group by value is shown in Table I.2.5-2.

The retail price of major species ranged from less than FCFA 100/kg of sardinella to more than FCFA 2,000/kg for thiof. The price of the fish depends on its size rather than on its quality at the CFM. In the case of sardinella, remarkable differences between 180g and 280g of fish were observed at prices of 50 FCFA/kg and 100 FCFA/kg, respectively. There was also no clear relationship between the price and the supply because only about 19 percent of the total supply to Dakar passed through the CFM, and for an effective price mechanism, it is necessary for more fish to pass through CFM.

2) Fish price before and after devaluation

The fish price changes before and after devaluation in CFM and for exportable fish is shown in Table I.2.5-3. In spite of the 100 percent increase in the cost of fishing inputs during 1993 and 1994, the fish price of some 23 major species has increased on an average around 30 percent.

The price of sardinelle in 1993 (FCFA 50/kg to FCFA 100/kg in CFM) did not increase much in 1995 (FCFA 107/kg). On the other hand, the prices of some export fish drastically increased - the price of drade (bream) increased 200 percent, carpe rouge (red snapper) increased 109 percent. On an average the increase ratio of 21 kinds of export fish was 88 percent from 1993 to 1994.

3) Marketing cost and margins

The study on marketing cost and margins of two fish species namely sardinelle and carpe blanche were carried out in 20 and 22 November 1996. The main components of fish pricing for sardinella and carpe blanche (sompatt, a medium

value fish) from fishermen to consumer are summarized in Table I.2.5-4. The producer price of sardinella at the landing site in Saint Louis was 20 FCFA/kg, the wholesale price to retailer was about 70 FCFA/kg, and the retail price to consumer was about 95 FCFA/kg (Thiaroye market). The income shares (margin) of fishermen, wholesaler and retailer were 10 FCFA (10%), 25 FCFA (26%) and 14 FCFA (15%) of the retail price 95 FCFA/kg, respectively.

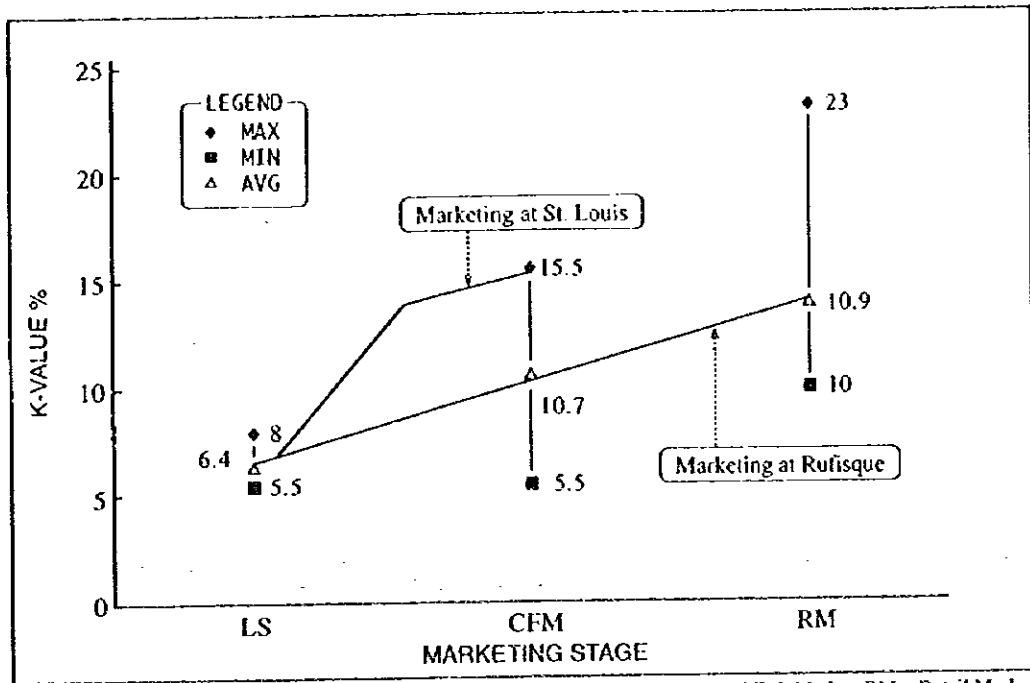
This kind of study is rather difficult to grasp the reality of the price mechanism because the price and margin varies greatly by day, location, etc. A study by ISRA on sardinelle in 1996 shows the margins of fishermen, wholesaler and retailer were 27 percent, 35 percent, 38 percent of the retail price, respectively. The study suggest relatively high margins for wholesaler to offset the high cost of ice and transport of Saint Louis fish.

On the other hand, the producer price of carpe blanche at the landing site (Joal) was 225 FCFA/kg, the wholesale price to retailer was about 351 FCFA/kg, and the retail price to consumer was about 423 FCFA/kg in Dakar. The income shares (margin) of fishermen, wholesaler and retailer were about 114 FCFA (27%), 93 FCFA (22%) and 46 FCFA (11%) of the retail price of 423 FCFA/kg, respectively.

The margins of high-priced fish were surveyed in Kayar 1997 through interviews of fishermen and fish exporting factory about dorade (sea bream) trading. The factory or exporter takes a margin of more than 60 percent, while they pay 1,000 FCFA/kg for air freight which accounts for about 30 percent of the price.

4) Income distribution

Income distribution of fishermen and owners of boat, engine and fishing gears was estimated based on interview survey in Hann and Saint Louis. The comparison of operation cost and income distribution of different fishing methods is shown in Table I.2.5-5. The operation cost varies according to different fishing method and fishing days, about 576,200 FCFA for a 10-day fishing trip, 135,00 FCFA for 7-day fishing trip and 8,000 FCFA for daily trip. The monthly income of fishermen ranged from 14,000 FCFA to 44,610 FCFA, indicating fishermen on longer trips earn better than the fishermen on shorter trips and daily trips.



Remarks : LS = Landing Site CFM = Central Fish Market RM = Retail Market

Fig. I.2.5-1 Freshness Test of Sardinelle Sampled in Dakar Region (Rufisque)

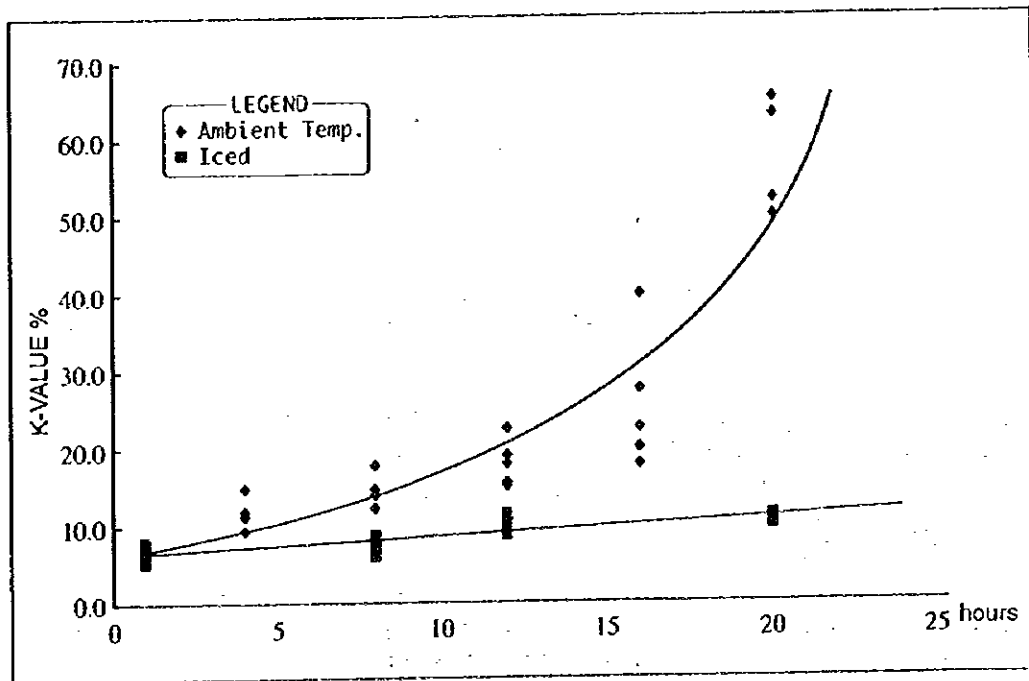
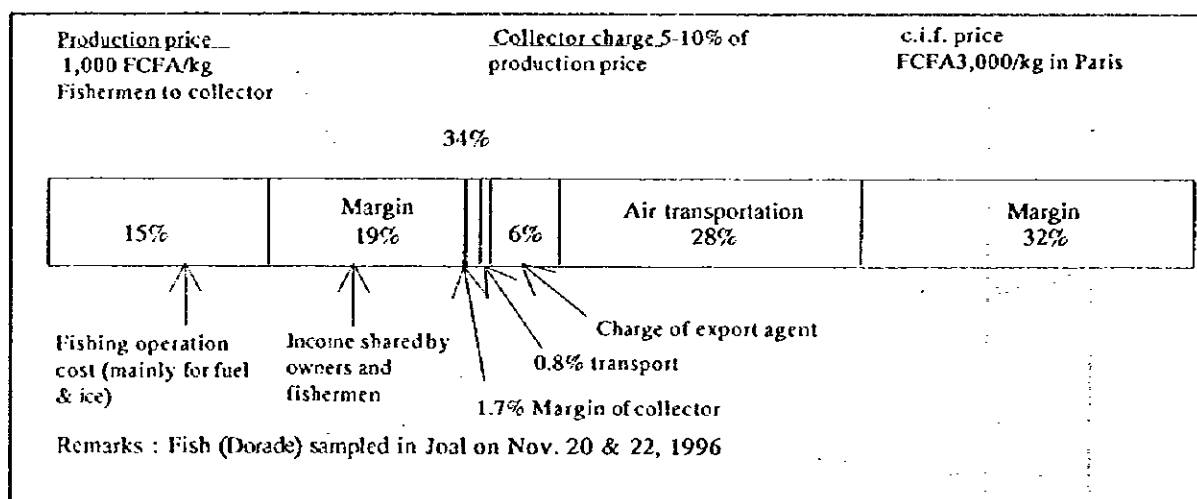
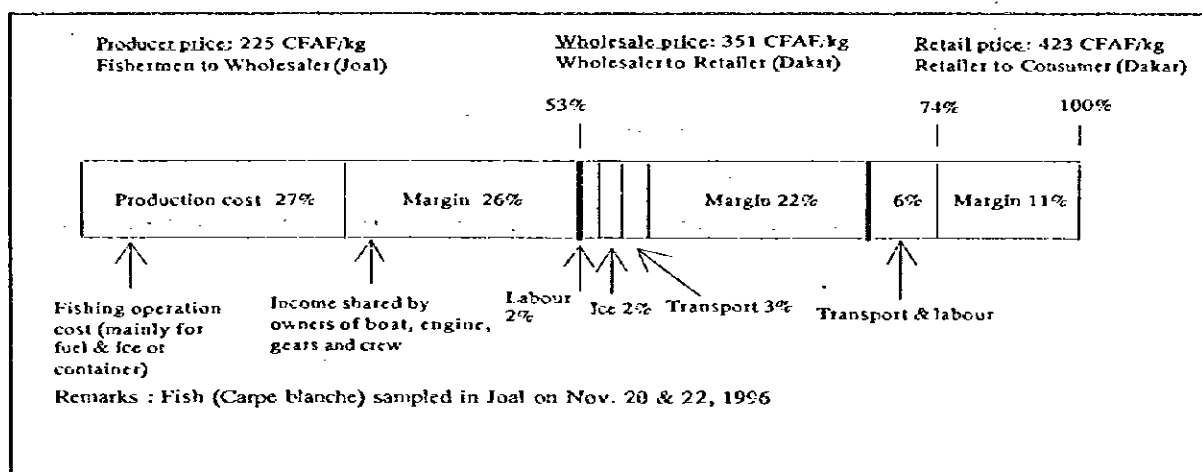
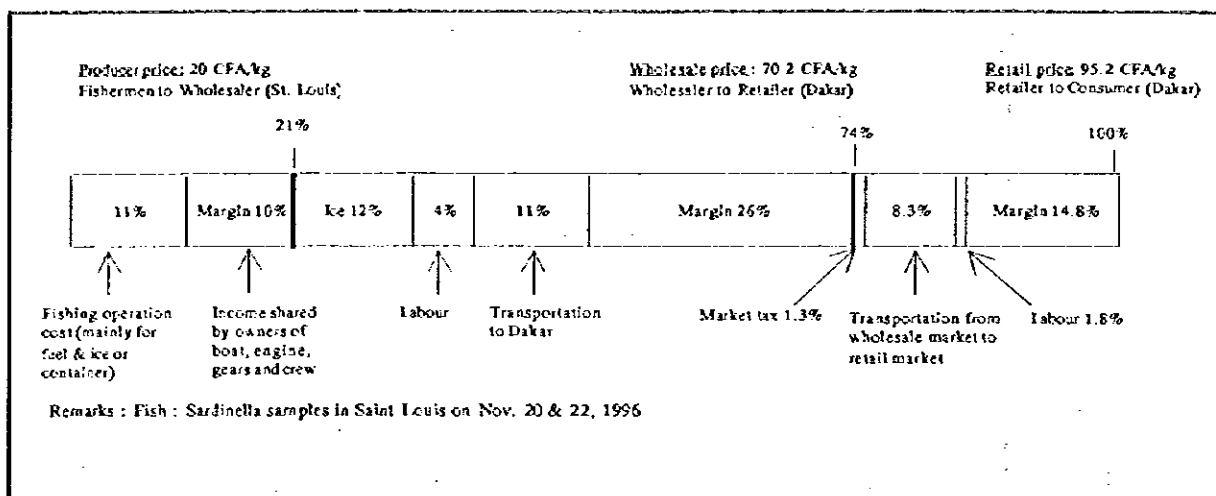


Fig. I.2.5-2 Changes in K-value of Sardinelle at Ambient and Iced Conditions



Source : Field Survey of Phase I & II (The Study on the Development Program for Northern Fishing Areas in Senegal) Oct., 1996 - Nov. 1997.

Fig. I.2.5-3 Market Cost and Margins of Three Fish Species

Table I.2.5-1 Classification of Fish by Retail Price (1995)

LOWER PRICE FISH, LESS FCFA 250/kg		MIDDLE PRICE FISH, FCFA 250-500/kg	
LOCAL NAME	CFA/kg	LOCAL NAME	CFA/kg
1 SARDINELLA PLATE	47	12 MAQUEREAU BONITE	282
2 ETHMALOSE	89	13 LOTTE	286
3 SARDINELLA ROUND	107	14 BROTULE	288
4 YET	152	15 GRDE CARANGUE	295
5 RAIE	167	16 CARANGUE	301
6 REQUIN	173	17 TILAPIE	301
7 MUSSOLINI	179	18 CARPE BLANCHE	306
8 MACHOIRON	179	19 MULET	306
9 THONINE	180	20 DREPANE	375
10 ZEBRE	205	22 TURBOT	443
11 CHINCHARD	211	23 LICHE	445
		24 PAGEOT	485
		25 DRADE GRISE	496

HIGH PRICE FISH 1. FCFA 500-1,000/kg		HIGH PRICE FISH 2. MORE FCFA 1,000/kg	
LOCAL NAME	CFA/kg	LOCAL NAME	CFA/kg
26 TASSERGAL	521	39 SEICHE	1,008
27 OTHOLITHE	584	40 SOLE LANGUE	1,026
28 TRUITE DE MER	587	41 DRADE ROSE	1,075
29 COURBINE	624	42 ROUGET	1,095
30 DOI	635	43 MEROU ROUGE	1,188
31 BADECHE	675	44 CARPE ROUGE	1,212
32 CAPITAINE	695	45 POULPE	1,231
33 TOUFFA FRAIS	785	46 SOLE ROCHE	1,296
34 PAGRE	794	47 CREVETT	1,350
35 CALAMAR	899	48 DENTEX	1,360
36 SAR MARBRE	905	49 THIOF	1,503
37 DIPLODUS	933	50 MEROU JAUNE	1,784
38 BROCHET	948	51 RASCASSE	2,151
		52 CIGALE DE MER	4,457
		53 LANGOUSTE	5,759

Source: Record of retail prices of DOPM, 1995.

