

PROGRAMME FOR INTEGRATED DEVELOPMENT OF
ARTISANAL FISHERIES IN WEST AFRICA

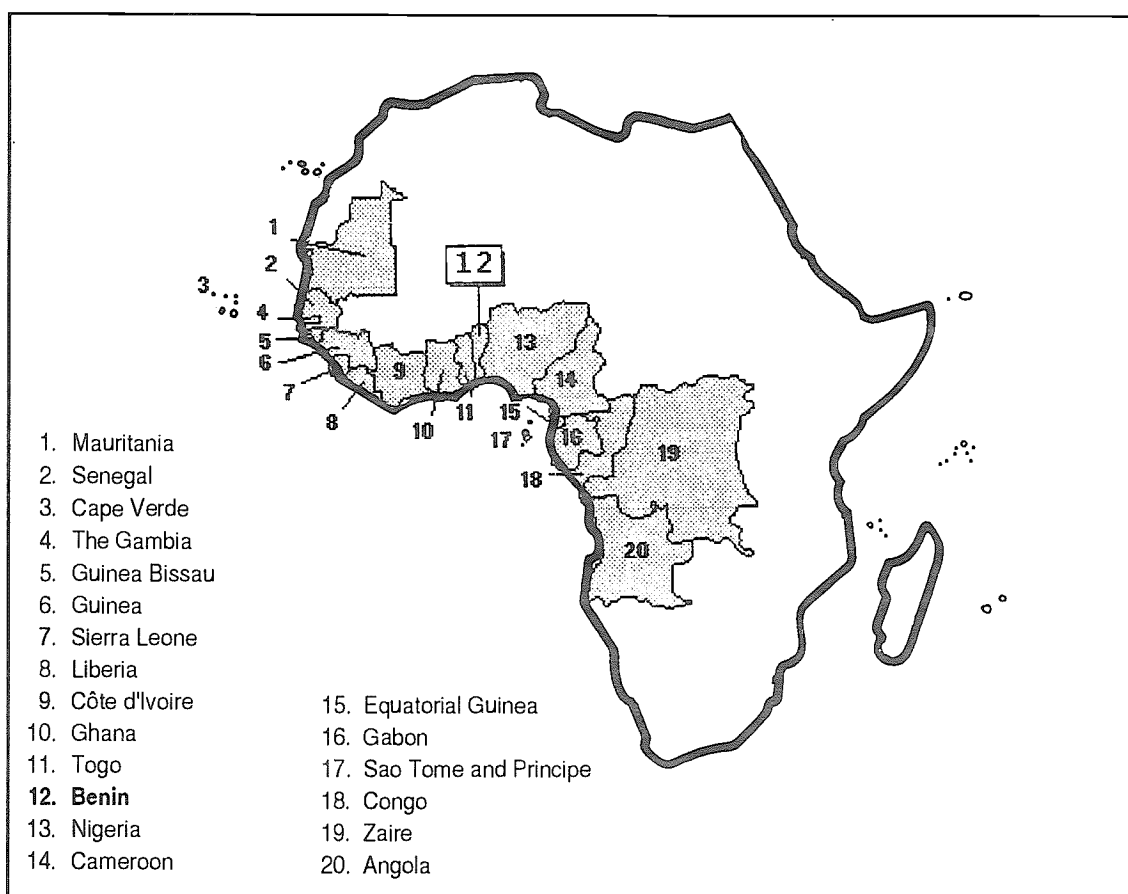
IDAF PROGRAMME

Technical Report N° 72

December 1995

**Report of the First Meeting of the IDAF Working Group
on Costs and Earnings in Artisanal Fisheries in West Africa**

(Dakar, Senegal 12 - 13 June 1995)



DEPARTMENT OF INTERNATIONAL DEVELOPMENT COOPERATION OF DENMARK



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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by

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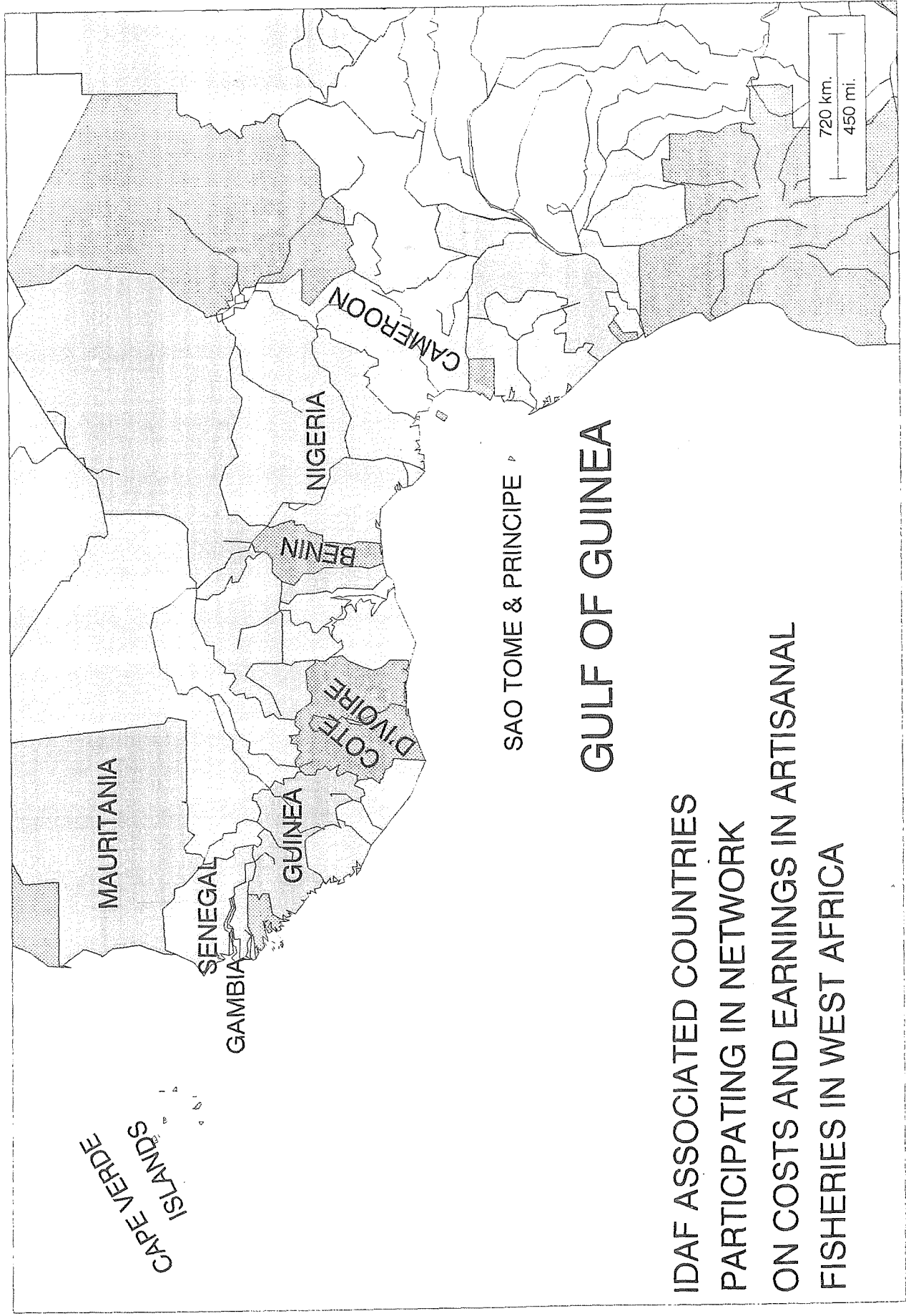
Jallow A. M.; Report of the First Meeting of the IDAF Working Group on Costs and Earnings
1995 in Artisanal Fisheries in West Africa , Cotonou , Benin, Programme for the
Integrated Development of Artisanal Fisheries in West Africa, 81p;
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IDAf ASSOCIATED COUNTRIES
PARTICIPATING IN NETWORK
ON COSTS AND EARNINGS IN ARTISANAL
FISHERIES IN WEST AFRICA

SAO TOME & PRINCIPE
GULF OF GUINEA

INTRODUCTION

Governments in the region covered by the IDAF Programme are increasingly giving priority to the development of artisanal fisheries because of the subsector's increasing role in providing much needed protein and employment opportunities. In their respective development policies there is emphasis on improving the socioeconomic condition of fisherfolk. In general the strategy has been interventions in improved fishing craft, fishing gear, outboard engines, and processing technologies documented in the mentioned region.

In spite of the significant progress in production levels, development planners still lack information on the costs and earnings of the artisanal fisherfolk. This has deprived them of the means of adequately assessing the technologies to encourage and those to discourage. The situation has been exacerbated by the fishermen not keeping account of the cost and earning in their operations. An essential element for assessing private and social benefits has, therefore, been marginalised in development planning and monitoring, in management policy formulation, in relevant sector related studies, and in project evaluation. Hence the need for data collection on costs, earnings, and profitability of different fishing units with regard to the methods they apply in the subsector.

To improve on the short and sporadic studies conducted in the region, the IDAF Programme invited national fisheries administrations and research institutions to collaborate with her to assess the cost structure, the sharing system, and the profitability of artisanal fisheries operations for a year in ten of its twenty associated countries. The results of the study will be used as a comparative information working document in a workshop to be organised in November 1996.

The invited institutions nominated economists or technologists with relevant experience to serve as Study Coordinators in their respective countries. To facilitate the exchange of information and experience these nominees now constitute a Working Group on Costs and Earnings on Artisanal Fisheries in West Africa. The first meeting of this Group was held in Dakar on the 12 and 13 June 1995.

Meeting

This first meeting was attended by all the invited participants (list in annex) from the ten countries selected; Mauritania, Senegal, Gambia, Cape Verde, Guinea, Cote d'Ivoire, Benin, Nigeria, Cameroon, Sao Tome & Principe. It was opened by the Senegalese Director of Fisheries, Dr. Ndiaga Gueye. After welcoming the participants, he outlined his government's policies on artisanal fisheries development. He used these policies as reference in emphasizing the importance and relevance of IDAF and its initiated costs and earnings studies in Senegal and the region. He concluded by offering, on behalf of his Minister, his government's full support to the costs and earnings network study. The meeting was chaired by Senegal and Messrs Moustapha Kebé of CRODT/ISRA (Dakar) and Thomas Ajayi of NIOMR (Lagos) were the rapporteurs.

Objectives of the Meeting

The objectives are:

- to initiate the operation of a Working Group on Costs and Earnings Studies on Artisanal Fisheries in West Africa;
- to select the fishing methods and the number of units to be studied at each site;
- to discuss and agree on a methodology to be applied for the studies.

Target Units

Each of the Study Coordinators presented a country report in which a census of the different fishing units operating in the selected study site was provided (see reports in annex). These units were analysed and classified according to type of canoe used, mode of propulsion, fishing technique applied, crew size, target species, and sharing system (s) practised. The information available was used to select the fishing methods and the number of units to be covered at the respective site(s). For each country, a maximum of four and a minimum of two fishing methods have been selected. The detail of the classified information is provided in the tables below.

The Working Group agreed on the following modus operandi for the study:

a) Definitions

Costs

These are expenses incurred by the fishing unit in a given period. They are separated into costs that are independent of the unit's fishing activity level (fixed costs) and those that are directly related to the fishing activity level (variable costs). The variable costs are owner's and common operating costs which increase as the amount of fishing per period increases.

The fixed costs are assessed periodically and the variable costs continually. Fixed costs to be observed by the data collectors are **interest on borrowed capital, licensing fees, cooperative society membership fees, and depreciation** (this is the anticipated reduction in value of an asset over time caused by physical use). The owner's operating costs include costs of **fuel, oil, food, ice, bait, twines, ropes, equipment rental for fishing, and repairs and maintenance**. The remuneration to the crew and to other workers on shore are also cost elements to the owner. The common costs are items deducted before the earnings are shared between the owner and crew - food or drinks before, during and after the fishing trip, fuel during the trip, fish sales commission, traditional taxes, and other shore contributions to associations created for the welfare of owner and crew.

The cost structure will be presented as the various cost elements which are a percentage of the total cost. These cost elements will be compared between locations, fishing methods, boat types, and other relevant parameters.

Earnings

The earnings, or revenues, received by the unit are the total value of the catch sold. This value is the weight of the catch multiplied by the price paid for each species. The net earnings, or net revenues, are the total revenues minus the common costs. The pricing of individual and mixed species should be monitored and properly recorded in the sheets. Fish given out to friends, family members, and the crew should be valued and recorded separately to complement the catch value. With some tact the data collectors can also obtain information on catch that is sometimes sold at sea to increase the income of a crew that is operating without the owner on board. This exercise requires absolute confidentiality to protect the crew and the flow of reliable information.

Note that the total revenues minus the operating costs is only the net production revenue and not the total profit, because of the absence of the fixed cost factor.

Table 1:

BENIN

(Study Site - COTONOU PORT)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Ghanaian Dugout	14 - 20 m	40 HP	10 - 21	40% for Boat, OBE, Gear, 20% for Owner, 40% for Crew	Pelagics	34	7
Long Line (Normal)	Ghanaian Dugout	15 - 20 m	40 HP	6 - 10	Same	Demersal	29	6
Drift Net	Ghanaian Dugout	9 - 12 m	25 / 40 HP	6 - 8	Same	Demersal Pelagics	64	15
Gill Net	Ghanaian Dugout	4 - 12 m	Sail 8 / 15 HP	3 - 6	10% Boat, 10% OBE, 80% Family	Demersal	91 (1993 Data)	Nil

Source: Souradjo Fousseyni, Direction des Pêches, 1995

Table 2:

CAMEROON

(Study Sites - LIMBE, IDENAU, MABETTA)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Ghanaian	15 - 20 m	40 HP	17 - 22	50% Owner, 50% Crew	Bonga & Sardinella	22	7
Gill Net	Planked Dugout	8 - 13 m 3 - 6 m	8 / 15 HP Paddle/Sail	2 - 3 1 - 2	50% Owner, 50% Crew	Demersal	27	7
Drift Net	Planked Dugout	8 - 13 m 3 - 6 m	8 HP Paddle/Sail	2 - 3	50% Owner, 50% Crew	Sardinella & Bonga	65	15
Crayfish Net	Planked	8 - 13 m	8 HP	5	*	Small Shrimps (Palaemon sp)	100	20

* In this system each crew member contributes a portion of the net. The boat owner contributes 15 "ngoto" and each of the canoe boys contributes 4 "ngoto", making it 35 "ngoto" per fishing unit. Each gets a portion of the catch that commensurates with his contributed portion. In addition to his share, the boat owner gets 100,000 FCFA per year from each canoe boy for the repair and maintenance of the boat and outboard engine.

Source: Njifonjou, CRHO - Limbé, 1995

Table 3:

CAPE VERDE

(Study Sites - SAN PEDRO, SALAMANZA, GAMBOA)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Planked Fibreglass	11 m	25 / 40 HP	11	65% Owner, 35% Crew	Pelagics	14	6
Long Line (Normal)	Planked	6 - 8 m	5 / 8 / 15 HP	3 - 4	Same	Tuna & Demersals	134	40

Source: Lopes, INDP, 1995

Table 4:

COTE D'IVOIRE

(Study Site - LAGUNE D' ABY)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Gill Net	Planked	N A	Paddle	1 - 2	N A	Bonga	N A	80
Beach Seine	Dugout	N A	Paddle	14 - 18	Collective System	Bonga, Catfish, Tilapia	47	10

Source: Angaman, Projet Pêche Aby, 1995

Table 5:

THE GAMBIA

(Study Sites - TANJI and BAKAU)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Encircling Gill Net	Planked Fibreglass	10 - 18 m 13 m	25, 40 HP / 27 HP diesel	10 - 15	75% Owner, 25% Crew	Pelagics	58	6
Long Line (Normal)	Planked	8 - 12 m	25 HP	4 - 6	Same	Demersal	27	6
Drift Net	Planked	10 - 18 m	25 / 40 HP	6 - 8	Same	Demersal / Pelagics	21	6
Gill Net	Planked	8 - 14 m	8 / 15 HP	4	Same	Demersal	11	6

Source: Dampha and Bah, Fisheries Department, 1995

Table 6:

GUINEA

(Study Site - BOULBINET)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Planked	18 - 25 m	25 / 40 HP	10 - 20	NA	Bonga & Sardinella	14	3
Gill Net	Planked Dugout	7 - 12 m 5 m	10 / 15 HP Paddle/Sail	3 1 / 2	NA	Demersal	32	6
Drift Net	Planked Dugout	6 - 12 m 6 - 9 m	10 / 15 HP Paddle/Sail	8 1 - 3	NA	Sardinella & Bonga	34	6
Long Line (Ice Carrier)	Planked	12 m / more	10, 15, 25 HP	5 - 8	NA	Demersal	62	10

Source: Diallo, CNSHB - Boussoura, 1995

Table 7:

NIGERIA

(Study Sites - BADAGRY and ORIMEDU)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Planked / Ghanaian	Not Available	OBE (HP not given)	Not available	1/3 Boat & Gear, 1/3 Owner, 1/3 Crew	Bonga & Sardinella	40	5
Encircling Gill Net	Planked / Ghanaian	N A	OBE	N A	Same	Bonga	4	4
Drift Net	Planked / Ghanaian	N A	OBE	N A	Same	Demersal	100	20
Gill Net	Dugout / Planked	N A	OBE & Sail	N A	Same	Demersal	100	10

Source: Ajayi and Okpanefe, NIOMR, 1995

Table 8:

MAURITANIA

(Study Sites - NOUADHIBOU and NOUAKCHOTT)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Purse Seine	Planked Fibreglass	N A	40 HP	N A	N A	Pelagics	59	12
Gill Net	Planked Fibreglass	N A	40 HP	N A	N A	Demersal	38	7
Octopus Pots	Planked Fibreglass	N A	40 HP	N A	*	Octopus	668	30

* In the octopus fishery the owner of the boat, outboard engine, and most of the pots is responsible for all the expenses and receives the revenue for the catch from all his pots. The crew work on his pots. The crew income is from their own pots that they carry along on the trip. In fact they normally sell the catch from their pots to the unit owner.

