

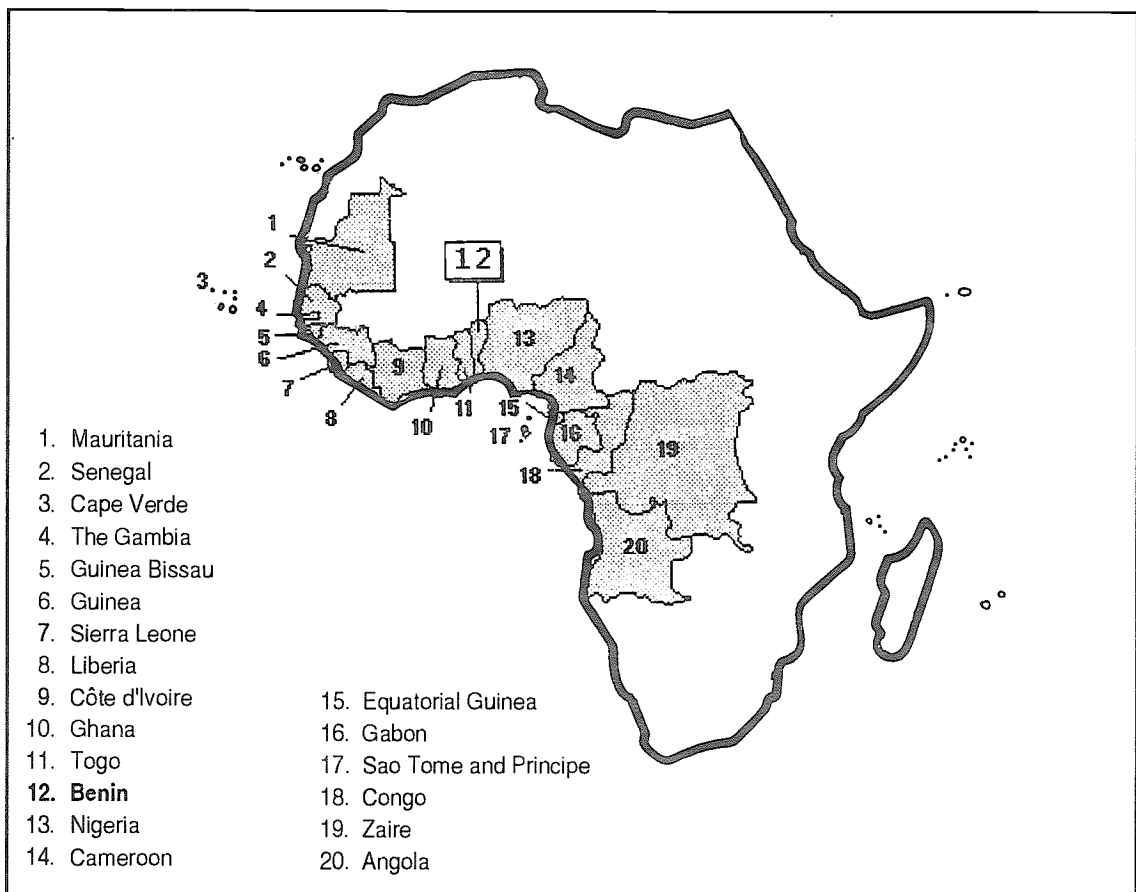
PROGRAMME FOR INTEGRATED DEVELOPMENT OF  
ARTISANAL FISHERIES IN WEST AFRICA

**IDAF PROGRAMME**

Technical Report N° 80

April 1996

**Sector Review of Artisanal Marine  
Fisheries in The Gambia**



DEPARTMENT OF INTERNATIONAL DEVELOPMENT COOPERATION OF DENMARK



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS



Technical Report N° 80

April 1996

**Sector Review of Artisanal Marine  
Fisheries in The Gambia**

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# THE VISION FOR IDAF PHASE III

## INTRODUCTION

Development strategy during the 1960 and 1970s was based on the philosophy that developing countries lacked improved technology and capital for speeding up their development. Industrialization was promoted in order to capitalize on the abundant fish resources. However, the anticipated expansion of the economy did not happen and the development approach shifted towards an integrated rural strategy where emphasis is put on the community as a whole to upgrade incomes and the quality of life through technical assistance and the active participation of fisherfolk and the community.

In this context, emphasis was initially placed on the Community Fishery Centre (CFC) concept as a means of promoting artisanal fishery development. But it became apparent that the presence of a complex of facilities and services tailored to meet local needs was no guarantee that the structures/facilities would be used or that development would occur. The active participation of fisherfolk and the mobilisation of local and community resources was imperative in order to assure sustainability of initiatives undertaken by development projects and/or the community.

So far and in general terms, the IDAF Programme has worked under the context of abundant or seemingly adequate fishery resources with moderate population pressure. The scenario is however changing (and very fast for that matter) and we would soon face the triple constraints of reduced or depleting fish stocks, degrading environment and increasing population pressure. Like in other sectors, it must be anticipated that just to survive, parts of the population surplus in the fishing communities will enter the artisanal fisheries, which will increase the competition for the resources among the small scale fisherfolk in addition to the prevailing competition between the artisanal and industrial fisheries, with their attendant effect on the environment.

This scenario calls for a continuation of the integrated participatory strategy which remains relevant to the development of artisanal fisheries in West Africa. However, the emphasis needs to be placed on the elements and mechanisms that favour the sustainability of initiatives: responsible fishing, the empowerment processes that ensure the devolution of major resource management and development decisions to the local community, the strengthening of national human and institutional capacities at all levels for a sustainable and equitable fisheries resources management and development, as well as in the follow-up and consolidation of past achievements.

## DEVELOPMENT OBJECTIVE

Thus the development objective of the Programme in the present phase III which started on 1 July 1994 is to ensure twenty coastal West African countries a sustainable development and management of their artisanal fisheries for maximum social and economic benefit of their fishing communities in terms of employment, proteins and earnings. This will be done through an integrated and participatory approach in which emphasis will be laid on equity, gender issues, the transfer of technology for development, environment protection, as well as the strengthening of human and institutional capacities.

**The immediate objectives are:**

1. To identify, assess and disseminate strategies and mechanisms for sustainable management and development of the artisanal fisheries in fishing communities;
2. To improve the competence of national Fisheries Departments staff in development and management planning of artisanal fisheries;
3. To enhance regional technical competence in the fisheries disciplines, particularly in fishing and fish technology;
4. To improve information and experience exchange related to artisanal fisheries within the region;
5. To promote regional and sub-regional collaboration for the development and management of artisanal fisheries

**In this context, IDAF will among other things tackle the following major aspects in its work :**

- assisting in the elaboration and implementation of a clear and coherent national development policy for the artisanal fishery sector;
- providing advice on management and allocation of resources between artisanal and industrial fishing fleets, both national and foreign;
- involving users in the design and management of on shore infrastructures;
- monitoring the sector's evolution by the setting up of an economic indicator system for the sector adapted to the financial and human availabilities;
- improving fishing technologies in accordance with the available resources;
- increasing the final product's value by improvement in processing and marketing;
- promoting community development in accordance with the lessons learned from Phase I and II and oriented towards the sustainability of actions undertaken;
- reinforce the Programme's information/communication system.

It is anticipated that by the end of the third phase of the Project, the region will have a nucleus of field oriented experts capable to respond to the challenges of the artisanal fisheries sector and to spur development in their individual countries in keeping with the aspirations and needs of fisherfolk.

## SUMMARY

The Gambia, about 10,500 km<sup>2</sup> in area, comprises a strip of land varying from 25 to 40 km wide on either side of the 480 km long River Gambia. It is surrounded on three sides by Senegal and bordered on the West by the Atlantic Ocean where River Gambia discharges. The Gambia's Exclusive Economic Zone (EEZ), which covers 19,500 km<sup>2</sup>, has a continental shelf of 3,855 km<sup>2</sup>. The coast length is 80 km.

The population was estimated in 1993 at 1.014 million. At 4.1% per annum, population growth is high and almost 40% of the population is concentrated in the urban areas around Banjul, the capital.

The agricultural sector continues to be heavily dependent on a single cash crop, groundnuts, which accounts for almost 90% of domestic exports and represents 38% of total export value. Gross National Product (GNP) per capita was 309 US\$ in 1993. Although fisheries contribute a relatively small proportion of GDP, significant importance is attached to the development of the sector by the national authorities. It provides indeed valuable fish supplies for domestic consumption, direct and indirect employment for about 20,000 people and foreign exchange earnings through exports.

Marine fish landings were estimated in 1994 at 27,670 tonnes out of which 72% came from the artisanal sub-sector. Total potential for marine waters is estimated between 128,000 and 167,000 tonnes per year. Demersal species seem to be fully, if not, over-exploited. The level of exploitation of small pelagics, especially sardinella species presently not exploited, could be increased substantially.

In 1994, there were a total of 500 fishermen and 2,614 assistants on the Atlantic coast of The Gambia. In marine fisheries, Gambian boat-owners are a minority (35%). As far as crew is concerned, the difference is even higher as 74% of the crew members are foreigners, mainly Senegalese.

In 1994, artisanal marine fish production was dominated by pelagic species which accounted for 86%. Demersal species accounted for about 1,550 t. (8%). The value of artisanal fisheries production at the landing site was estimated at 50 million Dalasis (5.2 million US\$) of which about 40% was made by bonga catch.

The industrial vessels operate in the Gambian marine waters either through local companies or one of the fishing agreements signed by The Gambia with the European Community, Senegal and Japan. Only 20 % of the vessels licensed in 1992-1993 were owned by companies based in The Gambia. Annual catches of the local companies in 1994 were 7,750 t. consisting of 5,900 t. finfish (70%), 3,243 t. cephalopods (23%) and 560 t. shrimps (7%). The FOB value of fish exports was D30.6 million comprised mainly of catches collected from artisanal fishermen by the industrial fishing companies for processing and export. Because there is no fishing port in the country more than 90% of all licensed industrial fishing vessels land their catch in foreign harbours, mainly Dakar and Las Palmas.

In The Gambia, like in most countries of the region, fish is the cheapest source of animal protein. This is particularly true for bonga. Imports are negligible and most of the fish is marketed after processing. On average, per capita fish consumption is estimated at about 20 kg per year and fish provides about 46 % of animal protein.

Environmental degradation has become a serious problem. This has resulted from the combination of factors such as inappropriate land use practices in agriculture, overgrazing of pasture

lands, deforestation arising from overfelling of trees and bush fires, increase in salinity of the Gambia River and erosion along the coastline. Although some progress has been made to reduce fuelwood consumption, artisanal fisheries is still an important consumer of wood.

The scarcity of both investment and working capital in the Gambian fishing communities, as well as the lack of credit facilities and private investors, delays the entry of nationals in the sector. On the other hand, the low purchasing power of the Gambian population makes the local market for high value products very narrow. It is therefore necessary to find outlets outside the country for these products. On the domestic market, the producers have great difficulties in passing on production cost increases.

The number of high and middle level staff in the Fisheries Department is inadequate to meet its mandate. The level of fisheries research is low, especially in fisheries statistics and stock assessment, product development and quality control of fish products. The poor knowledge of some high value species, like cephalopods and crustacea, is a constraint to the rational management of the resource and to the development of these fisheries.

Women fisherfolk have very limited resources and little or no access to formal credit. They also have difficulties in securing ownership right to assets. Upgrading their living and working conditions will therefore have an important and direct impact on the household.

The development of artisanal fisheries will likely be based on a combination of biological, commercial and socio-economic opportunities.

From a biological point of view, demersal resources which are presently fully exploited need to be better managed in the future so as to limit their level of exploitation by industrial fleets. The potential of pelagic resources remains very important. One estimates the potential additional catch of bonga to be between 15,000 and 30,000 t. per year. *Sardinella* species are currently unexploited. But their potential is 70,000 to 80,000 t. per year which represents real prospects for additional productive investments.

Commercial opportunities lie in both domestic and export markets. The natural outlet for small pelagic species is the domestic market. It seems that it could easily absorb additional landings of bonga provided that constraints related to access roads, ice supply, storage facilities and fuelwood availability and price are resolved. The identification of a financially solvent market and an appropriate processing technique could lead to the profitable exploitation of *sardinella* species. The example of Senegal shows also that artisanal fishery can contribute significantly to the objective of foreign exchange earnings. This could be done by supplying export fish processing companies with shrimp, cephalopods, sole, etc.

From a socio-economic perspective, the opportunities rest in the contribution of the artisanal fishery sector to employment, revenue and community development. Professional artisanal fishing is a relatively new activity in The Gambia. Notwithstanding, one observes already an increase in the number of full-time national fishermen. This will allow the progressive substitution of foreign fishermen by national. It is obvious that the participatory approach followed by the Fisheries Department has contributed to a high degree of acceptability of the facilities by the fishing communities, as well as to a willingness to manage them carefully. The good relations existing between the fishing communities and Fisheries Administration will help fisherfolk to be more responsible in managing their assets, which are not only infrastructures, facilities or money, but also natural resources like fish and forest.



## ACRONYMS

AFDP	Artisanal Fisheries Development Project
CAS	Catch Assessment Survey
CRODT	Centre de Recherche Océanographique of Dakar-Thiaroye
CFC	Community Fisheries Centre
EEZ	Exclusive Economic Zone
ERP	Economic Recovery Programme
ECOWAS	Economic Community of West African States
ECU	European Currency Unit
EC	European Community
EDF	European Development Fund
FAO	Food and Agriculture Organization of the United Nations
FDF	Fisheries Development Fund
CECAF	Committee for the Eastern Central Atlantic Fisheries
FAC	Fisheries Advisory Committee
FOB	Free on board
GCDB	Gambia Commercial and Development Bank
GDP	Gross Domestic Product
GNP	Gross National Product
GRT	Gross registered tonnage
HP	Horse power
ICAM	Integrated Coastal Area Management
JICA	Japanese International Cooperation Agency
MANR	Ministry of Agriculture and Natural Resources
MCS	Monitoring, Control and Surveillance
NASSCC	National Artisanal Safety at Sea Coordination Committee
NARI	National Agricultural Research Institute
NEA	National Environment Agency
ODA	Official Development Assistance
PSD	Programme for Sustained Development
SRFC	Sub-Regional Fisheries Commission
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme

## FOREWORD

The present study was undertaken in the framework of the activities of the Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF). It is particularly related to the preparation of an appropriate methodology for socio-economic monitoring of artisanal marine fishery. Previously, Guinea Bissau, Cameroon, Sao Tome and Principe, and Congo had benefitted from IDAF assistance in this area (DIPA/WP/46; DIPA/WP/48; DIPA/WP/55 and DIPA/WP/70).

The study has been carried out by a team composed of an economist/planner (team leader), a fishery biologist and a fishing technologist. The mission stayed in The Gambia from 11 to 28 February 1996. The team worked closely with the following counterparts: MM. Momodou Njie, Nfamara Dampha, Asberr Mendy and Peter Ndow.

The objective of the work is the sectoral analysis of the Gambian artisanal marine fishery (i. e. the importance of the sub-sector in the national economy) in view to identify some qualitative and quantitative indicators that will facilitate the monitoring of the evolution of the sub-sector.

The team thanks the personnel of the Fisheries Department in Banjul, especially Mr. Ousman Drammeh Director of Fisheries, as well as all persons met (annex 1) for the assistance, the support and the valuable information provided.

After a description of the general context, the document presents the major characteristics of the fisheries sector (resources, boats, fishing techniques, economic operators and catch), as well as the utilization of fish products (processing, distribution and marketing). The examination of the national development policy has facilitated the review of the major development projects and programmes, and the administrative structures involved. Finally, the analysis of the development constraints and opportunities leads to the identification of the main socio-economic indicators proposed for the monitoring of the artisanal fisheries sub-sector by the Fisheries Administration.

However, this work is not an end in itself. It is intended to be a first element in elaborating a continuous monitoring tool for the artisanal marine fishery in The Gambia. It is in this perspective that the IDAF Programme expects it to be used.