Table I.2.5-2 Fish Production by Fish Value Categories in the Study Area (1995)

	St. Louis	%	Louga	%	Kayar	%	Dakar	%
Low price fish	28,845	76%	1,238	71%	11,830	70%	17,480	63%
Middle price fish	4,140	11%	178	10%	2,100	12%	3,150	11%
High price fish	1,895	5%	140	8%	335	2%	1,583	6%
Others	3,072	8%	188	11%	2,633	16%	5,550	20%
	37,952		1,744		16,898		27,763	

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

Table I.2.5-3 Fish Price Changes Before and After Devaluation

1) In Dakar Central Fish Market

Type of fish	Scientific name	Unit: FCFA/kg		
		1993	1994	Percent change
Sardinelle	Sardinella spp.	50-100	50-150	34%
Sompall	Pomadasys spp.	150-350	200-350	10%
Machioron	Arius spp.	100-175	200-300	82%
Brochet	Sphyraena spp.	200-250	250-400	44%
Pageot	Pagellus bellottii	150-250	150-300	13%
Thiof	Epinephelus spp.	900-1,000	1000-1,300	21%

2) For Export Fish

Type of fish	Scientific name	Unit: FCFA/kg		
		1993	1994	Percent change
Thiof	Epinephelus spp.	1,200	1,500-1,700	33%
Merou jaune	Epinephelus spp.	1,500	2,500	67%
Dorade rose		600-700	1,800-2,200	210%
Pageot	Pagellus bellottii	350-400	650	63%
Pagre	Sparus caeruleostictus	600	1,000-1,100	83%
Dentex	Dentex spp.	1,000	1,500	50%
Sar	Diplodus spp.	600	900	50%
Sole langue	Cynoglossus pp.	800	1,500	88%
Carpe rouge	Lutjanus fulgens	800	1,500-1,600	110%

Source: Field survey in Phase 1 (The Study on the Development Program for Northern Fishing Areas in the Republic of Senegal), Oct.-Dec., 1996.

Table I.2.5-4 Main Component of Fish Pricing of Sardinelle and Carpe Blanche

Items	FCFA/kg of Sardinelle	Share of retail price (%)	FCFA/kg of Carpe Blanche	Share of retail price (%)
1. Fishermen				
Fish price paid to fishermen	20	21%	225	53%
2. Wholesaler/Middlemen				
1) Ice	11.1	12%	8	2%
2) Labour	3.9	4%	13	3%
3) Transport to Dakar	10.1	11%	13	3%
4) Margin	25.1	26%	92	22%
3. Retailers				
1) Transport to retail markets	7.9	8%	25	6%
2) Labour	1.7	2%		
3) Market tax, others	1.3	1%		
4) Margin	14.1	15%	47	11%
4. Consumer				
Retail price	95.2	100%	423	100%

Remarks:

- 1) Data collected on 20 and 21 of November 1996.
- 2) Quantity of fish handled by wholesaler/middleman was 6,900 kg and his total margin was about FCFA 173,190
- 3) Quantity of fish handled by retailer was 60 kg and his total margin was about FCFA 888.

Source: Field survey in Phase 1 (The Study on the Development Program for Northern Fishing Areas in the Republic of Senegal), Oct.-Dec., 1996.

Table I.2.5-5 Comparison of Operation Cost and Income Distribution

	Unit: FCFA		
	Hann	St. Louis - A	St. Louis - B
Type of fishing	Hand & longline	Handline	Handline
Fishing ground	Guinea Bissau	Mauritania	
Fishermen/boat	15	5	3
Day/fishing trip	10 days	7 days	Daily
Fishing trips/month	2	3	20
1. Sales/trip (FCFA)	1,000,000	275,000	14,500
2. Operation cost/trip			
1) Fuel	226,200	52,000	6,000
2) Ice	200,000	60,000	2,000
3) Container			
4) Bait	50,000	3,000	
5) Food	100,000	20,000	
6) Other			
Total	576,200	135,000	8,000
3. Depreciation/trip	84,297	20,210	1,018
4. Total operation cost (2 + 3)	660,497	155,210	9,018
5. Income before depreciation (1 - 2)	423,800	140,000	6,500
6. Income after depreciation (1 - 4)	339,503	119,790	5,482
Income distribution/month (FCFA)			
1) Boat owner	44,610	140,000	43,320
2) Engine owner	89,222	140,000	43,320
3) Fishing gear owner	44,610		
4) Fishermen	44,610	28,000	14,440

Remarks:

- 1) Hann - Income before depreciation is divided by 19 shares (15 shares for fishermen, 1 share each for boat owner and fishing gear owner and 2 shares for engine owner)
- 2) St. Louis-A - Income before depreciation is divided by 3 shares (one share for 5-fishermen, one share each for boat owner, and engine owner)
- 3) St. Louis-B - Income before depreciation is divided by 3 shares (one share for 3-fishermen, one share each for boat owner, and engine owner)
- 4) Kayar - Income before depreciation is divided by 3 shares (one share for 3-fishermen, one share each for boat owner, and engine owner)

Source: Field survey in Phase 1 (The Study on the Development Program for Northern Fishing Area in the Republic of Senegal), Oct.-Dec., 1996.

2.6 Credit System in the Fishery Sector

(1) Credit System in the Study Area

1) Pro-Peche credit line through CNCAS

The Pro-Peche project supported by CIDA did have a significant impact on the study area, although the project has finished. The project was composed of two elements: ATEPAS (for technical improvement) and Servi-Peche (for credit). A line of credit was provided through CNCAS along with a guarantee fund to cover possible losses to CNCAS in making use of this credit line. Servi-Peche encouraged CNCAS to develop expertise in fisheries and to put their officers "on the beach."

The Saint Louis branch of CNCAS opened in 1987 to support the development of rice cultivation in an area served by large dams and gravity irrigation for 200,000 ha. Shortly after the Pro-Peche credit line started in the Saint Louis branch, a very large number of Senegalese who had been living and fishing north of the border were repatriated to Senegal as a result of a dispute with the government of Mauritania. At the request of the Government, CIDA placed FCFA 100 million (US\$200,000) at the disposal of CNCAS to provide loans to 40 GIEs composed of repatriated people who were certified as fishermen. The consequence has been that out of the 40 groups, only one individual fisherman is believed to have repaid his loan. Non-payment by these repatriates from Mauritania affected repayment by other borrowers in Saint Louis. It has had a profoundly negative impact on CNCAS lending for fisheries which had been fairly successful on loans up to that time.

In Saint Louis, CNCAS had written off 111 (42%) out of the 263 artisanal fisheries loan made. The repayment rate on the remaining loans was about 75 percent. New lending in Saint Louis has been at a virtual standstill for three years, although it has been partially reopened recently. Only 3 percent of the number of loans made in the Saint Louis region have been to women (8 loans in all), as women's groups have effectively been held penalized for the failure of repatriates and fishermen to pay their loans. The Pro-Peche has repeatedly asked CNCAS to make loans to women, whose responsibility of repaying loans is well understood.

Fishermen from Saint Louis are especially renowned for their transmigration. Those most directly involved did not see this as a major factor in non-payment of loans in the area. Fishermen who transmigrate usually do so in groups; and when they return as a group to where their families live, they usually settle their arrears with the bank. In some case, CNCAS follows up on migrants in other parts of the country and even to Mauritania. Rarely has transmigration presented a problem for credit programs where account is taken of its existence when the loan is granted and during loan recovery.

As the result of the Pro-Pêche project, CNCAS developed some expertise in artisanal fisheries lendings, although the learning process was expensive. Three agents were hired and stationed in Saint Louis, Kayar and Dakar. Performance of the Pro-Pêche portfolio in Dakar and Kayar was much better than in Saint Louis.

In Kayar, 37 (35%) out of 107 loans have been written off; and the repayment rate of those remaining was 86 percent. Over 53 percent of the loans made in Kayar have gone to women. In Dakar, 54 (16%) of the 338 loans made have been written off. The repayment rate on remaining loans was 80 percent and 46 percent of the loans in the Dakar region have been to women.

2) NGO credit system

There are a large number of small projects funded by various NGOs and operating in fisheries communities in the study area. ADPES, CREDETIP, Plan International and COPAR (Conseil et Partenariat Entreprise) are among the most active NGOs in the study area. An outline of ADPES and CREDETIP is introduced in chapter "1.5 Credit System for Fisheries Sector" of this report.

3) Mutual fund system

Mutual fund system have functioned relatively well with members from various income generating sectors including fishery and agriculture under the technical and financial assistance of the foreign donors in the study area. However, they still face various problems such as the lack of human resources for accounting in the local level, a shortage of operation capital, and limited facilities and equipment such as computers.

Some conflicts have been observed where multiple mutual fund systems have been established in one local community in Kayar. In order to achieve the sustainability of mutual fund systems, local human resources with accounting and auditing expertise need to be developed among the people in the private fishery sector and the officers of DOPM.

There are Mutual Fund System in Hann and Kayar which were initially supported by CNCAS and the Pro-Pêche project; and these two mutual fund systems have been operated successfully with the technical assistance of the PAMECAS Project.

In the Mutual Fund in Hann, each person is required to pay FCFA 25,000 to be a member. The Fund currently has 1,461 members with a total savings of FCFA 82 million. The interest rate paid on savings is 3 percent. Members must have a minimum savings of 20 percent of the loan amount. The interest rate which had been 17 percent annually was reduced to 14 percent. The current repayment rate is 98 percent. According to the information from the female leaders in Hann, women's

accessibility to the Mutual Fund in Hann is limited although 75 percent of the members are female. This is mainly because the management board of the Fund is dominated by men.

In Kayar, the Mutual Fund was founded in October 1993, and it is located within the building of Women's Center. It has 240 members of which 155 women are individual accounts of women: 17 women's groups and 68 men's groups. By the third quarter of 1996, deposits varied from FCFA 11-15 million and loans amounted to FCFA 6 million. A 3 percent annual interest rate was paid on deposits. All loans are short term and are given at an interest rate of 2 percent a month. Lending only began in February, 1996. The maximum loan amount for buying fish, for small scale trading, fish processing, and vegetable production ranges from FCFA 5,000 to FCFA 100,000. Members must maintain a savings balance of 20 percent of the loan value. In Kayar, women do not have any difficulties in receiving Mutual Fund loans.

4) Informal credit system

The system of credit referred to as informal credit exists in the private sector and is not submitted to public laws. In the Senegal fishermen community, informal credit relationships are characterized by their diversity and complexity. Typically, fishermen have access to several informal credit opportunities within immediate neighborhood. However, owing to the lack of transparency in the informal credit sector only limited information is available about the system. Sources of informal credit are as follows.

Wholesaler credit to fishermen

Wholesalers are the major source of credit to fishermen; and wholesaler credit is critical to the fishing sector, and it is considered to be an exploitation of the fishermen because of its high cost. According to a report "The Different Sources of Credit for the Artisanal Fishing Sector in West Africa, 1992), about 30 percent of the wholesalers in Senegal own fishing units, and they were former boat-owners who have turned wholesalers. From the wholesaler point of view, the main objective is to secure their regular fish supply. Securing fish supply allows the wholesaler to control not only the production but also the marketing and processing of fish. In spite of the control gained by the wholesalers, the credit provided by wholesaler is a necessity.

There are three categories of wholesalers based on their financial capability who provide credit to fishermen, as follows.

- Small-scale wholesalers who provide credits for gas, food or fishing gears
- Medium-scale wholesalers who provide credit for boat, engines and equipment
- Wealthy wholesalers who fund several fishing units at the same time

Wholesaler credit to processor

In addition to being major source of credit for fishermen, wholesalers play an important role in funding of marketing and processing activities. Some wholesalers own small marketing enterprises which depend on a supply of fish from a large number of processors. There are numerous loan arrangements between the wholesalers and the fish processors; the condition depends of loans depends mainly on the relationship of wholesaler within the family or the ethnic group. In Senegal, the wholesalers provide credit to processors on the following terms.

- On a daily basis : reimbursement is done the same day with interest
- On a six-month credit : reimbursement is made at the end of the campaign or season plus interest

Family credit

In the fishermen community, the family is the primary source of credit for someone who wants to acquire the necessary equipment to become a fishermen. Loans from the family are generally given without interest or a specified payment date; the common understanding is that the debt will be paid only when the debtor can afford to repay. Moneys borrowed from other informal credit such as tontines and mutual support fund are sometimes used to repay debt. Fishermen also get credit from their wives or other women of their family. Generally this type of credit is repaid with fish. The fishermen agrees to give his production to his creditor, or sell the fish at a very amicable price; this type of family credit is considered desirable because the profit from the sale of the fish goes to a family member.

Credit between fishermen

Fishermen with a surplus of money following good catches are reported to lend money to fellow fishermen whose catches have been less successful. This type of credit does not carry a time limit; it is understood that the debtor will repay the loan when he is able. This type of credit lead to a mutual help relationship hat binds fishermen to support one another whenever financial assistance is needed. If the debtor is not able to repay his debt when the money is needed by his creditor, the debtor will go to another fishermen to whom he has already borrowed money or else he can ask his community members to intervene to seek a source of fund.

5) Overview of existing credit systems

The existing credit system in the Study Area is summarized as shown in Fig.I.2.6-1.

(2) Needs of Artisanal Fisheries Credit

An overview of the existing credit lines available in fishing communities is shown in Fig. I.2.6.1. Instead of the number and variety of credit lines, the accessibility of community members to credit is still limited. The possible beneficiary groups with real needs for credit within the artisanal fisheries sector are as follows.

Women processors

Women are processing "Afrique" varieties of fish which finds a ready market in the interior of Senegal and in neighboring West African countries. If marketing constraints can be resolved, women could increase the amount of processed fish and increase their incomes if they had reasonable access to small amounts of working capital.

Women pay back nearly 100 percent of what they borrow, even in credit programs which are not properly managed. Any credit program should target women, provide funds promptly when needed, and have relatively low loan limits so that credit is not monopolized by a few women.

Female micro-wholesalers

Female micro-wholesalers, who are wholesaling or retailing small quantities of fresh fish in the local markets, face the problem of a lack of working capital with which to operate. They handle fish species which meet local needs, and their income is relatively high compared to fishermen and processors. As in the case of female processors, if marketing constraints can be resolved, they could expand their marketing and increase their incomes if they had reasonable access to small amounts of working capital. Additionally, it needs to be remembered that women pay back nearly 100 percent of what they borrow and that any credit program should target women, provide funds promptly when needed and have relatively low loan limits so that credit is not monopolized by a few women.

Fishermen

Credit programs which are designed in consultation with fisherman, and take their problems, points of view and idiosyncrasies into account, can be devised and will function. The total volume of credit cannot be increased without affecting those resources already being fished at MSY (maximum sustainable yield); therefore, DOPM will have to be consulted to know which types of equipment can be financed and in which amounts for each type.

Programs should be designed in conjunction with fishermen and their organizations, financial institutions, and donors which taken into account the very real

problems faced by fishermen and at the same time assure that loans are repaid. Resources should be taken into account when determining what types of fishing should be supported.