Source: Thiam and Touleb, CNROP - Nouadhibou, 1995

Table 9:

SAO TOME & PRINCIPE

(Study Site - SAN PEDRO and NEVES)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	Selected No. of Units
Gill Net	Dugout	3 - 12 m	6 - 10 HP	2	N A	Demersal	N A	15 - 20%
Beach Seine	Dugout	3 - 12 m	6 - 10 HP	N A	N A	Demersal	N A	15 - 20%

Source: Menezes, Department of Fisheries, 1995

Table 10:

SENEGAL

(Study Site - HANN)

Fishing Method	Boat Type	Boat Size	Mode of Propulsion	Crew Size	Sharing System	Target Species	Total No. of Units	No. of Units Selected
Purse Seine	Planked	14 - 18 m	25 - 40 HP	20	1/3 Net, 2/3 Boat, OBE, Crew	Pelagics	29	6
Long Line (Normal)	Planked	4 - 6 m 6 - 12 m	Unmot. 8 - 15 HP	1 3 - 4	1/3 Boat, 1/3 OBE, 1/3 Crew	Demersal	21	4
Long Line (Ice Carrier)	Planked	12 - 16 m	25 - 40 HP	7	1/4 Crew, 1/4 OBE, 1/4 Boat, 1/4 Insulated Container	Demersal	45	9
Gill Net	Planked	4 - 6 m 6 - 12 m	Unmot. 8 - 15 HP	3 - 4 3 - 4	1/4 Crew, 1/4 OBE, 1/4 Boat, 1/4 Net	Demersal	46	9
Beach Seine	Planked	14 m	Unmot.	Varies with net size	Share for each co-owner of net	Pelagics	7	Nil

Source: Moustapha Kebé, Hann Census 1995

Extra earnings that are directly related to the use of the fishing equipment, especially the canoe and outboard engine, should be accounted for and considered in the analysis of repair and maintenance costs. These earnings can be from the transportation of goods or passengers, common in some fishing centres.

It is very important to know the sharing system applied in a particular fishing unit. The system is usually based on an accepted method by both the owner and the crew. The crew shares reflect labour and those of the boat and gear are returns on capital. If the owner works as a crew, he gets a share as a crew member and his/her share as an owner (boat and gear shares). Once established, the earnings received by the crew and the boat owner can be calculated without asking the crew, which can sometimes raise suspicion and difficulties for data collectors.

b) Methodology

In the methodology, the approach, collaborating institutions, criteria for selection of fishers, and the principles for data collection have been adopted.

i) Approach

The approach to be applied is participatory. This entails doing the studies at the fishing community level through the collaborating institutions. The fishers will provide the information and in the process will be trained to keep records of their costs and earnings. The agents conducting the studies in the field will be trained to sustain the initiatives at the national level. These respective national activities will contribute to the strengthening of the capacity of the institutions.

ii) Institutions

The institutions involved in the study are:

Benin	-	Department of Fisheries
Cameroon	-	Centre for Marine and Oceanographic Research(Limbe)
Cape Verde	-	National Fisheries Development Institute (INDP)
Cote d'Ivoire	-	Department of Fisheries (Aby Lagoon Project)
Gambia	-	Department of Fisheries
Guinea	-	National Centre for Marine Science (Boussoura)
Mauritania	-	National Centre for Oceanographic and Fisheries Research
Nigeria	-	National Institute for Oceanography and Marine Research
Sao Tome	-	Department of Fisheries
Senegal	-	Department of Oceanography and Fisheries

iii) Selection of Fishers

The requirement of reliable information can be best fulfilled by obtaining information from a few well informed and willing fishermen. Therefore, purpose sampling that is based on the experience, willingness, and honesty of the fisherman will be used to select collaborating fishers.

iv) Principles for Data Collection

Field data collectors could be recruited from among the field staff who have a good working relationship with the fishers to maintain confidence and the goodwill to deliver accurate information. They would be trained by the Coordinators and their activities monitored to discourage the falsification of data that sometimes occur in catch assessment surveys. The collectors could obtain information from the fishers directly and by limited direct observations which will not cause distortions in the data.

The information given will be recorded on data sheets provided by IDAF (see Annex). A Canoe Data Sheet will be filled for each unit. The Daily Report Sheet will be filled for each fishing trip for three days per week per unit.

c) Landing Sites Selected

The following sites were selected for the study in the respective countries:

Benin	-	Cotonou Port
Cameroon	-	Limbe, Idenau, Mabetta
Cape Verde	-	San Pedro, Gamboa, Salamanza
Cote d'Ivoire	-	Lagune Aby
Gambia	-	Tanji, Bakau
Guinea	-	Boulbinet
Mauritania	-	Nouadhibou, Nouakchott
Nigeria	-	Badagry, Orimedu
Sao Tome	-	San Pedro, Neves
Senegal	-	Hann

d) Identifiers

Identifiers establish an identity for the unit that is being assessed, its source of capital, and the area of operation.

These include:

- the name of the canoe owner/ skipper;
- the name/registration number of the unit's canoe;
- the landing site;
- the canoe length, date of purchase, place and cost of construction;
- outboard engine type and horsepower, date and place of purchase, cost and source of funds;
- fishing gear type(s), date and place of purchase, cost and source of funds;
- number of crew on board (fishermen, assistants, apprentices);
- fishing area;
- weather condition on fishing day.

The collector should be as observant as possible and record the observations on the questions posed in the additional information section provided on the sheet.

e) Data to be Collected

The data obtained from each of the units selected for the network study (see Table 11) will be analysed separately. The following information will be compiled over the twelve-month period;

- total catch per fishing trip by species;
- price of caught species per kilo or acceptable measure;
- total value of catch per trip;
- number of trips per unit per month;
- total catch and value per month;
- income of fishermen per trip and per month;
- income of boat owner per trip and per month;
- principal costs per trip and per month (provide percentage contribution);
- average price of catch species per kilo or acceptable measure;

f) Data Analysis

The data will be analysed on the basis of the economic and social benefits the fishermen get in their operations, and the technical efficiency of the fishing units in relation to the fishing methods/gears used.

The details of the analysis will be discussed at the review meeting of February 1996. Final reports of the "Study Coordinators" will be presented at the August 1996 meeting.

g) Calendar for Future Meetings

The first review meeting will be held in February 1996, the second in August 1996, and the Workshop in November 1996.

Table 11:

FISHING UNITS TO BE STUDIED IN THE NETWORK ON COSTS AND EARNINGS IN ARTISANAL FISHERIES IN WEST AFRICA

	PURSE SEINE	LONG LINE Normal	I . C	GILL NET	ENCIR. GILL NET	DRIFT NET	BEACH SEINE	POTS (Octopus)	CRAYFISH NET
BENIN	7	6	-	-	-	15	-	-	-
CAMEROON	7	-	-	7	-	15	-	-	20
CAPE VERDE	6	40	-	-	-	-	-	-	-
COTE D'IVOIRE	-	-	-	80 ♦	-	-	10	-	-
GAMBIA	-	6	-	6	6	6	-	-	-
GUINEA	3	-	10	6	-	6	-	-	-
NIGERIA	5	-	-	10	4	20	-	-	-
MAURITANIA	12	-	-	7	-	-	-	30	-
SAO TOME	-	-	-	15 - 20 %	-	-	15 - 20 %	-	-
SENEGAL	6	4	9	9	-	-	-	-	-

I . C denotes a long line fishing method in which ice is carried along for several days fishing

Normal denotes fishing without ice and for a day's trip

Sao Tome still has to complete the census for the fishing units. So the Coordinator gave an indicative percentage to cover the study at San Pedro and Neaves.

♦ This number is divided into 30 units of Bonga Gill net and 50 units of Tilapia Gill net operators at the Lagune d'Aby.

COST AND EARNING REPORT

NAME OF CANOE OWNER

NAME OF CANOE/REGISTRATION NO.

LANDING SITE

CANOE DATA SHEET

Length of Canoe Date of Purchase

Constructed at Total Cost

Outboard Engine Type Horsepower

Date and Place of Purchase

Cost and Source of Funds

Type(s) of Fishing Gear Used

Date and Place of Purchase

Cost and Source of Funds

Number of Full-Time Crew on board Fishermen Assistants

What Share System is used to divide Sale of Catch

.....

DAILY REPORT

Date : Time Out :

Date : Time In :

Fishing Area (If available)

Weather Observation

Catch Landed At

EXPENSES :	Fuel (including oil)	.....Litres	Cost
	Food :	.....	Cost
		.....	Cost
		.....	Cost
	Ice :	.....Kg	Cost
	Bait :	.....Kg	Cost
	Spare Parts/Repairs	.....	Cost
	Twine/Rope :	.....	Cost
	Other :	.....	Cost
		Total Cost	.....

INCOME	:	Target	Species	Weight(Kg)	Value
	
	
	
	
		By - Catch	.....	.....	.....
			Total Value

Fish given out to friends, relatives, etc

Species	Weight(Kg)	Value
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.....
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Price Per Species :	Species	Price

Extra Earnings	Source	Amount

Additional Information

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**PARTICIPANTS AT WORKING GROUP MEETING OF NETWORK
ON COSTS AND EARNINGS IN ARTISANAL FISHERIES
IN WEST AFRICA**

Dakar, Senegal June 12 - 13, 1995

Chérif	Touleb	CNROP - Nouadhibou	MAURITANIA
Ismaël	Thiam	CNROP - Nouadhibou	MAURITANIA
Moustapha	Kebé	CRODT/ISRA - Dakar	SENEGAL
Matarr	Bah	Fisheries Department	THE GAMBIA
Nfamara	Dampha	Fisheries Department	THE GAMBIA
José Augusto	Lopes	INDP - Mindelo	CAPE VERDE
Mamadou O.	Diallo	CNSHB - Boussoura	GUINEA
Konan	Angaman	Projet Pêche Aby	COTE D'IVOIRE
Souradjou	Fousseyni	Direction de Pêche	BENIN
Thomas	Ajayi	NIOMR - Lagos	NIGERIA
Moses	Okpanefe	NIOMR - Lagos	NIGERIA
Oumarou	Njifonjou	CRHO - Limbé	CAMEROON
Ana Paula	Menezes	Department of Fisheries	SAO TOME & PRINCIPE
Ibrahima	Namadio	DOPM - Dakar	SENEGAL
Mahtarr	Ndiaye	DOPM - Dakar	SENEGAL
Abdourahman	Diop	DOPM - Dakar	SENEGAL
Mahtarr	Diouf	DOPM - Dakar	SENEGAL
Ben P.	Satia	Programme Coordinator	IDAF
Benoit	Horemans	Fishery Planning Adviser	IDAF
Alhaji	Jallow	Socio-economist	IDAF

ANNEXES

BENIN

(IDAF TECHNICAL REPORT N° 67 OF APRIL 1995

"A COST AND EARNINGS STUDY AT COTONOU HARBOUR, BENIN"

WAS USED AS REFERENCE BY
THE BENIN "STUDY COORDINATOR" AT THE DAKAR MEETING)

CENSUS OF THE DIFFERENT FISHING GEARS IN THE MARINE ARTISANAL FISHERIES SECTOR IN CAMEROON

THE DIFFERENT TYPES OF FISHING UNITS FOUND IN LIMBÉ REGION.

by

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Centre de Recherches Halieutiques et Océanographiques
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INTRODUCTION

Located at the bottom of the Guinea Gulf, Cameroon is situated between latitude 2° and 13° North and longitude 9° and 16° East. It covers an area of 475 000 sq. km and has about 12 million inhabitants. It has a coastline of about 360 km, extending from the Nigerian border in the North (Akwafe River) to Equato-Guinean border in the South (Campo River). The continental shelf covers an area of about 14 000 Sq' km and the EEZ is estimated at 15 400 km² (Seki and Bonzon, 1993). Important industrial and artisanal fishing activities are practised in both inland and coastal waters of the country. In 1990, the total production of the fishery sector was estimated at 121,000 tons: 53,000 tons for artisanal marine fishery, 57,000 tons for inland fishery and 11.000 tons for industrial fishery (Statistical Service MINEPIA). The artisanal fishing sector supplies more than 62% of the population's sea product food supply (Njock 1986). Besides this importance, the artisanal fishery is a source of employment for several thousand people including national fishermen and many foreigners (about 18.000). More than 6000 canoes are used in all five coastal divisions of the country combined. Each locality has several types of fishing techniques related to the type of gear used as well as to the target species.

In this document, a general idea on artisanal fishery in Cameroon is given through a brief description of the equipment used in Limbé region. Moreover, the different types of fishing units found in this locality are classified according to well defined criteria.

I FISHING ACTIVITY IN LIMBE

Limbé, a major town in Fako division, is situated 70 km west of Douala. It is one of the towns that play an important part in artisanal fishery activity in Cameroon. It has a great number of camps and fishing villages (about 40) wherein live Cameroonians, Beninese, Nigerians or Ghanaians. The larger camps that often specialise in certain types of fishing are Limbé - Dockyard, Mabeta, Eyengue, Kangué, Wovea and Idenau. The gears, boats and the size of the crew vary a great deal with the type of fishing practised in the camps.

1.1 The different boat types

There are three kinds:

The monoxyle canoe is carved out of a single tree trunk whose length varies generally from 3 to 6 m and is propelled by paddles and or a sail. The monoxyle canoe is used for several types of fishing.

The average size canoe or " Nigerian type" is either entirely made up of planks or carved out of a tree trunk like the monoxyle canoe and strengthened with planks to raise the sides. Its average dimensions vary a great deal, ranging from 8 to 13 m long and 1,5 to 2 m wide. This type of canoe that is propelled by an outboard engine of 8 to 25 HP is also used in several types of fishing.

The large canoe or "Ghanaian type"; this canoe comes from west Africa (Ghana) and is a very large monoxyle canoe whose sides are strengthened with planks. It is 13 to 15 m long. The Nigerian type of this canoe is entirely made of planks and is oversized (15 to 20 m long and 2.80 to 3 m wide). The interior is divided into compartments with a deck on which the seine net is placed. These canoes are equipped with 40 HP outboard engines installed on one side of the canoe.

On the whole, the rate of motorisation of the fleet in limbé region is close to 48 % (Frame survey 1995, in press).

1.2 Fishing gears

In general, the fishing gears that are used define the different types of fishing practised in the region. Their characteristics vary from one camp to the other, within the same camp and from one community to the other (table I). Therefore, according to the gears used, several types of fishing can be identified in Limbé.

- Purse seine (AWASHA)
- Beach seine (B.S.)
- Encircling gillnet (EG) or Bonga net
- Surface gillnet (S.G). or strong net
- Bottom gillnet (BG)
- Driftnet with larger meshes (D.L.M)
- Cast net (C.N)
- Shrimp (Ngoto) net (S.N).
- Hook and line.

Table I: Characteristic of marine artisanal fishing gears in Limbé(Njock, 1986 Njifonjou, 1986).

Type of Net	Length (m)	Depth (m)	Mesh (mm)
PurseSeine(Awasha)	500 - 800	50 - 80	20 - 36
Encircling Gill Net	200 - 700	7 - 12	33 - 40
Surface Gill Net	300 - 900	10	26 - 33
Bottom Gill Net	350 - 650	1,20	33 - 40
Drift Gill Net	700 - 2000	1,50	40 - 60
Shrimp Net (Ngoto)	7 - 9	-	-

II. THE FISHING UNITS IN LIMBE REGION

2.1 Definition

Since the notion of fishing unit has been polemic, it is advisable to define the expression as it is used, so as to satisfy the need for logical continuation of the present report. A fishing unit can be defined as a set of means that a decision making center has at its disposal for the execution of fishing activities. In the framework of a given survey, fishing unit can be reduced to its simple expression: a unit of production as it exists on fishing sites - i.e a canoe(motorized or not), a fishing gear, and a crew managed by an owner-fisherman or a captain. Another definition of fishing unit would take into account unembarked items, labour on shore, gears, and other unused canoes (Charles Dominique, 1993).

2.2 Classification of fishing units in Limbé

Taking into account the different types of fisheries and on the basis of the aforementioned definition, several types of fishing units can be identified in Limbé:

2.2.1 The Bottom gillnet (B.G) fishing units

The B.G is a bottom set gillnet targeting demersal species and mostly of the Sciaenidae, Polynemidae, and Ariidae families (pseudolithus spp, Arius spp, Galeoides decadactylus, Pentanemus quinquarius, etc). During fishing season, BG fishing units make two trips per day: one at night, during which the collected net is set again and one in the day time, during which fishermen go back to sea to collect their nets set overnight.

Two types of BG fishing units can be identified:

The non motorized unit: this uses a monoxyle canoe propelled with paddles and or a sail, and its crew is composed of 2 or 3 fishermen.

The motorized unit: this is generally a dugout canoe, with an 8-15 HP outboard engine; a net that is by far longer than the previous one with a crew of 2 to 3 fishermen.

2.2.2 Encircling gillnet fishing units

The fishing gear used by these units is the surface encircling gillnet that targets alosas in general and ethmalosa in particular (*Ethmalosa fimbriata*). Generally, it operates in zones of small depth where the top float-rope can remain at the surface while the bottom lead rope touches the bottom during the operation. This facilitates the encircling of a located fish shoal. In general, the EG fishing unit uses a small boat propelled by an 8HP engine and has an average crew size of 3 men.

2.2.3 Purse seine fishing units (Awasha)

This type of fishing entails the use of a very large canoe propelled in general by a 40 HP outboard engine. The fishing gear that is labeled Awasha, (Ghanaian word) is a purse seine. Stretched around a located large shoal of fishes, this gear catches the latter by encircling and closing the bottom of the gear and by acting as a purse.

Due to the very large capacity of this gear, some of them can encircle and catch a shoal of 17 tons (the Awasha unit requires a crew of 17 to 22 fishermen for an effective operation). The purse seine mainly lands ethmalosa (*Ethmalosa fimbriata*) and in minor quantity sardinella (*Sardinella maderensis*), and pseudolithus (*Pseudolithus elongatus*).

2.2.4 Drift gillnet Fishing Units

These fishing units catch pelagic species. According to the size of the meshes, the gear can catch either ethmalosa (Young and adult) or sardinella, or sometimes razor fish "Ilisha africana" in minor quantity. The gear drifts and is operated very close to the surface with one end held to the canoe. Two types of drift net fishing units are identified:

- The motorized units found in Idenau and in Dockyard use a small boat equipped with an 8HP engine and are operated by a crew of 1 or 2 men.
- The non-motorized fishing unit: it uses monoxyle canoes propelled by paddles and /or a sail and operated by a crew of 1 or 2 men; generally with a net of a reduced size.

2.2.5 Ngoto fishing units

The Ngoto net is a trap for shrimps (*Palaemon hastatus*) and is used in the camps of Mabeta and Mboko. I and II. The Ngoto measures 7 to 9 m and has an aperture of 1.5 to 2 m. Here, the fishing unit is a motorized or non motorized canoe, with a crew of 5 men including the owner and four canoe-boys. In this fishing unit each crew member possesses 4 ngoto and the owner possesses 15, this means that for a given fishing unit the total number of Ngoto is 31.

2.2.6 The beach seine fishing units

Beach seine fishing is practised at the beach-level and entails the use of a motorized canoe. A large rope tied to the extremity of one of the seine sides is left on the beach and the net is

stretched along an arc of circle. A swimmer-fisherman carries the second extremity of the seine to another place of the beach. The operation requires two teams: one on each extremity of the net, trying to bring the net back to the beach by pulling it. On bringing the net they close its aperture little by little. The fishes that are obliged to flee to the bottom of the net are then caught.

A beach seine fishing unit requires the service of about twenty fishermen and many other unpaid workers. Various species are caught with the predominance of the caranx and chloroscombrus.