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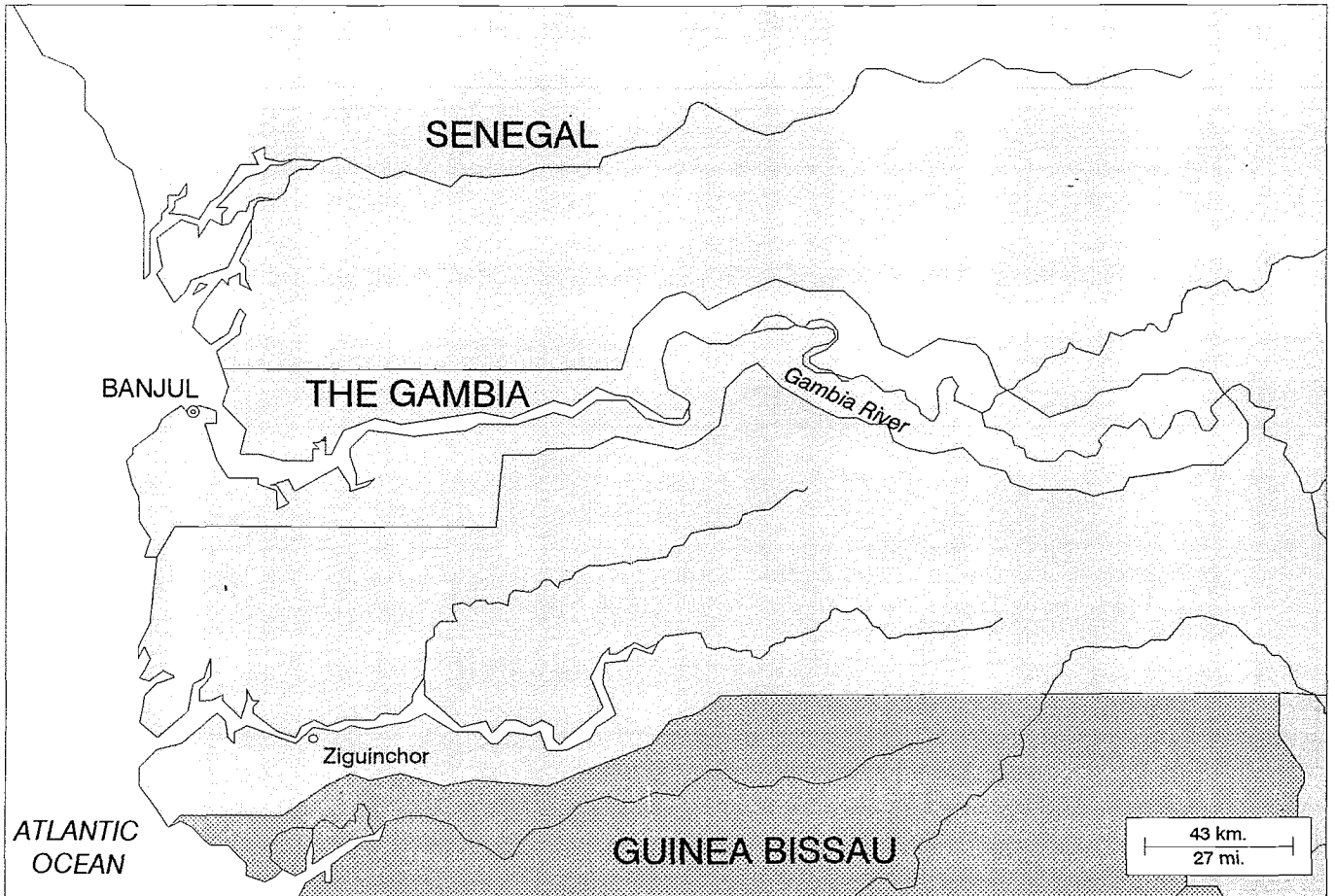
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## **1. GENERAL CONTEXT**

### **1.1. Physical**

The Gambia, about 10,500 km<sup>2</sup> in area, lies on the West coast of Africa between 13° and 13° 40' latitude North. It comprises a strip of land varying from 25 to 40 km wide on either side of the 480 km long River Gambia. It is surrounded on three sides by Senegal and bordered on the West by the Atlantic Ocean where River Gambia discharges.

The Gambia's Exclusive Economic Zone (EEZ), which covers 19,500 km<sup>2</sup>, has a continental shelf of 3,855 km<sup>2</sup>. The coast length is 80 km.

Hydrologically, three seasons can be distinguished :

- (i) the cold and saline water season (December-April), when the temperature is less than 24°C and salinity is greater than 35‰;
- (ii) the warm and saline water season (May-September), when the water temperature is greater than 24°C and salinity is greater than 35‰;
- (iii) the warm and low salinity water season (October-November), when the water temperature is greater than 24°C and salinity is less than 35‰.

The Gambia, located in the Sudan-Sahel climatic zone, has a dry climate for most of the year. The rainy season starts in June and lasts till October, with maximal rainfall during August and September. Annual rainfall ranges from 850 to 1,200 mm.

The surface of the inland waters formed by River Gambia, at peak floods, is about 2,000 km<sup>2</sup>, 20% of the country. The flow of the river is typical of the tropics, with a period of high water from July to November, and a period of low water from January to June when the flow is negligible. During the low water period, the 1‰ salinity boundary moves up to 260 km from the river mouth while at the moment of the flood, the brackish waters are pushed down to the sea and the 1‰ boundary lies around 80 km from the mouth of the river. The lower river is dominated by permanent brackish swamps as well as mangroves which are the nursery grounds for many marine species.

Overall, the ecology and therefore the fisheries of the Gambian shelf are interlinked with the Senegalese shelf on either side, and are heavily dependent on the estuary of the River Gambia.

Environmental degradation has become a serious problem. This has resulted from the combination of factors such as inappropriate land use practices in agriculture, overgrazing of pasture lands, deforestation arising from overfelling of trees and bush fires, increase in salinity of the Gambia River and erosion along the coastline.

### **1.2. Human**

The population was estimated in 1993 at 1.014 million, with a density of 96 persons per square kilometre, making it very densely populated when compared to other countries of the region. At 4.1% per annum, population growth is high and almost 40% of the population is concentrated in the urban areas around Banjul, the capital. About 44% of the population is under the age of 15.

The Gambia's social diversity is reflected in the different ethnic groups. The main ones are: Mandikas (40%), Fula (19%), Wolof (15%) and Jola (10%). The majority of the population is Muslim (95%).

The level of human development achieved is very low. According to the 1995 UNDP Human Development Report, The Gambia ranks 161 on the Development Scale out of a total of 173 countries. Life expectancy is only 52 years and the infant mortality rate is about 85%. The adult literacy rate does not exceed 25% while the primary school enrolment ratio as a percentage of the school age population is 68.7%.

Twenty seven per cent of the population has no access to safe water and the average calorie intake is only 86% of total requirement. Furthermore, these average figures hide serious urban-rural and male-female differences.

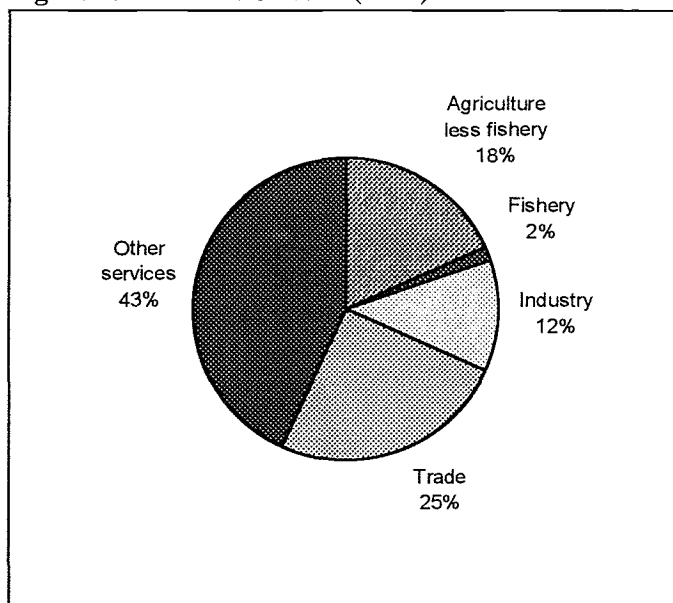
### 1.3. Economic situation<sup>1</sup>

Economic activity in the Gambia is based on a narrow range of goods and services. The agricultural sector represents a major determinant of economic activity both in terms of output, about 20% of Gross Domestic Product (GDP) (Fig. 1), and employment, about 75% of total labour force. It continues to be heavily dependent on a single cash crop, groundnuts, which accounts for almost 90% of domestic exports and represents 38% of total export value.

The industrial sector does not play a significant role. Its contribution to GDP is only 12%. Re-export trade to neighbouring countries encouraged by an open trade policy provides over 50% of foreign exchange earnings.

Although fisheries contribute a relatively small proportion of GDP (between 1.5 and 2%), significant importance is attached by the national authorities to the development of the sector. It provides indeed valuable fish supplies for domestic consumption, direct and indirect employment for about 20,000 people and foreign exchange earnings through exports. In 1993, the contribution of the fishery sector to GDP was about 98 million dalasis<sup>2</sup> at current market prices.

Figure 1. Structure of GDP (1993)



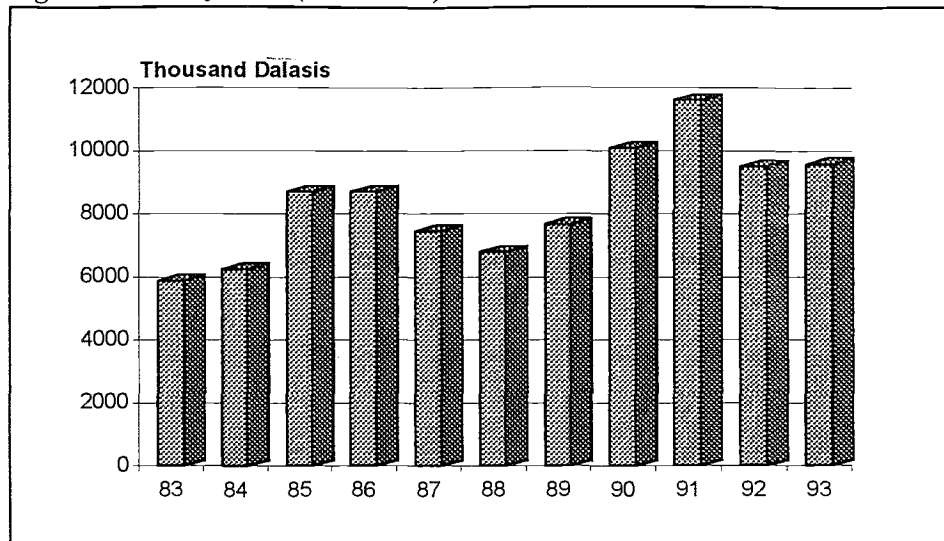
<sup>1</sup> Fiscal year, in The Gambia, begins 1<sup>st</sup> July and ends 30<sup>th</sup> June. Therefore, when data on National Accounts are mentioned in the report, the year referred to is the starting year. For example, 1993 refers to the fiscal year which started 1<sup>st</sup> July 1993 and ended 30<sup>th</sup> June 1994.

<sup>2</sup> Exchange rate: US\$ 1 = 9.5 dalasis (February 1996)



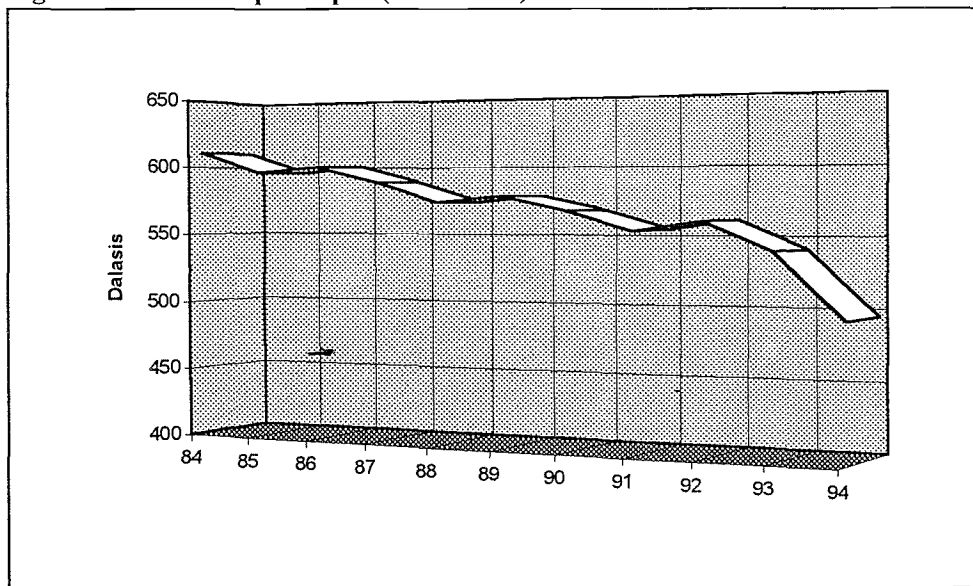
Figure 2 shows the evolution of fishery GDP between 1983 and 1993 at constant prices.

**Figure 2. Fishery GDP (1983-1993)**



The GDP for the 1994/95 fiscal year was about D495.6 million at constant 1976/77 prices, compared with D528.4 million in 1993/94. This represents a decline of 10% in per capita income (Fig. 3) which is mainly due to the negative consequences at the international level of the 22 July coup d'état: suspension of new project interventions and 60% decline of tourist arrivals. Revenue performances were also poor.

**Figure 3. Real GDP per caput (1984-1994)**



The Gross National Product (GNP) per capita was 309 US\$ in 1993. Official Development Assistance (ODA) reached 94 million US\$ in 1994, equivalent to 93 US\$ per capita. Grants constituted 87.3% of total assistance while loans represented 12.7%.

## 2. CHARACTERISTICS OF THE MARINE FISHERIES SECTOR

### 2.1. The resource base

The marine resources can be divided into 3 main components: pelagic and demersal species and shrimp.

#### 2.1.1. Pelagic species

Bonga (*Ethmalosa fimbriata*)<sup>1</sup> is a euryhaline clupeid common in West African waters. Tolerating 5-35‰ salinity, bonga occurs in The Gambia from the littoral to 15-20m of water and in the estuary up to 200km inland. The estuary is the nursery ground for the young. Growth rate is high.

Distributed between Sierra Leone and Mauritania, stocks of *Sardinella aurita*, round sardine, and *Sardinella maderensis*, flat sardine, are seasonally abundant in Gambian waters. The southward displacement of the Senegal-Mauritania stocks brings *S. aurita* to the coast of Gambia in December - May as part of the southern limit of the cold front. Smaller sized *S. aurita* constituting the Guinea - Senegal stocks migrates northwards towards Cape Verde in the warm and low salinity waters in August and September. On the other hand, *S. maderensis* more littoral and tolerating lower salinities makes limited migrations. It predominates in areas where rain and run off lower the salinities seasonally as is the case off the Gambia River mouth.

Sardinella stocks together with Carangids (*Trachurus* spp, *Caranx rhoncus* and *Scomber* spp) make up the non littoral pelagics off the Gambia characterized by extensive migrations and seasonal abundance.

#### 2.1.2. Demersal species

At 5-20 metres depth, there is a Sciaenid community made of cassava fish (*Pseudotolithus brachygnathus*), lady fish (*Pseudotolithus typus*) and catfish (*Arius* spp.), threadfin (*Galeoides decadactylus*), sompat grunt (*Pomadasyus* spp.) and soles (*Cynoglossus* spp.).

Between 20 and 50 metres the Sparid community fish is made of sea breams (*Pagellus coupei* and *Dentex congoensis*), groupers (*Epinephelus guaza* and *Epinephelus aeneus*), banda (*Plectorhynchus mediterraneus*) and snappers (*Lutjanus agennes* and *Lutjanus goreensis*). There are also cephalopods, especially cuttlefish (*Sepia officinalis hierredda*) and octopus (*Octopus vulgaris*).

Shrimp by-catch is made of bigeye grunt (*Brachydeuterus auritus*) and West African shad (*Ilisha africana*) which are often discarded.

#### 2.1.3. Shrimp

Exploited at sea as adults, and growing from larvae to sub-adults in the estuary, juveniles of pink shrimp (*Penaeus notialis*) and guinea shrimp (*Parapenaeopsis atlantica*) are targets of the canoe stow net fishery.

The most recent estimates of resources potential are given in Table 1.

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<sup>1</sup> The list of the main commercial fish species is given in Annex 2.

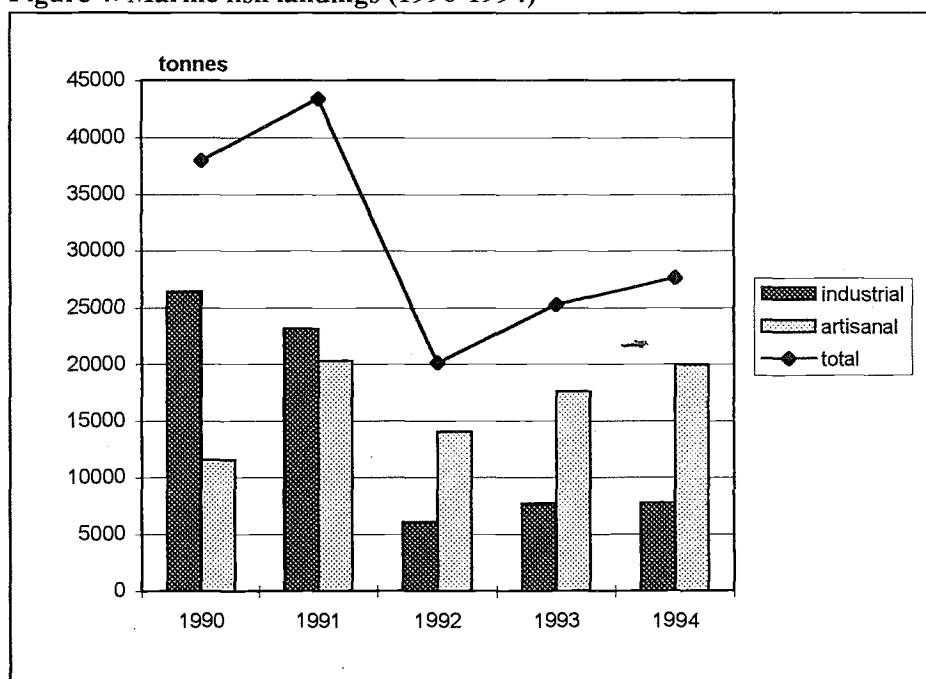
Table 1. Estimated potential (tonnes)

Species	Potential
<b>Pelagics</b>	
Bonga	35,000 - 50,000
Sardinella	68,000 - 85,000
Carangid	16,000 - 20,000
Sub Total Pelagics	119,000 - 155,000
<b>Demersal</b>	
Finfish	8,000 - 11,000
Cephalopod	1,000 (preliminary biomass estimates)
Penaeid Shrimps	400 (biomass estimate declared as unreliable)
Lobsters	No estimate
Crabs	No estimate
Freshwater Fisheries	5,000 - 10,000
<b>Total Potential</b>	<b>133,400 - 177,400</b>

In view of the mangroves, aquaculture productivity may be significant, but no estimate of potential is available.