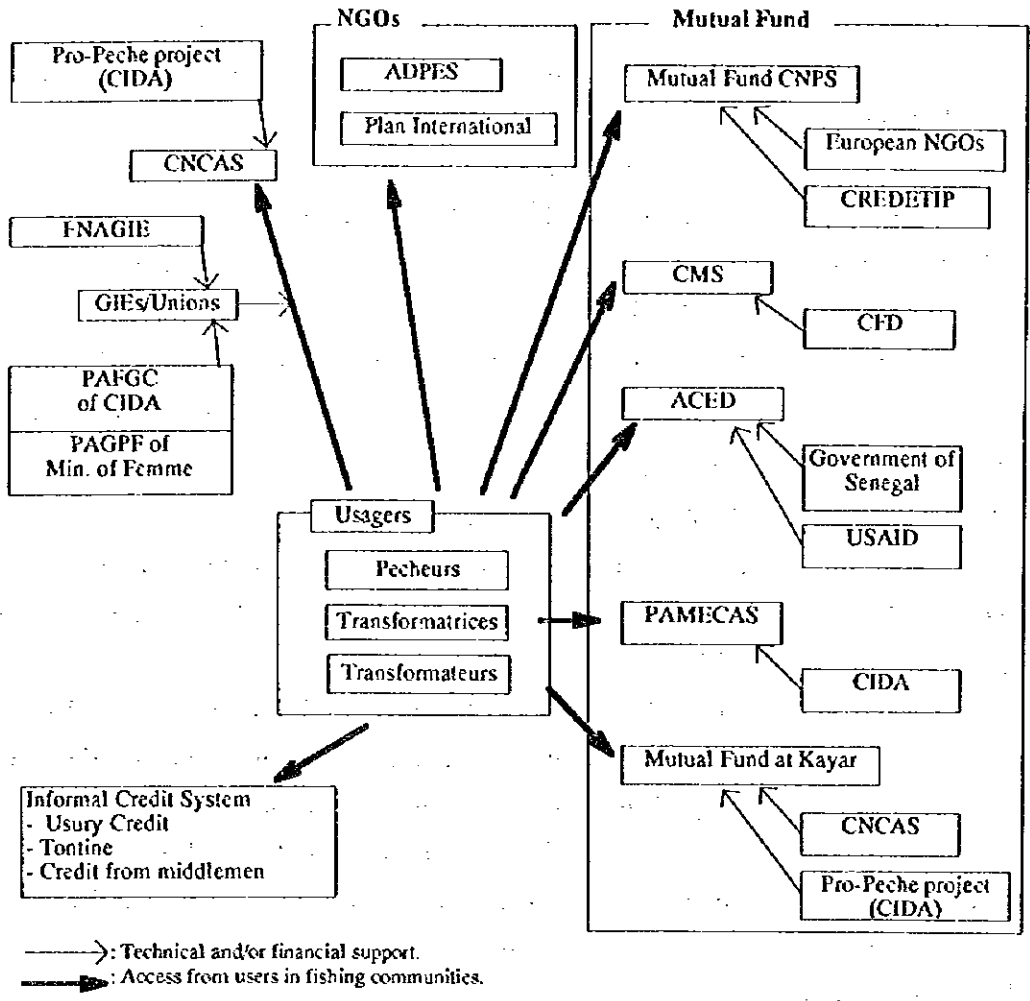
The targeted population in the study area number 30,782 fishermen (1995) in the in this sub-sector; of which about 15,000 fishermen are in Saint Louis and 4,113 in Kayar. It can be assumed that about 1,645 out of 4,113 fishermen in Kayar are transmigrates from Saint Louis when applying the rate of 40 percent, which is calculated using the 1996 data provided by the DOPM area office in Kayar. The remaining, approximately 2,468 are the fishermen who are the permanent residents in the community.

(3) Credit Lines Suitable to the Study Area

The study makes it clear that there is a real need for credit within the artisanal fisheries sector and that the need is generally not being met by programs currently operating through CNCAS.

Due to good accessibility in terms of location and time, mutual fund systems may be most suitable for use by community members in fishing villages judging from the experience of several past and on-going projects. Female processors and micro-wholesalers may be the beneficiaries since they have a good record of repayment and there is a potential of expanding their business through increased accessibility to credit lines. As for the fishermen, it is necessary to consider fishery resources in order to design credit systems.

For example, there are about 4,278 female processors and about 900 female micro-wholesalers working in the study area in 1995. Assuming a loan size is FCFA 25,000, which is the existing minimum lending amount of CNCAS supported mutual fund, approximately FCFA 130 million (US\$260,000) are required to cover all of them. Funding for lending will be from the member deposits and from the external financial resources. When applying these numbers to Saint Louis and Kayar, the two major artisanal fishing and fish processing centers in the study area, FCFA 27 million (US\$54,000) are required in Saint Louis to cover its 1,000 processors and 70 wholesalers; FCFA 24 million (US\$48,000) is required for its 396 processors and 570 wholesalers in Kayar.



Source: Field Survey of Phase (The Study on the Development Programme for Northern Fishing Areas in Senegal), Oct. - Dec., 1995

Fig. 12.6-1 Access to the Existing Credit System in the Study Area

2.7 Fishing Communities and Gender Analysis

(1) Transmigration of Fishermen

Seasonal fishing is dynamically conducted by Senegalese fishermen transmigrating along the coasts in Senegal and in neighboring countries including Ghana, Mauritania, Guinea Bissau, and Gambia. Based on the data of CRODT, there were about 1,110 migrating boats in May, 1985 and 800 in September, which shows a decrease in terms of migration of fishermen during the rainy season. Table I.2.7-1 outlines the trends of migrating boats at the major fishing centers and the table I.2.7-2 shows the trends in fishing gears in September, 1985.

As is shown in Figure I.2.7-1, Wolof fishermen (one of the major ethnic groups in Senegal) living in Guet Ndar, Saint Louis, who are called "Guet N'darien" are the major group of transmigrating fishermen. They began moving with their families to maintain their fisheries activities due to over-population in fishing villages, and the deteriorating marine resources in coastal area in the Saint Louis region.

They moved to wherever people accepted them economically, socially, and geographically from Saint Louis to mainly Kayar and other fishing villages in the Grande Côte and Cap-Vert. Since fishermen from Guet Ndar are expert fishermen due to their long fishing experience, they are able to fish in various conditions and are accepted in fishing communities by transferring their fishing skills and knowledge.

Table I.2.7-3 shows fish landing by major groups and by month in Saint Louis and in Kayar (1995), and shows the seasonal fluctuation in fish production. The peak season for fishing sardines in Saint Louis is from February through April, and from January through March in Kayar. Table I.2.7-4 shows the monthly changes in the number of fishing boats in 1995.

The number of boats transmigrating from Saint Louis is stable throughout the year, while the number of boats moving from other landing sites to Kayar changes dynamically. January through May is the peak season in Kayar according to the number of boats; and December through April is the peak season in Kayar according to the fish landing volume. The fluctuations in fish landing volume nearly coincides with the change in the number of boats in Kayar.

In contrast, fluctuations in fish production do not influence on the number of fishing boats landing at Saint Louis and the number of boats moving from Saint Louis to the other fishing centers.

(2) Population Structure in the Targeted Fishing Communities

According to the data in Table I.2.7-1, about 527 boats emigrated in 1985 from Guet Ndar in Saint Louis. This indicates that about 50 percent of transmigrating fishermen originated from Guet Ndar. Due to the seasonal fluctuation in fish

resources and overpopulation in fishing communities, the fishermen in Guet Ndar have accepted transmigration as a way of life. Guet Ndar fishermen called "Guet" are expert fishermen and they have brought various technical resources including fishing and artisanal processing technologies to the new areas to which they move.

When using the same transmigration rate of 1985, it is estimated that about 7,050 (47%) out of 15,000 fishermen in Saint Louis area emigrated to the other places with their families in 1995. The remaining, 7,950 fishermen, stayed in the fishing village. Based on the population projection by DPS, the population of Guet Ndar will increase to more than 20,000 people in the year of 2015. Therefore, proper countermeasures need to be taken to improve the migrants' living conditions and to help them settle in the destination fishing villages. The living conditions in Guet Ndar and the surrounding areas also need to be improved.

In Lompoul and Fass Boye, there are many Guet N'dariens in the fishing communities. Most of the original inhabitants of these two villages are farmers; and some of them have become fishermen or artisanal fish processors through technology transfer from Guet N'dariens. In Lompoul, Guet N'dariens live in straw hut cottages located along the sea shore, which is the national property. In Fass Boye, they rent the rooms of the houses of the original inhabitants. None of them possess their own land in the villages. Guet N'dariens and the original inhabitants conduct fishing activities cooperatively, however, Guet N'dariens' residential areas are separated from the original inhabitants'.

In Kayar, many Guet N'dariens arrive with their families during the peak season from November to July. They stay in Kayar for 9 to 11 months and return to Guet Ndar. They have houses on the beach, which are illegally constructed on national land. There are some immigrants from Fass Boye; and they usually arrive without their families. There have been some conflicts between the community of original inhabitants, many who are farmers, and the transmigrant community. Currently those problems are coordinated and resolved by the management committee under the Region Office. The landing points on the beach are divided into two areas: one for the original inhabitant fishermen and the other for the transmigrant fishermen. Transmigrant female processors do not belong to any GIEs.

According to the data from the DOPM regional office, there were about 761 boats in February 1996; of which about 306 boats (40%) were transmigrants from Saint Louis, and about 28 boats (4%) from Fass Boye. There were about 3,000 fishermen during the peak season. When the rate of 40 percent for the fishing boats from Saint Louis, about 1,200 of them are Guet N'darien and about 1,680 are the original inhabitants of Kayar.

The population in Kayar was about 9,000 in 1995. If we assume that about 1,200 Guet N'darien fishermen arrived in Kayar with five family members, the population in the village during the peak season is estimated to be about 16,200 people. The population in Kayar is expected to increase up to 15,332 by the year 2015. Due to the limited land area in Kayar, a serious overpopulation is easily foreseen if no countermeasures are taken.

(3) Women's Accessibility to Community Resources

1) Income generation and distribution

Most of the artisanal processors are running small-scale business; and some are hiring male laborers for fish processing and selling the products in the nearby communities. Based on the 1994 data from the PAFGC project, in Kayar, a high-level income for female processors was FCFA 139,000/month, FCFA 100,000/month for middle level income, and FCFA 50,000/month for low level income. In Fass Boye, a high level income was FCFA 150,000/month, FCFA 100,000/month for middle level income, and FCFA 25,000/month for low level income.

Female wholesalers can be divided into three groups according to the size of their business. The high-level group is the wholesalers having lorries and engaged in large-scale business. The middle-level group is the "micro-wholesalers" who buy and sell fish individually on a small-scale using public transportation. The low level group is the "very small micro-wholesalers" who sell fish catch from their husbands' boats and their income is not clearly separated from their husbands'. In Kayar, a high-level income of female "micro-wholesalers" is FCFA 180,000/month, a middle level income is FCFA 80,000/month, and a low level income was FCFA 12,000/month. In Pikine in the Dakar region, a high level income is FCFA 174,000/month, a middle level income is FCFA 56,000/month, and a low-level income is FCFA 16,300/month.

2) Formal credit system

The major problem faced by female processors, micro-wholesalers and retailers is the lack of working capital with which to operate. They receive working capital from the credit provided by the Mutual Fund and informal credit systems including tontine and usury credit systems.

Women in the study area have had some access to credit from the Pro-Pêche line of credit with CNCAS. They hold 46 percent of the loans in the CNCAS's current portfolio for Dakar and 52 percent in Kayar. However, women's groups have a grand total of eight loans out of a total 263 loans in the current portfolio for the

region (only 3%) in Saint Louis. Generally, women's access to CNCAS credit lines is limited because of the complicated procedures and requirement.

3) Institution and organizations

Management committees of UOPAGC

There are UOPAGC management committees in the six fishing centers including Saint Louis, Lompoul, Fass Boye, Kayar, Pikine, and Hann. The committees consist of representatives from local GIEs of female processors and micro-wholesalers and have their center buildings constructed by the Pro-pêche project. Generally, they are well organized and conduct various group activities including revolving funds, renting the center facilities, buying and selling fresh fish and vegetables, and conduct literacy education under technical and financial assistance from CIDA through a local consulting company. In general, the transmigrants are not included in these unions in the fishing villages.

FENAGIE local union

FENAGIE local unions are organized in the communities. The union members are the local GIEs from various income generating sectors including fishery, wholesalers, retailers, and agriculture. For example, the local union in Yen was established in the beginning of 1996. They have 80 members including fish processors, micro-wholesalers and retailers of fish and vegetables. Each person pays FCFA 1,000 to be a member. The members can receive credit in the amount of FCFA 5,000 with an interest rate of 10 percent. The service from FENAGIE is not clearly known.

4) Basic Human Needs (BHN) Services

Most of the fishing communities in the Grande Côte area face a serious problem of very limited accessibility to health services. In Kayar, Fass Boye, and Yene, there is a health post, where no doctor consultation is available and a shortage of drugs is common. In Lompoul and Potou, there is no health service facilities. The bad conditions of access roads to these communities multiply the burdens of the community members.

Another problem related to the BHN services in the fishing communities is the low enrollment rate of primary schools. In Saint Louis, 11 to 12 year old boys often stop going to school and join the fishing activities. The dropout rate of boys is high. Children of transmigrants, Guet N'darien, do not have a chance to join a school because of constant move with their families. Some families leave their school age children in Guet Ndar to allow them to continue with their schooling.

Illiteracy rate of people in the fishing communities is very high. It is said

more than 90 percent of female processors and micro-wholesalers are illiterate. Literacy education in Wolof is provided by CAEP, PAFGC project and NGOs.