2.2.7 Other fishing units

Fishing gears like cast net, and hooks and lines are used in association with another gear that constitutes the principal element. However, during certain seasons, cast net or hook fishing units are found particularly in Mabeta and Tiko creeks. Here, the fishing unit is composed of a monoxyle canoe propelled by paddles and is operated by a crew of 1 or 2 men. All species are caught, with the predominance of demersals, in the catches of hooks.

CONCLUSION

The above described fishing units are the major ones encountered in Limbé. Some of these units are permanent but most of them are seasonal. The latter use the same crew and the same material but vary the fishing gears according to the season. The present classification is a preliminary work for any serious study based on the follow-up of the exploitation of the artisanal fishery sector.

Bibliographical references.

CHARLES-DOMINIQUE E, 1993. L'exploitation de la lagune Aby COTE - D'IVOIRE par la peche artisanale. Dynamique des ressources, de l'exploitation et des pecheries. THESE DE DOCTORAT, UNIVERSITE DE MONTPELLIER II, 407 p.

NJIFONJOU O, 1986. Contribution à l'étude de la peche artisanale dans la région de Limbé. MEMOIRE D.A.A. ENSA-YAOUNDE, 68p.

NJOCK J.C 1986. La peche artisanale au Cameroun, son importance socio-économique. In: CONF. inter. Sur la peche, RIMOUSKI, CANADA, pp. 745-753, INV. fdm 183.

SEKI E, BONZON A, 1993. Selected aspects of African fisheries: a continental overview.

FAO Fisheries Circular. N° 810, Rev. I. Rome, FAO 1993. 158p.

CAPE VERDE IN BRIEF

Artisanal Fisheries

by

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Cape Verde

A. General Information

The archipelago of Cape Verde is made up of ten islands, 9 of which are inhabited. They are from volcanic origin and are situated between the 14° 50' N and 17° 20' N parallels and the 20° 40' and 25° 30' meridians at about 500 km from the West Africa coast.

The total area of the islands is 4,033 sq. km and its length is about 2,000 km. The insular tableland is very narrow as it doesn't overstep a 5,400 sq. km area at 200 m isobath line. On the other hand, the Exclusive Economic Zone (EEZ) introduced after 1977 is very large with an estimated area of 734,265 sq km.

Cape Verde, a sahelian zone country, has been victim of drought for the last decades and that has lessened the agricultural potentialities which were already too low for the country's population. In addition fishing has been one of the rare alternative activities wherein development has been stirred out of the country's natural resources.

The country's population amounts to 360,000 inhabitants, 44% of which is under 14. It is estimated that unemployment affects 40 to 50% of the active population. An important proportion of the active population traditionally emigrates to Europe and North America. Fisheries sector employs about 6% of the active population.

Praia, the capital city, is located in the Santiago Island, the most populated Island of the country with 50% of the whole population. S. Vincente Island, which concentrates almost all its population in Mindelo, one of its towns, is the second Island of the country owing to the number of its inhabitants and its economic importance. Thanks to the favourable natural conditions of its Port, Mindelo plays an important economic role and has, for a long time, served as the main base line for sea transport activities, industrial fishing and for the first processing industries set up in the country.

The economic structure of Cape Verde is dominated by a tertiary sector representing 60% of its GNP. The primary and secondary sectors have a very low productivity and can only meet 40% of the country's food requirements. In addition, the balance of trade of these sectors is a highly unbalanced one. However, the country's balance of payments has been finally balanced these last years owing to international assistance and to the country's government policy towards the community of emigrated Cap Verdians. Indeed, private money transfer of the emigrants is about 48% of the total transfer of the country. The stability of the parity of Cape Verdian currency, the lower inflation rate and the favourable conditions made for term deposits have rendered those transfers easier.

In spite of its less favourable natural conditions, Cape Verde has succeeded in starting an economic growth and a social progress which have permitted it to pull itself up at the end of the 80's among countries with intermediate income (890 \$ US in 1990; Source: Government of Cape Verde).

FISHERIES IN CAPE VERDE

General Aspects

The archipelago of Cape Verde is under the influence of strong north-east winds between December and April, and its waters are part of the cold stream system of Canary Islands, with a very low productivity in primary sector and marine species typical to a tropical system. Fishing activities are then highly influenced by natural conditions. The Fisheries sector represents 3.6% of the G N P (1988 data) and 40% of the country's export earnings.

It is estimated that after the implementation of the 2nd National Development Plan 1986-1990 about 6% of the active population should be involved in activities directly connected with fishing. However, in the islands that are the most deprived of resources, nearly 20% of the active population work in the fisheries sector. The infrastructures of support for industrial fisheries are also very concentrated in the islands of S. Vicente, Sal and Santiago (Praia). Given these circumstances it can be estimated that 5400 persons are directly dependent on fishing for their livelihood. Among them, 79% practise artisanal fisheries, 13% industrial fisheries and 8% are the sector's clerical workers. Besides, it is estimated that about 1500 women regularly carry out sales activities. In practice most of the fishermen are located in the Santiago and S. Vicente Islands (55% of the artisanal fishermen and 63% of the industrial fishermen).

Fresh fish is the main source of animal protein that exists in the country's food supply. It is estimated that the average consumption per caput per year is around 15 - 18 kg (1989 data, Source: Government of Cape Verde). However, that average of consumption varies sensibly from one island to the other. Apart from Sal, where the estimated level of consumption of about 40 kg is probably related to the existence of important tourist and commercial activities, the average level of consumption per caput per year varies from one Island to the other 12 to 16 kg in Santiago, Fago, S. Vicente and Boa Vista; 18 to 20 kg in Sto Antao and Brava and finally 30 kg in S. Nicolau and Maio.

It is estimated that the national fish production doesn't exceed 8 to 10,000 tons per year. To this we can add about 3,500 tons per year produced by foreign fleets. In 1991, the national output has fallen to 6500 tons essentially because of the instability of export markets and tuna preserves. On the other hand, in 1992, the output has come up again to 8,800 tons. Nevertheless, these tonnages are still far from the 40,000 to 50,000 tons representing the total annual potential estimated for the Exclusive Economic Zone of Cape Verde (Source: A. Forest, May 1994).

Artisanal Fisheries

Artisanal fisheries traditionally represents a minimum of 65% of the national catches. According to the 1992 national artisanal fisheries census, the overall group of artisanal fishermen own 4,143 small artisanal boats and nearly all these boats are open-decked ones, and 50% of

them are motorized. Most of these boats use handline fishing. However, purse seines, beach seines and gillnets are also used. Finally, an important group of divers from artisanal fishing communities hunt the spiny lobster. Artisanal fishermen are in general among the poorest social groups. Indeed, truly unfavourable natural conditions make it difficult to practise fisheries and agricultural activities simultaneously, which would have permitted artisanal fisherfolk communities to lessen their hardship during the scarcity period and to live in better conditions during the period of strong winds from December to April. Sometimes, fishing is but an episodic activity, which is practised only when one cannot do better paid activities like harbour services, agriculture during favourable years or public works.

Tuna Fisheries

Tuna fishing is the most important fishery in Cape Verde. The main tuna species presented are yellowfin (*Thunnus albacores*, locally known as rabil), skipjack (*Katsuwonus pelanis*, locally known as garado), fat tuna (*Thunnus obesus*, locally known as patudo), and king mackerel (*Acanthocybium*, locally known as serra and ilheu). They are species with very wide geographical distribution and most of the time they are the target of the activities carried out by many foreign fleets on the shelf of the Atlantic Ocean. If one considers the 80's and the early 90's data, the whole average annual tuna production has not exceeded 9,000 tons per year: 2,200 tons of which are from the national industrial fisheries (pole and line and live-bait), 2,300 tons from artisanal line fisheries and 3,500 t. from foreign fleets (Dakarais pole and line operators, European seiners and Asian longliners). The industrial tuna fishing season starts in April and ends in November. After 1990, the catches of industrial fleets reduced because of the closing of the Algerian market. Apart from the yellowfin, it seems that catches of the other species could be intensified. Though an estimation is difficult, we consider that the potential of the whole tuna species in the Cape Verdian Exclusive Economic Zone would be from 25 to 30,000 t per year. Nevertheless, the lack of live-bait in the periods of great abundance of tuna seems to call in question again the productivity of the national industrial armament and the possibility to increase the output with traditionally used methods.

Small Pelagic Fisheries

Due to their contribution to the food supply of Cape Verde small pelagics are among the major resources of the country. The main species of the present small pelagics of Cape Verde are black mackerel (*Decapterus macarellus*, locally known as cavala preta), white mackerel (*Decapterus punctatus*, locally known as cavala branca), horse mackerel (*Selar crumenoptalmus* and *caranx ronchus*, locally known as chicharroa), and the big alache (*Sardinella maderensis*, locally known as arenque). The black mackerel is the most dominant species in the catches. There are also strong inter-annual and seasonal variations of the abundance of the different species. These variations seem to be connected with climatic variations. Until 1991, the catches were estimated at 2,000 tons per year; of this volume only an average of 200 tons was from industrial fisheries. After tuna fishing crisis and the emergence of bait demand destined to foreign longliner fleet operating in the region, we witnessed a partial reconversion of the industrial fleet to long line fishing (960 tons in 1992). The potential of catch would be 10 to 12,000 tons per year.

Demersal Fisheries

Demersal resources include about twenty species associated with rock bottom. The most important groups of the structure of the catches are serranideans, *Cephalopholis taeniops*, locally

known as garoupa, muranids, sea breams (*Spicara melanurus*, locally known as dobrada), pomadasides, etc... There is a great variation in the structure of the catches of two different species. Some of these species have a very interesting bargain value. Demersal fishes have almost been exclusively exploited by artisanal fishermen, who catch about 700 tons per year. However; in 1992 the total catches have increased to attain 2,275 tons with a high increase of industrial fleets catches (960 tons). The potential is estimated at 8,000 tons per year with 4,400 tons of the species likely to be exported.

According to some studies, 4,000 tons per year could be caught by trolling gears (trawl, Danish seine) in the platform of Boa Vista Maio. A part of these catches includes species that are different from the ones caught by the artisanal fleet.

Means of production

According to the most recent census in 1994, the situation of the artisanal fisheries is as follows

Islands	Crafts	Fishermen	Surrounding net	Beach net	Gillnet
Maio	59	116	2	3	1
Santiago	676	2823	20	25	61
Fogo	184	443	0	0	0
Brava	62	122	0	0	2
S. Antao	128	538	8	15	2
S. Vicente	135	752	16	7	8
S. Nicolau	81	211	2	4	1
Sal	80	0	0	0	0
Boavista	34	73	0	0	0
TOTAL	1439	5078	48	54	75

Crafts are normally 6.5 m long and the crew size is of three or four fishermen, except for the crafts that use purse seines and whose crew size is - due to the bigger size of these crafts - more than 10 fishermen.

Nearly 75% of the crafts are motorized with engines of 5, 8, 15, 25 and 40 HP and an important part of these crafts practise handline fishing.

Purse seines have a normal length of 200 m and a width of 20 m. Crafts that use this type of seine mainly practise coastal small pelagics fishing as well as small tuna fishing.

FISHING UNITS IN ABY LAGOON (CÔTE D'IVOIRE)

by

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1. ABY LAGOON

ABY Lagoon is the second in Côte d'Ivoire after the Ebrié lagoon (566 km²). With its 425 Km², it is a lagoon complex consisting of the Aby lagoon (*sensu stricto*) with 305 km², Tendo with 74 km² and Ehy, 46 km².

- **ABY LAGOON:** its average depth is 4,5 metre but it can go as deep as 20 metres in some points. Its salinity varies between 0.2 and 1.2%. Its average temperature is 29 °c. It is influenced by the south sea water that flows down into it and mixes with the freshwater coming from Bia (in the northern part of the country).

- **TENDO LAGOON:** It corresponds to the median part and appears as the most stretched one. It is 22 km long and between 1.5 and 3.5 km wide. Its average depth is 2.6 metres. Its southern part shares a border with Ghana.

- **EHY LAGOON:** It is located in the far east and has a basinlike shape. Its average depth is 1.5 metre.

2. FISHING GEARS

Two groups of fishing gears can be seen on the lagoon (Table 1) group gears (beach seine or "Aly" net, and syndicate seines) as well as individual gears which are very diversified (gillnets adapted to specific target species, pots, bamboos, lines etc).

- Aby Lagoon (*sensu stricto*) is dominated by beach seines and represents 66% of the sum total. Due to their specific target (*ethmalosa*), syndicate seines are found exclusively in this area. 88% of the gillnets are in use there. Crab trap is used only in this zone.

- Tendo-Ehy Lagoon: The remaining 32% of the beach seines are in operation here. The most numerous gears are the gillnets for *Tilapia*, the pots and bamboos used for catching catfish.

- The Deltaic zone is dominated by shrimp nets, although in Aby Lagoon (*sensu stricto*) seasonal fishing of shrimps permits the maintenance of an important potential.

In a word, Aby Lagoon (*sensu stricto*) is the most dynamic of the three zones.

Table 1: Different kinds of gears and their distribution over each fishing zone (1992)

TYPE OF GEARS	ABY	TENDO	ASSINIE	SUM TOTAL
Beach seines.....	31	15	1	47
Syndicate seines.....	23	0	0	23
Gillnet for Ethmalosa.....	2507	6	48	2561
Gillnet for Tilapia.....	1165	426	26	1617
Gillnet for Trachinotus.....	690	0	0	690
Gillnet for Spyreana (pike).....	51	0	14	65
Cast net.....	107	27	6	140
Baited longlines.....	69	14	2	85
Malian lines without bait.....	117	26	0	143
Pots for Tilapia.....	52	670	0	722
Shrimp nets.....	219	0	149	359
Scale for crabs.....	1103	0	0	1103
Bamboos.....	20	8199	0	8219

The distribution of the counted 3000 fishermen per zone and per type of gears is as follows:

Table 2: Fishermen distribution per gear and per zone

	GROUP GEARS	PERCENTAGE	INDIVIDUAL GEARS	PERCENTAGE	TOTAL
Aby	714	28.3	1809	71.7	2523
Tendo Aby	270	56.6	207	43.7	477
Total	984	32.8	2016	67.2	3000

Note: Individual fishermen who generally own their working gear represent 67% of the whole group of fishermen with 33% for group gears where most of the fishermen are like agricultural labourers.

Table 3: Distribution of catches per gear and per species (1993).

GEARS	SPECIES						Total	% Gears
	Ethmalosa	Elops	Cichlidae	Catfish	Geres	Others		
Beach seines	896	76	1060	905	33	285	3255	48
Syndicate seines	882						882	13
Gillnet for Tilapia	8	57	975	33		34	1107	17
Gillnet for Ethmalosa	1274	45	15	1	3	118	1456	22
Total	3060	178	2050	939	36	437	6700	100
% of species	46	2	31	14	1	6	100	

The beach seines account for 48% of the landings with 39% for the gillnets (all types) The syndicate seines target Ethmalosa species, which represents 100% of its catches.

2.1. Group gears

2.1.1. Beach seine

This constitutes the biggest gear used on the lagoon. Its length is about 1,200 metres; its operating depth ranges from 8 to 12 meters. The top rope is equipped with 9 floats per metre, whereas the foot rope is ballasted with small lead balls weighing each 80 g and placed at every metre distance between the balls. Each side of the mesh is 14 mm long. Fishing is done at a depth of 2 to 4 metre with a crew of 14 to 18 fishermen. This method requires two canoes. The canoes should be non-motorised ones. The net is placed in the main canoe. During the launching, the big canoe unfastens the net and surrounds the shoal, while the small canoe anchors the other end of the net. Once the handling is over, the seine is hauled into the big canoe. The fishing takes an average time of 6 hours and is generally done early in the morning.

2.1.2. Syndicate seine

It is a surrounding seine without a purse. Its length varies between 200 and 300 m. Its handling requires two canoes which work like bulls dragging a cart. Two nettings of the same dimension joined together by one of their edges, are dragged in the same direction by two boats. Once the handling is over, each team joins its net in a circle so as to take the catches.

2.2. Individual gears

They are of various types and the most common ones are briefly described.

2.2.1. Gillnets

They are widely used on the lagoon. They are stationary nets whose length varies between 25 and 75 metres; their operating depth is 2 m. The meshes have a bar size of 20 to 35 mm. Each team of two fishermen uses several nettings at a time. The average number of nettings per trip is 11. They are set in the evening and collected the following morning.

2.2.2. Malian lines

These gears are without bait. The lines can be several tens of metres on which snoods are put at regular intervals. This constitutes a real barrier of hooks that can take any species of fish. These gears are not selective.

2.2.3 Longlines with bait

Snoods are placed 4 metres apart. Various baits are used (shrimps, fish) to hook pikes, trachinotus and tilapia.

2.2.4 Bamboos

This is a fishing gear widely used in Ivoirian lagoons. Bamboos are cut in pieces of 80 to 90 cm with one end closed. They are placed at the bottom of the lagoon with an element of identification at the surface (a float or an empty gallon). In their search for a shelter the sea catfish (which are the target species) hide there. They are regularly collected by the fisherman.

CONCLUSION

The most representative gears in the Aby Lagoon are the beach seine, the syndicate seine (which is used seasonally) and the gillnets. Despite the higher number of the other gears, they account for a very limited proportion of the landings. Due to the important labour force that these gears require, they offer many job possibilities in rural areas. As a consequence, their economic and financial impacts are worth being evaluated.

WORKING GROUP ON COSTS AND EARNINGS IN
ARTISANAL FISHERIES

REPORT ON THE DIFFERENT FISHING UNITS IN
BAKAU AND TANJI

by

Matarr Bah and Nfamara Dampha

1. CENSUS REPORT ON THE DIFFERENT FISHING UNITS IN THE
ENVISAGED LOCALITY

INTRODUCTION

In The Gambia, marine and inland fisheries pose a challenge for development, management and control. In order to effectively manage and control the aquatic resources of The Gambia (acclaimed as one of the richest fishing Zones in the West Coast of Africa) a system for collection, analysis and interpretation of socio-economic statistical data and biostatistical data should be in place. Reliable statistics can only be collected when qualified personnel and the requisite institutional framework exist at the national level. This also requires the establishment of a permanent system which may be modified over time to adapt to the changing circumstances and objectives.

1.1 Review of statistical systems

The fisheries sector is seen as a major potential source of employment, domestic food supply and export earnings. The sector is divided into industrial sub-sector being characterised by large scale in Greater Banjul. The artisanal sub-sector is characterised by low levels of investment and operates from many dispersed, and often isolated landing sites.

1.2 Census report on the different fishing units in the envisaged locality

As a necessary step in the preparation of the proposed Costs and Earnings studies on Artisanal Fisheries in The Gambia a census was carried out on the different fishing units in the envisaged locality (i.e. Bakau and Tanji) from the 25th to 30th May 1995. This report presents the results from this census.

2. FISHERIES IN THE ENVISAGED LOCALITY

Fishing methods

The fisheries in Bakau and Tanji are mainly marine. The fishermen are engaged in encircling gill netting (surround gill netting), set gill netting, hook & line, hand line and drift netting. The fishermen go out mostly in the morning to fish for bonga (a pelagic fish) with the surround gill nets and to collect the set gill nets set overnight. The drift net fishermen go out at night and return very early in the morning. The hook & line fishermen go out in the afternoon, while the hand line fishermen are more active during calm sea.