Marine fish landings were estimated in 1994 at 27,670 tonnes out of which 72% came from the artisanal sub-sector (Fig. 4).

Figure 4. Marine fish landings (1990-1994)



## 2.2. Artisanal fisheries

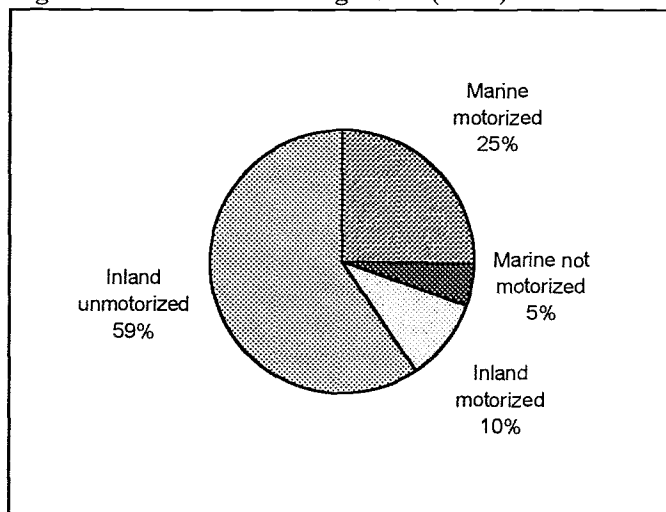
### 2.2.1. Fishing units

The artisanal fishing fleet and fishing techniques have evolved over the past decades. The material utilized in the neighbouring Senegal has progressively influenced the shape and construction style of the Gambian canoes and most of the fishing gears.

During the last census conducted in 1994, a total of 1,653 fishing canoes were recorded in the country, of which 70% operate in inland waters. In marine fisheries 84% of the fishing units are motorized (Fig. 5).

Fishing crafts in The Gambia can be classified into three main categories: dug-out canoes, planked dug-out canoes and fibreglass boats. The dug-out canoes are propelled by paddle and their length varies from 4 to 10 m. The small ones use castnets or collect oysters in mangrove areas, the biggest use gillnets and lines. The traditional dug-out canoe found in The Gambia is made of three main timber trees:

Figure 5. Number of fishing boats (1994)



<u>Scientific name</u>	<u>Wollof</u>	<u>Mandinka</u>	<u>Commercial name</u>
<i>Khaya senegalensis</i>	Khaya	Jallo	Dry zone mahogany
<i>Azelia africana</i>	Fok	Lengko	Azelia
<i>Pterocarpus erinaceus</i>	Yirh	Keno	Muninga

The *K. senegalensis* is the most popular timber because this wood is moderately hard, thus easy to dig, to nail and eventually glue the joints. It is also reported to be cheap.

For the planked dugout canoe, the keel is made of *K. senegalensis*, on which planks of 3 - 4 cm thick, 35 - 40 cm width and 2 - 7 m length are added to increase the volume of the boat. This gives a higher carrying capacity to the canoe which can be used in rough sea with an out-board engine and, occasionally, a sail. Their main characteristics are given in Table 2.

Table 2. Technical features of dug-out planked canoes

Size	Length	Beam	Propulsion	Fishing gear
Small	4-7 m	0.60-0.70 m	Paddle - sail	Oyster harvest, Castnet, Handline
Medium	7-13 m	0.70-1.00 m	Out-board motor 6 - 25 HP (pre-mixed) and sail	Handline & Longlines, Set, Drift & Encircling Gillnets
Large	13 m and above	1.50-2.50 m	Out-board motor 25 - 40 HP (pre-mixed or diesel) and sail	Encircling and Drift Gillnets

Fibreglass canoes have been introduced by the JICA funded project in Bakau in 1993. In February 1996, 11 fibreglass canoes were operating from this landing site. Their dimensions are: 13 m. x 2 m. x 1 m. Most of them are propelled by a 40 HP petrol out-board engine.

The introduction in 1995 of the Yanmar diesel out-board engine by the Bakau project has shown a reduction on fuel costs by about 2.5 times compared to petrol powered engines. In February 1996, 11 diesel engines were operated from Bakau. The purchase cost of a diesel engine is higher than the price of a petrol engine, but its life expectancy is expected to be about 5 years instead of 3 years.

The cost is D8,000-10,000 for a dug-out canoe, and D20,000-30,000 for a planked dug-out canoe. Fibreglass boats are sold at D50,000 by the Bakau project. The cost of a petrol out-board engine in private shops varies from D12,500 (8 HP), D17,000 (15 HP), D24,000 (25 HP) up to D31,000 for a 40 HP. Diesel engines are sold at D30,000 by the Bakau project.

### 2.2.2. Fishing gear and techniques<sup>1</sup>

The supply of fishing material follows three channels: private importers, Government through the development projects, and Senegalese fishermen and fish traders which supply their own fishing units and sometimes, on request, the Gambian units. Supply of fishing gear is regular and does not represent a major constraint.

In marine fishery, according to the statistics of the Fisheries Department, the bulk of artisanal catch is made with two fishing gear: encircling gillnets (85%) and bottom, or set, gillnets (12%).

#### 2.2.2.1. *Encircling gillnet*

Encircling gillnet ("Mbaal kobo") is the common fishing method on the Atlantic coast for the capture of the most consumed species in The Gambia: the bonga. It accounted for over 95% of bonga landings in 1994. The fishing method entails surrounding the fish school, then frightening the fishes to force them to be gilled and/or entangled.

#### 2.2.2.2. *Set gillnet*

Set gillnet ("Mbaal seeras" and "Palli") are used for catching fin fish in brackish waters. These nets are more commonly used on the river bank. The catches are mainly composed of ladyfish, cassava fish, threadfin, catfish, tilapia and barracuda.

Set gillnet for solefish is mainly used along the littoral zone with depth of 5 to 10 metres. The fishing season is from October to July with a peak season from January to March. The gear is set out like a semi-circular barrier across the current on sandy/muddy bottom. There is a tendency among fishermen to use PA monofilament netting of green color. Coming from Senegal this material is rapidly spreading out along the Gambian coast because of the higher catching power of the monofilament netting which is due to its invisibility in the water. However, the netting doesn't last more than two months due to the weakness of the twine.

Set gillnet for lobster and associated species. This bottom net is set out in coastal rocky areas of 6 to 10 metres depth. The length is about 250 to 360 metres with a depth of 2 to 3 metres and the

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<sup>1</sup> Technical features of the fishing gear are described in Annex 3.

mesh size varies from 100 to 110 mm.

Set gillnet for white fin fish: this net is used in marine coastal as well as in inland waters. The main species caught are cassava fish, ladyfish, threadfin and catfish.

#### 2.2.2.3. *Drift gillnet*

Mid-water drift gillnet ("Yolal"): this fishing gear is widely used in the coastal waters and in the lower river estuary. It is adjusted to the precise swimming layer of a fish school and is hauled twice or thrice in a fishing night. The peak season is from May to September. Catches are constituted of barracuda, catfish and ladyfish.

Surface drift gillnet ("Felefele"): The surface drift gillnet is a popular gear used for catching pelagic and semi-pelagic species in the river. In the lower river, catches are made of bonga and mullet. In the upper river, they are composed of catfish, tilapia and mullet. Since industrial trawling activities intensified, resulting in encroachment into the artisanal zone, damages to artisanal fishing gears forced fishermen to partly abandon this method. Furthermore, drift netting is also in conflict with artisanal set gillnet owners operating in the same zone.

#### 2.2.2.4. *Lines*

Bottom longlines have a length varying from 300 to 1,500 metres. The gear is set out across the current in units of 100 metres or joined together as one long unit. This gear is to catch high value demersal species. A sub-classification of this gear is:

- Set longline for medium white fin fish along the Atlantic coast and in lower river. Bait used is bonga and mullet. Catches are composed of ladyfish, threadfin, cassava fish and catfish.
- Set longline for large size white fin fish predominantly used in the Atlantic coastal waters.
- Set longline for fresh water catfish called "Konokono" is used without bait in the upper river.

Handlines used in The Gambia are operated from the canoes, the shore, wharfs and bridges along the coast, river and creeks. It is a popular gear among fishermen. The specifications fall within the following ranges: branchline and hooks of 1 to 20, with hooks size ranging from number 1 to 15. The lines are made of PA monofilament with thickness of 0.5 mm to 2.5 mm in diameter. The length is about 30 to 150 m, depending on the fishing depth which ranges from 3 to 100 m.

#### 2.2.2.5. *Others*

Stow nets: they are stationary fishing gears/traps (passive methods) fixed by means of anchors placed against the current direction. There are two types of stow nets, the twin net usually supported by a canoe and the triple net supported by wooden frames and numerous buoys. The former is the most popular. Although no precise information is available, some data indicates that May to September are the peak months. Shrimps catches by stow nets are the main source of shrimp supply for export fishing companies.

Common cast net and cast net with pocket trap: their use is restricted to shallow water. They are cast from the shore or from a small dugout canoe and widely used in the majority of the fishing villages of The Gambia, but more common in the river estuary. Target species are mullet, tilapia, bonga and

croaker.

Trammel nets for cuttle fish and associated species are being more commonly used, especially close to the southern border, in the Kartong area, where they have been introduced by Senegalese fishermen. This is the best performing gear for cephalopod fishing in The Gambia. Rigid metallic traps for cephalopods were also introduced but, due to the volume of the gear and uneasy handling, they are abandoned for the more recently introduced nets. Collapsible metallic traps are still experimented, but it seems that the preference is still for the trammel net.

Although early purse seine trials yielded 3-4 tons/day fishing, quite superior to encircling gill net catches, purse seines are not used mainly because of their high cost compared to the low value of small pelagic species caught in them. Beach seining is prohibited.

### 2.2.3. Fishermen

Artisanal fishermen operate principally from 11 large coastal landing sites, and over 100 smaller riverine and estuarine locations.

The results of the 1994 frame survey indicate for the Atlantic coast a total of 431 full-time and 72 part-time "fishermen" and 2,614 "assistants". In fact, this designation corresponds to "boat-owners" and "crew members" respectively. Their nationality indicates that 62% of the boat-owners are Gambian citizens. However, in marine fisheries they are in minority (35%). As far as crew is concerned the difference is even higher as 74% of the crew members in marine fisheries are foreigners, mainly Senegalese (Fig. 6 and 7).

Figure 6. Boat owners' nationality (1994)

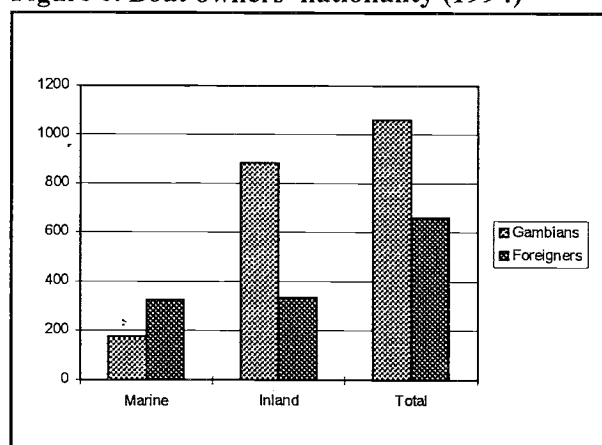
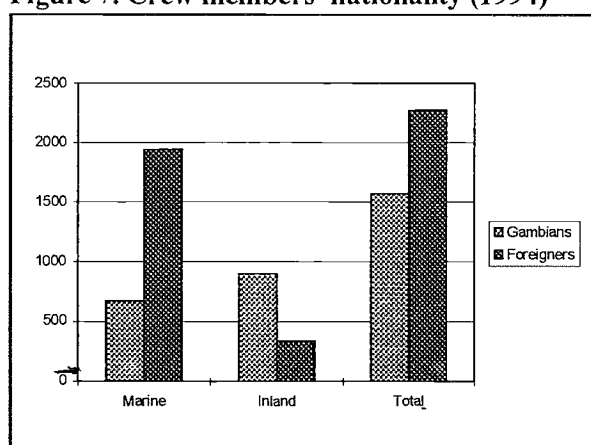
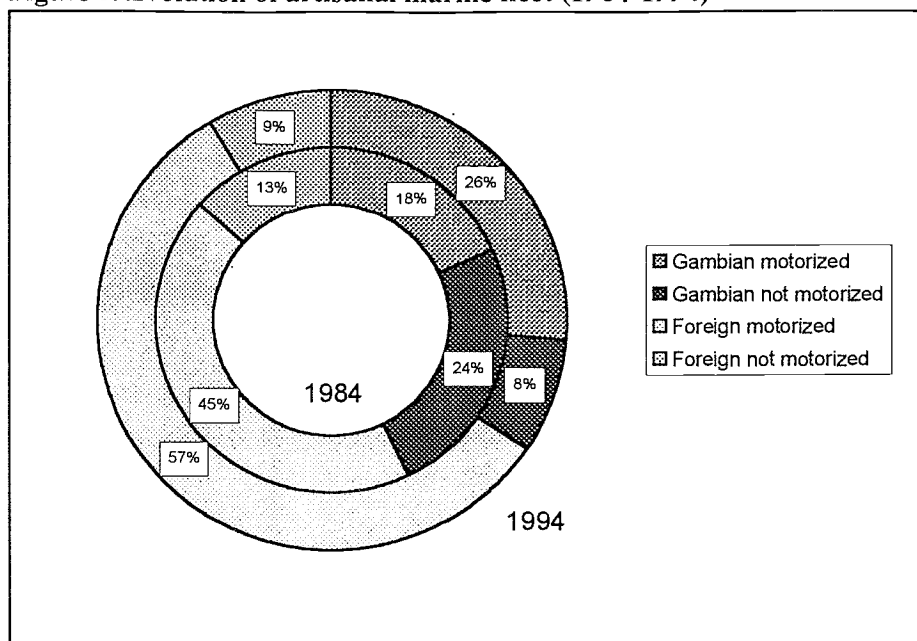


Figure 7. Crew members' nationality (1994)



It is also most interesting to look into the evolution of the artisanal marine fleet between 1984 and 1994 (Figure 8). It shows that the percentage of canoes owned by Gambian nationals has declined from 42% in 1984 to 34% in 1994, as a consequence of the increase of the Senegalese fleet. However, it is reported that since the devaluation of CFA franc in January 1994, many Senegalese fishermen have gone back to their own country.

**Figure 8. Evolution of artisanal marine fleet (1984-1994)**



Fishermen migration, which is a very common phenomenon in West Africa, is quite different for the Gambians and the foreign fishermen. Indeed, on the Atlantic coast, Gambian fishermen migrate much less (18.6%) than foreign fishermen (49.5%).

There is a lack of skilled Gambian fishermen in deep sea fishing. For example, most of the boats landing deep sea catches in Bakau are Senegalese based in Banjul. However, since the devaluation of CFA F many of them returned to Senegal because of cheaper fuel prices and higher fish prices.

In 1994, a survey on accidents at sea was carried out by the Fisheries Department with assistance of the IDAF Programme. During the survey, 16 fatal accidents were recorded for the period 1991-94. Most of them happened at night and about half of them were due to collision of fishing boats. They involved 57 deaths of which 18 happened from a single transport canoe accident, the rest involving fishing canoes. The major category of fatal accidents were those involving canoe capsizing and sinking and the major contributing factors were wind, waves and storm. Hypothermia seems to be the main apparent cause of death, especially during the "winter period". Non-fatal accidents were ascribed mainly to boat problems involving one's own boat or collision with other boats. They were also caused by wind, waves or storm.