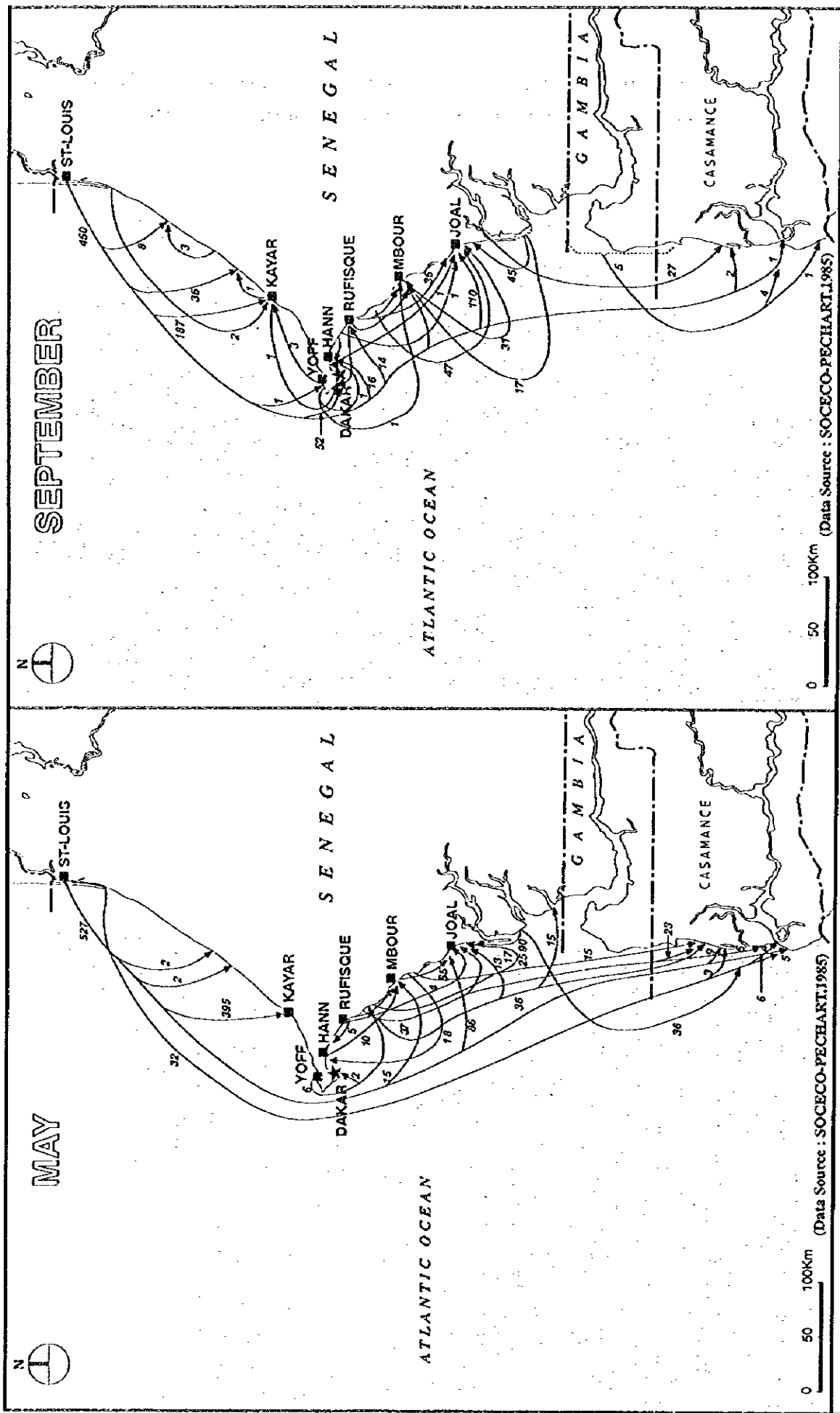


Fig. I.2.7-1 Movement of Fishing Boats along the Coast of Senegal (1983)

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Table I.2.7-1 Trends in Transmigrating Boats (September, 1985)

Fishing center	Total no. of boats of center origin	Emigrating boats		Immigrating boats	
		No. of boats	Rate to boats of center origin	No. of boats	Rate to existing boats
<u>Saint Louis Region</u>					
Saint Louis	1,103	527	47%	0	0%
Tassinere	23	21	91%	0	0%
Pilote	23	18	78%	0	0%
<u>Louga Region</u>					
Tare	14	0	0%	0	0%
<u>Thies Region (Grande Côte)</u>					
Fass Boye	56	0	0%	14	20%
Kayar	184	1	0.5%	396	68%
<u>Dakar Region</u>					
Yoff	301	6	2%	24	8%
Ngor	79	0	0%	0	0%
Ouakam	86	3	3%	0	0%
Soumbédioune	197	1	0.5%	22	10%
Hann	98	6	6%	20	18%
Thiaroye	61	11	18%	4	7%
Rufisque	115	7	6%	0	0%
Bargny	73	11	15%	0	0%
Yene	80	49	61%	0	0%
<u>Thies Region (Petite Côte)</u>					
Mbour	445	90	20%	52	13%
Joal	195	4	2%	333	64%

Source: CRODT

Table I.2.7-2 Share of Migration According to Fishing Method

Fishing Style	Share of Migrating Boat
Turning Seine (net boat)	24%
Turning Seine (fish boat)	23%
Surrounding Gill Net	67%
Beach Seine	11%
Deepening Pot	24%
All Gear	25%

Source: CRODT

Table I.2.7-3 Fish Landings by Major Group and by Month in Saint Louis and Kayar (1995)

Type of fish	(Unit: tons)												Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
St. Louis													
Sardinelle	1,742	3,170	3,800	4,052	1,114	1,600	555	345	1,095	1,320	2,448	1,600	22,840
Other fish	913	752	857	633	1,247	688	724	657	762	730	729	384	9,077
Exportable	487	528	441	332	837	1,006	902	353	377	234	327	214	6,035
Total:	3,142	4,450	5,098	5,017	3,198	3,294	2,181	1,355	2,234	2,284	3,504	2,198	37,952
Kayar.													
Sardinelle	1,889	3,402	1,512	426	53	94	342	143	163	107	67	821	9,018
Other fish	711	732	541	750	779	473	265	42	32	63	318	739	5,445
Exportable	155	497	374	330	142	157	220	129	104	97	94	138	2,435
Total	2,755	4,631	2,428	1,506	974	724	827	313	298	266	450	1,698	16,898

Source: Compiled from monthly records of Regional Service Centers of Saint Louis and Kayar, 1995

Table I.2.7-4 Monthly Changes in Number of Fishing Boats in Saint Louis and Kayar (1995)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
I. St. Louis													
1. Local boats landing at St. Louis													
(1) Line		590	590	595	595	603	609	614	622	630	463	646	646
(2) VL		45	45	45	45	45	45	45	45	45	45	45	45
(3) Purse seine		85	85	90	90	99	99	99	100	100	100	100	80
(4) Gill net		450	452	452	452	461	462	467	468	469	470	470	470
Sub-total		1,170	1,172	1,182	1,182	1,208	1,215	1,225	1,235	1,244	1,078	1,261	1,241
2. Migrating boats landing at St. Louis													
Sub-total		0	0	0	0	0	0	0	0	0	0	0	0
3. St. Louis boats emigrating to other sites													
(1) Line		475	475	475	475	475	475	475	475	475	475	475	478
(2) VL		0	0	0	0	0	0	0	0	0	0	0	0
(3) Purse seine		40	40	35	35	30	30	30	30	30	30	30	52
(4) Gill net		304	304	304	304	300	300	300	300	300	300	301	304
Sub-total		819	819	814	814	805	805	805	805	805	805	806	834
Total No. of boats		1,989	1,991	1,996	1,996	2,013	2,020	2,030	2,040	2,049	1,883	2,067	2,075
II. Kayar													
1. Local boats landing at Kayar													
(1) Line		207	348	229	256	289	na	107	108	196	196	194	194
(2) VL		20	20	13	18	25	na	9	9	17	17	21	21
(3) Purse seine		9	10	10	19	10	na	7	7	8	8	9	9
(4) Gill net		0	0	2	1	0	na	0	0	0	0	0	0
Sub-total		236	378	254	285	324	na	123	124	221	221	224	224
2. Migrating boats from other sites													
(1) Line		310	300	291	293	284	na	35	53	40	40	70	70
(2) VL		0	0	8	0	0	na	8	0	0	0	0	0
(3) Purse seine		48	49	26	20	16	na	0	0	0	0	2	2
(4) Gill net		49	62	49	31	37	na	9	10	36	36	9	9
(5) Line (Glaciere)		4	5	10	10	2	na	0	0	2	2	0	0
Sub-total		411	416	384	354	339	na	52	63	78	78	81	81
3. Local boats emigrating to other sites													
(1) Line		7	0	0	0	0	na	45	96	0	0	0	0
Sub-total		7	0	0	0	0	na	45	96	0	0	0	0
Total No. of boats		654	794	638	639	663	na	220	283	299	299	305	305

Source: Compiled from monthly record of Regional Service of DOPM in Saint Louis and Kayar, 1995

2.8 Infrastructure Development

(1) Administrative System

1) Administrative structure

The Senegalese administrative structure is as follows. There are ten administrative regions. One region has three departments. There are 30 departments which are divided in towns, districts, sub prefectures and municipalities except in Dakar and Pikine. Each district is composed of rural communities and a rural community is comprised of several villages.

2) Budget system

Municipality

A municipality draws its budget from various tax collections and also from government contributions. The bulk of the tax comes from commercial activities. In addition, a municipality receives 2.5 percent of the electricity and water bills. The ratio of the government's contributions to the budget of a municipality is not very significant. Most of the budget goes to operating and functioning expenditures (around 90 %). A municipality has, however the responsibility to develop the urban area. But municipalities often depend on state or foreign assistance for investments.

Rural areas:

A rural community also draws its budget from tax collections. In the past, sub prefectures used to control the budget of rural communities. But now the rural community operates its own budget.

3) Land ownership

In Senegal land ownership can be public or private. "Public land" refers to the public maritime zone (100 meters after the highest tide waters), which is the property of the state and is controlled by municipalities and rural communities. A formal authorization is required prior to any use of this land. Any project in urban areas should be considered in conformity with the existing urban development plan or policy. In rural areas it should be approved by the rural council. However, the Ministry of Finance is charged with land registrations.

4) Scheme of the Project

Projects can be categorized as national, regional or local projects. The categorization depends on the economic impacts of the project. As for a national project, all the concerned ministries and governmental services will join other governmental project committees to study the feasibility conditions of the project. Procedures related to a national project should be approved by the government of

Senegal.

(2) Outline of the Infrastructure

The outline of the infrastructure in the target areas are as follows: Findings during the Phase I Study are summarized in Figures I.2.8-1 to I.2.8-10 and Table I.2.8-1.

1) General aspects

In Senegal, most of the key infrastructure are concentrated in the western part of the country and especially in the metropolitan area of Dakar.

Transportation

- a. Road: Road is the most common means of transportation. Railroad used to play a key role in the past before the expansion of road transportation. Currently there is still a train between Senegal and Mali and another linking Dakar to Thiès. The one that used to join Dakar to Louga and Saint-Louis has stopped operating in May 1996. However the train remains important for the transportation of phosphates.
- b. Maritime transportation: Until the last century there used to be some maritime connections between Dakar and Saint-Louis and even between Saint-Louis and some French cities like Bordeaux. Currently maritime transportation is almost exclusively concentrated in Dakar because of the appropriate conditions of the port.
- c. Air: there used to be some flights between Dakar and Saint-Louis. Now there are some episodic direct flights linking Saint-Louis and French cities like Paris.

Other infrastructure

- a. Electricity: There are six (6) major power stations in Senegal. Electricity demand is growing but SENELEC (the electricity company, it will be privatized in 1996) is not able to meet all the needs. In rural areas electricity supply is very limited.
- b. Telecommunications: Most of the telephone lines are concentrated in Dakar. However telephone is accessible in all the regions and even in some remote places. There are also some private telephone centers all over Senegal. Telephone and other telecommunication services (fax, E-mail, etc.) are provided by SONATEL. The privatization of this company is on the way.

c. Water supply: In urban areas water is provided by SDE (for the marketing and distribution) and SONES (maintenance of the infrastructures and investments). In many rural areas there some community pumps. But individual or collective wells are also used where available. According to the Direction of Hydraulics and Sewage, the daily quantity of water consumed in Senegal is on average 26 liters per inhabitant. Their set objective is to reach FAO standard that is to say 35 liters per day and per inhabitant.

d. Sewage and Sanitation

In Dakar there are three (3) types of sewage system as follows.

- Reserve system using a tank;
- Connection to the general system without treatment. It flows directly to the sea or to the river;
- Connection to the general system with treatment, i.e. the Camberene water treatment plant.

In other areas, cities and towns there are some reserve tanks in most places. In some areas of St. Louis, there is a drainage system. The Ministry of Hydraulics and the Ministry of the Environment have worked out a plan to standardize sanitary conditions.

e. Garbage collection

In urban areas garbage collection is done by the municipality. In rural areas there is no formal garbage collection service. In Kayar, a "Cleansing Committee" is set up. It is charged with the upkeep and the and the healthiness of the of the landing sites. It should also be pointed out that in most rural areas there is no toilet or sanitary facilities whatsoever or water supply.

f. Public transportation service

All of the public transportation system is controlled by the private sector and consists of minibuses and taxis. This private transportation system is rather very informal for it lacks organization. Horse-carts are the most common means of transportation in rural areas. In Dakar apart from the buses, minibuses and taxis, there is a train running between the train station near the port and Rufisque (with some stops in Colobane, Pikine, Thiaroye). There are several daily rotations.

2) Saint Louis

Facilities / amenities characteristics / constraints

The fishing village of Guet N'dar being in the developed municipality of St. Louis has access to all the urban amenities such as electricity, pipe water, telephone, sewage network connections and rubbish disposal services.

There is an ice plant with a capacity of about 40 tons/day, a ice storage using saw dust but no cold storage facilities except in the processing factory. There are fuel stations scattered along the beach as the landing sites are not concentrated in any one area of the beach. There are private mechanics and CAEP office to service the out-board engines.

There is a covered local market near the bridge about 1 km from the major landing area, where fish and other commodities are sold.

Land / development characteristics / constraints

St. Louis is well connected to the main trunk road leading to the major market of Dakar. The roads within the narrow Langue de Barbarie is paved and affords good connection to all facilities. The narrow road leading to this fishing village is crowded with trucks at landing times that creates very crowded conditions on the road. Some of these trucks wait a few hours to collect their load thus aggravating the traffic congestion.

The fishing village of Guet N'dar is concentrated in a small area with a high population which result in crowded unsanitary living condition. There is no area adjacent to the village to accommodate expansion or upgrading of the village facilities. Relocation or new development areas need to be found to relieve the congestion. To implement better land use by developing new areas, an effective linkage must be considered with the existing fishing village and facilities such as the local market, schools, processing areas etc.

3) Kayar

Facilities / amenities characteristics / constraints

The village has electricity and telephone services. However, it does not have sewage network, pipe water nor rubbish collection services. There is 1 ice making and cold storage plant renovated in 1996 with 20t/day ice capacity and 20t/day (-20°C) cold storage.

There is a well developed processing area at the south west side of the landing area. Maintenance services are available for the out-board engines from private sector or CAEP office.

There is a consumer / retail market established in the area facing the DOPM office and the ice / cold storage plant. Future development of this areas should consider integrating the function of the market, DOPM and the ice / cold storage plant for more effective land use. Relocation of some aspects of the existing market not related to fisheries may be more effective to avoid conflicting usage pattern and congestion.

Land / development characteristics / constraints

The village extends toward the north east side and is of low ground elevation. DOPM office and the ice making plant are located on relatively high ground and is near the deep sea channel where the water is calmer for safe landing.

4) Dakar Region

Facilities / amenities characteristics / constraints

The fishing villages located around Dakar, with relatively good road connection and proximity to Dakar city, have access to most of the services such as pipe water, electricity, telephone, sewage network and rubbish disposal. Some of the bigger fishing villages have built facilities such as ice making/ cold storage facilities, concrete paved sorting areas, processing facilities and other fisheries related buildings.

Land / development characteristics / constraints

Those villages located on the Petit Côte and those with natural breakwater protection, enjoy calm landing conditions. Their development are intermingled with other types of urban land use such as market, residential areas, tourism, factories etc. which restricts their potential growth/development. Any future development of these fishing villages must consider the other land use designated for the nearby areas under the urban development plans of Dakar city.

The development characteristics of some of these villages should be incorporated into the Project design as models of good operation and management by the fishing community.

5) Between Saint Louis and Kayar

Facilities / amenities characteristics / constraints

The fishing villages located on the coastal area between Saint Louis and Kayar have poor services. They do not have electricity, pipe water, telecommunication network, sewage network, nor rubbish disposal. Water supply is from shallow wells. Road connections to some of these villages are rather poor.

Land / development characteristics / constraints

These villages have relatively small fishing community and presence of transmigrant fishermen. The transmigrant fishermen tend to live in temporary type houses or rental accommodations along the beach area.