The surround gill nets are used in all the villages surveyed. The largest group is to be found at Tanji (48) while Bakau has only 10 canoes operating surround gill nets. Tanji has the highest number of set gill net canoes (9), with Bakau following thereafter with 2 operators. Drift net fishing is done mainly by Bakau fishermen. Hook and line fishing is concentrated at the Tanji landing site, but a few fishermen at Bakau also operate it. Hand line fishing is mainly practised at Bakau.

2.1 Number of canoes - types

In The Gambia artisanal fishermen use four types of fishing canoes: dugout canoes, dugout canoes supported with planks (planked dugouts), planked canoes, and fibre glass boats. Dugout canoes are carved out a single tree trunk, whereas planked dugouts are strengthened with planks to raise the side levels. The planked canoes are made of planked wood with a V-shaped bottom.

During the survey 48 planked dugout canoes, 35 planked canoes, 11 dugout canoes and 17 fibre glass canoes were recorded in area (see table 1 below for more details). Bakau had 24 motorized and 20 unmotorized canoes. Tanji had 66 motorized and no unmotorized.

The encircling (surround) gill net canoes use at least a 25HP outboard engine, some also use the faster 40HP outboard engines. The most common brand of engines is YAMAHA. Recently a 27HP YANMAR diesel outboard engine was introduced through the Fisheries Department's fishermen training programme at Tanji. This engine is more fuel efficient than the commonly used YAMAHA engine according to training trials. The set gill net canoes operate mostly with an 8HP YAMAHA outboard engine, even though there are a few 15HP SUZUKI outboard engines in the fishery. Table 2 summarizes the information gathered for each type of outboard engines.

Table 1: Characteristics of boat types

	Dugout Canoes	Planked dugout Canoe	Planked Canoes	Fibre glass
Bakau	5	18	9	13
Tanji	6	30	26	4
Average age (years)	4	3	1	5
Estimated Lifespan (yrs)	5.2	5.3	7.3	15
Replacement value (Dalasi)	2,184	2,136	7,900	11,000
Maintenance Costs (Dalasi)	581	311	1,230	500

Table 2: Characteristics of outboard engines - (Types of outboard engines)

Sites	40HP	27HP	25HP	15HP	8HP
Bakau	4	11	3	4	2
Tandji	25	5	26	4	6

2.2 Gear used and species caught

According to the data compiled during the census, there are 58 surround gill nets, 11 set gill nets, 21 drift nets, 11 hook and line and 27 hand line at Bakau and Tanji landing sites. The surround gill nets are used mainly for bonga fishing, but they also get by-catches of mackerel, shine nose, bobo croakers (joto). The drift nets catch a lot of barracuda and crevalle jacks (sacca). The Hand line and hook & line gears are used for the demersal species. Most of the demersal species are caught with bottom gill net gear, but on a selective basis that depends on mesh sizes and gear depth (see table 3).

Table 3: Characteristics of nets and Targeted species

Type of Nets	Targeted Species
Set Gill-Net	Long neck croaker/tonone, barracuda, bobo, croaker/jortoh, catfish, fotta, cassava fish, sompat, sole fish
Surround Gill-Net	bonga, sardinella By-catches Shinenose, bobo croakers (jortoh), mackerel
Hook and Line	grouper/choff, grouper/doy, sompat, catfish
Hand Line	jortoh, sompat, fotta
Drift Net	barracuda, jacks (sacca), crevalle, sompat, fotta, jortoh, catfish

3. INFORMATION AND EXPERIENCES AVAILABLE IN THE GAMBIA ON COSTS AND EARNINGS OR RELATED STUDIES IN ARTISANAL FISHERIES

A study on the Management aspects of estuarine shrimp fishery was conducted in April/May 1993 sponsored by project INT/91/007 Integrated Coastal Fisheries Management to gain an insight in aspects of the estuarine shrimp fishery and is part of its activities to formulate an integrated management plan for the Gambian coastal fisheries. The objective of the study was to contribute to the acquisition of information needed for the elaboration of a management plan for the shrimp fishery. Besides indicative baseline information on the performance of the fishery, the study paid attention to other issues of special interest to management of the fishery, such as social characteristics of the fishers, their attitude towards and perception of the industry, and common management practices.

This follows a study on the biological aspects of the estuarine shrimp fisheries, which was being conducted by the Fisheries Department. That two-year study was funded under the EU/Gambia fishing agreement. It involves collection of length frequency data and other relevant biological and ecological information. However, for a full analysis of this fishery, it was felt desirable to also obtain information on technical, economic and social characteristics of the estuarine shrimp fishery.

In order to gain knowledge of the social characteristics of the shrimpers, respondents were questioned about their sex, age, marital status, household size and dependents, ethnic affiliation, education and migration.

Furthermore, a socio-economic survey of the EEC Artisanal Development Project along the Atlantic Coast in The Gambia was carried out. This study was funded by the IDAF project in December 1991 and conducted by E. Callerholm, IDAF and S.F. Officer A.M. Jallow of the Fisheries Department of The Gambia. In view of general lack of data, it was decided to modify the objectives of the study. Instead of estimating the impact of the project in quantitative terms, through the comparison of certain key-variables before and after implementation of the project, the results from this study constituted the base line against which future developments can be evaluated.

This study also involves the socio-economic characteristics of the fishermen and other operators operating within the EEC Artisanal Development Project. Respondents were questioned about their sex, age, marital status, household size and dependents, ethnic affiliation, education, migration, secondary occupations and property owned. For a full analysis of the EEC Artisanal Development project, it was also felt desirable to obtain information on technical, economic and social characteristics of all operators operating within the project sites.

PRESENTATION OF BOULBINET LANDING SITE (GUINEA)

by

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INTRODUCTION

This paper intends to give the reader an overview of the Boulbinet landing site which is selected as the site in Guinea for the study on Costs and earnings of artisanal fishing units that IDAF plans to carry out.

So the paper aims to locate the landing site in relation to the peninsula of Kaloum, then point out its physical characteristics and finally describe the canoes, the fishing gears used and the targeted species. Depending on the fishing gears used and the targeted species, each of the different fishing units described belongs to one of the five types of fishing as identified by P. CHAVANCE (a fishery biologist of the ORSTOM) on the Guinea Coastline.

It is essential to mention that all statistics given here are extracted from the 1992 Census carried out on the whole coastline by the CNSHB biologist. Statistics of the first trimester of 1995 on the Boulbinet landing site are available, but they are incomplete and less reliable. That is why we are reluctant to refer to them.

Finally, for references, an index of surveys related to costs and earnings of the fishing units in Guinea is available in the column entitled "experience in the field of research".

I. GEOGRAPHICAL SETTING OF THE BOULBINET LANDING SITE

The Boulbinet landing site is located at the uttermost and of the west side of the peninsula of Conakry in the Commune of Kaloum. It is used for fishing activities and transportation (of fish, wood, foodstuff and people).

Located on the coastline, this landing site is linked to the ground and has a rocky and silty shore. Its boarding area of about 250 m² is easy for access to canoes for their landing and the harbour itself is easy for access to transport vehicles.

II. DESCRIPTION OF THE TECHNICAL RESOURCES

A. CANOES

With 148 canoes after the 1992 Census carried out by the CNSHB, Boulbinet is the most important landing site on the Guinea coastline (this figure represents 15 % of the canoes in the Conakry region).

This site has five types of boats to which local names are given (Kourou, Gbankenyi, Yoli, Salan, Flimbote). The dimensions (length, width, and depth) which generally determine the propulsion mode of the canoes vary according to the type.

The "Kourou" and "Gbankenyi" are monoxyle canoes built from kapok tree trunk. The average length of the kourou is 5 metres and that of the Gbankenyi varies between 5 and 8 meters. The Boulbinet landing site has got five monoxyle canoes which are not motorized (3 kourou and 2 Gbankenyi). They are propelled by a sail, or sometimes by an oar. They take on board 1 or 2 crews (including the owner) and are used for subsistence fishing.

On account of the rapid depletion of the kapok tree out of which the monoxyles are carved and ease of their construction, these boats have a short lifespan estimated at 2 years for the kourou and 3 years for the Gbankenyi.

The "Yoli" are 18 in number, and they are small boats from Senegal, built on a monoxyle base strengthened with planks and a keel to raise the sides. The length varies a lot but never goes beyond 8 metres. These canoes are all propelled by a sail and a paddle as well.

The yoli takes on board 1 or 2 crew. Thirty-three percent of the yoli in Boulbinet are equipped with ice-boxes. The yoli have the longest lifespan among the canoes which exist on the site (about 10 years).

The salan: They are 106 in number and correspond to 71,6 % of the Boulbinet canoes. These canoes have planks and the length varies between 6 and 12 metres. 83 % of them are motorized and 65 units among them are equipped with ice-boxes. The number of crew depends on the dimensions and the propulsion mode. When it is motorized, the salan takes on board a crew of 8 and 2, when it is not motorized. The salan has a relatively short lifespan (about 4 years).

The flimbotes: They are 19 in number, which corresponds to 12,8 % of the canoes. The flimbote is a planked canoe with a length of between 7,5 and 25 metres. He takes on board 8 to 20 crews depending on its dimensions. The motorization rate of the flimbotes in Boulbinet is 100% and they are propelled by an engine whose power is between 15 to 40 HP engines.

The flimbotes have a lifespan of more than 5 years, which is over that of the salan, and the gbankenyi.

Table 1: The 1992 Census of Boulbinet canoes with details on motorized and ice-boxed canoes.

Type of canoe	Number	Motorized	Ice-boxed
Kourou	3	0	0
Gbankenyi	2	0	0
Salan	106	88	65
Flimbote	19	19	0
Yoli	18	0	6
Total	148	107	71

Source: P. Chavance et al. "La pêche Artisanale Maritime Guineenne en 1992"

B. FISHING GEARS AND TARGETED SPECIES

At the 1992 canoe census one could count up to 148 fishing gears in use at Boulbinet. This does not mean that each canoe uses only one fishing gear, but these are used as "main gears" for the fishing boat. They include drift gillnet, surrounding gillnet, set gillnet, the purse seine, the hook & line and the longline.

Table 2: Statistics on the fishing gears used at Boulbinet in 1992

Type of Gear	Number (main gear)
Drift gillnet for ethmalosa	45
Surrounding gillnet for ethmalosa	2
Surrounding gillnet for "otolithe"	1
Purse seine	13
Set gillnet with big meshes	3
Set gillnet with very big meshes	17
Hook & Line	43
Longline	14
Total number of gears	148

Source: P. Chavance et al. "La Pêche artisanale Guinéenne en 1992"

The mounting of the nets in relation to the mesh determines the species targeted by the fisherman. This brings about a problem of agreement between the name of the nets in French and their local names, which refer to the species targeted more by the net mounting than by the net itself.

Therefore, the main species that make up the landings at Boulbinet are: the "ethmalosa" (bonga), sardinella (bonga seri), "otolithes" (Boboe, Sosoe, Fouta) croakers (Sanis, Gbalakassa, Soori), catfish (konkoe) and soles (Fagba).

C. TYPE OF FISHING UNITS

Considering the types of boats, the gears used and the fishing zone frequented, Pierre Chavance has identified 5 types of fishing on the Guinea coastline which are found at Boulbinet. These are:

1. COASTLINE DEMERSAL FISHING

This fishing is practised at Boulbinet by canoes most of which are monoxyles and some small salan propelled by a sail. The crew is composed of one or two using the longline, the set gillnet with small or big meshes, the drift gillnet for ethmalosa or the hook and line.

The species targeted by this fishing are demersal species belonging to the group of the sciaenide (croakers)

2. PELAGIC FISHING BY DRIFT GILLNETS

There are 34 units that practise this fishing, including some monoxylole canoes and salans whose length varies between 6.5 metres and 9 metres. Very few of them are motorized. The crew is made up of 1 to 3 and the owner who acts as captain. The drift gillnet for ethmalosa is exclusively used in this type of fishing to catch the pelagics (ethmalosa, sardinella) and some Sciaenides.

3. SURROUNDING OR SET GILLNET FISHING

This involves 32 motorized boats (salan and flimbotes) having 7.5 to 12 metres length. The power of the engines varies between 10 and 15 HP. A crew of 3 use the surrounding gillnet for ethmalosa and set gillnet with big meshes. The species targeted by this fishing vary according to the mounting, the depth, the meshes and the fishing zones. However, these units land mainly demersal species belonging to the sciaenidae family and the coastal pelagics like ethmalosa and mullet. With this type of fishing, there are some rare owners who do not go out to fish and owners with two or more boats.

4. DEMERSAL FISHING EQUIPPED WITH ICE-BOXES

This type of fishing is practised exclusively by 62 high salans whose dimensions are slightly over 12 metres. It is distinguished by the use of ice-boxes on board and the duration of its trips (4 to 6 days). The canoes are equipped with at least 10 - 15 HP outboard engines. The crew is mainly 5 - 8, but there are rare cases of 1 - 4 crew. They catch species of Sciaenides, Lutjanids and Sparids using specifically the hook and line as fishing gear. With this type of

fishing, the canoe owners do not go out to fish and owners of two boats or more are more numerous than in the former fishing method. The presence of foreigners (Senegalese) is noticeable.

5. PELAGIC FISHING WITH PURSE SEINE

It is practised by the most important units of the Coastal artisanal fisheries of Guinea. At Boulbinet, this involves the 14 flimbotes. Being between 18 and 25 metres long, these boats are propelled by 25 - 40 HP outboard engines with a crew number that varies according to the length of the boat and the power of the engines. The gear used is exclusively the purse seine for pelagic species. The targeted species are exclusively *ethmalosa* and *sardinella*. Some demersals of the *sciaenidae* can also be found in the landings of these units.

In view of the importance of the technical capital mobilised and the level of management, the units involved in this fishing go beyond the family enterprise. Here, more than in the other techniques, there is a kind of proletarianization of the fishermen through the intensification of the physical effort applied in the use of the gears, through the sharing of knowledge and through the minimization of the fishermen's proportional share. The arrival of new owners coming from other horizons (merchants, civil servants etc...) and from other countries (Sierra Leone, Senegal), together with the great number of boat owners and owners of many boats, indicates a transition to a capitalistic investment.

III GUINEAN EXPERIENCE AS CONCERNS STUDIES ON COSTS AND EARNINGS

Only one real study has been carried out on costs and earnings in artisanal fisheries in Guinea. This study has been carried out by a team in charge of socio-economic matters at the "Centre National des Sciences Halieutiques de Boussoura" under the direction of B. Lootvoet in 1991. The economic units examined were located in 5 landing sites in Conakry.

At Dixinn-Port 3 and Landreah, the flimbotes equipped with purseless seines (reggae) have been surveyed.

At Dabondy, the sampled boats were canoes having a lower right stern (salans) coupled with some surrounding gillnets operating with "otholites" (gloya).

At Bonfi, the surveyed boats are of salan type, equipped with various gears (set gillnet, surrounding gillnet, lines), but the analyses were only based on "salan + set gillnet" unit.

This study has helped to calculate the variable costs (intermediary expenditures) for the units mentioned above, to determine their approximate earnings and to follow the distribution of these earnings among the different factors involved in the fishing.

From the results of the survey of these few sampled units, an extrapolation has been made on the entire coastline units to value the contribution of artisanal fisheries to the national economy. The result of the survey are being prepared for publication at CNSHB.

A second analysis, as equally important as the first one, has been made by Benoît Lootvoet and Regis Goujet (economists of ORSTOM) from surveys carried out on the landing

site of Bonfi. This analysis aimed at giving the result of the bookkeeping of a boat owner who was managing four big salans specialized in line fishing in the last trimester of 1990. The results were published in 1991 in the form of CRHB internal work document.

The sociological studies carried out by S. Bouij on the fishermen communities on the Guinea coastline have partly addressed the repartition of the earnings describing the sharing system that is in effect and which serves as the payment mode of the fishing factors. They have also helped to form the description of the 5 types of artisanal fisheries described above.

This means that no study on costs and earnings has been devoted to the Boulbinet landing site. The technical capital (canoe, engine, net) description of the fishing units made by biologists does not allude to any cost.

Moreover, the observation of the landings by biologists aimed only at knowing the structure of the catches per fishing gear. So, no quantitative or monetary evaluation of the production has been made on this landing site.

ARTISANAL FISHERIES IN MAURITANIA

by

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INTRODUCTION

The subsector of Artisanal Fisheries in Mauritania is characterized by:

- A canoe fleet of 1565 boats, 1320 of which are in Nouakchott and Nouadhibou; a motorization rate of 96% for the whole coastline and 100% for the two sites.
- Landings were between 14 and 15,000 tonnes in 1994, 80% of which were realised in Nouadhibou and Nouakchott.
- A renewed interest for cephalopod fisheries, mainly the artisanal one with octopus.
- A total number of 6893 fishermen were recorded in 1994 (6341 of this number came from the two sites).
- A rapid modernization of artisanal fleets which benefit from direct and local exploitation of new technologies (plastic, aluminium and planked boats, as well as octopus pots).
- The resources are exploited by industrial and artisanal fleets. Artisanal fisheries represents 5% of the whole catches and lands about 8% of the total tonnage of octopus in Nouadhibou.

Besides, priority is still being granted to artisanal fisheries in accordance with the Declaration of Development Policy of the Fisheries Sector (April 1987) and the 1994 "PASPECHE".

1. ARTISANAL FISHERIES

This Sector is very important because of the integration and dynamic role it plays in the social and economic development of the country (protein, employment, foreign currency).

Within an EEZ of 231.000 km² three large regions for artisanal fisheries are realized covering 22 landing sites, 17 of which are permanent. These zones are the following:

- The North region: Nouadhibou, La Guerra
- The Region of Imraguen of Agadir in lehféré
- The South region of Nouakchott in N'Diago

The main fishing centres include Nouadhibou with 912 fishing units, 58% of the fleet targeting mostly octopus, and Nouakchott which comes second with 408 units (26%) and specializing in non-octopus fishing.

1.1. Means of Production

1.1.1. Crafts

Many types of fishing boats are identified; planked canoes (including long duration or ice-carrying canoes), steel made canoes, plastic canoes, aluminium canoes; dinghy and the Imraguen types.

The numbers have evolved a great deal between 1990 and November 1994. The total number has relatively and quickly increased between August 1992 and November 1994 (From 735 to 1565, that is an increase of more than 100%). The total number was 750 and 519 respectively in 1988 and 1985.

Table 1: Distribution of crafts per type (Frame Survey, November 1994).

SITE	PB	PcB	TB	OC	AB	DIN	AS	IM	TOTAL
Nouadhibou	443	92	130	59	9	30	149	0	912
Nouakchott	389	0	19	0	0	0	0	0	408
TOTAL	832	92	149	59	9	30	149	0	1320

Source: CNROP

PB: Planked Boat **TB:** Tide Boat **OC:** Open Canoes **PcB:** Plastic Boat
PaB: Patrol boat **AS:** Aluminium and Steel **AB :** Artisanal Boat **DIN:** Dinghy

The last census of November 1994 gives a total of 1565 boats spread on the whole Coast and 1320 for the sites of Nouadhibou and Nouakchott, i e 84% of the overall boats. Besides, a "modernization" of the artisanal fleet is noticed.