#### 2.2.4. Production

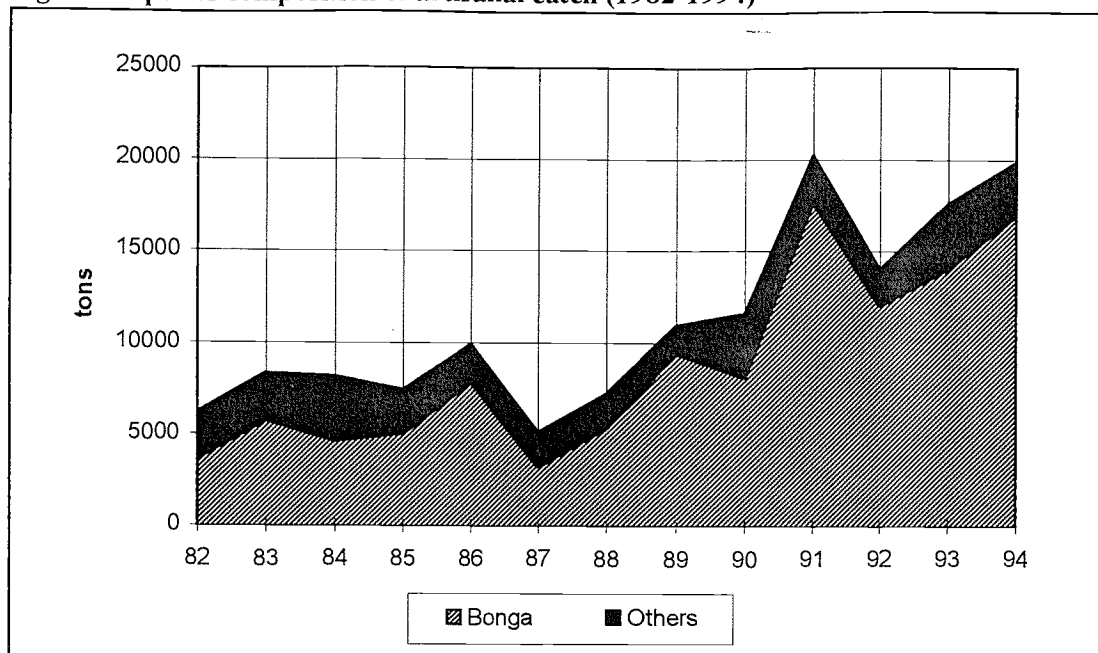
In 1994, artisanal fish production was dominated by pelagic species which accounted for 86%. Demersal species accounted for about 1,550 t. (8%). The remaining landed quantities were comprised of sharks, skates and rays (480 t.), shrimp (560 t.). Sea snails, cephalopods, lobsters and some non identified catches represented less than 1%.

Figure 9 shows total artisanal landings and annual catches of bonga from 1982 to 1994. The pattern shows a good bonga year being succeeded by a poor year, but overall, bonga landings have



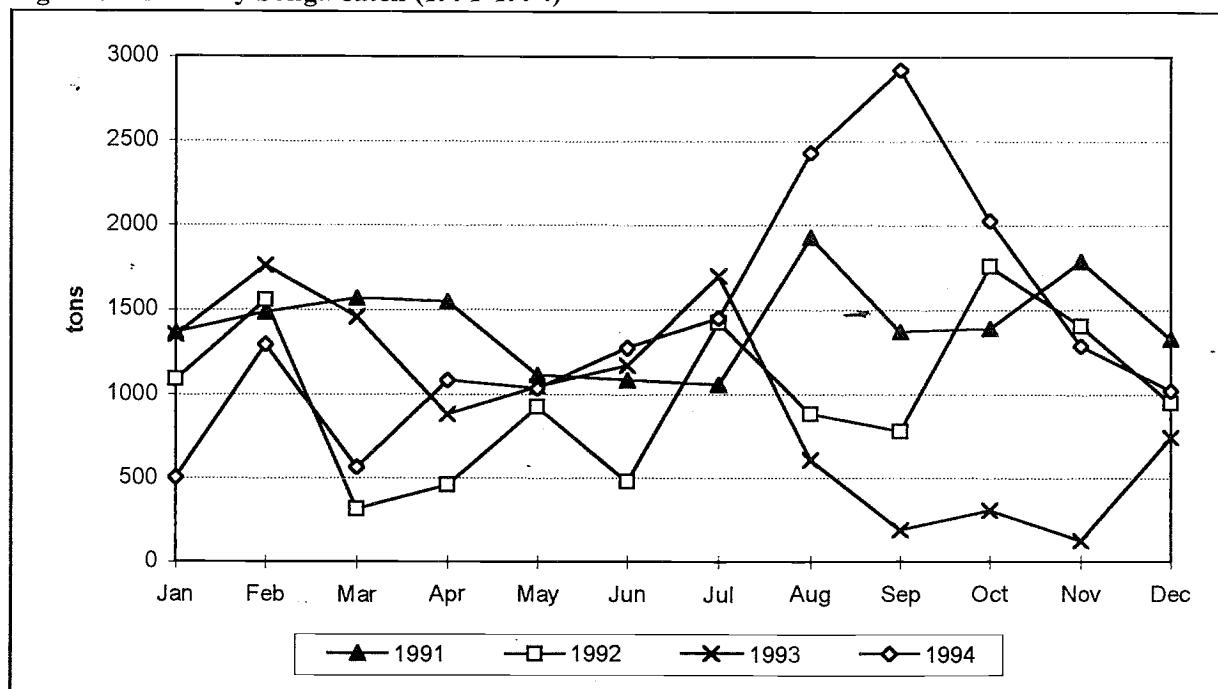
increased annually rather consistently from 3,600 t. in 1982 to 16,900 t. in 1994.

**Figure 9. Species composition of artisanal catch (1982-1994)**



Monthly distribution of landings suggests bi-modal peaks in February and in August-October (Fig. 10). The main production centres in the country are Gunjur, Tanji, Jeshwang and Bakau.

**Figure 10. Monthly bonga catch (1991-1994)**



Presently, *Sardinella* stocks, although heavily exploited in neighbouring Senegal, remain unexploited by both artisanal and industrial fleets in The Gambia.

In 1993, stow net shrimp catches supplied by artisanal fishermen to processing companies amounted to 450 t., about 80% of total shrimp processors' exports. In 1994, a record catch of 560 t. was reached. As far as gillnet fishery is concerned, oral evidence from fishermen suggest progressive reduction of abundance, particularly with respect to lobsters and soles.

The value of artisanal fisheries production at the landing site is estimated at D50 million in 1994 of which about 40% is from bonga catch.

#### 2.2.5. Economic aspects

Investment cost in a fishing unit fully equipped for bonga fishing with encircling gillnet is D64,000-87,000, for drift net fishing D57,000-73,000 and for set net fishing D33,000-75,000.

Supply and demand determine the price daily. In Bakau, bonga price is in the range of D0.40-3.33/kg, with an average of D1.20.

In July 1995, the Fisheries Department, with the assistance of the IDAF Programme, started to monitor for one year the costs and earnings of a sample of fishing units in Bakau and Tanji. The very preliminary information summarized in Table 3 concerns the months of July to October.

Table 3. Costs and earnings of some fishing units in Bakau and Tanji.

Average/month (dalasis)	Bakau			Tanji		
	Encircling gillnet (n=3)	Handline (n=3)	Drift gillnet (n=3)	Encircling gillnet (n=3)	Bottom gillnet (n=3)	Drift gillnet (n=3)
Crew size	7-8	4-7	6	7-8	2-3	2-3
Catch/trip	494	78	24	1,257	33	21
Fish price / kg	0.8	7.7	11.3	0.8	8.6	10.1
N° of trips	22	24	23	10	9	10
Fisherman's revenue	535	700	425	295	185	120
Boat-owner's share	3,100	2,400	1,900	5,900	1,300	900
Less depreciation	1,600	1,000	1,200	1,900	900	1,200
Boat-owner's revenue	1,500	1,400	700	4,000	400	- 300

Source: Fisheries Department

Although the sample size is small (3 fishing units for each fishing technique in each site), some indications can be derived from the Table. Firstly, to interpret the difference in revenue between the two landing sites, some explanation must be given about the sharing system. In Bakau, the fishing boats monitored by the survey are leased by the project to fishermen who followed successfully the training programme. The share of the catch is 60% for the crew and 40% for the project. In Tanji, the traditional system is applied for all fishing techniques: 75% for the boat-owner and 25% for the crew.

During the 4 months period of the survey, fish price was about 0.8 dalasi per kilo for bonga when average price of high value species (barracuda, sole, grouper, etc.) was D 8-11 per kilo.

It can be observed from the data that fishermen's monthly revenue is highly correlated with the number of fishing trips. On average, the number of fishing trips per month is double for the fishermen linked to the Bakau project than for the Tanji fishermen.

In 1994, opportunity cost of rural labour time was estimated at D 4.17 per day or about D 130 per month. Average per capita income was estimated at D 9.45 per day in 1991<sup>1</sup>. During the 4 month for which costs and earnings data were processed, fishermen revenue is estimated at D 20-25 per trip, 5 to 6 times the opportunity cost of labour and two times the average per capita income.

### 2.3. Industrial fishery

#### 2.3.1. Fishing fleet

Currently, the export focussed industrial fisheries, limited essentially to trawling, comprise of a national flag, inshore fish and penaeid shrimp component, and a deeper water, fin fish and shell fish, joint venture component.

The industrial vessels operate in the Gambian marine waters either through local companies or one of the fishing agreements signed by The Gambia with the European Community (EC)<sup>2</sup>, Senegal and Japan.

There is a downward trend in the number of fishing licences from 113 in 1992, 109 in 1993, 95 in 1994 and only 73 in 1995. Quarterly revenues for 1994 and 1995 are given in Table 4.

Table 4. Revenue from fishing licenses

Quarter	local companies		Senegal/Gambia		EC/Gambia		Japan/Gambia	
	N°	(Dalasi)	N°	(Dalasi)	N°	(ECU)	N°	(US\$)
01/94	15	226,698	10	124,829	2	7,167	10	10,000
02/94	5	72,678	0	0	2	2,000	2	2,000
03/94	8	189,980	9	100,341	0	0	0	0
04/94	10	72,598	2	18,627	18	18,000	4	4,000
Total	26	561,954	21	243,797	22	27,167	16	16,000
01/95	10	436,493	8	91,271	0	0	5	5,000
02/95	0	0	0	0	2	7,167	0	0
03/95	23	1,088,960	7	174,597	15	15,000	0	0
04/95	0	0	0	0	3	9,567	0	0
Total	33	1,525,453	15	265,868	20	31,734	5	5,000

<sup>1</sup> US State Dept., country background notes December 1992 (Saine and Willmann, 1995)

<sup>2</sup> formerly European Economic Community (EEC)

### 2.3.1.1. *Local companies*

By far the most common involvement by local companies is as agents to arrange the licensing of foreign vessels at the lowest fees applicable to foreign and local vessels. Indeed, industrial fishing operations are relatively limited in The Gambia. An examination of the ownership of vessels engaged revealed that only 20 % of the vessels licensed in 1992-1993 were owned by companies based in The Gambia.

Of the 20 locally registered companies engaged in the fisheries sector, only 7 have invested in on-shore processing facilities and only 3 of these own modern facilities. Two companies own vessels, but only one is considered as viable, maintaining 4 shrimp trawlers in Gambian waters.

Large shrimps are usually collected from artisanal fishermen by processing companies for export. Two companies still operate in shrimp trade, but only one is actively collecting shrimp along the estuary. A considerable difference in terms of turn-over is observed between the two companies, the major one trading 90% of the large shrimps production. Of the total of shrimps processed, 80% stem from artisanal shrimpers. The remaining 20% comes from trawlers owned by the company. In 1993, the company processed nearly 500 t of which 90% was exported mainly to Belgium and Spain. The smaller company's turn-over is estimated to come from shrimp processing 75% and from storage 25%.

The regular decrease of CPUE in shrimp fishery is compensated by an increase in the number of fishing units and a diversification of exports by the processing companies, in particular with cuttlefish and sole bought from artisanal fishermen.

### 2.3.1.2. *European Community*

The current Agreement with the European Community started on 1<sup>st</sup> July 1993 for a period of 3 years. The package of payment is presently ECU 1.1 million<sup>1</sup> as a compensation, ECU 80,000 towards scientific programmes, and up to ECU 220,000 for staff training. It should be noted that there is no provision for support to artisanal fisheries in the Agreement, which is the case in Mauritania and Senegal. The number of vessels licensed under the Agreement declined from 13 vessels at the beginning of 1992 to 3 vessels at the end of 1993. No request for licence was received in respect to tuna pole and line vessels. Therefore, most of the vessels are purse seiners.

### 2.3.1.3. *Senegal*

The Fishing Agreement with Senegal allows for reciprocal arrangements concerning artisanal fishermen and industrial fishing vessels engaged in the waters of the two countries. Nine Senegalese vessels were operating in the Gambian waters in each semester of 1992 and 1993, with a total of about 1 400 GRT. In the same time, 5 trawlers from The Gambia with a combined tonnage of 1 747 GRT were licensed under Agreement for operations in Senegal. As far as artisanal fisheries are concerned there is no restriction which is mainly at the benefit of Senegalese fishermen.

### 2.3.1.4. *Japan*

The Agreement with the Japanese Tuna Vessel Association started in December 1991. It provides for the licensing of Japanese longliners and purse seiners to fish in the Gambian waters. No

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<sup>1</sup> ECU 1 = 12.15 dalasis (February 1996)

vessel was licensed under this Agreement in 1992. In 1993, 21 longliners were licensed, each one for a period of three months. Catches reported from 6 vessels were 25.5 t. from 34 days fishing, or an average of 748 kg/day. The remuneration to The Gambia from this licensing was US\$ 21 000 in 1993. It decreased to US\$ 16,000 in 1994 and US\$ 5,000 in 1995.

### 2.3.2. Production

The inshore demersal fishing units trawl for shrimp and cephalopods. Annual catches of the trawl fisheries in 1994 were 7,750 t. consisting of 5,900 t. finfish (70%), 3,243 t. cephalopods (23%) and 560t. shrimps (7%). Substantial percentages of the fish by-catch, about 70-90%, are discarded because of a lack of refrigerated space on board.

Since the extension of national jurisdiction by coastal countries following UNCLOS and the departure of the Ghanaian industrial fleet in the late 70's, as well as the stopping of many units of the fleet of the former USSR, subjected to economic profitability criteria in the early 90's, the foreign industrial purse seiners exploiting the *Sardinella* stocks terminated their operations in the country.

There is no fishing port in the country and the priority is given to cargo vessels at the general purpose port. Therefore, it has been estimated that more than 90% of all licensed industrial fishing vessels land their catch in foreign harbours, mainly Dakar and Las Palmas.

## 3. FISH PRODUCTS UTILIZATION

### 3.1. Processing

#### 3.1.1. Fresh fish

Artisanal catches are usually kept on the canoe bottom, boxed with or without ice. Although most of the canoes make daily trips, some of them fish for two days to one week and store the catch on ice in insulated containers or old refrigerators. Generally, on coastal canoes, catch is not iced due to the fishing methods, mainly bottom gillnets. With the exception of bonga, it was estimated that 10 to 20% of the catch may, on average, be spoiled before landing. This portion is used for salting and drying.

Ice facilities were built by JICA at Bakau and Pakalinding, and by EC at Brikama with supply capacity of about 3 tons/day each. The ice facilities in Brikama have since been privatised. Other private ice facilities exist at Latrikunda Mampatoko, Jeshwang and Kanifing, all in the greater Banjul area. Each one produces about 3 tons/day. In addition, a fish processing company (NPE) produces about 10 tons/day, mainly for its own use. Generally, the price for ice is one dalasi per kg.

Since the departure of many Senegalese fishermen in 1994, there seems to be an overcapacity in ice production in some places. However, ice facilities are still needed for several big landing sites along the coast.

#### 3.1.2. Frozen fish

Few local companies operate industrial vessels. In that case, catch is iced or stored in chilled sea water.

In the export factories, shrimps or other high value species are mainly obtained from artisanal canoes whose catches are boxed, usually without ice. However, the time from catching to landing is short, and shrimps are in good condition when landed. On landing, the product is sorted and iced, or unsorted and iced when collected by the company or delivered at the factory.

Shrimp processing methods entail: cleaning, sorting, weighing, peeling, beheading or cooking, packing, freezing, storage and export. The cold chain is maintained all the time. For white fish and soles: cleaning as whole, or filleting or beheading, packing, freezing, storage and export. For cephalopods, mainly fresh cuttle fish iced for export to Senegal: cleaning, packing, freezing, storage, or exported directly in chilled form from landing.

### 3.1.3. Smoked fish

Fish smokers can be classified into two main groups: bonga smokers (male and female) and female smokers of catfish, skate and ray.

Smoked bonga is the economic mainstay of the artisanal fisheries sector: more than 10,000 t. are processed every year. Smoking utilizes a variety of facilities including Chorkor ovens, barrels and pits depending on location. However, the modified Chorkor oven predominates. It is the most popular for medium to large scale fish smoking, such as bonga smoking, since its introduction in 1984-85 through the IDAF Programme. The qualities of the Chorkor oven have ensured its acceptance and virtual replacement of the open fire Banda type. The technique is satisfactory and contributes successfully in the fight against fish losses, increased profitability and limited deforestation through reduced consumption of fuelwood, about 40%.