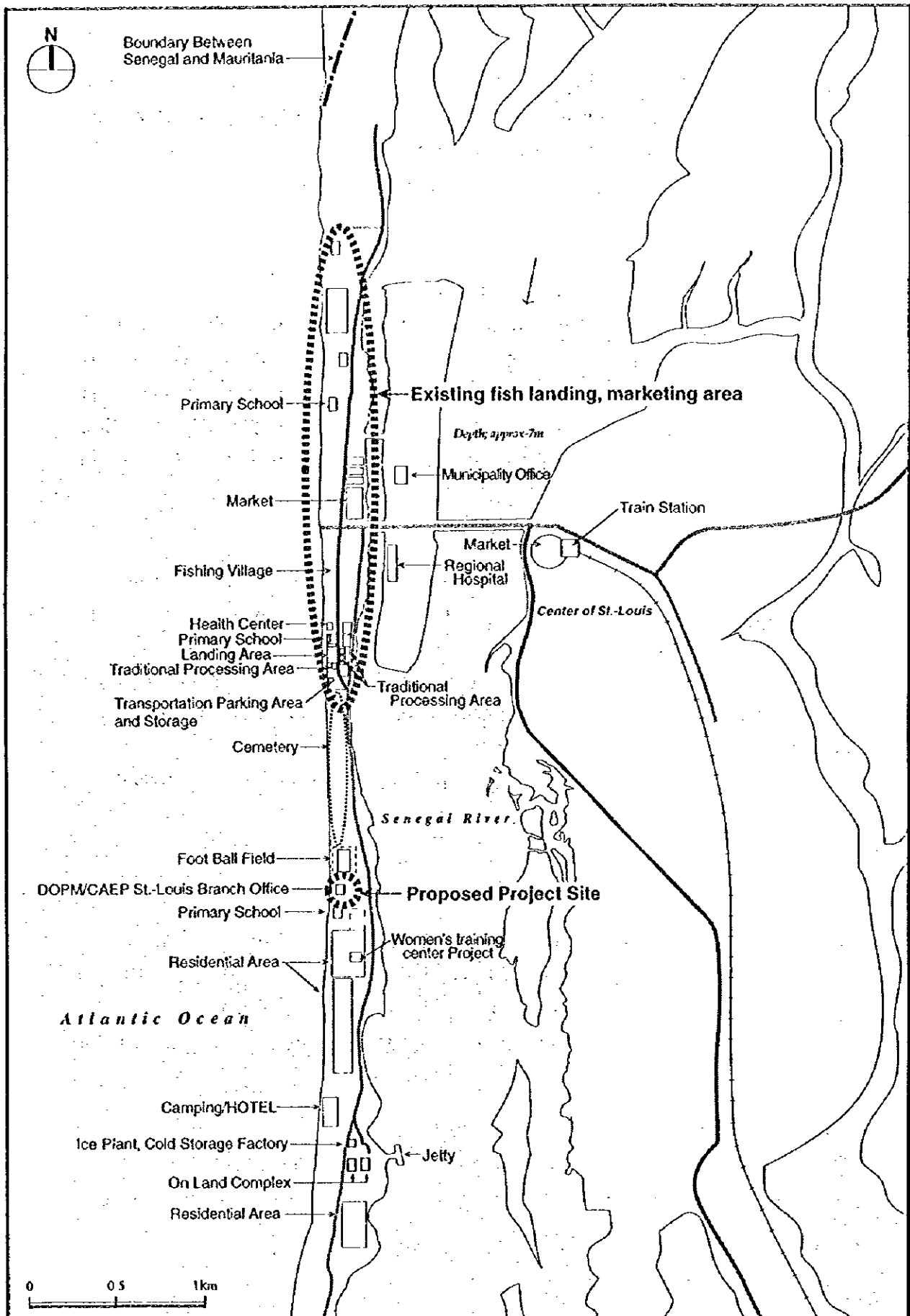
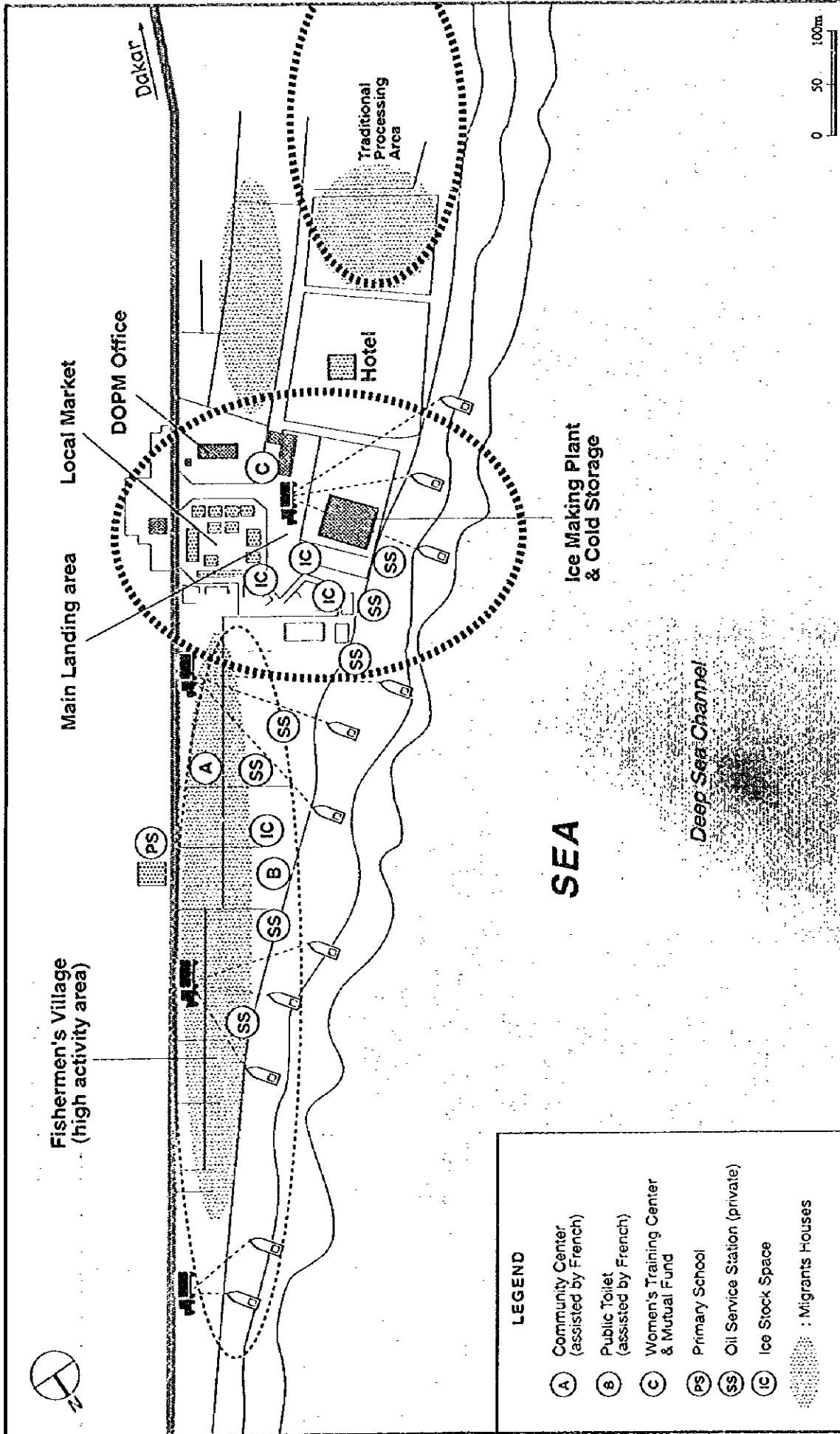


Fig. I.2.8-1 Existing Infrastructure Condition in Saint Louis

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LEGEND

- (A) Community Center (assisted by French)
- (B) Public Toilet (assisted by French)
- (C) Women's Training Center & Mutual Fund
- (PS) Primary School
- (SS) Oil Service Station (private)
- (IC) Ice Stock Space
- ⊙ : Migrants Houses

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Fig. I.2.8-2 Existing Infrastructure Condition in Kayar

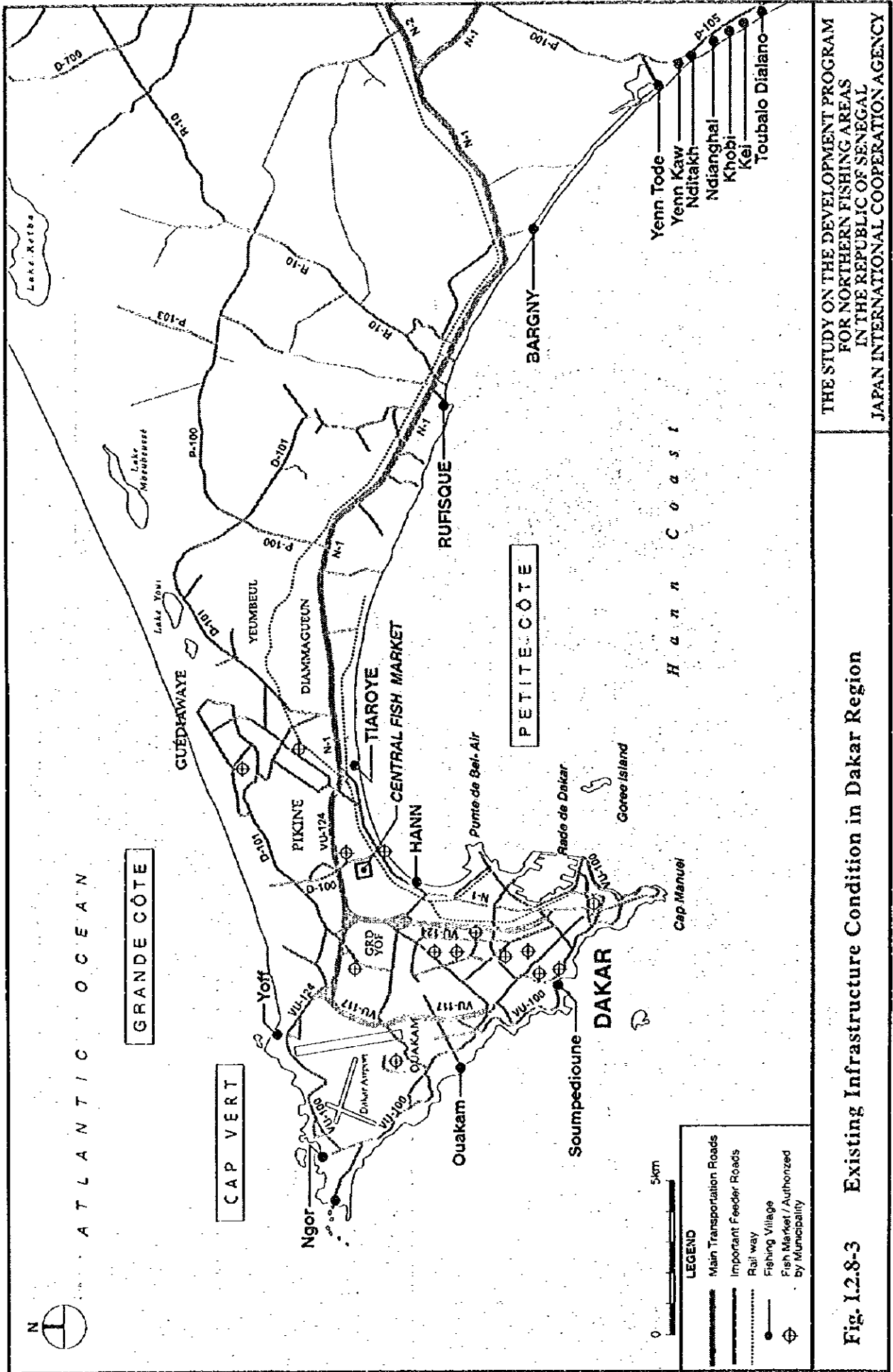
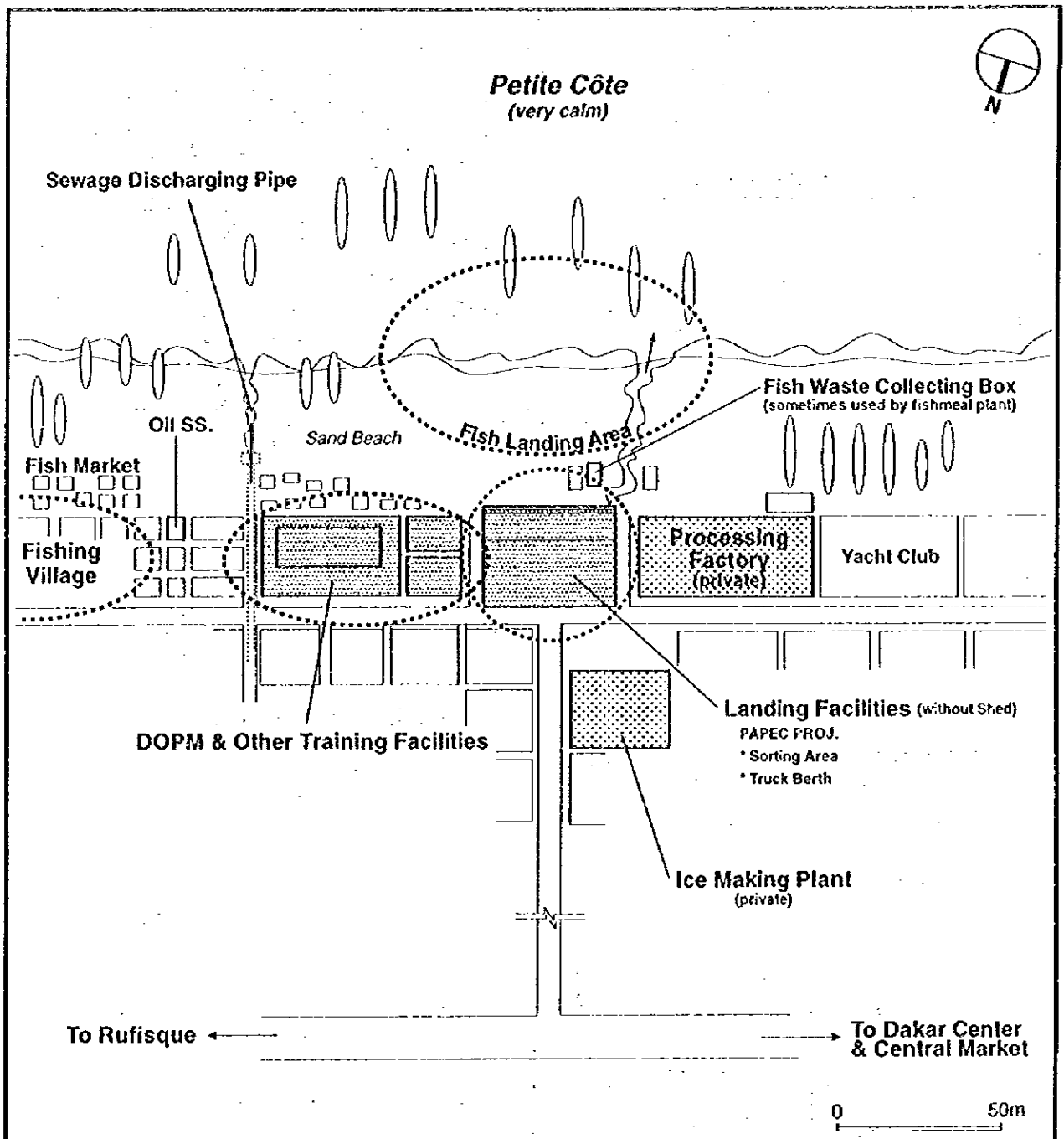


Fig. I.2.8-3 Existing Infrastructure Condition in Dakar Region



INFRASTRUCTURE

- Electricity, Pipe water and Telephone are connected to major facilities
- Many processing facilities, Ice making plants and Fuel service stations are located nearby. DOPM & Other Fishermen's related facilities are located beside the Landing facilities
- This Landing Point is very near to the Central fish market & accessibility is also sufficient
- Discharging Pipe is located near the Landing area
- Sanitary condition and garbage collection systems are very poor
- Heavy work conditions of loading and unloading are undertaken on the seashore area