As far as aluminium boats are concerned, the total number has, on the one hand, evolved from one unit (February 1990) to 18 in February 1992, 77 units in April 1993 to 203 in November 1994, (that is 13% of the total national number). On both sites, there are 149 units, that is 73% of the total number of aluminium canoes.

Nevertheless, the fleet is still dominated by planked canoes (Senegalese type) undoubtedly because of the presence of a craftyard at Tcharka (Nouadhibou) and to some extent in Nouakchott. Most canoes which are made of red planks have a life cycle that is by far shorter than the Senegalese type (an average of 5 years in comparison with 12).

1.1.2 Motorization

Table 2: Distribution of boats according to the power of the engine (Frame Survey, November 1992)

SITES	0HP	8HP	15HP	25HP	27HP	30HP	32HP	40HP	INACTIV
Nouadhibou	0	1	146	108	3	4	1	535	39
Nouakchott	0	5	253	36	0		0	112	2
Total	0	6	399	144	3	4	1	647	41

Source: CNROP

Table 2 shows the outboard engines used in 1994: 8HP, 15 HP, 25 HP, and 40 HP and more. Whereas the predominance of 15 HP until 1988 was influenced by the closeness of the fishing sites, the last survey shows that from 1990 the total number of outboard engines with a power more than or equal to 40 HP increased from 232 to 838 between February 1990 and November 1994. For both sites, there are 647, that is 77% of the total number of these engines.

The motorization rate which was 89% in 1986 and 93% in 1988 is 96% today (without including the Imraguen types, which are sail-propelled). For both sites, the motorization rate is 100% (see table 2).

1.1.3 Fishing gears

Table 3: Distribution of boats according to Fishing Gear (Frame Survey, November 1994).

SITES	NL	TN	CN	SEN	SN	SN	TURL IT	PAL	POIS	INACT	MIXED	TOT AL
Nouadhibou	88	25	29	13	11	5	0	1	668	103	8	951
Nouakchott	292	0	9	8	36	54	5	0	0	9	35	453
TOTAL	380	25	38	21	47	59	5	1	668	112	43	1404

Source: CNROP

Abbreviations:

NL	:	Normal line
SN	:	Surrounding net
CN	:	Croaker net
SLN	:	Spiny lobster net
TN	:	"Tollo" net
BS	:	Beach seine
SHIN	:	"Shoulder" net
INACT:		Inactive

The gears are used in artisanal fisheries according to seasons (cold, hot) and to the geographical zone.

We distinguish between normal line, longline, purse seine, beach seine, nets (spiny lobster, sole, tollo), Imraguen shoulder net, stationary net and octopus pot.

In the North, the most common gear is octopus pot (567 series, i.e. 60 to 80 pots by series in November 1993 in Nouadhibou).

In the center, motorized fishing is forbidden in the zone covering the National Park of Banc d'Arguin situated between Nouamghar and Agadir. The fishing gears used there are the set net with croaker and "tollo", and the Imraguen net used for grey mullet fishing. On the contrary, between Jreif and Blawakh we can see, depending on the seasons, that apart from the technique described in the first sub-zone, there are also handline, longline and stationary net (sole) fishing. In the south, the longlines that had disappeared after the departure of Senegalese artisanal fishermen (representing 34% of the total number recorded in 1989) reappeared: they were 11 in number in Nouakchott in November 1993 against 7 in February 1992.

1.2 Landings

Two large groups of species are identified for both artisanal and industrial fisheries.

- * Coastal Pelagics (horse mackerel, mackerel, sardinella, sardine, anchovy, tuna).
- * Dermersal species (sparidae, scianidae, serranidae, cephalopods, crustaceans...)

Artisanal fisheries accounts for about 5% of the total catches, i.e. 14,638 tonnes in 1992 (an increase of 17% as compared to that of the previous year) against 17,128 tonnes in 1998 and about 15,000 tonnes in 1994. Nevertheless, this percentage can be higher for a given species. Thus, octopus represents almost 8% of the overall tonnage of octopus landed in Nouadhibou.

The octopus catches show a progression of 18 tonnes in 1984, 309 tonnes in 1986 and 3,345 tonnes in 1987. They were up to 8,081 tonnes in 1992, that is an increase of 17%, as compared to that of the previous year, showing the significance of the two large centres: Nouakchott and Nouadhibou.

There has been a modification of the specific structure of the landings in favour of species bearing high market value. Indeed, octopus whose quantities were insignificant in 1984 (0,18% of the overall volume of landings) increased to 3,200 - representing 19,51% of the overall volume caught in 1987 - (Ahmeda 1990). In 1994, the catches reached over 6,000 tonnes.

The structure of these landings reflects a predominance of octopus, exclusively caught in Nouadhibou with 8,081 tonnes in 1992 i e 55% of the overall landings of artisanal fisheries and an increase of 30% when compared to the statistics of 1991.

1.3. Fishing effort

From the second semester of 1993, a rigorous and regular follow up of the fishing units for the zone of Nouakchott has been started. Since 1987, this system was conducted for Nouadhibou (landing site of Tcharka).

So far, there has been no estimation of the levels of efforts made in artisanal fisheries. However, the evolution of the total engine power and that of the national fleet, as well as the improvement of the technological level of the fleet became indicators of the increase of the fishing effort.

1.4. Employment

Table 4: Distribution of fishermen according to their geographical origin (Frame Survey, November 1994).

SITES	N'DIAGO	RIVER	IMRAG JEN	NOUAK CHOTT	NOUAD HIBOU	O ReM	O COUNT	TOTAL
Nouadhibou	659	399	21	10	125	2203	436	3853
Nouakchott	1571	139		5		142	631	2488
TOTAL	2230	538	21	15	175	2345	1041	6341

Source: CNROP

Abbreviations:

O. ReM: Other regions of Mauritania

O. count: Other countries

In 1987, the artisanal fisheries sector created far more jobs (7 times more) per tonne landed than to the industrial one (Sok M. et al; 1987).

A series of homogenous data gathered from February 1990 to November 1994 shows a rapid increase of the number of fishermen. Between February 1990 and February 1992, 3,500 fishermen were recorded. From April 1993 on, the number of fishermen reached 5,600 and increased to 6,863 in November 1994. Nouadhibou and Nouakchott counted altogether 6,341 fishermen, that is 93% of the total artisanal fishermen. This situation can be explained by the return of the Senegalese and the arrival of new fishermen (thanks to an Italian project).

Furthermore, it is worth mentioning the existence of numerous so called indirect employments linked to the marketing, the processing and the transportation of sea products, the building of canoes, and the repair of the means of production (repair of outboard engines and nets) etc. At present, there is no precise estimation of indirect employment linked to artisanal fisheries.

1.5. Migrations

In Mauritania, two urban centres, Nouakchott and Nouadhibou form two points for the concentration of migrant fishermen because of the existence of facilities of preservation and trading. The most important community of migrant fishermen comes from N'Diogo, a 2,260 fishermen community almost evenly distributed between these two big entres of coastline fisheries. These fishermen live for several months in the host sites and only go back home during great religious feasts (Tabaski and Maouloud).

Those who come from Senegal River are 579 in Number and are workers who recently took up marine fishing. They are mainly located in Nouadhibou and in La Guerra. In the latter area, they practise spiny lobster fishing.

As for the Imraguen, they practise a weak technical migration based on the movement of the target species. Since the emergence of octopus fishing in 1984, this social group started changing its attitudes. In fact, it is more and more involved in seasonal migration towards Nouadhibou during the passion period (from June to August). The latest frame survey carried out in Nouadhibou recorded 21 Imraguen fishermen. This nomadisation of a social group so far characterized by a community selfishness can be justified by an increasing monetarization of their fishing activities which were traditionnally done for their subsistence.

It is also important to mention the presence of foreign migrants (Maliens, Ghanaians, Bissau Guineans...) who came to find special fishing and employment possibilities. According to the frame survey conducted in November 1993, these foreign migrants represent 448 fishermen. In 1994, there were 1067 fishermen of this category in Nouakchott and Nouadhibou.

1.6. Economic Organisation

1.6.1 Remunerating the factors of production

As a whole, the most common mode of remuneration in artisanal fisheries is the dividing of income into different parts. This formula is well known and has been described in several studies.

Octopus fishing with pots favoured the creation of new modes of remunerating labour capital and manpower. These modes no longer match with the traditional systems of sharing (part-based remuneration) so far used. The old forms of part-based remuneration rest on a philosophy of spreading the risks (collective contribution to general costs: fuel, food, maintenance and repair).

In the case of octopus fishing, the system is based on the principle of risks coming mostly from a singling out of fishing gears in the same boat.

Behind the links of production created by the octopus fishing, there is a hidden capitalistic logic that is rising now and which varies according to the type of boat; it is relatively more acute with vessel owners who pay wages than with owners of plastic and planked canoes. With the former, the hired fisherman is obliged to sell the product he has caught with his own gears to the owner of the fishing unit. With the latter, the crew members who own self-acquired gears are not compelled to sell their products to the owner of the boat in which they are working. This system can be taken as a "shrunk" one in so far as "heavy" technical factors are better remunerated (high cost capital: engine, boat).

1.6.2. Marketing system of the catches

The fishing sector plays the traditional role of supplying the domestic market with essential fresh products weighed or directly handed over to the consumers (this is the most frequent case observed in Nouakchott), to the fishmongers or to petty retailers.

The main bottlenecks to the distribution of the products are the poor network, the lack of preservation facilities (unoperational freezers), and appropriate transport (insulated vehicles).

As for Nouadhibou, the overall artisanal production of cephalopods (octopus) is exported by the "Société Mauritanienne pour la Commercialisation du Poisson (SMCP)". This product was not formerly consumed by the local population because of:

- its recent appearance and still low level in the food habits of the population
- its relatively unknown local pre-culinary preparation
- the high profit generated by its export.

CONCLUSION

The main points of the Mauritanian artisanal fisheries policy can be summed up as follows:

- creating jobs to solve the unemployment problem of old herders and farmers sent away from their lands by drought;
- increasing the earnings of artisanal fishermen;
- supplying the population with animal protein (fish);
- maximizing the flow of foreign currencies.

To reach these objectives, a few observations and recommendations are worth considering:

Any management measure must take account of the fluidity of marine fish resources, and state of national and shared stocks. Any possible increase in the fishing effort must secure the perspectives or the development objectives of the artisanal fisheries sector (C. Chaboud, 1992).

At the regional level, and taking into account the real state of the shared resources, it is worth strengthening the scope of consultation (sub regional committee) between Mauritania and its close neighbours (Southern and Northern).

The small artisanal fisheries that employs 6,893 persons and uses more than 1,565 boats, is faced with many obstacles which are:

- the absence of an insurance system and that of true security measures that pose problem for the sustainability of artisanal fishing activities;
- surveys on indirect employment in artisanal fisheries sector should be carried out so as to evaluate the impact;
- there should also be a study on the possibility of creating a credit bank for the artisanal fisheries sector;
- the antagonistic relationships with the industrial sector will be solved only when fishing zones are clearly defined according to the biological reserve and to the trend of maximizing the cash generated by the artisanal fisheries. This problem is also related to the monitoring of Mauritanian fisheries sector;
- the setting up of training cycles for fishermen on rudimentary management techniques, and mainly the techniques of accounting about their national wealth as well as about the resource is necessary in order to better cope with problems related to costs and earnings in artisanal fisheries.

Bibliography.

CNROP - 93 "Groupe de travail sur l'évaluation des stocks en Mauritanie"

RECENT COSTS AND EARNINGS (SOCIO-ECONOMICS) RELATED
STUDIES OF NIGERIAN ARTISANAL COASTAL FISHERIES

by

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INTRODUCTION

One of the more recent attempt to conduct a very comprehensive socio-economic study of the fisheries in Nigeria was initiated by the Nigerian Institute for Oceanography and Marine Research. One of the objectives was to collect, analyse, present and store data in every aspect of the Nigerian coastal fishery and oceanography. As part of the Fisheries and Oceanography Data Bank, a study to collect primary and secondary fishing community data was commissioned.

The Statistics and Economics Division of the Institute was assigned the task and the first phase focused the socio-economics of fishing communities in coastal Nigeria with emphasis on community information rather than fishermen as an operating economic unit.

The study was conducted in six of the seven coastal administrative divisions of Nigeria, Akwa Ibom, Cross River, Bendel, Ondo, Rivers and Lagos States.

Methodology.

In each State, the survey objectives, output and merits were tabled and fully discussed with appropriate government functionaries. Thereafter, the questionnaire was reviewed along side a large scale map for the identification of river systems and associated fishing villages and communities for sampling. Subsequently, the team once incorporating State functionaries as guides moved to the field. One of the community leader was courtesied and his "stamp of approval" received, the cooperation, of the community was almost total.

The Questionnaire

The Questionnaire comprised of eight parts as below:-

- Part A: General Community Information - name of community, nature, age, location and status in relation to others.
- Part B: Population issues, Total population of the community and fishermen population.

- Part C: Gear and craft data, canoes parameters in 3 categories - Dug-out canoes, Banana or plank and Glass fibre boat.
- Part D: Fishing Records - provided information on fishing ground, fishing input, sources, catches, processing and marketing.
- Part E: Infrastructure and Facilities.
- Part F: Communication linkages.
- Part G: Community Priorities.
- Part H: Community Attitudes to development and reception.

Following the 12 month socio-economic survey, a 4 year coastwide Fisheries Resources Evaluation Survey was initiated late in 1991. Its primary objectives are:

- a) Determination of the potentials of the coastal and estuarine pelagic fisheries.
- b) Determination of the potential of the shrimps exploited by artisanal fishermen and
- c) Standardisation of fishing powers of artisanal boats, shrimpers and fishing trawlers.

Estimations of the profitability and viability of each of the main fisheries through cost and earnings analyses were built into the elaborate terms of reference of the survey. During the survey a full census and inventory were implemented as part of its first phase 12 months reconnaissance component.

Results.

The results of the socio-economic survey are summarised in Table 1. Generally 3 - 8 men made up a fishing unit, but records of costs and earnings were not readily available. Lack of records and insufficient motivation to keep records were apparent every where.

Many fishermen had difficulty engaging themselves in viable and profitable activities during the off season, a situation which resulted in indebtedness to fish mummies for survival.

Most operatives had problem financing their fishing operations and complaints about excessive exploitation by fish monger sponsors were rampant.

Some of the fishing villages covered by the census concluded by the resources evaluation survey are shown in Table 2.

Table 2. Fishing villages inventories in the 1991 - 92 fisheries census

Akwa Ibom State

Date	Locality	Fish landing sites/villages Investigated
Dec. 1991	Imo River System	Uta Ewa, Iko, Okoroete, Ikot Kampa, Whydah, ATC, Iworfe, Ikot Etetuk
	Qua Iboe River System	Ibeno-Eket, Iwuchang and Ubenekang
	Oron Area	Utam Brama, Utan Iyata, Inua Abasi, Ebughu, Mben Nodoro and James Town, Okposo

Cross River State

Date	Locality	Fish landing sites/villages Investigated
July 1992	Calabar Town and Environ	Nsidung, Eyip, Ine Sam, Esuk Utan, Adiabo, Ikot Mbo, Adiabo Okutikang Adiabo Ikot Okon, Adiabo Ikot Ukpa Creek Town, Ibonda, Ikon-Eto, Akwa efe, Akratre efe and Anantiagha Beach
"	Calabar River System	Ine Sam, Nkanta, Ibot Utunghomum, Utan Udia, Ine Affia Ofun, Ine Itak Ukana, Isong Iwang, Ukpa Ufreukim Ikang, Ine Affah, Ine Ekpo, Apak Ekok, Ine Ekoi and Etak Edak
"	Upper Cross	Ikot Okpora, Akpet Central, Obubra, Owakande Beach, Ikom and Ogoja

Ondo State

Date	Locality	Fish landing sites/villages Investigated
Sept. 1992	Ilaje-Ese	Bijimi, Aiyetoro, Idiogba-Oke, Obe-nla, Obe Ogbara, Enikunselu, Obe Iji, Ojumole, Odo-nla, Udo-agbo, Jinrinwo, Ajegunle, Ilepete, Idiogba, Orioke-Iwamimo, Araromi and Oke Siri

Ogun State

Date	Locality	Fish landing sites/villages Investigated
Dec.. 1992	Ijebu Waterside	Igbekki, Oka, Oke-Oso, Ollosumeta, Akede I, Ijegbe, Igboere, Awodikora, Ode omi, Ilete, Iro-Awodikora, Akede II and Elefon

Target Fisheries

The major coastal estuarine fin fish fisheries identified by the survey are:

- 1) Pelagic, exploiting:
 - a) Ethmalosa Fimbriata, Bonga;
 - b) Sardinella maderensis, sardinella and
 - c) Ilisha africana, West African Shad (Ilisha) as well as
- 2) Demersal, targeting:
 - d) Pseudotolithus spp., croakers; marine catfish, Arius spp., and brackish water catfish, Chrysichthys nigrodigitatus together with
 - e) Polydactylus quadrifilis, shiny nose; Megalops atlanticus, tarpon and large elasmobranchs.

In addition, the crayfish fisheries harvesting shrimps, principally pink shrimp, Penaeus notialis; guinea shrimp, arapenaeopsiatlantica; white shrimp, Nematopalaemon (Palaemon) hastatus and brackish water shrimps Macrobrachium spp. are very prominent.

Given the sensitivity of economic data, the coastal fisheries resources survey initially was heavily skewed in favour of biological data, in conformity with the sub-projects. However, factors connected with fishing and others attenuate biological considerations. In effect, indices other than biological are equally crucial to stock assessments as well.

Towards effective development and management, investments need to consider opportunity costs and profitability, Information about the economics - of small scale fisheries therefore is crucial. Although they were delayed and as such in the 4 year resource survey evaluation project till the confidence of the coastal fishermen had been won because of data reliability. Cost and earnings are now fully underway and some of the early results are shown in Tables 3 and 4.

CONCLUSION

It is hoped that with a good knowledge of the fishery and appropriate cautionary steps the cost and earnings as well as the sensitivity analyses will be true to form in order to guide the direction and pace of development, and therefore investments in small scale fisheries of Nigeria.