Due to relatively high cost of improved smoking facilities and affinity for cultural practices, poor pit and barrel ovens with low capacity and poor hygienic conditions are still operated by many women fish processors in Banjul, Jeshwang and at home in other places. Such women are in serious need of capital for improvement and expansion of their processing business.

Fish smoking is a highly profitable but also hard business as the smokers are exposed for many hours daily to polluted air affecting their health. According to a recent survey on large-scale fish smokers, average net revenues per month at Gunjur, where all smokers are male, varies between D2,100 and D3,800 depending on the season. In Tanji, average male revenues vary from D7,500 to 10,800 per month and female revenues from D335 to D900. The composition of retail price is given in Table 5.

Table 5. Composition of smoked bonga retail price (in %)

Season	Gunjur male smokers		Tanji male smokers		Tanji female smokers	
	Dry	Wet	Dry	Wet	Dry	Wet
Value of smoked fish	100.0	100.0	100.0	100.0	100.0	100.0
Fresh fish	25.5	55.5	22.2	31.4	60.8	66.1
Production costs	14.2	15.8	10.7	12.5	18.3	16.2
Marketing costs	-	-	-	-	11.1	7.3
Net revenue	60.3	28.7	67.1	56.1	9.8	10.4

Source: adapted from Saine and Willmann, 1995

Female smokers buy fish at a much higher price than male (Table 6.). This may partly be due to the greater market power of male smokers who buy fish collectively. Moreover, in Tanji a female bonga smoker process between 3 and 8 tonnes per month, i. e. about half the quantity of a male smoker. Another difference is the much lower selling price for female smokers who market a more "humid" product. They purchase, process and market fish in one or two days while in the case of male smokers several weeks or even months may pass between the purchase of raw material and sale of the smoked product. As a consequence, male smokers need much more working capital than female.

Table 6. Bonga price (dalasis/kg)

Season	Gunjur male smokers		Tanji male smokers		Tanji female smokers	
	Dry	Wet	Dry	Wet	Dry	Wet
Fresh fish	0.24	0.38	0.35	0.39	0.66	0.68
Smoked fish	2.38	2.27	6.22	4.83	1.38	0.75

Source: adapted from Saine and Willmann, 1995

In Tanji, it is estimated that average monthly revenue of catfish female smokers varies between D1,700 and D2,000.

Attention is now being paid to the progressive destruction of the Gambian forest ecosystem, since bonga smoking activities require a significant quantity of fuelwood, estimated at 8,000 tonnes per year. Fuelwood is therefore becoming scarce near the fishing centres and smokers are now more dependent on professional wood suppliers, who bring in the fuelwood by pick-up, tractor and donkey cart from several kilometres away. The Government addressed the problem by the establishment of a "Gmelina Arborea" forest plantation as a component of the Artisanal Fisheries Development Project funded by the European Development Fund (EDF). The plantation is now ready for rotational harvesting but some reluctance is observed which is apparently due to the low specific weight and calorific value of the wood.

#### 3.1.4. Dried fish

This method is practised in all major landing sites where the raw material is predominantly spoiled fish not consumed fresh as sharks, skates and rays. The raw material is often fermented or putrefied over night. Then, cleaned, gutted, dripped, salted and dried on drying racks/platforms, constructed with local materials from the forest/bush. Products take about 3 to 6 days to dry.

They are generally of good quality, but the processing and drying environment can be unhygienic. Fish is exposed and this result in pest infestation. At times, the effects of rain and dust causes spoilage and loss, particularly during the rainy season. Improved techniques are still required.

A good quality dried fish is commonly sold between D 10 and 20/kg. However, the price varies according to the fishing village, the season, quality of the product and species processed, from D8 up to D35/kg.

The sea snails, locally known as "yete", mainly caught by trawlers are collected from the boats near the coast by local fishermen of Brufut and Tanji. They process them in their villages and sell dry between D 8 and 10/kg. There is also a small market for wild oyster meat sold fresh at D 25/kg.

Shark meat is dried in the Ghanaian fishing community at Brufut for export to Ghana. Dried shark fins, including some quantities imported from Mauritania, are exported to Asia.

### 3.2. Distribution and marketing

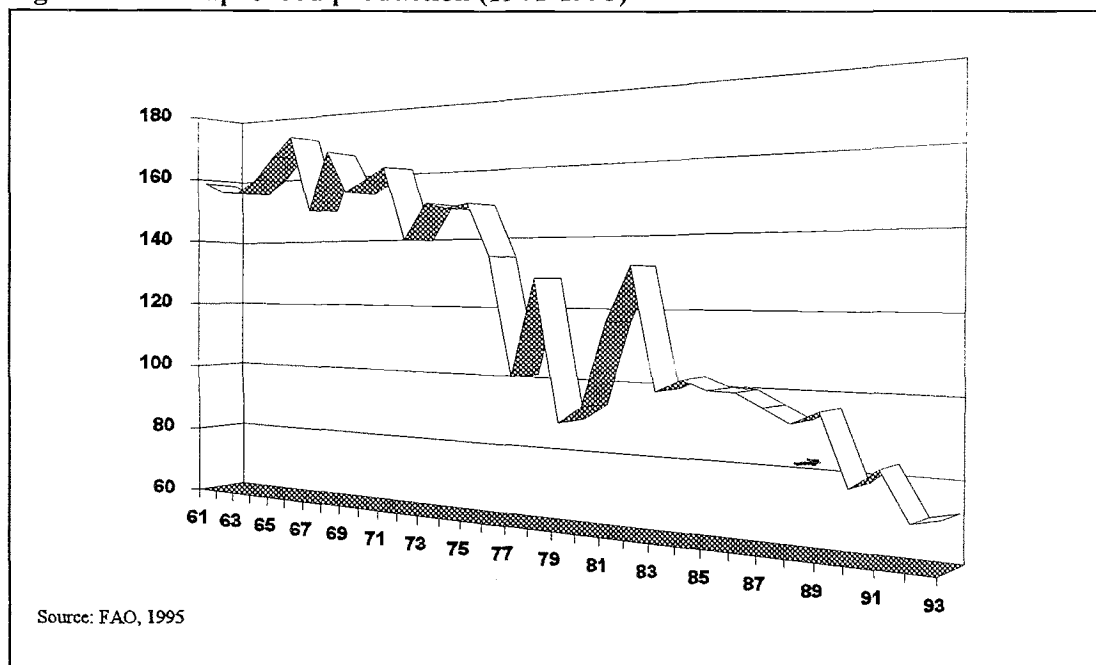
#### 3.2.1. Domestic market

Most of the fish is marketed after processing. The majority of fish traders, particularly women, use public transport (bus or bush taxi) or hitch rides. Along the coast some men have bicycles or motorbikes. Few Gambian fresh fish traders have their own vehicles, usually small vans, and use ice for the local market.

In 1994, imports reached 123 tonnes for a value of D1.9 million. They were mainly comprised of canned fish from Europe and Morocco for the domestic market and shark fins from Mauritania for re-export to Asia. The value of shark fins was 42% of total official fish product imports.

In 1994, the index of per caput food production was only half of its value in the early 1960's (Fig. 11). This drop is mainly due to the dramatic drought which affects the Sahelian region, as well as the rapid population growth. On average, per capita fish consumption is estimated at about 20 kg per year. Fish products provide therefore 46% of animal protein.

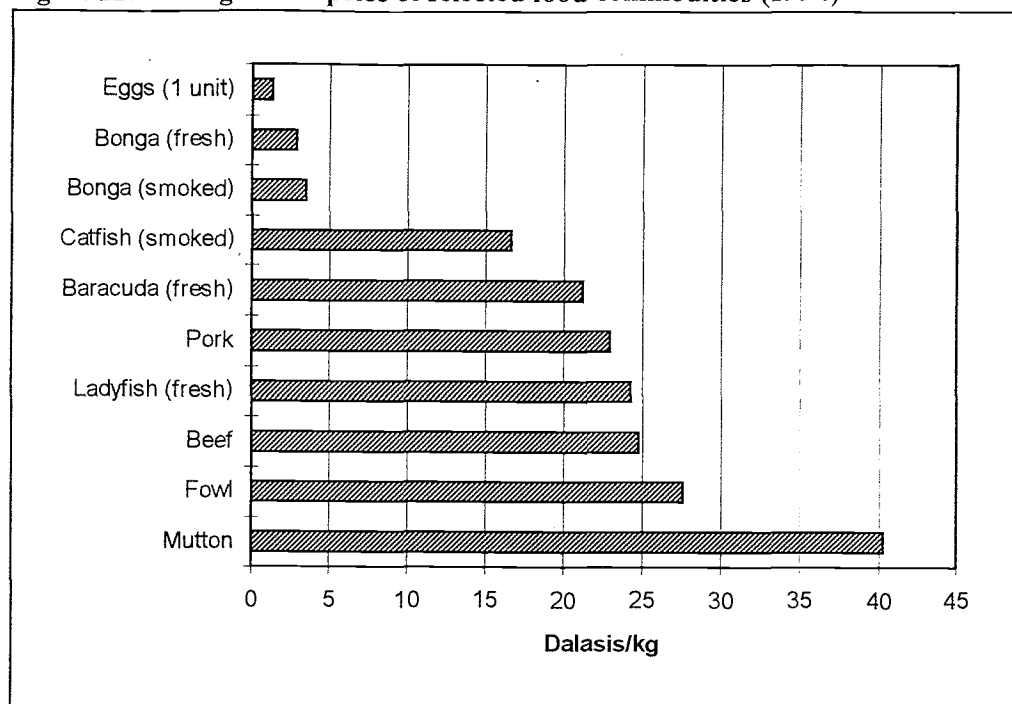
Figure 11. Per caput food production (1961-1993)



In The Gambia, like in most countries of the region, fish is the cheapest source of animal protein (Fig. 12). This is particularly true for bonga which is consumed 5-7 times per week by the majority of Gambians. Therefore, increase in bonga catches translates directly into improvement in nutritional standard of the population.



Figure 12. Average retail price of selected food commodities (1994)



The profit margin is difficult to assess, but bonga traders in Bakau recently estimated their profit at D20-50 per box of 250 pieces. Considering one box per day, which is a minimum, this gives a revenue of D5,500 per year. However, for most of them the annual revenue must be in the range of D10-25,000.

From data available in Bakau, average retail price composition of one kilo of fresh bonga in 1995 can be estimated as follows:

D 1.20	fish price at landing site	(48%)
0.60	ice, transport and storage costs	(24%)
0.20	sales agents commission	(08%)
0.50	fish trader's revenue	(20%)
<hr/>		
D 2.50	retail price	(100%)

It has been observed that the devaluation of CFA franc in January 1994 has made the Gambian market attractive for Senegalese fish smokers. On the other hand, selling smoked bonga from The Gambia to Senegal has lost most of its financial interest since the price expressed in dalasis has been divided by two.

### 3.2.2. Export

In 1993, the FOB value of fish exports by the industrial sub-sector was D 24.6 million comprised mainly of catches collected from artisanal fishermen by the industrial fishing companies for

processing and export. In 1994, the value of exports was 30.6 million dalasis (+24.4%). Export of fishery products was comprised of shrimp and cuttlefish (67%), fresh and frozen fish (16%), dried fish (14%), shark fins (2%) and lobsters (1%).

The main markets were Spain for shrimp (56% of total value) and Ghana for frozen fish (12%). Exports were made by 15 companies and 51 individuals. However, five companies contributed 80% of the total value of fishery product exports.

Since 1994, a new market has developed for sole and cuttlefish. Traders buy from artisanal fishermen and send the products simply preserved with ice by truck to Ziguinchor in Senegal where they are sent to Dakar for export to Europe. It was reported in February 1996 that between Gunjur and Kartong over 300 canoes were engaged in cuttlefish and sole fishery.

Local companies receive some incentives from the Gouvernement to promote exports. For example, there is no export duty if the transaction is done through the banking system. They also benefit from tax exemption on imported fishing equipment. However, they presently face two main problems. Firstly, they lack working capital to pay cash, therefore fishermen prefer to sell fish to Senegalese traders. Secondly, no Gambian company is certified to export to EC market on the basis of the new norms. Only few companies are authorized to export to Spain on the basis of a provisional bilateral agreement. Therefore, local companies often act as agents of Senegalese export companies.

#### **4. NATIONAL POLICY AND DEVELOPMENT PLAN**

##### **4.1. National Plans**

Fisheries development policies evolved during the two national five year Development Plans from 1975 to 1985 when Government set fisheries development objectives to direct public interventions in the fisheries sector and to complement national development policies. The policy was reviewed under the Economic Recovery Programme (ERP) of 1985 and the subsequent Programme for Sustained Development (PSD) of the 1990's.

Under the First Five Year Development Plan (75/76-79/80) the Government of The Gambia focused on the development of essential infrastructure and supporting services. As a consequence, public employment and recurrent expenditures rose rapidly without a corresponding increase in national wealth. This, combined with years of drought, falling world groundnut prices and rising oil prices led to a decline in foreign exchange earnings and low economic growth.

The Second Five Year Plan changed the emphasis of development effort towards agriculture. To further arrest economic decline the Government adopted an Economic Recovery Programme (ERP) in August 1985. The ERP had the objective of stabilising the economy in the short term and generating economic growth in the long term. The principle strategies of the ERP were:

- the reorientation of public investment to encourage the public sectors of the economy;
- the encouragement of greater private sector involvement in the development process through appropriate investment incentives;
- the redirection of the public sector role towards policy, planning, research, monitoring and evaluation and resource management.

In the first phase of the ERP the results have been encouraging with GDP increasing at more

than 5% per year over the 1986-88 period and inflation falling from 70% in 1985/86 to 9% in 1987/88.

The second phase of the ERP (1988/89-1990/91) retained the principal policies of the first phase and placed emphasis on the growth of agriculture, fisheries, livestock and tourism. Some success was achieved with the ERP which motivated the conception of the Programme for Sustained Development, which is aimed at continuation, completion and consolidation of the structural adjustment begun under the ERP. The main objective is the long-term expansion of the productive base of the economy whilst protecting the environment and encouraging private sector initiatives.

The fisheries sector is seen as a major potential source of rural employment, domestic food supply and export earnings. Indeed, the artisanal sub-sector contributes about 95% of the locally consumed fish supply and provides employment for approximately 2,600 Gambians in the harvesting sector and a further 13,000-18,000 in related activities.

In this context, a Strategic Plan for the Fisheries Sector of The Gambia (1994-2005) was prepared in 1994.

#### 4.2. Development objectives

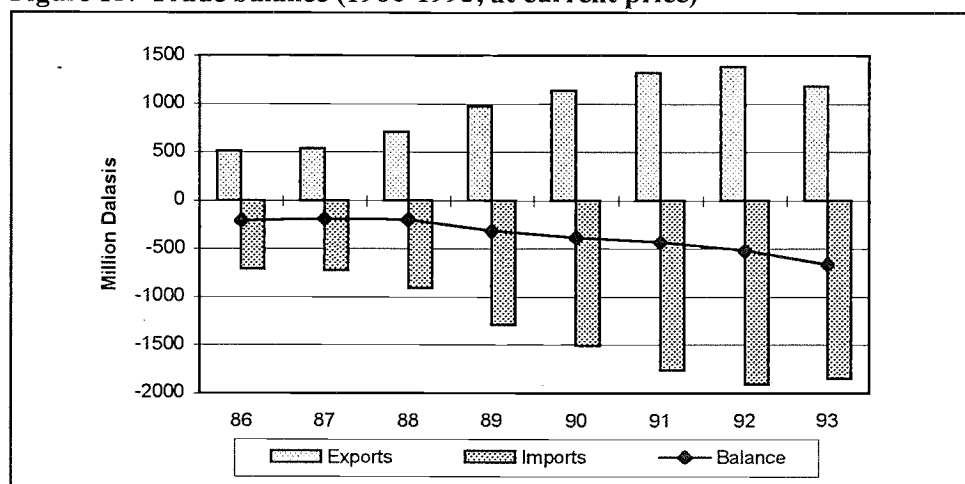
The ERP and PSD agricultural policies are based on development goals of improved nutritional standards in rural areas, the limitation of bulk cereal imports, increased cash crop production and diversification of the agricultural base. As far as environment and natural resources (forestry and fishery) are concerned, policies are based on the development, conservation and rational use of the natural resources of the country.

The objectives of the fisheries sector are:

- (i) to effect a rational long-term utilization of marine and inland fisheries resources;
- (ii) to use local fish as a means of improving nutritional standards of the population;
- (iii) to increase and expand the participation of private Gambian entrepreneurs in the fishing industry; and
- (iv) to increase employment opportunities and net foreign exchange earnings in the sector.

The last objective is justified by the structural trade balance deficit (Fig. 13).