Fig. I.2.8-4

Existing Infrastructure Condition in Hamm

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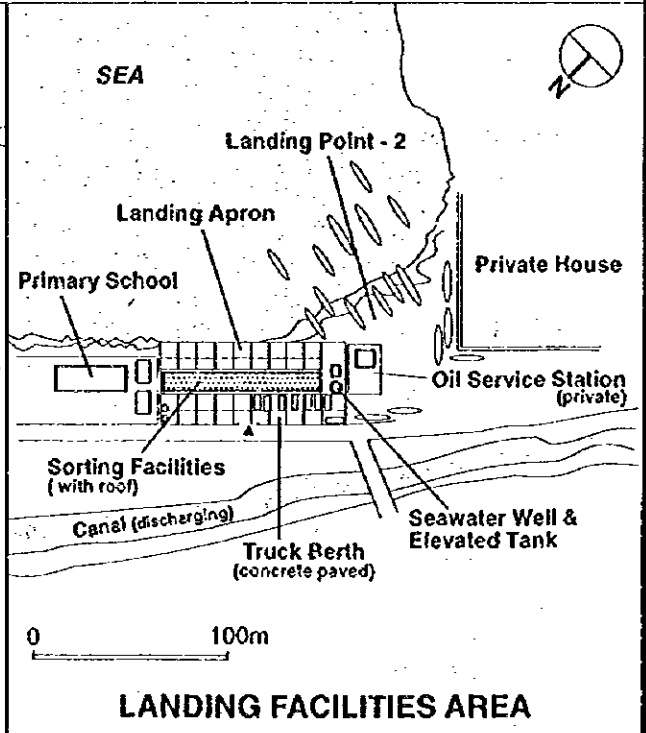
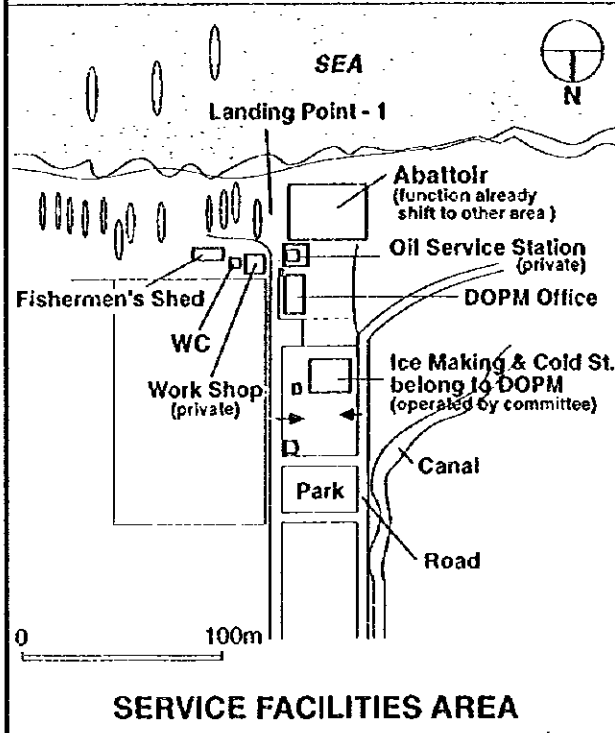
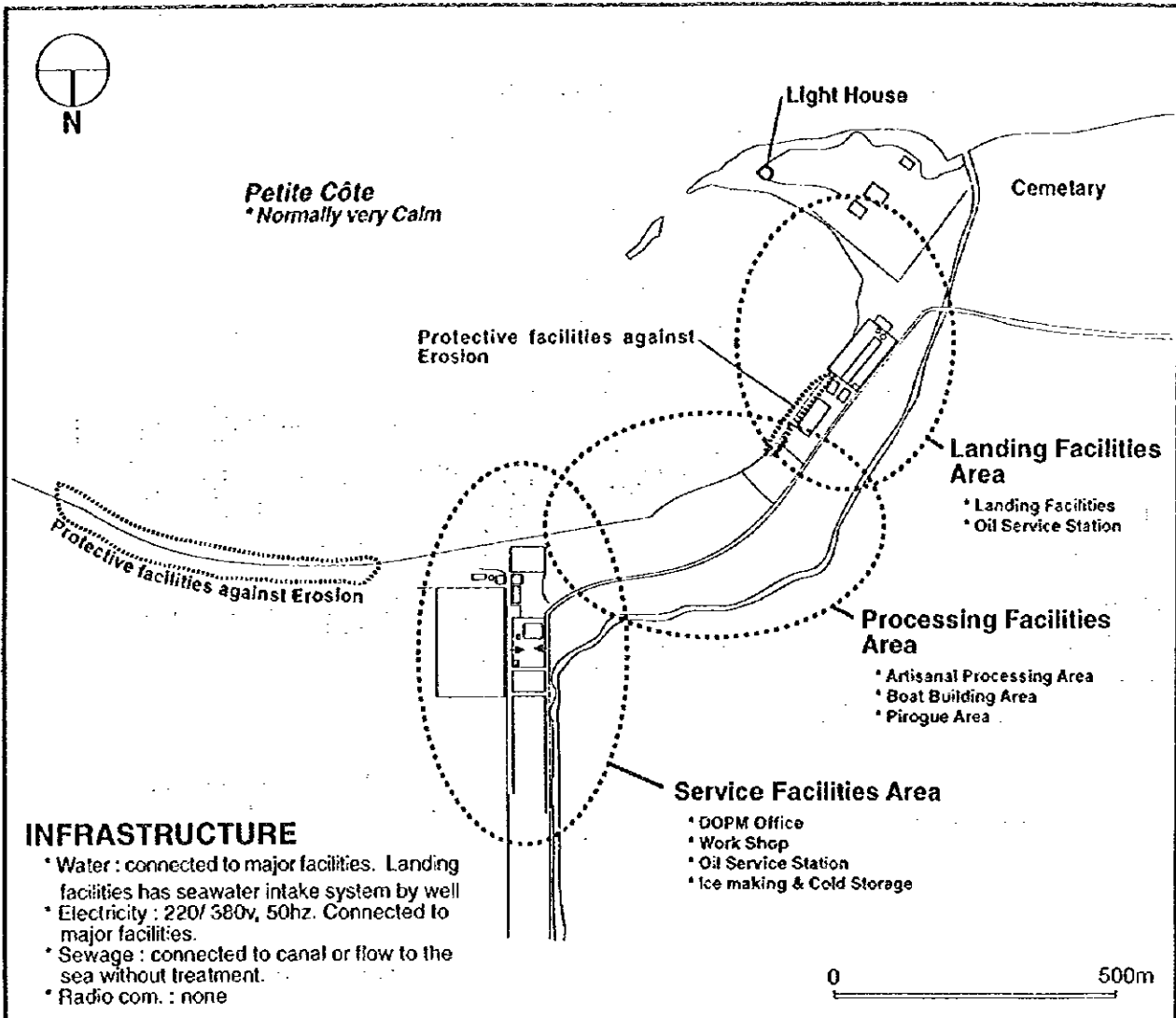


Fig. I.2.8-5 Existing Infrastructure Condition in Rufisque

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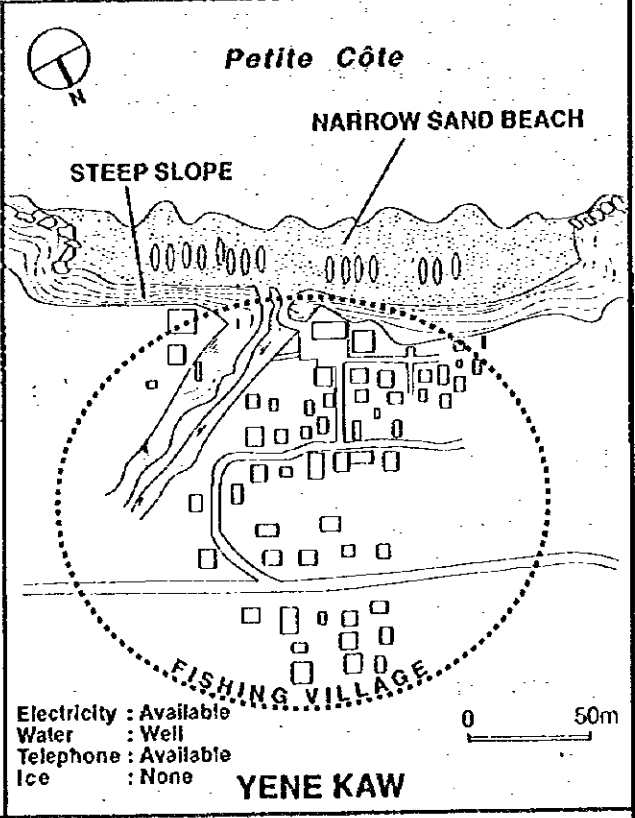
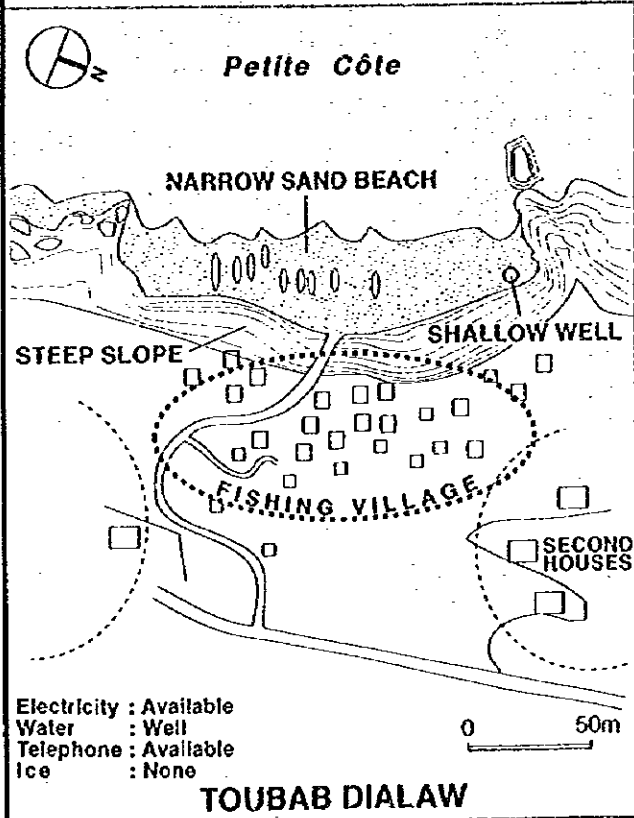
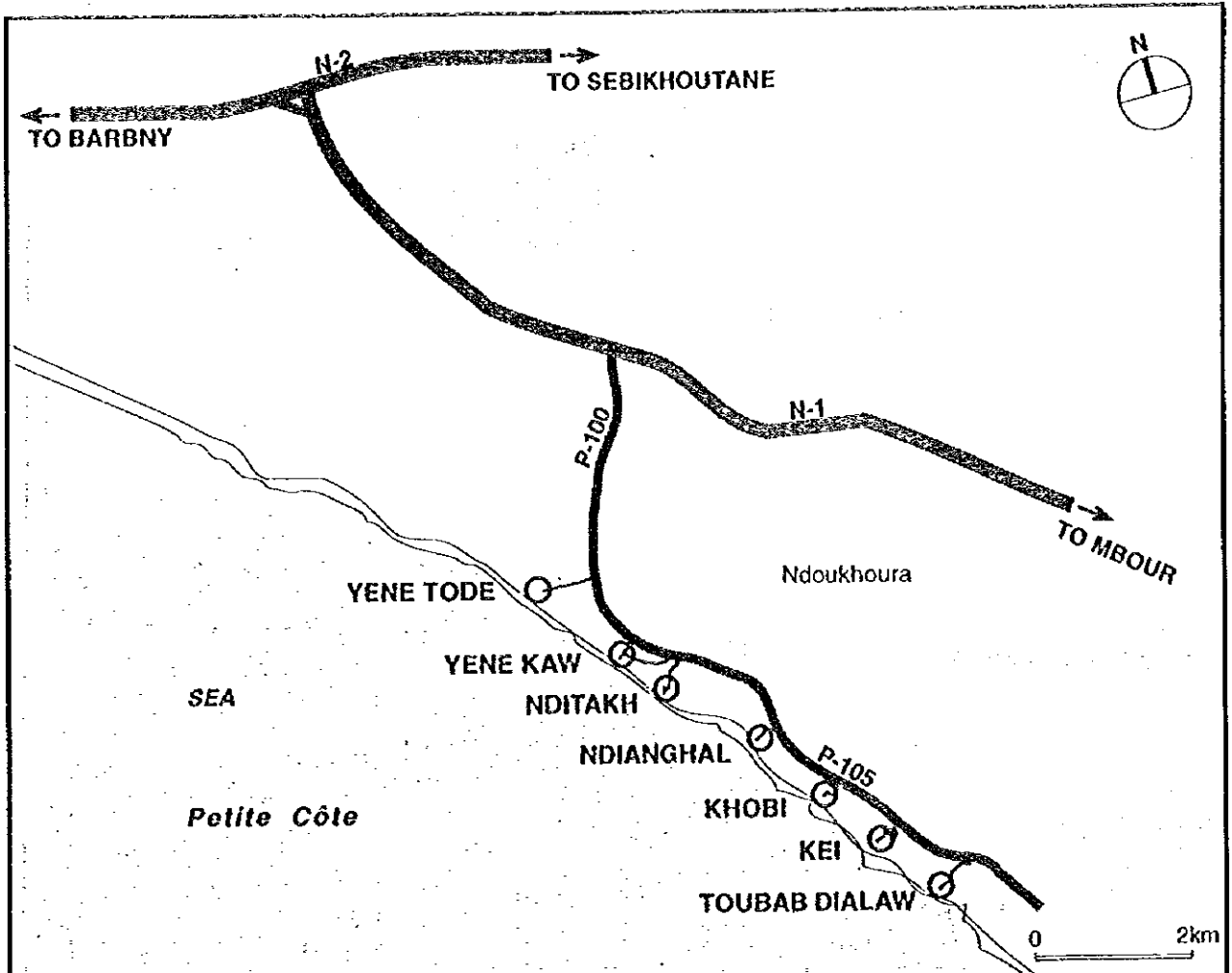