Table 4. Costs and earnings of the cray fish fishery in Imo River estuary - Nigeria

1 COSTS		
	Stow Net Fishery	Crayfish Basin Trawl
A: Investment		
4 Plank Canoe	₦ 6,000.00	
Gear	₦ 12,000.00	
Sail	₦ 200.00	
Outboard Mot. Engine	N/A	
Anchor	₦ 250.00	
Sub Total Investment	₦ 18,450.00	
B: Fixed		
Depreciation		
Craft @ 20%	₦ 1,200.00	
Gear @ 25%	₦ 3,000.00	
Sail @ 50%	₦ 100.00	
Outboard motor engine @ 25%	N/A	
Opportunity Cost @ 21%	₦ 3,874.50	
Sub Total	₦ 8,174.50	
C: Variable		
Repair and Maintenance @ 33%	₦ 6,088.50	
Fuel	N/A	
Lubricant	N/A	
Sub Total	₦ 6,088.50	

	Stow Net Fishery	Crayfish Basin Trawl
D: Total		
2. ANNUAL CATCH	4.176 kg	
3. REVENUE @ ₱10.00 - 12.5/kg		
Wet + Fresh	₱ 41,760 - 52,130.00	
4. PROFIT		
•		
Pre Tax		
Return on Capital		
Profit on sale		
5. BREAKEVEN		
Wet and Fresh		
Catch		
Price		
Fishery days		
6. GDP		
Per Capital Income		
National Minimum Wages		

	Stow Net Fishery	Crayfish Basin Trawl
7. SENSITIVITY ANALYSIS		
Fuel		
@ 10% increase		
@ 20% "		
@ 30% "		
@ 45% "		
@ 50% "		
@ 60% "		
@ 70% "		
@ 80% "		
@ 100% "		
Outboard Motor		
@ 20% increase		
@ 30% "		
@ 40% "		
@ 50% "		
Canoe		
@ 20% increase		
@ 30% "		
@ 40% "		

FIRST MEETING OF THE WORKING GROUP ON COSTS AND
EARNINGS IN ARTISANAL FISHERIES IN WEST AFRICA
DAKAR, SENEGAL, FROM 12 TO 13 JUINE 1995

by

Moustapha KEBE
Fisheries Economist/Chief of the Macro-Economic Analyses Office
"BAME/ISRA".

FOREWORD

The Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) is interested in creating a " Working Group on Costs and Earnings in Artisanal Fisheries ". The main objective is to provide the member countries with baseline information that exists on the sub-sector and which is necessary for decision making.

In cooperation with the other institution of the region, IDAF will initiate one year studies on costs and earnings of fishermen. These studies will be presented and discussed during a workshop that will be held in November 1996.

The first meeting of the working group that will determine the general plan of the study was held in Dakar, from 12 to 13 June 1995. The synthesis of the different reports presented by the selected countries will be done in August 1996.

As for Senegal, the fisherfolk village of Hann has been selected for this study. Moustapha Kebe, Fisheries Economist working at the Senegalese Institute of Agricultural Research (ISRA) has been appointed by the Fisheries Administration to take part in this study, in collaboration with the IDAF Liaison Officer (O. N'diaye).

The present document is the contribution of Senegal to the first meeting of the working group. It gives the baseline data gathered by the fishery research in order to assess the costs and earnings of the artisanal fishing units operating along the coastline of Senegal. A particular emphasis is put on the socio-economic data that are available on the sub-sector for the selected site, Hann.

SUMMARY

INTRODUCTION

1. SPECIAL SURVEY

- 1.1. Canoe Census
- 1.2. Village Survey

2. MONITORING BIOLOGICAL DATA

- 2.1. Fishing Effort
- 2.2. Catches Sampling
- 2.3 Space-Time covering

3. MONITORING PRICES AT LANDING

4. MONITORING FISHING UNITS

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ANNEXES

- 1 Canoe Census
- 2 Village Data Sheet
- 3 Fishing Effort Questionnaire
- 4 Monitoring Catches
- 5 Fish Price Survey
- 6 Questionnaire on Costs and Earning of Fishing Units

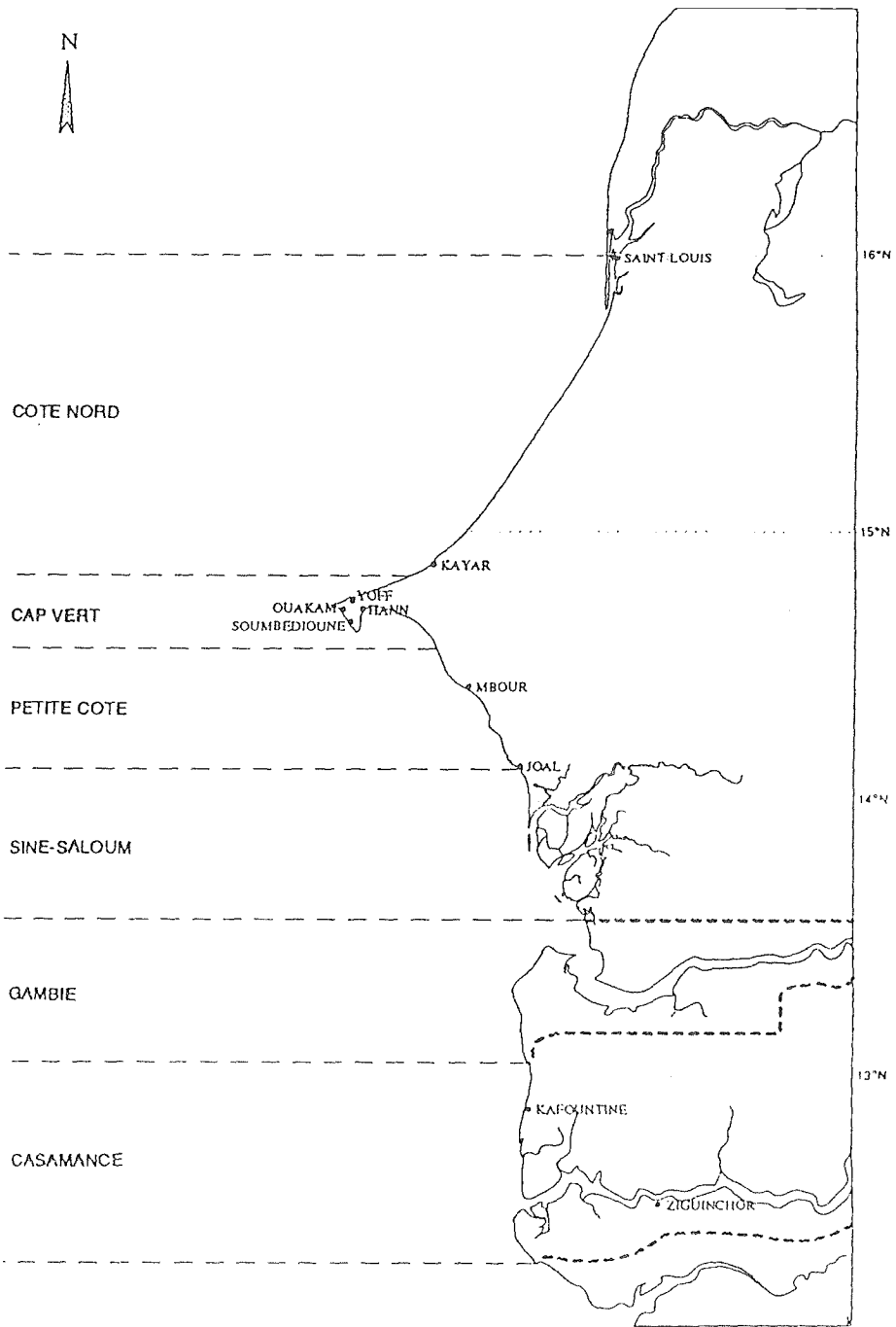
LIST OF TABLES

- 1 Space-time covering of biological data gathering System in Artisanal Fisheries
- 2 Canoe Census at Hann in 1993 and 1995
- 3 Fishery Products Landing at Hann in 1993
- 4 Average price at landing at Hann

INTRODUCTION

The Oceanographic Research Centre of Dakar - Thiaroye ("CRODT") initiated the collection of data in marine artisanal fisheries at the beginning of the 1970s within the framework of monographic studies conducted on some major species (tassergal, thiof, sardines). From 1975 on, the gathering system has been extended to all species and fishing gears. The first census of the artisanal fishing gears carried out in 1977 and 1978 has contributed to an awareness of the diversity of the exploitation system, of the multi-species nature of the resource and of the importance of the social dimension of artisanal fisheries. The collection schema and the processing of the data have been improved by the intervention of biometricians and socio-economists.

Figure 1 : Principaux centres de débarquements de pêche artisanale sénégalaise enquêtés par le CRODT.



As a matter of fact, the investigators realized, as the studies expand, that the biological factors are insufficient to explain and justify the form, level and socio-economic data at the different major landing points of the coastline (map 1) in order to better understand and explain the dynamic of the artisanal fisheries system.

1. SPECIAL SURVEY

To globally assess the potential of marine fisheries and to evaluate the exploration factors necessary for the estimation of marine fish products, a special survey has regularly been conducted since 1981 by a team of biologists and socio-economists of artisanal fisheries.

1.1. Canoe Census

Besides the counting of the overall fleets, the censuses help better understand the migratory movements and to measure the activity rate of the fleets. Their periodicity provides worthy indications on the evolution trends. Finally, these countings help estimate the employment created by artisanal fisheries.

Two censuses are carried out every year by the CRODT. The choice of the period is all the more important as the fishing seasons are well "marked". The periods chosen for Senegal are as follows:

- The cold season corresponding to the second fortnight of April. It is the period during which artisanal fisheries activities reach their peak and also the most intense period of the fishermen's migration;
- The hot season (the first fortnight of September). Fishing is at its lowest degree of activity, and most of the fishermen are back to their home villages, either for farming or for rest.

The coast as a whole (from DJIFFERE to SAINT-LOUIS) must be covered in a minimum of time (6 days) so as to avoid double countings due to the movements of boats from one place to the other. These censuses concern operational boats, that is, seaworthy boats. We distinguish the ones which are active from those which have not been used for fishing during the month preceding the census (annex 1).

The origin of each boat is marked, which helps to follow the migratory movements along the Senegalese coastline: the boats originating from the place of survey and the ones operating there.

All the countings are carried out per gear. In every place of survey there are questions on the type and number of the boats that arrived since the beginning of the census and their places of origin so as to avoid double counting.

Since 1985, the regions of Sine Saloum and Casamance have been covered occasionally.

1.2. Village Survey

The inventory of the existing infrastructures in every landing point helps us to update a dictionary of fisherfolk villages. The data recorded concern access to the village, fishing services, duty stations, ice deposits, mechanics, craftyards, builders of fishing gears, cooperatives, public services (annex 2).

This dictionary helps the planner better know the environment of a potential project, and makes possible the follow - up of a progress witnessed after the setting up of new infrastructures.

2. **MONITORING BIOLOGICAL STATISTICS**

The assessment of the catches at the main landing points of the coastline is obtained from the catches per trip multiplied by the number of trips. The strategy adopted includes two stages and concerns:

- the fishing effort, that's the number of trips per fishing gear;
- the catches per trip and per fishing gear.

Then CRODT proceeds to a stratified sampling, taking into account space-time and technological variabilities of the fishery. The strata are defined by the crossing of three qualitative variables: the on shore landing point of the boats, the period (fortnight) and the fishing gear. The numbers of the different strata are obtained by the counting of the daily trips. In each stratum, the preference is on the survey days on which the boats can be sampled. Within these boats some fish are measured. The sampling strategy meets the requirements of a stratified plan at several levels, but the units concerned by the sampling are not selected at random. The survey days correspond to opening days; the boats are sampled as they return. The fish of a boat are chosen the most "randomly" possible by the investigator while the fisherman is negotiating the sale of his product.

2.1. Effort Sampling

Fishing effort is in general measured six days per week (Monday to Saturday), as the lack of information is replaced by the average of adjoining days in order to take into account the time continuum. The efforts for the purse seines and the encircling gillnets of Joal and Mbour are accounted every day.

Three systems are used:

- The system of double deduction (Saint-Louis and Kayar). The knowledge of the fishery specific aspect (hours of departure and landing, places of landing per type of fishing...) helps deduct the number of trips per type of gear in difference with the deduction of the boats after their returning from fishing.
- The system of checking the arrivals (Mbour and Dakar region centres). A seaside aid marks per time block the arrival frequencies per type of fishing (annex 3);
- The system of interviews (Joal, Mbour, Point Sarène, Sarène, Kayar and Saint-Louis). The number of trips per day and per fishing gear is obtained from the list of fishermen, regularly kept up to date, and of interviews carried out on the beach

and involving some key fishermen. The informant registers the names of the fishermen that are out for fishing and the nature of the type of fishing practised.

2.2. Catch sampling

A sampling plan stratified at two levels is used: the primary units correspond to the sampled boats in the course of the survey days, and the secondary units to the fish selected within the catch of the sampled boats for the size frequencies.

The evaluation is carried out in two ways:

- in counting the number of individuals when this number is not very high. The size measurements of a sample of some individuals chosen "at random" (secondary units) help deduct the weight of the catches with the help of the relations "size/weight" set up for the main species;
- in estimating with the naked eye the weight per species. For species of secondary interest and the abundant species, the catches are estimated through the evaluation of the weight of small quantities of fish or by counting the number of baskets or boxes. So, for the purse seines (PS) and the encircling gillnets (EGN), the landing of fish is done by means of standardized baskets which are used for the sale. Some weighing and measure tests have been carried out by the investigators so as to control the average weight of the content of the baskets used. In 1981, a control of the assessment biases of the catches has been carried out from the lots of fish of known weights and different sizes.

The boats sampling helps estimate the catches by species (a list of 200 species is currently utilized) and record relevant information on the fishing effort (annex 4):

- type of fishing (gear);
- hours of departure and arrival;
- time spent on the way;
- weather forecasting;
- number of casts (total and positive) for the Purse Seine and Encircling Gill Net;
- fishing places;
- number of fishermen;
- Operating depth.

2.3. Space - Time - Covering

A summary of the space-time covering of the data gathering system is given in table 1. This system implies the participation of 9 investigators and 13 beach aids among whom 8 work on a full time basis and the remaining 5 on part time basis. The beach aids take charge of the fishing efforts and/or the size measurement of fish. The sampling rate in view per fishing gear (that's the proportion of targeted boats) is fixed at about 10% of the trips (which may represent 30 to 40 boats per survey day for some harbours, but can not always be achieved during certain periods of full fishing season). For the Purse Seine and Encircling Gill Net of Joal and Mbour, the sampling rate varies between 60 and 100% of the trips of the day.

The natural regions of Sine Saloum and Casamance are not covered by routine surveys on the catches and fishing activity. The data of the Department of Oceanography and Marine Fisheries (DOMF) are then used for the production of annual statistics of the whole marine boat fishing in Senegal.

3. MONITORING PRICES AT LANDING

The biological studies provide precise evaluations of the production in volume. The use of these data by the economist or the planner implies the possession of a good knowledge of the prices. But, these prices may vary from simple to triple in the course of a day, in a given place, in function of the landed quantities, and the number of present buyers, etc...

At landing, at least three prices are daily recorded for each one of the chief species landed or traded (representing 80% of the landing in volume and more than 90% of their value). These prices are collected daily at Saint-Louis, Kayar, Hann, Mbour and Joal. In each one of those centres, the work is carried out by an investigator that lives in the setting; the data gathering is done concurrently to the surveys on the landings. In some secondary centres, the prices at landing are recorded at irregular intervals.

The same questionnaire is used for all places (landing centres and markets) and all the categories of targeted agents (fishermen, fishmongers and retailers).

The survey records for each species the observation hour, the gear used for the catches, the category of inquired agent, the quality of the fish observed and the unit in which it is sold with its price (annex 5). Those units may be a basket or a box of a certain weight or a lot on the shore, the weight of which is valued, an individual whose length is measured by the survey and converted in weight by means of weight-lengths conversion tables. Then the price per kg is obtained by calculation. The observation is repeated three times daily for each species at the beginning, in the middle and at the end of the landings. This questionnaire can also be used outside Senegal.

4. MONITORING FISHING UNITS

The fishing gear constitutes the basis of the sampling for the biologist who studies the catches for stock management purposes.

The economist must base his analyses not on gears, but on fishing units. The fishing unit is made up of several boats, using one or several gears, simultaneously or successively. In the same way the purse seine units use beach seines in rainy season. The angling units also use set gill nets, jigging devices and/or cephalopod pots. In the same way a farmer can grow on several fields with different speculations or use polycropping system and, besides, practise husbandry, a fishing unit can also vary its activities.

The application of the results provided by biological studies passes by the monitoring of a fishing unit sample, which helps answer the following questions:

- what is the fishing capital used (boats, gears...)?
- how many fishing days do the monitored units operate?
- which fishing gears are used, according to what schedule?
- what are the costs of production?

- how is the added value divided between those who possess the equipment and those who operate it ?
- which portion of the production is traded ?

The annual cycle is necessary for the monitoring because of the importance of seasonal fluctuations. The number of monitored fishing units is determined by two constraints: the number of investigators and the migratory movements which may make the survey plannings difficult.

A sample of 80 artisanal fishing units divided into the major landing points of the coastline (Hann, Mbour, Joal, kayar and Saint-Louis) has gone through an annual monitoring in 1981. The results obtained (Production costs and earnings) are regularly updated.

5. SYNTHESIS OF AVAILABLE INFORMATION FOR HANN

All the data collected are coded in the field by the technicians and transmitted to Dakar for verification and processing on computer. Validation and data structuration plans have been designed.

Hann is one of the major coastal landing centres that has regularly been monitored by a fishery research team since 1981. The data gathering is currently ensured by two data collectors and two beach aids. The latest information available is summed up in tables 1 and 2.

The annual landings of Hann village are estimated at 17,000 tonnes, of which 80% are pelagic fish. They represent 43% of the overall catches of Dakar region, and 5% of the landings of the overall boats operating on the Senegalese coastline.

CRODT has counted 150 boats (120 motorized and 30 with oar) at Hann in April 1995 against 187 in 1993. In spite of this fall in the number of boats in this centre, Hann plays a very important role in the marketing of the products landed by the boats. As a matter of fact, the nearness of the Dakar market, which offers profitable prices, favours the landing at Hann of numerous boats of the Petite Côte and Dakar region.