Figure 13. Trade balance (1986-1993, at current price)



### 4.3. Development policies and measures

To reach these objectives the following policies are proposed in the Strategic Plan:

- (i) to strengthen the operational capacity of the Fisheries Department in terms of basic infrastructure and manpower;
- (ii) to expand and strengthen the control, monitoring and surveillance mechanism and its institutional linkages to adequately protect the territorial and land areas of the Gambia;
- (iii) to facilitate the provision of ashore facilities (fisheries port, iceplants, coldroom, storage facilities, etc.);
- (iv) to encourage the availability of credit facilities especially to the most needy operators in the rural communities;
- (v) to develop the commercial potentials of high value crustacea and shell fish such as oysters, shrimps and crabs;
- (vi) to revise upwards fishing licence fees to reflect resource management costs. Also to revise upwards the FOB values for fish which are the lowest in the sub-region;
- (vii) to intensify human resources development through external and local training programmes for Fisheries Department staff as well as for the various groups of operators within the artisanal and industrial fisheries sub-sectors;
- (viii) to develop a national network of repair and maintenance facilities and to encourage private entrepreneurs to stock outboard engine spare parts and fishing gears and related equipments and materials. Also to establish premixed fuel vending stations in areas where the premixed fuel is not yet available;
- (ix) to assist in developing a reliable fish distribution and marketing network through the provision of cold storage facilities at major inland fish markets, the provision of insulated/refrigerated fish carriers (road and sea);
- (x) to improve local institutional facilities through strengthening and transforming the existing fishermen associations in formal cooperative societies and later the formation of a National Fisheries Cooperative Union. Also to organize women fisherfolk to facilitate their integration in the fishing industry;
- (xi) to regulate fishing methods, gears and intensity to the regenerative capacity of the resource base, especially for the commercially attractive fish species which are highly susceptible to depletion: the demersal species, cephalopods and shrimps; and
- (xii) to rigorously enforce the requirement that all licensed fishing vessels land all or a part of their fish catches in the Gambia.

The Strategic Plan stresses that the artisanal fisheries sub-sector offers a greater potential of making a positive immediate impact on the country's long-term development goals of achieving equitable income distribution consistent with a generalized improvement in rural nutritional status.

Since 1985, the industrial fisheries sub-sector has been exempted from duties and taxes on fuel, the importation of equipment and materials, and the export of fishery products. The artisanal sub-sector benefits also from the tax exemption on fishing equipment and material. Moreover, between 1989 and 1994 pre-mixed fuel for out-board engines was subsidized. The removal in 1994 of the fuel subsidy scheme constitutes a major change since the preparation of the Strategic Plan. The system was not easy to manage and fishermen complained about the quotas and frequent shortages. Until 1994 the price was D6.40 per litre. Now the price at the pump is D9.00, an increase of 40%. However, it is possible to find pre-mixed fuel coming from Senegal at D6.50 per litre. Indeed, fuel is still subsidized in Senegal and sold to fishermen at 265 CFA F instead of 500 CFA F, corresponding to D5.0 and D9.5 respectively. This explains why the pre-mixed fuel stations built near the fishing centres at the time of the subsidy are

now closed. In the long term, the removal of subsidy could represent an incentive for the development of diesel engines, as price of gasoil is D6.00/litre.

## **5. FISHERIES ADMINISTRATION**

### **5.1. Fisheries Department**

The Fisheries Department is the public technical agency responsible for the administration and implementation of the national fisheries management plan within the overall natural resources management mandate of the Ministry of Agriculture and Natural Resources (MANR). The Ministry has responsibility for overall national policy planning and guidance and is assisted in its policy analysis function by a Planning Department.

The Fisheries Department consists of four main functional units: Directorate and Administration, Development and Research, Extension, Inspectorate. As at 1996, the staff enrolment of the Department is 91 persons, of which 57 (63%) are part of the Extension Unit.

The budget of the Fisheries Department (about D1.2 million) is mainly used to pay personnel (89%) and expenditures related to the vehicles (7.3%).

### **5.2. Fisheries legislation**

The Fisheries Act of The Gambia was enacted by Parliament in 1977. However, growth and development of the fisheries sector during the past years made the Act obsolete and necessitated its revision. With assistance of FAO, the Government revised the Fisheries Act which came into force in June 1991, as the Fisheries Act 1991. On 1<sup>st</sup> January 1995, the Fisheries Regulations 1995 came into force. They deal with foreign and local fishing vessel licence, conservation measures, as well as aquaculture, processing and export of fish. In 1995 an amendment decree to the Fisheries Act 1991 revised the fines and penalties on fishing without licence for industrial vessels upwards to a minimum of D5 million and a maximum of D25 million or 3 years imprisonment.

Management measures adopted with special reference to the protection of fish stocks and the aquatic environment include:

- (i) the delineation of fishing zones: industrial fishing vessels are restricted to beyond 7 nautical miles from the shore line. Vessels above 250 GRT shall not fish within 12 nm. This way juvenile fish stocks are protected from the destructive activities of trawlers. Artisanal fishermen are also provided with a protected fishing zone by preventing industrial vessels from encroaching on artisanal fishing grounds.
- (ii) the ban on the use of destructive gear and fishing methods: the use or attempts to use any explosive, poison or other noxious substance is prohibited. The beach seine is prohibited for fishing due to its small mesh size and fishing technique which destroys juvenile fish in near-shore and riverine areas. Gill net fishing is also prohibited in areas which have been identified as breeding and nursery grounds.

The development of artisanal fishery has increased the number of conflicts. They can be classified into two groups: conflicts between artisanal and industrial vessels, and conflicts among

artisanal fishermen. Conflicts between industrial and artisanal fishermen arise when industrial vessels, in particular trawlers, enter in the 7 miles zone reserved for artisanal fishermen and destroy their fishing gears. But artisanal fishermen go now so far as 40-50 miles from the coast to catch fish. This recent development increases obviously the risk of collision with industrial vessels. Moreover, in absence of witness, it is allways difficult to determine the respective responsibilities. Therefore, when the reality of the damage is demonstrated, the Fisheries Department encourages the industrial operators to accept amicable settlement instead of going to Court.

Most of the conflicts arising between artisanal fishermen are caused by drift gillnets users. Considering the increasing number of complaints, this fishing technique is becoming a serious concern for the Fisheries Department.

### **5.3. Training**

There is no academic training programme in fisheries in the country. Therefore, the fisheries officers are trained abroad. They benefit also from scholarships, training courses through projects and international institutions.

The artisanal fishermen training programme started in 1988 in Tanji and was later extended to cover Kartong, Sanyang, Batokunku, Brufut and eventually Bakau. Training activities have also been taking place in river fisheries, but they have not been as successful as in the marine sector.

One instructor has been trained in Japan and he trained two other instructors. Now, two instructors are assigned to the marine fishery programme and one to the inland programme.

The duration of the training course, which was initially 6 months, increased regularly to reach 24 months in 1995. A batch of trainees is comprised of up to 22 young Gambian fishermen from different parts of the country. Training activities involve: fish catching, fishing gear construction, maintenance and repair, as well as fish handling and processing.

Once graduated, young fishermen are grouped into between 3 to 6 members and given a complete fishing equipment which become a fishing economic unit. Fishing materials provided include canoe, nets, out-board engine, fishing accessories. Catches from loan beneficiaries and their loan repayment are monitored.

Due to the present state of no fishing material grant from the Government of Japan, it is being considered to ensure savings from trainees during the training programme to enable them to purchase fishing equipment from the open market.

A 10 days national seminar on fish inspection and quality assurance was organized in November 1995 for the staff of the Extension Unit and private operators by FAO, INFOPECHE and the Fisheries Department.

### **5.4. Research**

Research is carried out by the Development and Research Unit (DRU) of the Fisheries Department. Some funds are made available through external assistance as well as the Fisheries Development Fund (5.5.3.). DRU collaborates also with the National Agricultural Research Institute

(5.5.1).

At the sub-regional level, The Gambia has been benefitting from surveys on pelagic resources which were carried out bi-annually since 1980's. The last one was carried out in 1995 with the objective of determining the composition, distribution and abundance of small pelagic species in the waters of Morocco, Mauritania, Senegal, The Gambia and Guinea Bissau.

## **5.5. National fisheries related institutions**

### **5.5.1. National Agricultural Research Institute**

The National Agricultural Research Institute (NARI), a recently set up local agriculture research and development institution collaborates with the Fisheries Department in its research planning and implementation.

The research mandate of NARI covers crops, forestry, fisheries and natural resources. NARI is proceeding with the formulation process of long term fisheries research strategy and prioritization following a comprehensive appraisal of the fisheries sector in June 1995 with full Fisheries Department participation.

In the interim NARI is enabling the Fisheries Department to continue its research functions. In this regard it is funding an experimental fish culture project at Sapu commissioned in July 1995. NARI's philosophy is to borrow fisheries technologies for adoption rather than attempt to re-invent the wheel. For this approach the active cooperation and collaboration of the Department of Fisheries will be essential.

### **5.5.2. National Environment Agency**

The National Environment Agency (NEA) collaborates with the Fisheries Department in matters related to environment and associated issues. In the framework of UN Agenda 21 plans are advanced to fund a 3 year project on capacity building.

In the area of waste recycling, shrimp and fish processing wastes, primarily offals and shrimp heads are to be reprocessed into meal for the livestock industry. NEA has budgeted D 100,000 for the Department of Fisheries and Department of Livestock collaboration programme to adapt existing technology.

NEA, in collaboration with UNEP and FAO, is currently profiling the Gambian coast extending into the estuary and up to 50 km inland for purposes of Integrated Coastal Area Management (ICAM). Fisheries activities and installations are featuring prominently. A shrimp culture project cleared 1,000 ha of mangroves exacerbating water salinization, seepage and coastal erosion. Resource use conflicts and other issues arising from the ICAM profiles will be translated into projects for conflict resolutions and sustainable exploitation. It is anticipated that the Department of Fisheries will be deeply involved in the projects.

The NEA Intersectoral Network incorporates the Department of Fisheries for environmental education and information dissemination.

### 5.5.3. Fisheries Development Fund

The Fisheries Act 1991 established a Fisheries Development Fund which is fed by:

- (a) 12.5% of the proceeds of any out-of-Court settlement or the proceeds of sale of any article or equipment forfeited in accordance of the provisions of the Act;
- (b) 20% of any compensation paid by virtue of any fisheries agreement entered into with another country or organisation;
- (c) such moneys as may be appropriated to it by Parliament; and
- (d) such voluntary contributions as may be made to the Fund from whatever source.

The proceeds of the Fund must be used to promote the development of fisheries in The Gambia and, in particular, to promote small-scale fisheries industries and cooperative enterprises. The Fund is lodged in a deposit account in the Government Treasury and is administered by the Fisheries Advisory Committee. Any purchase exceeding D10,000 needs a tender. The Fund receives D250,000 quarterly, i. e. D1 million per year.

Most of the money is used through the Extension Unit of the Fisheries Department. Emphasis is presently put on inland fishing villages, in particular Jarreng, Jappine and Bwiam. The project provides training and fishing equipment to young national fishermen. It constructs fish processing facilities and ordered transport canoes to allow women to reach their rice fields more easily. Some money is also used by the Research and Development Unit for stock assessment, inland aquaculture development and fish handling and processing improvement.

### 5.5.4. Fisheries Advisory Committee

The Fisheries Act 1991 created a Fisheries Advisory Committee which comprises:

- (a) the Permanent Secretary, Ministry of Agriculture and Natural Resources as Chairman;
- (b) the Permanent Secretary, Ministry of Industry, Trade and Employment;
- (c) the Permanent Secretary, Ministry of Finance and Economic Affairs;
- (d) two representatives from the fishing community nominated by the Minister; and
- (e) the Director as Secretary.

The functions of the Fisheries Advisory Committee are:

- (a) to assist in promoting the development of the fisheries sub-sector;
- (b) to monitor important fisheries development projects and advise the Minister accordingly; and
- (c) to deal with such matters as may be referred to it by the Minister.

### 5.5.5. Fishery Revolving Loan Fund

In 1968, the Fisheries Division set up a Revolving Loan Fund (RLF) to finance the motorization of existing fishing units and help fish smokers replace burn-down huts. Loan recovery was over 95%. In 1977, the RLF was lodged with the Gambia Commercial and Development Bank (GCDB). From 1979, the Bank administered the credit line provided by the EEC Artisanal Fisheries Development Project (AFDP). The recovery rate was only 40%. Because of GCDB's poor performance mainly due



to administrative and technical weaknesses, the RLF of AFDP was transferred back to Fisheries Department where a Credit Unit was set up in 1988 to administer it. The funds recovered from GCDB were allocated for loans outside the project area. The recovery rate was 25%. AFDP-II made a new input for the credit line. The recovery rate was 47.3%.

Presently, loans are requested by the Community Fisheries Centres (CFC) in favour of their members through the Fisheries Committee. The Fund is supplied with material from the JICA project. Interest rate is 10% compared to bank rates which are 25%. The loans are provided to fishermen, fish processors and fish mongers. Three women associations, i. e. 30 women, and 10 individuals received a loan from RLF. The portfolio of RLF is D3.5 million and the recovery rate is 48%. The low level of the recovery rate is attributed to several reasons: poor catches, lack of follow up and monitoring, poor technical and financial analysis, marketing difficulties in particular in inland fisheries.

#### 5.5.6. National Artisanal Safety at Sea Coordination Committee

The National Artisanal Safety at Sea Coordination Committee (NASSCC), which has no legal status, has been put in place in 1995 to discuss safety at sea matters between the national responsible institutions and a team of fishermen leaders. Members of the Committee are: the Department of Fisheries, the Department of Water Resources (MANR), the Fire Services, The Gambia Army Marine Unit, the Gambia Port Authority and the Ferry Services Division of the Gambia Public Transport Corporation.

The Committee proposed a sea survival training programme for artisanal boat operators to avoid sea accidents and to gain techniques for survival in an accident at sea.

### 5.6. Monitoring, Control and Surveillance (MCS)

The Monitoring, Control and Surveillance Unit of the Fisheries Department is assisted in its duty by a regional project funded by Luxembourg Government and based in The Gambia. Aerial surveillance is carried out on a regular basis and assistance is provided by the Gambia Army Marine Unit when required.

In 1993/94, 3 vessels were arrested and fines amounted to D1.9 million. In 1994/95, 6 vessels were arrested.

Because most of the industrial fishing vessels land their catch in Dakar or Las Palmas, there are observers on board which report once a week per radio. However, in spite of the statutory requirement for an observer per vessel to document catch and effort statistics, some vessels sail without observers.

### 5.7. Regional institutions

The Gambia is member of a certain number of regional structures specific to the fishery sector.

#### 5.7.1. Sub-Regional Fisheries Commission

The Sub-Regional Fisheries Commission (SRFC) composed of Cape Verde, The Gambia, Guinea, Guinea Bissau, Mauritania and Senegal, was created in 1985 and constitutes a basis for

cooperation in the field of fisheries management and development for those countries characterized by a geographical and biological interdependence of fish stocks. It allows, in the long run, the elaboration of joint policies and favours cooperation in the field of access to fishing areas between member States. The Commission has started recently some activities such as the creation of a regional register for fishing boats, the review of possibilities for a sub-regional cooperation in the field of surveillance and enforcement, the harmonization of research programmes, the training of observers on a sub-regional basis and the creation of a sub-regional database for fishery statistics.

#### 5.7.2. Ministerial Conference

The Ministerial Conference on Fishery Cooperation between the African States bordering on the Atlantic Ocean whose first meeting took place in Rabat in April 1989 is composed of the states from Morocco to Namibia. On this occasion the States of the region expressed their common will to reinforce and develop their cooperation in the fields of resource evaluation and preservation, as well as in fish production. For that purpose, they insisted on the development of marine scientific research and the reinforcement of professional and technical training. The second meeting that was held in Dakar in 1991 elaborated a certain number of projects. The implementation of some of these projects has already started and was reviewed during the third meeting held in Cape Verde in 1995.

#### 5.7.3. CEECAF

The Fishery Committee for the Eastern Central Atlantic Region (CEECAF) was created in 1967 in accordance with the FAO Constitutive Act and in application of a FAO Council resolution. It includes the coastal countries from Morocco to Zaïre and 10 non African countries operating in the region. The Committee is empowered to give its views to governments of member States to help them define the scientific bases of regulation measures aiming at ensuring the conservation and improvement of marine resources in all the area under its authority. In 1994, the Working Groups on the evaluation of marine resources and on fishery statistics met in Accra. The CEECAF Sub-Committee on resource management within the framework of the national jurisdiction that was held in Agadir in December 1994 made many recommendations concerning the quantification of fishing efforts, the mesh size and the technical cooperation among developing countries. It also approved the ones made by the Working Groups.

#### 5.7.4. INFOPECHE

In December 1994, the Regional Fish Trade Information and Cooperation Service in Africa (INFOPECHE), became an intergovernmental organisation. This office whose headquarters are in Abidjan, Côte d'Ivoire, provides regular information about the fish product market, gives technical advices on products and processing, ensures training in specialized fields related to post-harvest activities in the region. This office is part of the network of the regional information offices for fish marketing and technical advice (INFOFISH for Asia and the Pacific, INFOPESCA for Latin America and INFOSAMAK for Arab countries). INFOPECHE has received agreement for funding by the Common Fund for Commodities of a pilot project entitled "Development and Promotion of Value Added Fishery Products - The Gambia". This is the first fisheries related project to be approved by the Fund.