Fig. I.2.8-6 Existing Infrastructure Condition in Yene

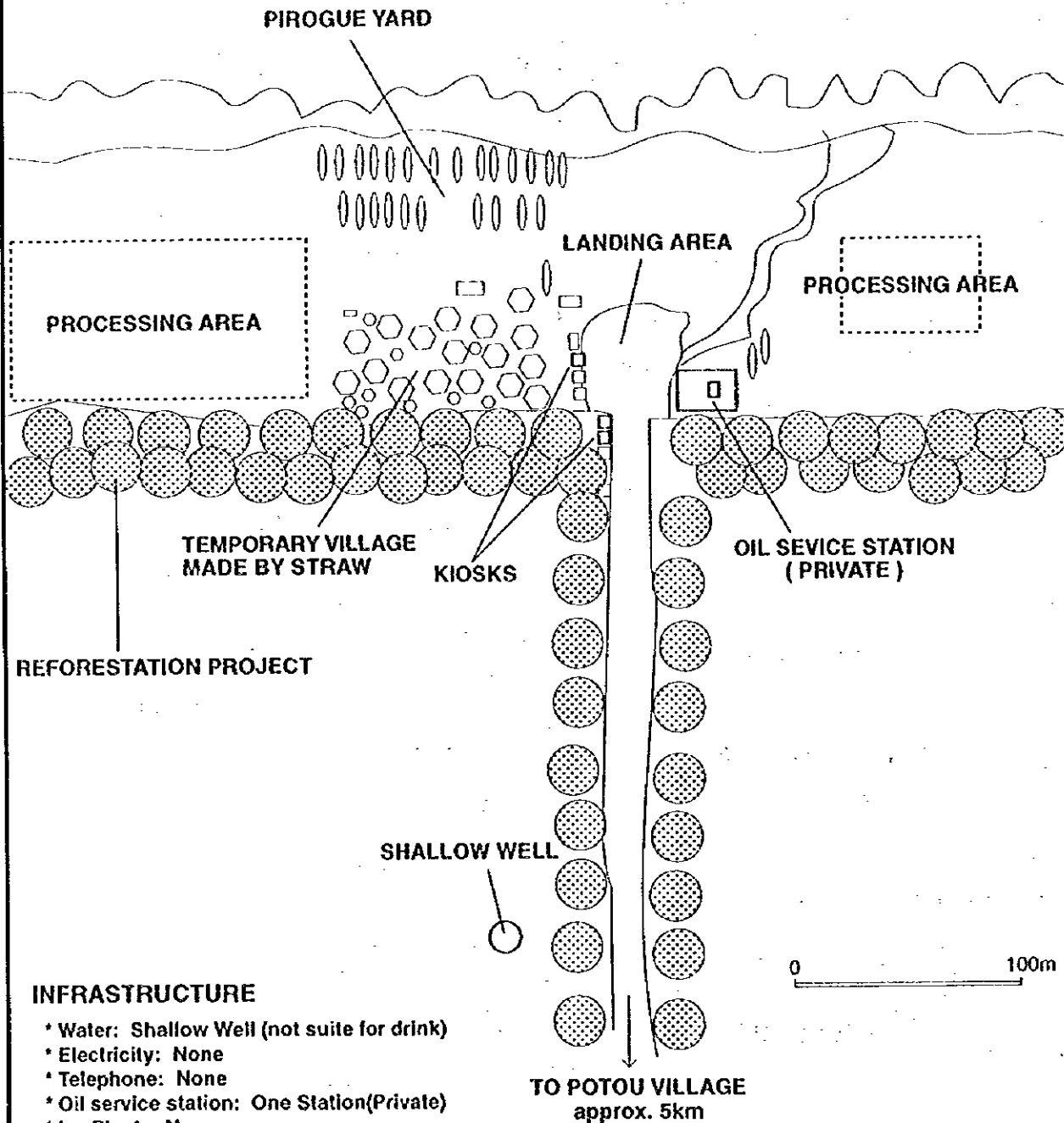
THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
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GRANDE CÔTE

Distance from Potou to mouth of Senegal river
is approx. 7km

Rough season is from January. to March.



INFRASTRUCTURE

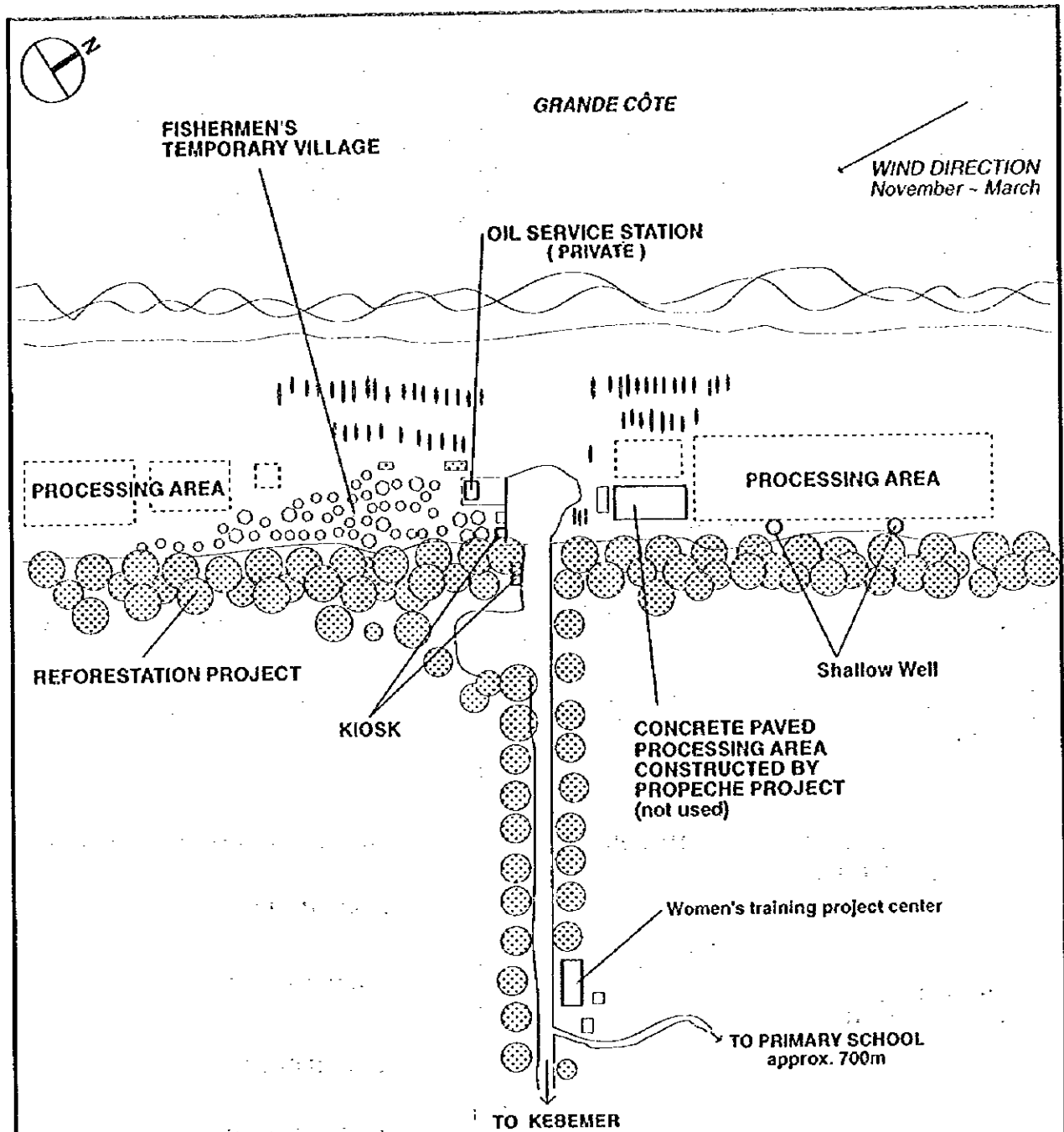
- * Water: Shallow Well (not suite for drink)
- * Electricity: None
- * Telephone: None
- * Oil service station: One Station(Private)
- * Ice Plant : None

COMMUNITY ASSISTANCE

- * School: None (at Potou Village, One Primary School)
- * Health Post: None
- * Community Center: Temporary Shed Only

Fig. I.2.8-7 Existing Infrastructure Condition in Potou

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INFRASTRUCTURE

- * Water: Shallow Well (not suitable for drinking)
- * Electricity: None
- * Telephone: None
- * Radio communication: None
- * Oil service station: One Station (Private)
- * Ice plant: None
- * Road: Some parts are very bad

COMMUNITY ASSISTANCE

- * School: One Room Type Primary School Constructed by Rural Community
- * Health post: None
- * Community center: Women Training Center operated by PAFGC Project assisted by CIDA

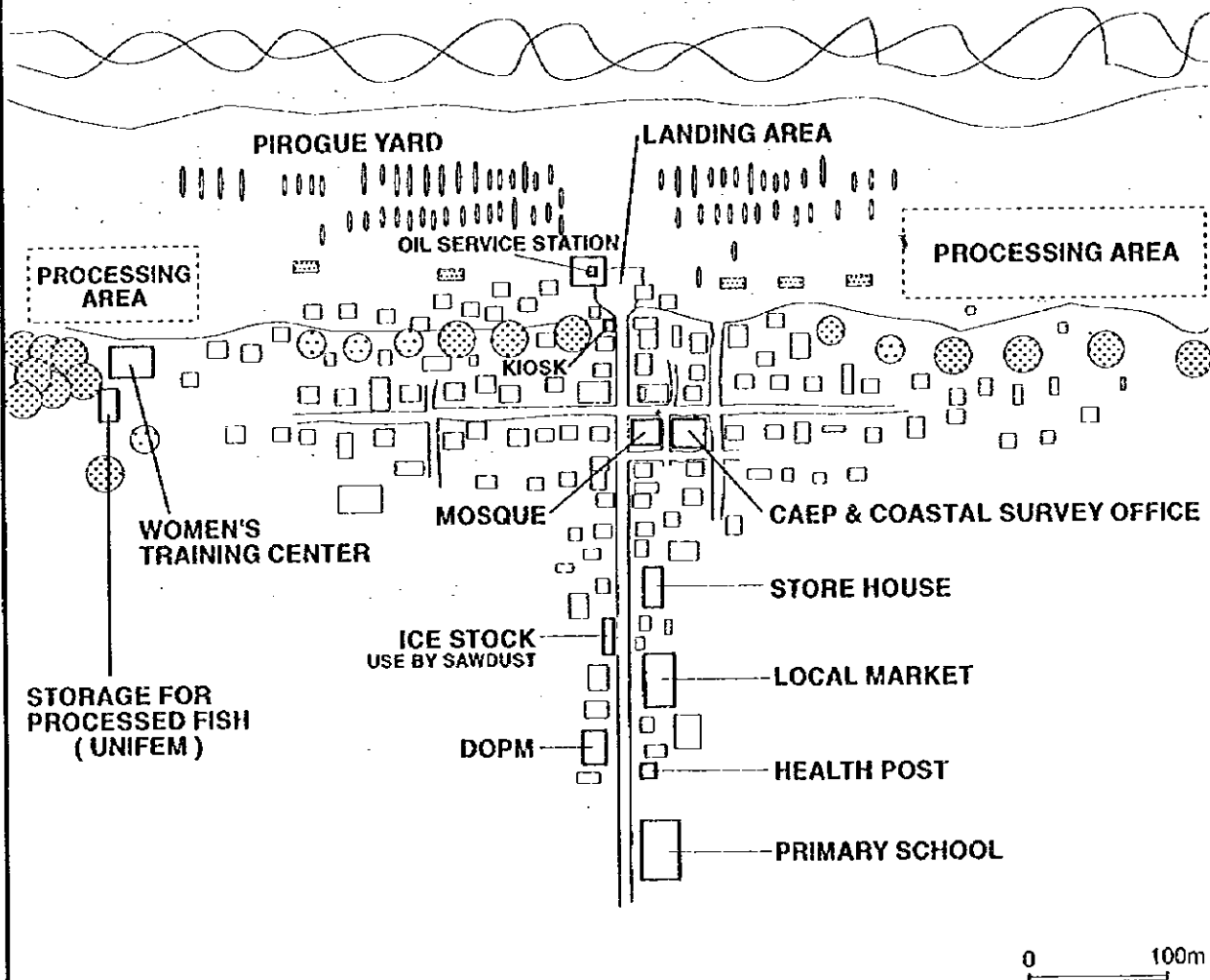
Fig. I.2.8-8

Existing Infrastructure Condition in Lompoul

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Grande Côte



INFRASTRUCTURE

- * Water: Shallow Well
- * Electricity: None
- * Telephone: None
- * Oil service station: One Station (Private)
- * DOPM Office
- * Coastal Survey Office & CAEP Workshop

COMMUNITY ASSISTANCE

- * School: One Primary School
- * Health Post: One
- * Community Center: Women Training Center Operated by PAFGC Project (Without; water, electricity, telephone)
- * Storage for Processing (UNIFEM Project)

Fig. I.2.8-9 Existing Infrastructure Condition in Fass Boye

THE STUDY ON THE DEVELOPMENT PROGRAM FOR NORTHERN FISHING AREAS IN THE REPUBLIC OF SENEGAL
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Table I.2.8-1 Summary of Infrastructure Characteristics in the study area

Infrastructure Characteristics / Outline	St.Louis	Kayar	Dakar Region (Summary)	Potou, Lompoul, Fas Boye
Facilities				
• Fish Sorting space	In the open on beach.	In the open on beach.	Mainly in the open on beach.	In the open on beach.
• Processing area	Crowded and unsanitary, in landing area	Developed and apart from landing area	small scale or none	small scale
• Ice Making Facilities	Only 1 operating ice plant	1 renovated in 1996, 20 t/day capacity	From Dakar city	None
• Cold Storage Facilities	None. Only in processing factory	20 t (-20°C)	Available in some villages	None
• Market	Consumer / retail market nearby	Consumer / retail market on site	Some villages integrated with market	Consumers buy direct from fishermen
• Workshop/engine maintenance	CAEP & private mechanics	CAEP & private mechanics	CAEP & private mechanics	None
• Fuel station	11 fuel stations	6 fuel stations	Dakar city	1 in each village
Amenities				
• Electricity Supply	Available 220/380 volts, 50 Hz	Available 220/380 volts, 50 Hz	Available 220/380 volts, 50 Hz	Not available
• Water Supply	Pipe water connected to major facilities	Supply from shallow well	Pipe water available nearby	Supply from shallow well
• Road connection	Well connected to main truck road	Well connected. Some paved.	Well connected to Dakar city	Poor
• Telephone communication	Private tel. service available	Private tel. service available	Private tel. service available	None
• Sewage disposal system	Municipal network	No network	City network	None
• Rubbish disposal system	Municipal collects 2-3 times/week	No municipal service	Municipal service available	No municipal service
Land / Development Characteristics				
• Sanitary /living condition	Crowded & unsanitary with no space for expansion	Houses on sea-shore to be shifted but without conflict	Generally poor in fishing villages.	Poor with temporary type houses
• Land Traffic flow	Narrow with high traffic volume.	Narrow with moderate traffic volume.	Narrow road inside village	Low traffic volume
• Width of beach landing area	Wide with scattered landing locations ~ 3km along beach	Concentrated ~ 100 m wide in deep channel location.	Concentrated at village. Calm with natural breakwater in sheltered area & Petit Côte	Concentrated at village.

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

Table I.2.8-2 Summary of Infrastructure Characteristics of Potou, Lompoul and Fass Boye

Infrastructure Characteristics / Outline	Potou	Lompoul	Fas Boye
Facilities			
• Fish Sorting space	In the open on beach.	In the open on beach.	In the open on beach.
• Processing area	Both sides of village	Both sides of village with concrete floor facility (unused)	Both sides of village with storage facility.
• Ice Making Facilities	None	None	None
• Cold Storage Facilities	None	None	None. Ice stock shed using saw-dust
• Market	Consumers buy direct from fishermen	Consumers buy direct from fishermen	Local market building
• Workshop/engine maintenance	None	None	CAEP workshop
• Fuel station	1 private station	1 private station	1 private station
Amenities			
• Electricity Supply	Not available	Not available	Not available
• Water Supply	Supply from shallow well	Supply from shallow well	Supply from shallow well
• Road connection	Poor	Poor	Poor
• Telephone communication	None	None	None
• Sewage disposal system	None	None	None
• Rubbish disposal system	No municipal service	No municipal service	No municipal service
Land / Development Characteristics			
• Sanitary /living condition	Temporary straw houses on beach	Temporary straw houses on beach	Block houses intermingled with temporary straw houses
• Land Traffic flow	Low traffic volume	Low traffic volume	Low traffic volume
• Width of beach landing area	Concentrated at village.	Concentrated at village.	Concentrated at village.