Tableau 1.- Couverture spatiale et temporelle du système
de collecte de données biologiques de pêche artisanale

Centres de débarquement enquêtés	Début des enquêtes	Personnel impliqué	Fréquences prises	Fréquences efforts
Saint-Louis	1974	1 enquêteur 2 aides	5 jours/ semaine	6 jours/ semaine
Kayar	1974	1 enquêteur 2 aides	5 jours/ semaine	6 jours/ semaine
Yoff	1979	1 enquêteur 2 aides	2 jours/ semaine	6 jours/ semaine
Ouakam	1982	1 enquêteur	2 jours/ semaine	2 jours/ semaine
Soumbédioune	1976	1 enquêteur 1 aide	2 jours/ semaine	6 jours/ semaine
Hann	1981	1 enquêteur 2 aides	2 jours/ semaine	6 jours/ semaine
Mbour	1978	2 enquêteur 2 aides	5 jours/ semaine	6-7 jours/ semaine
Joal	1978	2 enquêteur 2 aides	5 jours/ semaine	6-7 jours/ semaine

Tableau 2.- Parc piroguier recensé à Hann en 1993 et 1995

Type de pêche	1993 Avril	1993 Sept.	1995 Avril
Senne tournante	35	9	29
Senne de plage	3	5	7
Filet dormant	42	26	46
Ligne normale	37	40	21
Ligne glacière	66	46	45
Palangre	4	5	2
Total	187	131	150

Tableau 3.- Débarquements de produits halieutiques à Hann en 1993 (tonnes)

ESPECE	JANV	FEVR	MARS	AVRIL	MAI	JUIN	JUIL	AOUT	SEPT	OCT	NOV	DEC	TOTAL
ETHMALOSE	0	0	0	0	0	0	0	2	9	0	0	0	11
SARDINELLE RONDE	648	926	671	1506	2154	1926	77	39	26	74	217	282	8544
SARDINELLE PLATE	17	320	121	48	183	327	444	186	109	55	168	1	1978
BROCHET	0	0	0	22	7	12	14	2	8	3	15	6	91
MULET	43	42	207	47	0	6	28	1	14	9	66	21	485
CARPE BLANCHE	1	0	0	0	0	52	66	41	28	9	0	0	201
PELON	0	3	0	2	0	0	0	0	0	0	0	0	6
CHINCHARD JAUNE	26	53	72	95	50	56	80	49	56	24	85	61	706
CHINCHARD NOIR	25	155	39	25	0	0	0	0	0	0	21	225	490
GRANDE CARANGUE	0	0	0	0	0	0	7	15	2	31	0	0	55
LICHE	0	0	0	1	0	0	0	1	1	0	0	0	3
SCYRUS D'ALEXANDRIE	14	1	14	5	13	4	16	13	9	16	5	4	113
TASSERGAL	0	0	0	0	0	4	5	0	0	7	0	0	17
MAQUEREAU	167	26	30	43	0	6	6	0	0	0	17	26	315
MAQUEREAU BONITE	43	0	0	0	1	6	10	10	11	8	42	3	132
THONNE	0	38	2	3	4	6	6	4	2	44	7	26	149
BONITE	0	0	0	0	1	15	6	0	0	0	2	4	29
CEINTURE	0	0	1	13	17	2	2	3	1	0	0	0	38
VOILIERS	0	0	0	0	0	1	10	2	0	0	0	0	13
AUTRES PELAGIQUES	51	19	14	13	24	7	6	12	6	3	28	8	192
TOTAL PELAGIQUES	1036	1582	1195	1807	2461	2425	769	384	318	256	681	653	13568
MACHOIRON	0	0	0	0	0	0	16	0	0	0	0	0	16
MURENE	0	6	0	0	0	0	0	0	0	0	0	0	7
PLEXIGLASS	0	3	0	0	1	0	0	0	0	0	0	0	4
BADECHE	0	1	1	3	0	0	0	0	0	0	0	0	6
THIOF	56	72	43	43	18	11	55	64	19	11	28	55	475
MEROU DE MEDITERRANEE	8	20	30	50	9	0	2	4	5	3	2	4	136
MEROU DE GOREE	32	100	88	90	11	2	44	50	22	24	33	57	554
MEROU GRIS	3	0	0	0	0	0	0	2	0	0	1	0	7
CARPE ROUGE	26	2	4	7	23	11	10	3	3	17	14	20	139
DORADE GRISE	37	11	20	22	4	5	27	22	22	15	17	8	208
CAPITAINE	0	0	0	2	0	7	0	0	0	0	0	0	9
COURBINE	0	0	24	0	4	1	3	8	3	12	0	7	64
DENTES	4	4	7	4	17	2	0	1	0	7	8	5	57
PAGEOT	9	2	7	19	3	23	29	65	123	84	36	6	405
PAGRE	40	53	49	71	76	99	127	71	21	73	36	58	772
SOLE LANGUE	0	0	1	0	0	0	0	0	0	0	0	1	2
REQUINS	0	0	0	0	0	1	0	0	5	0	0	0	7
RAIES	1	0	7	6	25	5	18	0	0	0	0	0	61
SEICHE	1	1	0	1	0	0	0	0	0	0	0	0	2
AUTRES DEMERSAUX	12	30	47	75	26	15	6	14	23	53	25	18	342
TOTAL DEMERSAUX	228	304	327	392	218	182	336	305	245	298	199	239	3271
GASTEROPODES	3	3	1	9	4	1	3	3	3	8	4	3	46
DIVERS	0	0	0	0	0	0	0	0	0	0	0	2	2
TOTAL GENERAL	1267	1889	1523	2208	2683	2609	1108	692	566	563	886	895	16886

Tableau 4. - Prix moyens au débarquement
à Hann (FCFA/kg)

Espèces	1993	1994
Sardinelle ronde	44	53
Sardinelle plate	46	45
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Thonine	61	103
Ceinture	13	33
Sole	960	1495
Seiche	-	1175

Ogun State

Date	Locality	Fish landing sites/villages Investigated
Dec.. 1992	Ijebu Waterside	Igbekki, Oka, Oke-Oso, Ollosumeta, Akede I, Ijegbe, Igbosere, Awodikora, Ode omi, Ilete, Iro-Awodikora, Akede II and Elefon

Target Fisheries

The major coastal estuarine fin fish fisheries identified by the survey are:

- 1) Pelagic, exploiting:
 - a) Ethmalosa Fimbriata, Bonga;
 - b) Sardinella maderensis, sardinella and
 - c) Ilisha africana, West African Shad (Ilisha) as well as
- 2) Demersal, targeting:
 - d) Pseudotolithus spp., croakers; marine catfish, Arius spp., and brackish water catfish, Chrysichthys nigrodigitatus together with
 - e) Polydactylus quadrifilis, shiny nose; Megalops atlanticus, tarpon and large elasmobranchs.

In addition, the crayfish fisheries harvesting shrimps, principally pink shrimp, Penaeus notialis; guinea shrimp, arapenaeopsislantica; white shrimp, Nematopalaemon (Palaemon) hastatus and brackish water shrimps Macrobrachium spp. are very prominent.

Given the sensitivity of economic data, the coastal fisheries resources survey initially was heavily skewed in favour of biological data, in conformity with the sub-projects. However, factors connected with fishing and others attenuate biological considerations. In effect, indices other than biological are equally crucial to stock assessments as well.

Towards effective development and management, investments need to consider opportunity costs and profitability, Information about the economics - of small scale fisheries therefore is crucial. Although they were delayed and as such in the 4 year resource survey evaluation project till the confidence of the coastal fishermen had been won because of data reliability. Cost and earnings are now fully underway and some of the early results are shown in Tables 3 and 4.

CONCLUSION

It is hoped that with a good knowledge of the fishery and appropriate cautionary steps the cost and earnings as well as the sensitivity analyses will be true to form in order to guide the direction and pace of development, and therefore investments in small scale fisheries of Nigeria.

Table 4. Costs and earnings of the cray fish fishery in Imo River estuary - Nigeria

1 COSTS		
	Stow Net Fishery	Crayfish Basin Trawl
A: Investment -		
4 Plank Canoe	₦ 6,000.00	
Gear	₦ 12,000.00	
Sail	₦ 200.00	
Outboard Mot. Engine	N/A	
Anchor	₦ 250.00	
Sub Total Investment	₦ 18,450.00	
B: Fixed		
Depreciation		
Craft @ 20%	₦ 1,200.00	
Gear @ 25%	₦ 3,000.00	
Sail @ 50%	₦ 100.00	
Outboard motor engine @ 25%	N/A	
Opportunity Cost @ 21%	₦ 3,874.50	
Sub Total	₦ 8,174.50	
C: Variable		
Repair and Maintenance @ 33%	₦ 6,088.50	
Fuel	N/A	
Lubricant	N/A	
Sub Total	₦ 6,088.50	

	Stow Net Fishery	Crayfish Basin Trawl
D: Total		
2. ANNUAL CATCH	4.176 kg	
3. REVENUE @ ₱10.00 - 12.5/kg		
Wet + Fresh	₱ 41,760 - 52,130.00	
4. PROFIT		
Pre Tax		
Return on Capital		
Profit on sale		
5. BREAKEVEN		
Wet and Fresh		
Catch		
Price		
Fishery days		
6. GDP		
Per Capital Income		
National Minimum Wages		

	Stow Net Fishery	Crayfish Basin Trawl
7. SENSITIVITY ANALYSIS		
Fuel		
@ 10% increase		
@ 20% "		
@ 30% "		
@ 45% "		
@ 50% "		
@ 60% "		
@ 70% "		
@ 80% "		
@ 100% "		
Outboard Motor		
@ 20% increase		
@ 30% "		
@ 40% "		
@ 50% "		
Canoe		
@ 20% increase		
@ 30% "		
@ 40% "		

FIRST MEETING OF THE WORKING GROUP ON COSTS AND
EARNINGS IN ARTISANAL FISHERIES IN WEST AFRICA
DAKAR, SENEGAL, FROM 12 TO 13 JUNE 1995

by

Moustapha KEBE
Fisheries Economist/Chief of the Macro-Economic Analyses Office
"BAME/ISRA".

FOREWORD

The Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) is interested in creating a " Working Group on Costs and Earnings in Artisanal Fisheries ". The main objective is to provide the member countries with baseline information that exists on the sub-sector and which is necessary for decision making.

In cooperation with the other institution of the region, IDAF will initiate one year studies on costs and earnings of fishermen. These studies will be presented and discussed during a workshop that will be held in November 1996.

The first meeting of the working group that will determine the general plan of the study was held in Dakar, from 12 to 13 June 1995. The synthesis of the different reports presented by the selected countries will be done in August 1996.

As for Senegal, the fisherfolk village of Hann has been selected for this study. Moustapha Kebe, Fisheries Economist working at the Senegalese Institute of Agricultural Research (ISRA) has been appointed by the Fisheries Administration to take part in this study, in collaboration with the IDAF Liaison Officer (O. N'diaye).

The present document is the contribution of Senegal to the first meeting of the working group. It gives the baseline data gathered by the fishery research in order to assess the costs and earnings of the artisanal fishing units operating along the coastline of Senegal. A particular emphasis is put on the socio-economic data that are available on the sub-sector for the selected site, Hann.

SUMMARY

INTRODUCTION

1. SPECIAL SURVEY

- 1.1. Canoe Census
- 1.2. Village Survey

2. MONITORING BIOLOGICAL DATA

- 2.1. Fishing Effort
- 2.2. Catches Sampling
- 2.3 Space-Time covering

3. MONITORING PRICES AT LANDING

4. MONITORING FISHING UNITS

5. SYNTHESIS OF AVAILABLE INFORMATION FOR HANN

ANNEXES

- 1 Canoe Census
- 2 Village Data Sheet
- 3 Fishing Effort Questionnaire
- 4 Monitoring Catches
- 5 Fish Price Survey
- 6 Questionnaire on Costs and Earning of Fishing Units

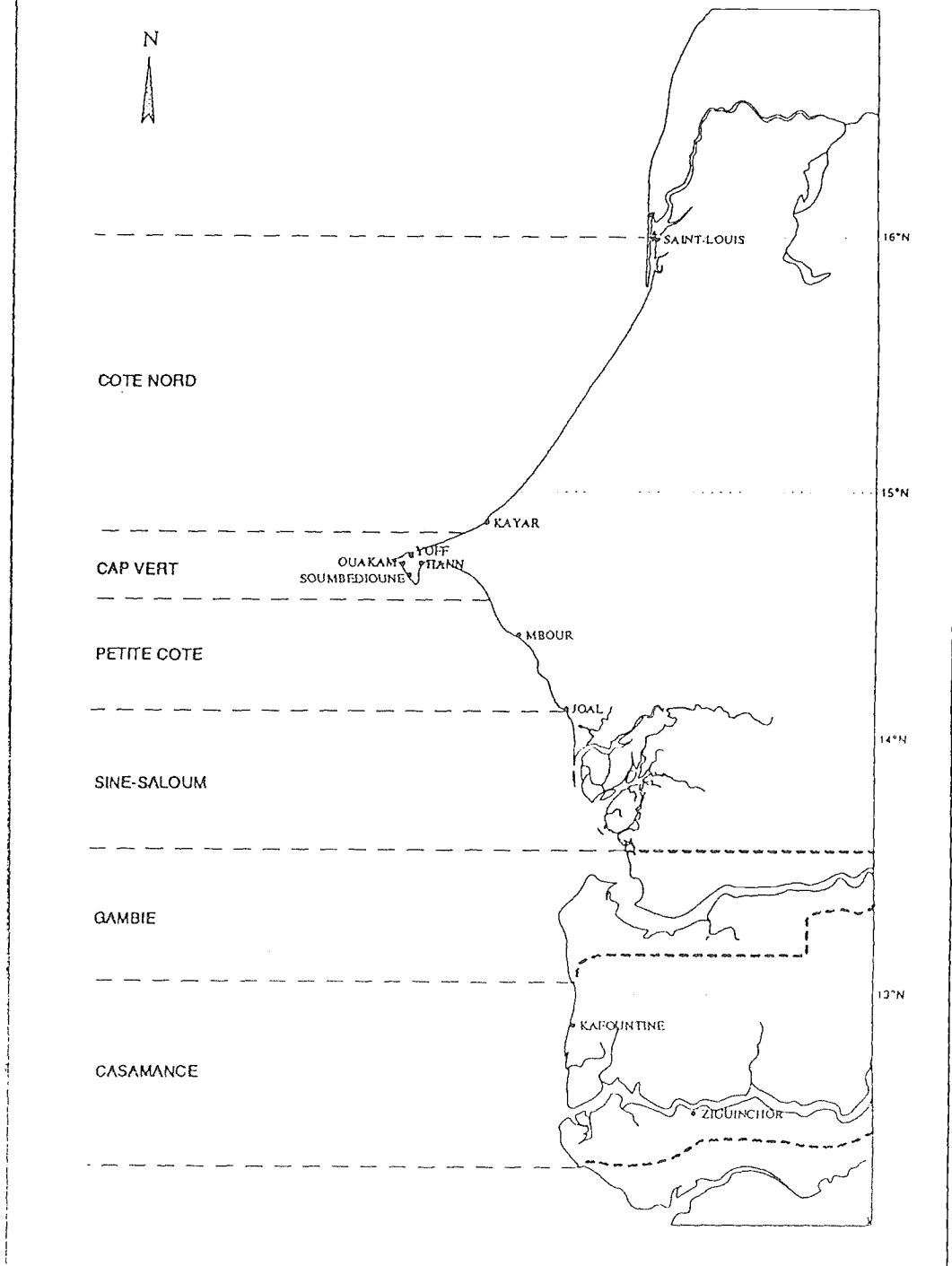
LIST OF TABLES

- 1 Space-time covering of biological data gathering System in Artisanal Fisheries
- 2 Canoe Census at Hann in 1993 and 1995
- 3 Fishery Products Landing at Hann in 1993
- 4 Average price at landing at Hann

INTRODUCTION

The Oceanographic Research Centre of Dakar - Thiaroye ("CRODT") initiated the collection of data in marine artisanal fisheries at the beginning of the 1970s within the framework of monographic studies conducted on some major species (tassergal, thiof, sardines). From 1975 on, the gathering system has been extended to all species and fishing gears. The first census of the artisanal fishing gears carried out in 1977 and 1978 has contributed to an awareness of the diversity of the exploitation system, of the multi-species nature of the resource and of the importance of the social dimension of artisanal fisheries. The collection schema and the processing of the data have been improved by the intervention of biometricians and socio-economists.

Figure 1 : Principaux centres de débarquements de pêche artisanale sénégalaise enquêtés par le CRODT.



As a matter of fact, the investigators realized, as the studies expand, that the biological factors are insufficient to explain and justify the form, level and socio-economic data at the different major landing points of the coastline (map 1) in order to better understand and explain the dynamic of the artisanal fisheries system.

1. SPECIAL SURVEY

To globally assess the potential of marine fisheries and to evaluate the exploration factors necessary for the estimation of marine fish products, a special survey has regularly been conducted since 1981 by a team of biologists and socio-economists of artisanal fisheries.

1.1. Canoe Census

Besides the counting of the overall fleets, the censuses help better understand the migratory movements and to measure the activity rate of the fleets. Their periodicity provides worthy indications on the evolution trends. Finally, these countings help estimate the employment created by artisanal fisheries.

Two censuses are carried out every year by the CRODT. The choice of the period is all the more important as the fishing seasons are well "marked". The periods chosen for Senegal are as follows:

- The cold season corresponding to the second fortnight of April. It is the period during which artisanal fisheries activities reach their peak and also the most intense period of the fishermen's migration;
- The hot season (the first fortnight of September). Fishing is at its lowest degree of activity, and most of the fishermen are back to their home villages, either for farming or for rest.

The coast as a whole (from DJIFFERE to SAINT-LOUIS) must be covered in a minimum of time (6 days) so as to avoid double countings due to the movements of boats from one place to the other. These censuses concern operational boats, that is, seaworthy boats. We distinguish the ones which are active from those which have not been used for fishing during the month preceding the census (annex 1).

The origin of each boat is marked, which helps to follow the migratory movements along the Senegalese coastline: the boats originating from the place of survey and the ones operating there.

All the countings are carried out per gear. In every place of survey there are questions on the type and number of the boats that arrived since the beginning of the census and their places of origin so as to avoid double counting.

Since 1985, the regions of Sine Saloum and Casamance have been covered occasionally.

1.2. Village Survey

The inventory of the existing infrastructures in every landing point helps us to update a dictionary of fisherfolk villages. The data recorded concern access to the village, fishing services, duty stations, ice deposits, mechanics, craftyards, builders of fishing gears, cooperatives, public services (annex 2).

This dictionary helps the planner better know the environment of a potential project, and makes possible the follow - up of a progress witnessed after the setting up of new infrastructures.

2. MONITORING BIOLOGICAL STATISTICS

The assessment of the catches at the main landing points of the coastline is obtained from the catches per trip multiplied by the number of trips. The strategy adopted includes two stages and concerns:

- the fishing effort, that's the number of trips per fishing gear;
- the catches per trip and per fishing gear.

Then CRODT proceeds to a stratified sampling, taking into account space-time and technological variabilities of the fishery. The strata are defined by the crossing of three qualitative variables: the on shore landing point of the boats, the period (fortnight) and the fishing gear. The numbers of the different strata are obtained by the counting of the daily trips. In each stratum, the preference is on the survey days on which the boats can be sampled. Within these boats some fish are measured. The sampling strategy meets the requirements of a stratified plan at several levels, but the units concerned by the sampling are not selected at random. The survey days correspond to opening days; the boats are sampled as they return. The fish of a boat are chosen the most "randomly" possible by the investigator while the fisherman is negotiating the sale of his product.

2.1. Effort Sampling

Fishing effort is in general measured six days per week (Monday to Saturday), as the lack of information is replaced by the average of adjoining days in order to take into account the time continuum. The efforts for the purse seines and the encircling gillnets of Joal and Mbour are accounted every day.