### 5.7.5. ECOWAS

It should also be mentioned that a Treaty creating the Economic Community of West African States (ECOWAS) was signed on of 28 May 1975. This treaty aims at establishing a progressive integration among the signatory countries as well as the free movement of persons and goods. Though the treaty does not provide any specific measure in the field of fisheries, some activities have been undertaken, sometimes with a sub-project on fisheries, in order to strengthen the economic cooperation and the integration of the countries of the region.

## 6. PROGRAMMES AND PROJECTS

### 6.1. Past

External funding allocated for artisanal fisheries development between 1979 and 1992 amounts to 25 million US\$. Three donors contributed almost equally to this effort: EEC, Italy and Japan. Practically all this funding has been directed at the village level through the coastal and inland integrated projects which have now phased out. Exception is the training facility built at the Fisheries Department.

Most of the fisheries centres under the EEC funded AFDP for the six coastal fishing villages (Gunjur, Tanji, Kartong, Sanyang, Brufut and Batokunku) are now self-sustaining and being managed by the beneficiaries themselves, but still with little assistance from the Fisheries Department.

The Italian Government funded Inland AFDP which involved eight inland community fisheries centres (Barra, Albreda, Jurunku, Bintang, Kemoto, Tankular, Salikene and Tendaba) phased out in July 1993. Some of the centres are performing well. However, many still require technical and other forms of assistance if they are to be sustainable.

The research project to study the biology of the pink shrimp (*Peneus notialis*) which started in 1993 and was aimed at understanding the ecosystem as it affects the shrimp came to an end in 1994. The project was funded and executed by the Fisheries Department through a compensatory research fund established under the fishing agreement with EEC.

With the financial support of UNDP, FAO executed since 1993 the preparatory phase of an Inter-regional Project for the Integrated Management of Coastal Fisheries. This preparatory phase which came to an end in 1994 aimed at elaborating some coordination methodologies and mechanisms for the integrated management of coastal fisheries, as well as preparing an extended assistance programme in this area. The expected results of the project include a plan for the integrated development of fisheries in three pilot sites. In Africa, the Advisory Committee of the project had chosen The Gambia as the pilot site. Unfortunately, no donor has yet been identified to finance the main phase of this project.

### 6.2. Present

#### 6.2.1. National

The CFC project in Bakau is funded by JICA. The project was funded in 2 phases. The first phase involved the construction of a fishing complex and provision of facilities and equipments such as an ice plant, cold storage plant, office, workshop, smoking ovens, drying racks, fishing boats, nets, engines, and insulated vans. The second phase involved the construction of a fish landing jetty, a sea

protection wall, slope erosion protection, supply of fishing related equipments (boats, nets, engines etc) and pick-up vehicles. The construction of the first phase was completed in May 1993 and the operations of facilities and equipments started in June 1993. Whilst the second phase construction was completed in June 1995 and operations commenced in July. In February 1996, 46 fishing boats operated from Bakau. Total catch increased from 295 t in 1993/94 to 885 t in 1994/95 (+200%). The Centre received no Government subvention or donor pre-financing or credit financing of its operations, it has self-sustained its operations. The Centre's bank accounts are healthy.

The Research and Development Unit of the Fisheries Department is implementing a pilot aquaculture research project, looking into the possibility of rearing *Oreochromis niloticus* as a rural undertaking in the flood plains of the River Gambia.

#### 6.2.2. Regional

Since 1993 the Government of Luxembourg sponsors a pilot project on Regional Aerial Surveillance of Fishing Zones. Approval has been granted in May 1995 for the full scale implementation of the project for 2.5 years. The countries covered by the project are the members of the sub-regional Commission for fisheries (Mauritania, Senegal, Cap Verde, Guinea, Guinea Bissau, The Gambia) and Sierra Leone. The objective of the project is to contribute to the establishment of a sub-regional Fisheries Management Regime. The main activities of the project include aerial flights, training on land and inflight for MCS operations, development of a sub-regional database.

The West African Regional Programme for the Utilization of Fishery Products is financed by the EC. The Programme, whose head-office is in Abidjan, aims at reducing the physical losses of fish, improving the quality of fresh and processed products as a means of obtaining an increase in private operators' incomes, and expanding regional trade in artisanal fishery products. In 1994, this Programme entered its main phase of five years and is operated by a consortium of four NGOs namely INADES (Côte d'Ivoire), Credit Union (Ghana), CREDETIP (Senegal) and CEASM (France).

The Geographical Information System on fisheries in West Africa elaborates and uses a planned management system for fisheries that covers all coastal West African countries through the applications of geographical information. This project is financed by France and is based in Casablanca, Morocco since December 1994. The project intends to operate in close collaboration with the project for Data Base in Marine Research which should be financed by the EC.

The project "Improvement of the legal framework of cooperation, management and development of fisheries in West African coastal States" is financed by the EC. It started in May 1994 and will last 3 years. The general objective of the project is to provide the states of the region with an assistance on legal issues so that they could maximize their opportunities within the framework of the new Law of the Sea.

Thanks to the financing of Denmark, IDAF Programme whose headquarters are in Cotonou, Benin started in July 1994 its third phase planned for a period of 4.5 years. It aims at strengthening the national capacities as regards the management and development of fishery resources while focusing on artisanal fisherfolk communities. It also seeks to promote responsibility taking and decision making at the level of these communities through a participative approach, training and access to information.

### **6.3. In-the-pipeline**

Government of The Gambia would like to get support from donors to consolidate the results of the two AFDP projects. In 1992, an evaluation mission of the EDF project recommended the continuation of the programme for a further two years. Estimated cost was 0.5 million ECU with particular emphasis on credit both for fishermen and fish processors and traders. A third phase of the project for inland fisheries is also desired.

A donor has yet to be identified to finance the main phase of the project for the Integrated Management of Coastal Fisheries.

A project proposal for improvement of safety at sea in artisanal fishery is being prepared. It is expected that the project would be a component of a major project coordinated at the level of the SRCF.

A fishing harbour is still required to allow the country to fully benefit from the industrial fishery. In that respect the Islamic Development Bank financed a feasibility study which is now completed.

## **7. DEVELOPMENT OPPORTUNITIES AND CONSTRAINTS**

### **7.1. Constraints**

#### **7.1.1. Physical**

The Marine Artisanal Fisheries Development Project has improved the road links between fishing villages and local markets. However, a tarmac road is still necessary to ensure good and regular access throughout the year to the coastal fishing villages. This, combined with better ice supply, would improve the quality of fishery products. Another constraint is the difficulty to access the remote inland markets.

Although some existing ice plants and cold storage facilities are not fully used, there is still a lack of these facilities in some important landing sites in the southern part of the country. In particular, the export oriented development of sole and cuttlefish fisheries needs better access to cold storage.

Bonga production has dramatically increased during the last 10 years from 5,000 to 15,000 t. Most of the fish is smoked which contributes to deforestation. Many efforts have been made to reduce fuelwood consumption through the introduction of a modified Chorkor oven. Presently, two measures are experienced to stop the rapid depletion of coastal forests: establishment of forest plantations in close proximity to major fish smoking sites and assignment of exclusive use rights to communities.

The absence of a fishing harbour is probably the major physical constraint for industrial fisheries as licensed fishing vessels cannot easily land their catch in The Gambia. Because of the synergy between artisanal and industrial sub-sectors, the existence of a fishing harbour could also involve some benefits for artisanal fishermen, particularly in terms of outlets.

#### **7.1.2. Technical**

Technical constraints are linked to the lack of some expertise and facilities in the fishing communities, as well as in the Fisheries Department.

At the fishing community level, there is a lack of adequate repair and maintenance facilities and an inadequate number of qualified tradesmen to manage and operate such facilities. The poor handling, processing and marketing of fish is another constraint which gives rise to a high degree of harvest and post production losses. It is also observed that very few Gambian fishermen are experienced in high sea fishing.

At the administration level, the poor knowledge of some high value species, like cephalopods and crustacea, is a constraint to the rational management of the resource and to the development of these fisheries. The lack of a fisheries laboratory at the Fisheries Department effectively limits the Research Unit's capacity and activities.

Fish processing companies are not yet authorized to export their products to EC. This is one of the reasons that explain why most of the exports are made through Senegal. The upgrading of existing facilities to satisfy the European norms should receive high priority and will benefit the artisanal fishermen.

#### 7.1.3. Economic and financial

The scarcity of both investment and working capital in the Gambian fishing communities, as well as the lack of credit facilities and private investors, delays the entry of nationals in the sector. Although the training programme for young nationals organized by the Fisheries Department is a success, foreign fishermen and traders have still better access to fishing equipment and capital.

The inadequate operational and development funds of the Fisheries Department limits its capacity as regards training, data collection and MCS activities. The Fisheries Development Fund, albeit concentrated now on inland fisheries, could play an important role in providing the necessary financial means for a sustainable development of artisanal fisheries.

More and more people are involved in bonga processing. This development is positive in terms of employment, but careful attention must be paid to the consequences of increased competition in terms of production costs. Notably, the cost of wood is rapidly increasing and this has adverse consequences on retail prices and profit margins.

The low purchasing power of the Gambian population makes the local market for high value products very narrow. It is therefore necessary to find outlets outside the country for these products. As far as low value species sold on the domestic market are concerned, the producers have great difficulties in passing on production cost increases.

#### 7.1.4. Institutional

The number of high and middle level staff in the Fisheries Department is inadequate to meet its mandate. In particular, there is presently no expertise in socio-economics. The level of fisheries research is low, especially in fisheries statistics and stock assessment, product development and quality control of fish products.

Conflicts happen between the artisanal and industrial fishing fleets, as well as among artisanal fishermen themselves. At present, most of these conflicts are solved informally which seems to be the best approach. However, regulations should be envisaged for drift nets which are at the origin of most

of the conflicts arising among artisanal fishermen. Present activities to improve MCS will also have positive effects on artisanal fishing units. However, to improve enforcement of any regulation, participatory approaches should be promoted.

Related with MCS, safety at sea could be improved. Firstly, adequate safety equipment should be made available at reasonable cost. Secondly, training activities for artisanal boat operators should be developed. They will put emphasis on avoiding sea accidents and surviving an accident at sea once it occurred.

The increasing number of administrative structures (governmental and non-governmental) dealing with fisheries forces a number of high level staff to spend a lot of time in meetings and coordination of activities of all agencies involved in exploitation, control, monitoring and surveillance.

With the strong support and commitment from the international community, the artisanal fisheries sector has proven its importance in the national economy. Unfortunately, the prospect for further foreign assistance is not bright. This situation is unfortunate because it is now necessary to consolidate the achievements. In particular, the CFC Management Committees need to improve the level of their organizational skills and management practices to ensure the sustainability of their actions.

#### 7.1.5. Socio-cultural

The level of literacy is very low which is evidenced by the poor business management habit and practices of the national operators. It is most likely that an improvement of the education system, formal and/or informal, will have positive consequences on the standard of living of fisherfolks, as well as on the results of the national economy.

Like in most countries of the region, women are usually in charge of the household. They have to find the necessary resources to pay for food, education and health. However, they are the most affected group of operators. They have very limited resources and little or no access to formal credit. They have also difficulties in securing ownership right to assets. Upgrading their living and working conditions will therefore have an important and direct impact on the whole family.

### 7.2. Opportunities

The development of artisanal fisheries will likely be based on a combination of biological, commercial and socio-economic opportunities.

From a biological point of view, demersal resources which are presently fully exploited need to be better managed in the future so as to limit their level of exploitation by industrial fleets. This should allow the artisanal fishery to sustain and increase its contribution. The potential of pelagic resources remains very important. One estimates the potential additional catch of bonga to be between 15,000 and 30,000 t. per year. Sardinella species are currently unexploited. But their potential is 70,000 to 80,000 t. per year which represents real prospects for additional productive investments.

In view of the peculiar circumstances of the waters of the Gambia vis-à-vis the Senegambia continuum and stocks migrations, management should reflect the characteristics of shared stocks. Joint management by Gambia and Senegal and programme harmonisation of management measures should therefore be in the interest of both countries. Joint research field surveys, assessments and reviews of

stock levels are also logical for equipment, expertise and cost sharing. In particular, a 2-year stock assessment programme for coastal pelagic and demersal finfish and shellfish resources should be considered to clarify the status of these stocks. In that respect, bilateral cooperation should be developed with the Centre de Recherche Océanographique at Dakar-Thiaroye (CRODT) which has good facilities and equipment as well as expertise.

Commercial opportunities lie in both domestic and export markets. The natural outlet for small pelagic species is the domestic market. It seems that it could easily absorb additional landings of bonga provided that constraints related to access roads, storage facilities and fuelwood availability and price are resolved. If one refers to Senegal where the consumption per capita is 28 kilos, the supplement could be approximately 8.000 t. per year, i. e. about 40% increase.

The example of Senegal shows that artisanal fishery can contribute significantly to the objective of foreign exchange earnings. This could be done in The Gambia by supplying export fish processing companies with shrimp, cephalopods, sole, sea bream, grunt, etc. Indeed, current development of cephalopod and sole fishery indicates that Gambian fishermen adapt rapidly to new commercial opportunities. However, a condition for the country to really benefit fully from this opportunity is the conformity of export fishing companies to European norms. This will allow fish products to be exported directly from The Gambia. Tourism development in the country provides also a good outlet for artisanal fishermen. In the future, the identification of a financially solvent market and an appropriate processing technique could lead to the profitable exploitation of sardinella species.

From a socio-economic perspective, the opportunities rest in the contribution of the artisanal fishery sector to employment, revenue and community development. Professional artisanal fishing is a relatively new activity in The Gambia. Notwithstanding, one observes already an increase in the number of full-time national fishermen. Such a tendency would have to continue in the future provided that training and access to financial market are improved. This will allow the progressive substitution of foreign fishermen by national. In addition to the creation of job, the sub-sector can contribute to maintaining the population in rural areas along the coast and therefore to limit the rural exodus.

Finally, it is obvious that the participatory approach followed by the Fisheries Department has contributed to a high degree of acceptability of the facilities by the fishing communities, as well as to a willingness to manage them in the interest of future generations. The improvement of living and working conditions in these communities will be based on a continuous dialogue among the communities and between them and the Fisheries Administration. A lot has already been done in that respect and one of the best opportunities for future development is the high degree of confidence existing between the communities and the Fisheries Administration. This will help the fisherfolk communities to be more responsible in managing their assets, which are not only infrastructures, facilities or money, but also natural resources like fish and forest.

## **8. BIOLOGICAL AND SOCIO-ECONOMIC MONITORING**

The system of collecting statistics, especially in the artisanal fisheries, has evolved through several stages and had been so perfected that it was adopted as the model for the entire CECAF region.

As far as industrial fisheries are concerned, a restructuring of the observer programme is recommended. Pre- and post- fishing trip home port calls to initial a voyage/fishing grounds register (to be opened in the harbour masters office or Port Fisheries/Surveillance Office) and pick up or discharge the observer should be mandatory for licensed vessels as double checks of records of effort



levels. Another output of the observer programme should be the assessment of by-catch and discards which are not negligible, in particular in the shrimp fishery.

### **8.1. Frame survey**

The frame surveys inventory all landing sites totally enumerating fishermen, canoes, gear and other key variables of the fishing economic units. All three coastal and inland strata are covered in 2 weeks scheduled to coincide with the peak of the season between mid January and February ending every other year.

Since the beginning of the 80s, a number of infrastructures, facilities and services have been successfully introduced in many fishing communities. It could therefore be useful to complement the results of the frame survey by an inventory of these facilities and services. All this information could be included in a "Dictionary of fishing villages" which will allow the development planner to monitor the evolution of the sector and to know immediately the environment of a specific area.

### **8.2. Survey of Organizations and Institutions**

A survey of the various organizational and institutional arrangements, including structure, membership, rights, rules, regulations, etc., is much needed for the artisanal fisheries sector.

### **8.3. Catch assessment surveys**

The annual Catch Assessment Survey (CAS) collects catch and effort statistics from a sample of the fishing units per gear in a sample of fish landing sites for a sample of fishing days monthly. Altogether, 6 canoes are sampled for each of 6 fishing days sampled - 3 days in the first and 3 in the second fortnight every month. Three raising factors - landing, frame and time (derived by dividing the number sampled by the total number of landing sites, canoes and fishing days) - aggregate the monthly estimate. All marine landing sites give a landing factor of 1.

Biennial one-time total enumeration frame surveys and continuous catch assessment surveys (CAS) for 6 (3 + 3) days monthly as practised are appropriate, as funds permit. The 6 sampling days are selected randomly, number of canoes is the unit of effort adopted. But biological data are not comprehensive enough, especially for stock assessment purposes. In that regard, periodic length frequency measurements for marine, estuarine and freshwater artisanal and industrial fisheries in The Gambia should be incorporated as soon as possible into the CAS.