Source: Field survey in Phase 1 (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct.-Dec., 1996.

Table I.2.8-3 Summary of Infrastructure Characteristics for Dakar Region (1 of 2)

Infrastructure Characteristics / Outline	Hann	Yoff	Ouakam	Soumbédioune	Ngor
Facilities / Amenities					
• Fish Sorting space	Concrete paved area	In the open on beach.	In the open on beach.	In the market area	In the open on beach.
• Processing area	Small scale	Concrete paved area	Small scale	None	None
• Ice Making Facilities	Private	In the home. Ice from Dakar city	None. Ice from Dakar city	None. Ice from Dakar city	None. Ice from Dakar city
• Cold Storage Facilities	Private	None	None	None	None
• Market	Market near beach	Yes	Yes	Integrated with market	Yes
• Workshop/engine maintenance	Private mechanics	Private mechanics	Private mechanics	Private mechanics	Private mechanics
• Fuel station	3 fuel station	1 fuel station	1 fuel station	1 fuel station	2 fuel station
Amenities					
• Electricity Supply	Available	Available	Available	Available	Available
• Water Supply	Pipe water access	Pipe water access	Pipe water access	Pipe water access	Pipe water access
• Road connection	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city
• Telephone communication	Private tel. service available	Private tel. service available	Private tel. service available	Private tel. service available	Private tel. service available
• Sewage disposal system	City network	City network	City network	City network	City network
• Rubbish disposal system	Municipal service available	Municipal service available	Municipal service available	Municipal service available	Municipal service available
Land / Development Characteristics					
• Sanitary /living condition	Generally good	Generally good	Generally good	Generally good	Generally good but congested
• Land Traffic flow	Good road connection	Good road connection	Good road connection	Just beside main road	Good road connection but narrow in village
• Width of beach landing area	Concentrated at village. Calm, located in sheltered bay	Concentrated at village. On Grande Côte with rock outcrop	Concentrated at village. Calm with natural breakwater in sheltered area & Petit Côte	Calm with natural breakwater	Concentrated at village. Calm with natural breakwater

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

Table I.2.8-3 Summary of Infrastructure Characteristics for Dakar Region (2 of 2)

Infrastructure Characteristics / Outline	Thiaroye	Rufisque	Bargny	Yene	Toubab Dialano
Facilities					
• Fish Sorting space	In the open on beach.	Sheltered facility	In the open on beach.	In the open on beach.	In the open on beach.
• Processing area	Concrete paved area nearby with partial shelter	On beach nearby landing spots	Concrete paved area with storage facilities	Concrete floor	Concrete floor
• Ice Making Facilities	None. Ice from Dakar city	DOPM's but operated by committee	None. Ice from Dakar city	In the home. Ice from Dakar city	None. Ice from Dakar city
• Cold Storage Facilities	None	- as above-	None	None	None
• Market	Yes	Yes	Yes	Yes	Yes
• Workshop/engine maintenance	Private mechanics	Private mechanics	Private mechanics	Private mechanics	Private mechanics
• Fuel station	1 fuel station	1 fuel station at each of the 2 major landing point	1 fuel station	1 fuel station	1 fuel station
Amenities					
• Electricity Supply	Available	Available	Available	Available	Available
• Water Supply	Pipe water access	Pipe water access	Pipe water access	Pipe water access	Pipe water access
• Road connection	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city	Well connected to Dakar city
• Telephone communication	Private tel. service available	Private tel. service available	Private tel. service available	Private tel. service available	Private tel. service available
• Sewage disposal system	City network	City network	City network	City network	City network
• Rubbish disposal system	Municipal service available	Municipal service available	Municipal service available	Municipal service available	Municipal service available
Land / Development Characteristics					
• Sanitary /living condition	Generally poor in fishing villages.	Generally good	Generally good	Generally good	Generally good
• Land Traffic flow	Narrow road inside village	Winding road inside village	Winding road to village	Narrow road inside village	Narrow road inside village
• Width of beach landing area	Concentrated at village. Calm and shallow	Concentrated at 2 points with service facilities. Calm within a sheltered bay.	Concentrated at village. Calm with natural breakwater in sheltered area & Petit Côte	Various landing spots at village. Calm	Various landing spots at village. Calm with rock outcrop

Source: Field survey in Phase 1 (The Study on the Development Program for Northern Fishing Areas in Senegal), Oct.-Dec., 1996.

2.9 Environmental Findings and Natural Conditions

(1) Major Environmental Programs and Projects in Study Area

1) Program environment (Cadre)

There were studies done in 1992 and 1993 to study the marine & coastal pollution in/around Dakar and the north coast. From these studies, a plan of action was formulated which resulted in the Program Environment (Cadre) financed by UNDP. Program Environment (Cadre) is a multi-sectoral program that seeks to enhance and improve the environment by active participation of the communities. It involves the Fisheries, Health, Hydraulic, Agriculture, Meteorology agencies. From the study on the pollution in the bays of Dakar, a tentative Plan of Actions have been proposed.

- Propose littoral/coastal law - to monitor area and to regulate activities
- Action to minimise industrial waste - promote recycling, non-waste technology, sound efficient management
- Control of specific/hazardous chemical release
- Action to monitor & survey water quality in Bays of Dakar
- Feasibility study on collection of royalties/taxes (Polluter to Pay principle)
- Management of waste
- Sanitation awareness in the Bays of Dakar
- To control erosion of coast line

2) Pilot village projects in Kayar

There is a program which seeks to improve the sanitation of the villages also financed by UNDP. One of the 7 villages in this program is Kayar. The project in Kayar started with a study in 1986 to identify the problem and to promote participation of the community to manage their natural resources & improve sanitation. Community activities was started in 1990 and the project ended in 1995. Some of the activities included, waste composting unit, economic activities for fishermen and traditional processing, health education, literacy, gardening.

3) Reforestation to control movement of sand dunes on Grande Côte

The coastal area from Dakar to Saint Louis called the Niayes is covered by sand dunes about 200 km by 4-5 km. To fix the sand dunes to prevent further lost of agricultural land, planting and reforestation by casuarina trees have been carried out. In the Niayes, there are presently the project for conservation of north coastal soil financed by Canada, and Project for fixing dunes and conversion of Kebemer's market garden basin financed by UNDP.

4) Monitoring of Natural Resources by Centre Suivi Ecologique (CSE)

The centre was set up to monitor the biomass production of Senegal by the use of satellite imagery correlated with field study, aerial photography and existing topography maps. The satellite landsat imagery database is from 1988. They have 37 monitoring sites all around Senegal.

(2) Natural Condition

1) Natural disasters

Senegal is not subjected to major earthquake or typhoons. There were slight tremors in Dakar region in 1836, 1862 and 1932, Tambacounda in 1954, and off Kayar in 1986. The country is located near the mid-Atlantic rift. Off Dakar there is a submarine volcano still active, and 3 submarine massifs off Kayar.

The main natural environmental disasters in Senegal are flooding, desertification, dune advance, epidemics, and droughts. There was slight flooding in Saint Louis in 1994 and in some low lying areas of Dakar in 1989.

2) Overview of climatic condition of study area

Although the project study area has been divided into 4 areas, the climatic characteristics could be compared in terms of 3 broad areas, i.e. around Saint Louis, Kayar and Dakar. The climatic data for Thies will be used for Kayar as there is no comprehensive climatic data available for Kayar.

Comparison of climate by area

Area	Yearly Av. Rainfall (mm)	Rainy Season	Dry Season	Humidity (%)	High Temp. (°C)	Low Temp. (°C)	Predominate Wind Direction
Saint Louis	230	Jul - Oct	Jan - April	65	28.5	22.5	N-NW
Kayar/Thies	330	Jul - Oct	Jan - April	76	28	22.5	N-NW
Dakar	450	Jul - Oct	Jan - April	76	27.5	21	N

Source: Direction de la Meteorologie Nationale, 1951-1995 data

The climatic variation between the areas is not big and they could be treated as having the same climatic conditions. The study area experiences little rain during the non-rainy season i.e. November till June. This coincides with the peak fishing season which is ideal from the point of processing and drying of fisheries produce.

(3) Environmental Condition of Study Area

1) Saint Louis

Physical resources

The village of Guet Ndar in Saint Louis is located on a sandbar between Senegal River and the Atlantic Ocean. Its widest point is about 200 m.

There are no mineral extraction and no seismic activity in the area. There are some shallow wells the water quality of which is not acceptable for drinking. For drinking water, there is pipe water supply to some areas of the village.

As for the air quality and pollution, there was an unpleasant odour from the processing area located on the beach near the major landing site.

Ecological resources

Fisheries resources is described elsewhere in this report. There are no terrestrial wildlife, endangered species or forest cover in the village of Guet Ndar. At the southern end of the sandbar is a protected National Park, Languede Barbarie where settlement is prohibited.

Human use values

The fisheries industry in Guet Ndar consist of ship building, ice plant, ice storage, fueling station, local fish market, and fish processing. As the village is within the municipality of Saint Louis, the usual urban amenities such as pipe water, electricity, sewage network and treatment, and rubbish disposal services are available.

The village is well connected by road to the main truck road leading to Dakar and Saint Louis although the road condition within the village is not good with pot-holes, depressions and of narrow width.

There are some small vegetable plots but no agriculture farming of any significance in or around the village. Housing is of block construction and in a very congested area. The houses located close to the beach are in danger of high seas intrusion.

Quality of life values

Intensive use of available beach space for boat landing, trading, distribution, and traditional processing had lead to very congested condition. The lack of proper waste disposal and cleaning in the processing area has resulted in a polluted environment with an abundance of flies and bad odour creating unhygienic living conditions.

The high population concentration and cramped living condition aggravated by the low ground elevation and lack of proper drainage results in water stagnation and

poor public health conditions. Risk of epidemic and disease is high.

Public safety is good in the village but every year, fishermen drown after boats capsized in the high waves. The slightly sloping beach creates breaking waves near the shore making navigation through the waves a problem during the winter months when the sea is rough.

There are no archaeological sites and limited tourist activity in the village.

Major environmental constraints are the lack of land and space for future development; the high concentration of population; the poor condition of the existing services such as rubbish disposal, cleaning, waste treatment; the unprotected beach landing condition; the threat of erosion & high wave attacks; and the intermingling of the various activities such as fish landing, processing, marketing & distribution etc.

2) Kayar

Physical resources

The Kayar village of about 15,000 people is located facing the Atlantic Ocean with a deep sea channel that approaches the shore. This unique feature creates a calm area without breaking waves which allows the fishing boats to land and launch in relative calm seas. However this calm area is narrow (less than 100 m wide) leading to congestion in this favoured landing area.

Water supply is from shallow wells. Good quality drinking water is available from some of the wells in the village. There is no pipe water supply to Kayar.

There are no mineral extraction and no seismic activity in the area although it experienced slight tremors off shore in 1986.

There was no unpleasant odor in the air. The developed processing area was located south of the village which is ideal as the predominant wind direction is from the north.

Ecological resources

Kayar is a developed urban fishing town devoid of terrestrial wildlife, endangered species or forest cover. Along the beach area north and south of the town, there is a belt of casuarina trees planted under the reforestation program to control the movement of the sand dunes.

Human use values

The fisheries industry consist of ice plant & storage, fueling station, local fish market and fish processing. There is electricity and telephone supply to the village but

no sewage network and treatment or rubbish disposal amenities from the municipality.

The main road are paved but minor roads are not and very narrow. Kayar is well connected by the main truck road to Dakar.

There are agriculture farms in the interior away from the coast. The houses of both the permanent and transmigrant fishermen are of the permanent type made from blocks and/or concrete. The fishing village extends towards the north-east along both the sea-ward and land-ward side of the main truck road.

Quality of life values

The main fisheries related activities are concentrated in an area between the main road and the beach which has prompted some fishermen to settled in this "public land" area for ease of access. Although there was a project to clear this illegal settlement from the "public land" and to resettle the fishermen to other areas within the village, the fishermen did not move as resettlement terms were not agreed.

Kayar population fluctuates during the fishing season due to transmigrant fishermen. The sudden increase in population due to the arrival of these fishermen puts a strain of the existing amenities and services such as schools, health services etc. There is peaceful coexistence and tolerance even in these circumstances.

The deep sea channel in Kayar is very favorable for landing and launching especially during the rough season. This undoubtedly has contributed to public safety of the fishermen.

There are no archaeological sites and limited tourist activity in the village.

Major environmental constraints are the lack of land and space for future development, the lack of pipe water supply, the congested favoured landing spot (especially in rough sea conditions), the threat of erosion and high wave attacks.

3) Dakar Region

Physical resources

This area includes the major fish landing sites in Dakar city and the surrounding fishing villages. Some of the fishing villages have coast line facing the Petit Côte while others faces the Grande Côte.

There are no mineral extraction and no seismic activity in the area. Although there are wells in some areas, for drinking water, there is pipe water supply to some houses.

Ecological resources

There are no terrestrial wildlife, endangered species or forest cover in these fishing village due to the pressure of other urban and industrial uses as these villages are near the Dakar city.

Human use values

The fisheries industry of these villages are geared towards supplying of fish to Dakar city. There are some villages that have built facilities for processing such as concrete paved area or shelter, ice plant and cold storage. The proximity of these fishing villages to Dakar means that access is available to most of the urban amenities such as pipe water, electricity, telephone, sewage connection and rubbish disposal.

The villages are well connected by road to Dakar although some roads within some villages are very narrow.

Farming is limited to individual vegetable plots. In general, the housing condition in these fishing villages have kept paced with the urban development and are of permanent block construction although generally in a very congested manner.

Quality of life values

The ones facing the Petit Côte and those with natural break water shelter from rock outcrop or islands have calm seas for landing contributing to public safety of fishermen when landing or launching.

However due to the urban land use pressure, these fishing villages are fringed by other urban land use such as residential areas, tourism, industries etc. which have restricted their expansion. As a consequence and influence of these other activities and industries, the fishermen are no exclusively fishing but do have other means of livelihood.

There are no archaeological sites and active tourist activity in some villages.

Major environmental constraints are the constraints from other urban land use and lack of space for future development. The congestion has led to unsanitary conditions in some villages both from pollution within the village and from nearby industrial waste and other urban users. Congestion of the houses has also restricted road access within the village to very narrow road some unpassable to motor vehicles. The congestion also pose a fire hazard risk and an access problem for the emergency fire fighting services.

4) Area between Saint Louis and Kayar

Physical resources

This area encompasses the various small fishing villages from Saint Louis to Kayar such as Potou, Lompoul, Fass Boye and Mboro.

There are no mineral extraction and no seismic activity in the area. Water supply is from shallow wells. Good quality drinking water is available from some of the wells in the villages. There is no pipe water supply to these villages.

Small scale processing in these villages has not created problems of land pollution.

Ecological resources

These rural fishing villages located on the sandy beach area are fringed by casuarina trees planted under the reforestation program to control the movement of the sand dunes.

Human use values

The fisheries industry is not well developed due to the difficulty of access. There are no electricity, telephone supply, sewage network and treatment or rubbish disposal amenities.

There are agriculture farms in the interior away from the coast. Houses are generally of the temporary type made from straw although in Fass Boye, there is intermingling of block houses with straw houses.

The water supplies are from shallow wells which are susceptible to salt intrusion.

Quality of life values

The seasonal nature of the fishing in these villages have led to the fishermen housing conditions being of temporary nature and of poor condition generally located on the sea-shore. There is haphazard & unplanned development with the new transmigrant fishing community intermingled with the older established farming community.

Major environmental constraints are the lack of the necessary infrastructure for development such as road, pipe water, electricity, tele-communication, and sewage infrastructure. Large water extraction will need to consider the danger of salt intrusion into the water supplies.