In addition to biological parameters certain environmental variables should be monitored routinely. There is evidence that environment variabilities often subtle and seemingly inconsequential on the micro scale are significant and cyclic on the macro level. Coastal pelagics abundance and stocks epicentre respond to cyclic hydroclimatic changes through larval survival rates. Upwelling intensity, for example, influences growth rates, modal lengths, distribution, displacements and abundance peaks. Environmental data are at the core of ecosystem dynamics, and inter-annual stocks fluctuations. It is therefore important to monitor coastal upwelling, thermal fronts and temperatures, winds, river discharge and salinity changes, currents and others for their

predictive value. Weekly hydrographic transects off Gunjur, Tanji and Bakau should also incorporate fish egg, larvae and zooplankton assessments to supplement the interpretation of remote sensing records.

#### **8.4. Costs and earnings surveys**

Since July 1995 the Fisheries Department carries out with the assistance of IDAF a costs and earnings survey in Bakau and Tanji. The purpose of the exercise, which is done in 8 other countries of the region, is to test, during one year, a methodology for assessing the financial and economic profitability of the fishing units. It is expected that after this period the Fisheries Department will continue the survey. After this experimental period it is recommended to increase the sample size for each fishing type in each locality from 3 to 10.

The results of costs and earnings surveys are important for both fisheries development and management. They allow the planner to monitor the economic situation of the sector and, thus, to assess the need for or the impact of some interventions. They also complement the results of the catch assessment survey to give a picture of the bio-economics of a fishery which can explain and predict its evolution.

#### **8.5. Socio-economic surveys**

A socio-economic survey was carried out in 1991 along the Atlantic coast. It was recommended at that time that a full-scale follow-up survey be done in 1993. Unfortunately, this was not possible. Taking into account the important changes which happened in artisanal fisheries since 1991, an updating of socio-economic information would be worthwhile.

On the other hand, a more general coverage, including the various stakeholders, will provide valuable information for preparation of realistic artisanal fisheries management and development policies.

#### **8.6. Others**

A marketing study will usefully complement the results of the costs and earnings survey. It will assess the retail price structure and the flow of products. The combined results of costs and earnings survey and marketing survey will give a full picture of the financial and economic health of artisanal fisheries in The Gambia. It will also identify the bottlenecks which limit the distribution of marine water fish in the country.

The preparation of a catalogue of fishing gear and techniques will update the information available on fishing technology. This is required because the rapid development of new fisheries could lead to a type of exploitation detrimental to the resource base. The catalogue is also useful when preparing or modifying the regulations on fishing gear.

The Fisheries Department achieved a survey of accidents at sea in 1994. It is recommended to update it systematically every year. A simple computer programme, conceived by IDAF, to store, process and analyse the data is available at the Fisheries Department.

Table 7 summarizes the information system proposed for the monitoring of artisanal fisheries in The Gambia.

Table 7.- Summary of socio-economic monitoring of artisanal marine fishery

Type of survey	Objectives	Main activities	Data to be collected	Periodicity
Frame survey	Inventory of production means  Regular updating of the dictionary of fishing villages	Census of fishing units and fishermen  Survey on fishing villages and landing sites	Number, activity and size of fishing boats, types of fishing gear, origin of boat-owners, means of propulsion, number of fishermen  Infrastructures and services related to fisheries: water, health, education, electricity, markets, supply centres, engine workshops, development projects, boat-building workshops, fish products utilization, profile of fishing activities, etc.	At least every 3 years with spot checking every year
Catch assessment survey	Assessment of total production and productivity per type of fishing unit	Data collection on fishing effort and catch	Catch per species, fishing effort, length frequency	Continuous, regular monitoring
Survey of organizations and institutions	Assessment of organizational and institutional arrangements	Analysis of local and external institutional and organizational arrangements	Number of organizations, memberships, structure, rights, rules, regulations.	One-off, every 3 to 5 years
Costs and earnings survey	Assessment of the profitability of fishing units and value added secured by the sector	Survey of costs and earnings of fishing units	Fish price at landing site, operation costs, crew size, sharing system	Continuous
Socio-economic study	Assessment of the socio-economic structure of the system  Assessment of characteristics of stakeholders	Baseline survey of a sample of fishing units  Analysis of economic, demographic and socio-cultural features	Investment costs, fixed costs, social organisation, employment, socio-economic characteristics, perceptions and strategies, relations between the different elements of the system  Demography, economic activities, occupational structure, cultural features	One-off, every 3 years combined for practical reasons with frame survey
Marketing survey	Assessment of price structure, profitability of the business and the flow of products	Survey of costs and earnings of fish-mongers and distribution network	Fish price at each stage of the distribution chain, - operation costs, fixed costs, volume of transactions	One-off, at least for two months
Catalogue of fishing gear	Production of a baseline document for mesh size regulations	Data collection on fishing gear and techniques used in marine waters	Characteristics of fishing gear and techniques	One-off, depending on the evolution of the sector
Safety at sea survey	Measurement of the importance of accidents at sea	Survey of accidents at sea and cataloguing rescue and insurance arrangements	Causes and effects of accidents at sea (material and physical damages) and safety compensation insurance arrangements	One-off, every year

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## ANNEX 1. PERSONS MET

Mrs. Florence A. Chenoweth	FAO Representative in the Gambia
Mr. Cherno Joof	Principal Assistant Secretary, Ministry of Agriculture and Natural Resources
Mr. Ousman Drammeh	Director, Department of Fisheries (DOF)
Mr. Nfamara J. Dampha	Assistant Director of Fisheries, DOF
Mr. Austin Jones	Senior Fisheries Officer, MCS
Mr. Momodou Njie	Fishery Officer, IDAF Liaison Officer, DOF
Mr. Peter Ndow	Fishing Gear Technologist, DOF
Mr. Nabil N. Nachif	General Importer of fishing materials, Banjul
Mrs. Isatou Touray	Management Development Institute
Mr. Asberr Mendy	Biologist, DOF
Mr. I. Keita	Department of Statistics, Ministry of Trade, Industry and Employment
Mr. Lamin Mbye	Fisheries Credit Unit
Mr. M.J. Suwareh	Senior Fisheries Officer (Extension), DOF
Mr. Janko Ceesay	Principal Fisheries Assistant, Kartong
Mr. Ousman Bojang	President, Bakau Fishermen Community
Mr. Salifu Bojang	Principal Fisheries Assistant, Brufut
Mr. Almami Drammeh	Principal Fisheries Assistant, Tanji
Mr. Mustapha Touray	Principal Fisheries Assistant, Sanyang
Mr. Aliem Touray	Secretary, Management Committee, Gunjur
Mr. Ebrima Cham	Mechanic, DOF
Mr. Omar Njie	Factory manager, National Partnership Enterprise Ltd (NPE)
Mrs Nathalie Baillon	Statistician/Marine biologist, Lux-Development
Mr. Musa Saïdykhan	Factory manager, Lyefish
Mr. Alhaji Cham	Chief refrigeration mechanic, Lyefish
Mrs Samathey Colley	Factory Supervisor, Lyefish
Mr. A. Danso	Assistant Director, Department of Forestry
Mr. Abobarin	Marketing adviser, INFOPECHE
Mr. Matarr Bah	Fisheries Officer, DOF

Artisanal fisherfolks in Kartong, Brufut, Tanji, Sanyang, Bakau, Gunjur and Mandinari.

ANNEX 2. LIST OF MAIN COMMERCIAL FISH SPECIES IN ARTISANAL FISHERIES

Scientific Names	English	Local
<i>Ethmalosa Fimbriata</i>	Shad	Bonga
<i>Pseudotolithus brachygnathus</i>	Law Croaker	Nguka
<i>Pseudotolithus typus</i>	Long neck Croaker	Tonnone
<i>Plectorhyncus meditaraneus</i>	Rubberlip Grunt	Banda
<i>Arius spp.</i>	Catfishes	Kong/ngunja
<i>Sphyraena Spp.</i>	Barracudas	Sedda
<i>Polydactylus quadrifilis</i>	Giant African threadfins	Kujeli
<i>Trachurus spp.</i>	Mackerel	Njuna
<i>Epinephellus spp.</i>	Grouper	Choff
<i>Pseudotolithus senegalensis</i>	Cassava Croaker	Fotta
<i>Galeoides decadactylus</i>	Lesser african threadfins	Chekem
<i>Caranx spp.</i>	Jacks, Crevalles, Nei	Sacca/Fetta
<i>Sardinella spp.</i>	Sardinellas	Yabuoy
<i>Cynoglossidae</i>	Solefishes	Solefish
<i>Mugilidae</i>	Mulletts	Mullet/Giss/Cakanja
<i>Drepane africana</i>	African Sickleafish	Tapandarr
<i>Fonticulus elongatus</i>	Bobo Croaker	Jortoh
<i>Pomadasyus jubelini</i>	Sompat Grunt	Sompat
<i>Piscics</i>	Sharks/Skates/Rays	Chaah/gaindeh/Tum.
<i>Panulirus regius</i>	Lobster	Suum
<i>Lutjanus spp.</i>	Snapper	Yaah
<i>Tilapia spp.</i>	Tilapia	Wass
<i>Argyrosomus regius</i>	Meagre	Beur
<i>Tetraodontidae</i>	Puffer fishes	Konkareh
<i>Elops lacerta</i>	West African Ladyfish	Nginyan
<i>Pomatomus saltatrix</i>	Bluefish	Ngot
<i>Cybiium spp</i>	Sea Snails	Yete



ANNEX 3. TECHNICAL FEATURES OF FISHING GEAR

Type of net and local name	Cast net. Mbaal saney	Bottom gillnet for white fin fish. Mbaal seer	Bottom net for Cynoglossus. Mbaal sol	Set gillnet for lobster. Mbaal suum
Depth & Stretched meshes	4 to 7 m. 45 to 85 mm	4 m.	1,5 - 2 m. 80 to 100mm	2-3 m. 100 to 110mm
Twine N° & Hanging ratio	210d/3 - 6 -9 -	210d/12 - 15 E : 0.50 - 0.55	210d/12-15 for multifil netting and 0.45mm for monofil net	210d/12 - 24 0.50 - 0.55
Floatline diam./Length ref. PA-PP-PE, etc.	3 - 4 mm	6mm.L600m/set PP	5 - 6 mm L.20-25m/unit. 160-260m/set	6 - 8 mm L. 100m/unit L. x 4 -5 units
Floats type & kgf	-	mixed floats type, foam made	Foam shoes pcs, ~ 25-30 gf	35-40 gf
Leadline diam/length ref. PA-PP-PE, etc.	3 - 4 mm PA -PP	6mm.L600m/set PP	As floatline	As floatline
Sinkers,kind,individual or total weight	3 - 4 kg	lead mixed with stones	Pb ~120-130 grams x 60 cm	120 - 150 grams
Type and lenght of canoe used	optional Dug-out 5 - 7 m	Dug-out planked 7 - 10m	Dug-out planked 7 - 13 m.	Planked 7 - 13 m
Propulsion system, HP and type of fuel	Paddle & sail	OBM 6 -15 HP Premixed	OBM 6 -25HP Premixed	OBM 8 - 15 HP Premixed
Number of crew, skipper included	1	3 - 4	3 - 4	3 - 4
Target species	Tilapia-Bonga-small croakers & associat. species	Cassavafish, Ladyfish,Kujeli, Cuttlfish,and associated species	Soles and associated species	Lobsters
Fishing season	all year round	all year round	October -July. Peak season January-March	All year round
N°. of Fishing hours	any time	8 - 10 hours a day	12-16 hours	10 - 12 hours
Total value of the gear	D.800 - 1000	D10 800/100 m.	Total ~ 18 000	D3000/100m
Life expectancy	~ 3 years as per handling/ maintenance	~ 2 - 3 years	For monofil netting, ~ 2 months. Ropes/floats/ leads,1,5 years	2 - 3 years

Type of net & local name	Bottom set gillnet. Mbaal seerass	Bottom set gillnet. Mbaal palli	Midwater driftnet. Yolal	Surface driftnet. Felefele
Depth & stretched meshes	2 to 4 m. 110 to 160mm	2 to 3 m.	4 to 6 m 110 to 160 m	50-72-80-100mm
Twine & hanging ratio	210d/24 to / 48	210d/9 to / 12	210d/18 to/48	210d/3/6/9
Floatline diam./length ref. PA-PP-PE etc	diam ~ 6mm L.30 to 140m PP	diam 5 - 6mm L.20-80m PP	diam 6mm L.400 - 800m PP	diam 5-6mm L.140 to 300m. PP
Floats type & kgf	30 -40 grf	20 - 30 grf	135/160 grf	20 - 30 grf
Leadline dia./length ref. PA-PP-PE-etc	As floatline	As floatline	As floatline	As floatline
Sinkers, kind, individual or total weight	~ 120 gr.	small stones / mixed lead	150 gr/unit	small stones/ mixed lead
Type and length of canoe used	Dug-out canoe 7 m	Dug-out canoe 5 - 7 m	13 - 16 m	Dug-out canoe 5 - 7 m
Propulsion system, HP & type of fuel	Paddles & OBM 8 HP	Paddles - sail	OBM 15 - 25 HP	OBM 8 - 15 hp
Number of crew, Skipper included	4	1 - 2	6	4
Target species	ladyfish, cassava fish, kujeli, catfish, barracuda	heterotis niloticus, tilapia;Gymnarchus niloticus	barracuda, catfish; ladyfish	bonga, mullet and fresh water species
Fishing season	All year round	Maily in dry season	All year round peak season May to Sept.	All year round peak in dry season
N° . of fishing hours	10 - 12 hours/day	6 - 8 hours/day	12 - 16 hours/day	10 - 12 fours/day
Total value of the gear	~ D 3 000 /100m	~D 800 - 1000/ 50 meters	20-22 000 for 1000 m	D3000/100M
Life expectancy	~ 2 years	~ 2 years	1 to 2.5 years	1 to 2 years

Type of net & local name	Drift gillnet. Kaino	Encircling gillnet. Kobo		
Depth & stretched meshes	2 - 3 m. 80 mm	10 - 12 m. 70-75-80-90-92mm		
Twine & hanging ratio	210d/3 / 9	210d/6 / 9 / 12 E : ~ 0.60		
Floatline diam./length ref. PA-PP-PE etc	diam. 6 mm 20 to 80m. PP	diam.6 to 12mm 230 to 500m. PP		
Floats type & kgf	20 -30 gf	33 gf		
Leadline dia./length ref. PA-PP-PE-etc	As floatline	As floatline		
Sinkers, kind, individual or total weight	~70 - 75 gf	150 gf		
Type and length of canoe used	Dug-out. 4 - 5 m.	Planked canoe 10 to 18 m.		
Propulsion system, HP & type of fuel	Paddles	OBM 25 - 40 HP Premixed		
Number of crew, Skipper included	3 - 4	5 to 10 depending on boat length		
Target species	tilapia, kujelo, johtor	Mainly bonga		
Fishing season	All year round	all year round		
N°. of Fishing hours	6 - 8 hours /day	6 - 8 hours/day		
Total value of the gear	D1000/100m	D.28 000 /500m		
Life expectancy	~ 2 years	2 - 3 years		

Type of line and local name	Handline. Napichass	Hanline for sompat- shinenose-johtor	Handline for ladyfish,cassavafish,ca tfish	Handline for groupers
Main line, Diameter, PA-PP-PE etc.	0.5 - 2.5mm PA. monofil:	0.5mm	0.50 - 0.80mm	0.80 - 1.20 mm PA monofil
Branchline, length, number, diameter, PA-PP-PE- etc.	1to20,pcs. PAmonofil 0.5 to 2.5mm	L. 25 cm 0.50mm PA monofil	L.30cm	L. 50 cm diam 1.5 to 2.2mm.
Distance between branchlines	variable, as per target species	~ 30 cm	45 cm	-
Hooks, ref. /N° and quantity on the line	1 to 20 pcs usually 2	9 to 12 pcs	N° 7 to 9	1 to 3 pcs
Kind of bait or type of lure used	bonga is common	bonga	bonga mixed with available fish	bonga and mullet
Sinker, type / weight, or float type / kgf	variable	30-50 grams or stone		70 to 120 grams
Total lenght of the line	30 to 150 m	~ 38 m.	~ 38 m	~ 75 m
Targeted species	demersal and pelagic species	-	-	-
Fishing period	all year round	all year round	-	-
Type and lenght of canoe used	optional wharf/jetty	optional wharf/jetty	dugout and medium planked	dug-out canoe 5 - 7 m
Propulsion system, HP and type of fuel used	optional	optional	optional wharf/jetty	paddle & sail
Number of crew, Skipper included	1 - 2	1 - 2	1 - 2	1 - 2
Ligne used on the bottom, sub- surface or surface	bottom and sub- surface	Bottom	Bottom	Rocky bottom mainly
Total value of the gear	~ 150	~ 150	~ 200	~ 250
Life expectancy of the gear	~ 1 year	~ 1 year	~ 1 year	~ 1 year
N°. of fishing hours	6 - 8 hours/day	Idem	Idem	Idem

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