Three systems are used:

- The system of double deduction (Saint-Louis and Kayar). The knowledge of the fishery specific aspect (hours of departure and landing, places of landing per type of fishing...) helps deduct the number of trips per type of gear in difference with the deduction of the boats after their returning from fishing.
- The system of checking the arrivals (Mbour and Dakar region centres). A seaside aid marks per time block the arrival frequencies per type of fishing (annex 3);
- The system of interviews (Joal, Mbour, Point Sarène, Sarène, Kayar and Saint-Louis). The number of trips per day and per fishing gear is obtained from the list of fishermen, regularly kept up to date, and of interviews carried out on the beach

and involving some key fishermen. The informant registers the names of the fishermen that are out for fishing and the nature of the type of fishing practised.

2.2. Catch sampling

A sampling plan stratified at two levels is used: the primary units correspond to the sampled boats in the course of the survey days, and the secondary units to the fish selected within the catch of the sampled boats for the size frequencies.

The evaluation is carried out in two ways:

- in counting the number of individuals when this number is not very high. The size measurements of a sample of some individuals chosen "at random" (secondary units) help deduct the weight of the catches with the help of the relations "size/weight" set up for the main species;
- in estimating with the naked eye the weight per species. For species of secondary interest and the abundant species, the catches are estimated through the evaluation of the weight of small quantities of fish or by counting the number of baskets or boxes. So, for the purse seines (PS) and the encircling gillnets (EGN), the landing of fish is done by means of standardized baskets which are used for the sale. Some weighing and measure tests have been carried out by the investigators so as to control the average weight of the content of the baskets used. In 1981, a control of the assessment biases of the catches has been carried out from the lots of fish of known weights and different sizes.

The boats sampling helps estimate the catches by species (a list of 200 species is currently utilized) and record relevant information on the fishing effort (annex 4):

- type of fishing (gear);
- hours of departure and arrival;
- time spent on the way;
- weather forecasting;
- number of casts (total and positive) for the Purse Seine and Encircling Gill Net;
- fishing places;
- number of fishermen;
- Operating depth.

2.3. Space - Time - Covering

A summary of the space-time covering of the data gathering system is given in table 1. This system implies the participation of 9 investigators and 13 beach aids among whom 8 work on a full time basis and the remaining 5 on part time basis. The beach aids take charge of the fishing efforts and/or the size measurement of fish. The sampling rate in view per fishing gear (that's the proportion of targeted boats) is fixed at about 10% of the trips (which may represent 30 to 40 boats per survey day for some harbours, but can not always be achieved during certain periods of full fishing season). For the Purse Seine and Encircling Gill Net of Joal and Mbour, the sampling rate varies between 60 and 100% of the trips of the day.

The natural regions of Sine Saloum and Casamance are not covered by routine surveys on the catches and fishing activity. The data of the Department of Oceanography and Marine Fisheries (DOMF) are then used for the production of annual statistics of the whole marine boat fishing in Senegal.

3. MONITORING PRICES AT LANDING

The biological studies provide precise evaluations of the production in volume. The use of these data by the economist or the planner implies the possession of a good knowledge of the prices. But, these prices may vary from simple to triple in the course of a day, in a given place, in function of the landed quantities, and the number of present buyers, etc...

At landing, at least three prices are daily recorded for each one of the chief species landed or traded (representing 80% of the landing in volume and more than 90% of their value). These prices are collected daily at Saint-Louis, Kayar, Hann, Mbour and Joal. In each one of those centres, the work is carried out by an investigator that lives in the setting; the data gathering is done concurrently to the surveys on the landings. In some secondary centres, the prices at landing are recorded at irregular intervals.

The same questionnaire is used for all places (landing centres and markets) and all the categories of targeted agents (fishermen, fishmongers and retailers).

The survey records for each species the observation hour, the gear used for the catches, the category of inquired agent, the quality of the fish observed and the unit in which it is sold with its price (annex 5). Those units may be a basket or a box of a certain weight or a lot on the shore, the weight of which is valued, an individual whose length is measured by the survey and converted in weight by means of weight-lengths conversion tables. Then the price per kg is obtained by calculation. The observation is repeated three times daily for each species at the beginning, in the middle and at the end of the landings. This questionnaire can also be used outside Senegal.

4. MONITORING FISHING UNITS

The fishing gear constitutes the basis of the sampling for the biologist who studies the catches for stock management purposes.

The economist must base his analyses not on gears, but on fishing units. The fishing unit is made up of several boats, using one or several gears, simultaneously or successively. In the same way the purse seine units use beach seines in rainy season. The angling units also use set gill nets, jigging devices and/or cephalopod pots. In the same way a farmer can grow on several fields with different speculations or use polycropping system and, besides, practise husbandry, a fishing unit can also vary its activities.

The application of the results provided by biological studies passes by the monitoring of a fishing unit sample, which helps answer the following questions:

- what is the fishing capital used (boats, gears...) ?
- how many fishing days do the monitored units operate?
- which fishing gears are used, according to what schedule ?
- what are the costs of production ?

- how is the added value divided between those who possess the equipment and those who operate it ?
- which portion of the production is traded ?

The annual cycle is necessary for the monitoring because of the importance of seasonal fluctuations. The number of monitored fishing units is determined by two constraints: the number of investigators and the migratory movements which may make the survey plannings difficult.

A sample of 80 artisanal fishing units divided into the major landing points of the coastline (Hann, Mbour, Joal, kayar and Saint-Louis) has gone through an annual monitoring in 1981. The results obtained (Production costs and earnings) are regularly updated.

5. SYNTHESIS OF AVAILABLE INFORMATION FOR HANN

All the data collected are coded in the field by the technicians and transmitted to Dakar for verification and processing on computer. Validation and data structuration plans have been designed.

Hann is one of the major coastal landing centres that has regularly been monitored by a fishery research team since 1981. The data gathering is currently ensured by two data collectors and two beach aids. The latest information available is summed up in tables 1 and 2.

The annual landings of Hann village are estimated at 17,000 tonnes, of which 80% are pelagic fish. They represent 43% of the overall catches of Dakar region, and 5% of the landings of the overall boats operating on the Senegalese coastline.

CRODT has counted 150 boats (120 motorized and 30 with oar) at Hann in April 1995 against 187 in 1993. In spite of this fall in the number of boats in this centre, Hann plays a very important role in the marketing of the products landed by the boats. As a matter of fact, the nearness of the Dakar market, which offers profitable prices, favours the landing at Hann of numerous boats of the Petite Côte and Dakar region.

Tableau 1.- Couverture spatiale et temporelle du système de collecte de données biologiques de pêche artisanale

Centres de débarquement enquêtés	Début des enquêtes	Personnel impliqué	Fréquences prises	Fréquences efforts
Saint-Louis	1974	1 enquêteur 2 aides	5 jours/ semaine	6 jours/ semaine
Kayar	1974	1 enquêteur 2 aides	5 jours/ semaine	6 jours/ semaine
Yoff	1979	1 enquêteur 2 aides	2 jours/ semaine	6 jours/ semaine
Ouakam	1982	1 enquêteur	2 jours/ semaine	2 jours/ semaine
Soumbédioune	1976	1 enquêteur 1 aide	2 jours/ semaine	6 jours/ semaine
Hann	1981	1 enquêteur 2 aides	2 jours/ semaine	6 jours/ semaine
Mbour	1978	2 enquêteur 2 aides	5 jours/ semaine	6-7 jours/ semaine
Joal	1978	2 enquêteur 2 aides	5 jours/ semaine	6-7 jours/ semaine

Tableau 2.- Parc piroguier recensé à Hann en 1993 et 1995

Type de pêche	1993 Avril	1993 Sept.	1995 Avril
Senne tournante	35	9	29
Senne de plage	3	5	7
Filet dormant	42	26	46
Ligne normale	37	40	21
Ligne glacière	66	46	45
Palangre	4	5	2
Total	187	131	150

Tableau 3.- Débarquements de produits halieutiques à Hann en 1993 (tonnes)

ESPECE	JANV	FEVR	MARS	AVRIL	MAI	JUIN	JUIL	AOUT	SEPT	OCT	NOV	DEC	TOTAL	
ETHMALOSE	0	0	0	0	0	0	0	2	9	0	0	0	11	
SARDINELLE RONDE	648	926	671	1506	2154	1926	77	39	26	74	217	282	8544	
SARDINELLE PLATE	17	320	121	48	183	327	444	186	109	55	168	1	1978	
BROCHET	0	0	0	22	7	12	14	2	8	3	15	6	91	
MULET	43	42	207	47	0	6	28	1	14	9	66	21	485	
CARPE BLANCHE	1	0	0	0	0	52	66	41	28	9	0	3	201	
PELON	0	3	0	2	0	0	0	0	0	0	0	1	6	
CHINCHARD JAUNE	26	53	72	95	50	56	80	49	56	24	85	61	706	
CHINCHARD NOIR	25	155	39	25	0	0	0	0	0	0	21	225	490	
GRANDE CARANGUE	0	0	0	0	0	0	7	15	2	31	0	0	55	
LICHE	0	0	0	1	0	0	0	0	1	0	0	0	3	
SCYRIS D'ALEXANDRIE	14	1	14	5	13	4	16	13	9	16	5	4	113	
TASSERGAL	0	0	0	0	0	4	5	0	0	7	0	0	17	
MAQUEREAU	167	26	30	43	0	0	6	0	0	0	17	26	315	
MAQUEREAU BONITE	43	0	0	0	1	6	10	10	11	8	42	3	132	
THONINE	0	38	2	3	4	6	6	2	44	7	26	14	149	
BONITE	0	0	0	0	1	15	6	6	0	0	0	2	4	29
CEINTURE	0	0	1	13	17	2	2	3	1	0	0	0	38	
VOILIERS	0	0	0	0	0	1	10	2	0	0	0	0	13	
AUTRES PELAGIQUES	51	19	14	13	24	7	6	12	6	3	28	8	192	
TOTAL PELAGIQUES	1036	1582	1195	1807	2461	2425	769	384	318	256	681	653	13568	
MACHOIRON	0	0	0	0	0	0	16	0	0	0	0	0	16	
MURENE	0	6	0	0	0	0	0	0	0	0	0	0	7	
PLEXIGLASS	0	3	0	0	1	0	0	0	0	0	0	0	4	
BADECHE	0	1	1	3	0	0	0	0	0	0	0	1	6	
THIOF	56	72	43	43	18	11	55	64	19	11	28	55	475	
MEROU DE MEDITERRANEE	8	20	30	50	9	2	4	5	4	3	2	4	136	
MEROU DE GORREE	32	100	88	90	11	2	44	50	22	24	33	57	554	
MEROU GRIS	3	0	0	0	0	0	0	2	0	0	1	0	7	
CARPE ROUGE	26	2	4	7	23	11	10	3	3	17	14	20	139	
DORADE GRISE	37	11	20	22	4	5	27	22	22	15	17	8	208	
CAPITAINE	0	0	0	2	0	7	0	0	0	0	0	0	9	
COURBINE	0	0	24	0	4	1	3	8	3	12	0	7	64	
DENTES	4	4	7	4	17	2	0	1	0	7	8	5	57	
PAGEOT	9	2	7	19	3	23	29	65	123	84	36	6	405	
PAGRE	40	53	49	71	76	99	127	71	21	73	36	58	772	
SOLE LANGUE	0	0	1	0	0	0	0	0	0	0	0	1	2	
REGUINS	0	0	0	0	0	1	0	0	5	0	0	0	7	
RAIES	1	0	7	6	25	5	18	0	0	0	0	0	61	
SEICHE	1	1	0	1	0	0	0	0	0	0	0	0	2	
AUTRES DEMERSAUX	12	30	47	75	26	15	6	14	23	53	25	18	342	
TOTAL DEMERSAUX	228	304	327	392	218	182	336	305	245	298	199	239	3271	
GASTEROPODES	3	3	1	9	4	1	3	3	3	8	4	3	46	
DIVERS	0	0	0	0	0	0	0	0	0	0	0	2	2	
TOTAL GENERAL	1267	1889	1523	2208	2683	2609	1108	692	566	563	886	895	16888	

Tableau 4.- Prix moyens au débarquement
à Hann (FCFA/kg)

Espèces	1993	1994
Sardinelle ronde	44	53
Sardinelle plate	46	45
Machoiron	101	295
Brochet de mer	203	344
Barracuda	590	846
Mulet	174	343
Badèche	388	876
Thiof	900	1707
Mérou de Méditerranée	1061	1906
Mérou de Gorée	354	649
Mérou gris	611	1667
Mérou rouge	1111	1333
Carpe rouge	560	1139
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Pelon	-	85
Dorade grise	236	241
Courbine	442	505
Chinchard jaune	162	224
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Liche vadigo	-	1122
Chinchard noir	52	70
Trachinote	-	303
Mussolini	145	372
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Tassergal	355	475
Mafou	579	833
Denté bassa	793	1200
Pageot	230	323
Pagre	554	882
Sar	168	191
Brotule	-	944
Maquereau bonite	271	310
Bonite à dos rayé	129	150
Thonine	61	103
Ceinture	13	33
Sole	960	1495
Seiche	-	1175

ANNEX 2: VILLAGE - DATA SHEET

CRODT/SOCECO - FISHERMEN

PLACE : _____ MONTH: _____ YEAR —

ACCESS: _____ REGION: _____

CANOE PARK: SUMMARY TABLE

	PS		BEN		BS		KAYA		ARMA ND		CAST NET		LFDC		SBGN		SGN		OTHE R			
	P.P.				R.F.																	
	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C
Engine																						
Sail																						

NUMBER OF PS NETS: _____ NUMBER OF BS NETS: _____

MIGRATIONS

Origin of the migrants: _____
 Migration period: _____
 Destination of the migrants: _____
 Migration period: _____

FISHING

Type of fishing and species: _____
 Destination of the products: _____
 Fishing seasons: _____
 Landing sites: _____
 Type of processed products: _____

INFRASTRUCTURES AND SERVICES

DOPM: _____ Cooperatives: _____
 Mechanics: _____ Glass : _____
 Fuel: _____ Craftyards: _____
 Education: _____ Lobsterpots makers: _____
 Health: _____ Water _____ Electricity _____
 Poste offices: _____ Gendarmery: _____ Other
 administrations : _____

COMMENTS: _____

EFFORT IN CAP VERT (NUMBER OF TRIPS/HOUR)

CENTRE OF:

DATE:

INVESTIGATOR:

TYPE OF FISHING	CANOES SAIL-LINE	CANOE	ENGINE	LINE	STILL NETS		PURSE SEINES	BEACH SEINES
		BOTTOM	TROLLING	ICE-BOX	BOTTOM	SURFACE		
24-01								
01-02								
02-03								
03-04								
04-05								
05-06								
06-07								
07-08								
08-09								
09-10								
10-11								
11-12								
12-13								
13-14								
14-15								
15-16								
16-17								
17-18								
18-19								
19-20								
20-21								
21-22								
22-23								
23-24								
TOTAL								

QUESTIONNAIRE N° / / / / /
 CRODT/ISRA - SINE SALOUM PROGRAMME

FISHING UNITS QUESTIONNAIRE

PLACE: _____

DATE: / / / / / / / /

INVESTIGATOR: _____

INTERVIEWED PERSON

NAME OF THE SHIP OWNER: _____

/ /

NAME OF THE OWNER: _____

/ /

AGE: _____ RESIDENCE: _____

YEARS IN THE FISHING SECTOR (IN YEARS): _____

ADDITIONAL ACTIVITIES: _____

FORMER ACTIVITIES: _____

DO YOU BELONG TO ANY GROUP: YES / / NO / /

WHICH ONE: _____

DESCRIPTION OF THE F.U
 CRAFTS

NUMBER	1	2	3
TYPE			
LOCAL NAME			
LENGTH (M)			
WIDTH (M)			
HOLLOW (M)			
POSITION OF THE HOLE			
TYPE OF PROPULSION			
FUNCTION			
OWNER			
NEW OR SECOND HAND			
YEAR OF PURCHASE			
PRICE			

QUESTIONNAIRE N° / / / / /
 CRODT/ISRA - SINE SALOUM PROGRAMME

OPERATIONAL OR REPAIRABLE ENGINES

TYPE (BRAND, POWER)				
NEW OR SECOND HAND				
YEAR OF PURCHASE				
WAY OF PAYMENT (CASH OR CREDIT)				
PRICE •				
OPERATIONAL/REPAIRABLE				
ORIGIN OF THE BREAKDOWN				
OWNER				

FISHING GEARS

LINES NORMAL / /

TRIP / /

NUMBER OF LINES PER FISHERMAN: _____

NUMBER OF HOOKS PER LINE: _____

OWNER OF LINES: _____

NET

TYPE						
NUMBER OF NETS						
NUMBER OF NETTINGS/NET						
LENGTH OF THE NETTINGS						
STRETCHED OUT MESHING						
DEPTH						
TARGET SPECIES						
SEASON						
ESTIMATED PRICE						
OWNER						

QUESTIONNAIRE N° / / / / /
 CRODT/ISRA - SINE SALOUM PROGRAMME

OTHER FISHING GEARS USED

TYPE				
NUMBER				
PRICE/UNIT				

OTHER EQUIPMENTS

	NUMBER	ESTIMATED PRICE
TANKS		
ANCHORS		
ROPES		
BUOYS		
LAMPS		
WAX		
JACKETS		
POLES		

**ECONOMIC ORGANISATION OF THE F.U.
DESTINATION OF THE CATCHES**

ARE YOUR CATCHES PARTLY DESTINED TO SELF CONSUMPTION
OF THE MEMBERS OF THE F.U: YES /_ / NO /_ /

FISH GIVEN TO PERSONS OUTSIDE THE F.U (BE PRECISE)

UNDER WHICH FORM ARE THE CATCHES SOLD: FRESH /_ /

PROCESSED /_ / WHAT TYPES: _____

QUESTIONNAIRE N° /_ /_ /_ /_ /
CRODT/ISRA - SINE SALOUM PROGRAMME

WHO IS IN CHARGE OF THE SELLING OF THE F.U CATCHES: _____

WHO ARE YOUR CUSTOMERS (NUMBER THEM IN ORDER OF DECREASING
IMPORTANCE)

FISHMONGER		/_ /
BANA-BANA (SMALL TRADER)	/_ /	/_ /
PERSONS IN CHARGE OF THE PROCESSING	/_ /	/_ /
YOUR WIVES		/_ /
PLANTS (PRECISE WHICH ONES)	/_ /	_____
OTHER (BE PRECISE)	/_ /	_____

WERE THERE ANY AGREEMENT WITH TRADERS ? (STATE THE TERMS)

WHAT IS THE MODE OF SELLING OF THE CATCHES

IN SMALL LOTS /_ / PER UNIT /_ / IN BOXES /_ / PER KILO /_ /

SHARING SYSTEM OF THE EARNINGS OF THE F.U

WHEN DO YOU SHARE YOUR EARNINGS: _____

WHAT ARE THE CHARGES TAKEN OUT BEFORE THE SHARING: _____

WHAT ARE THE PARTS OF THE DIFFERENT EQUIPEMENTS (PER ELEMENT):

WHAT ARE THE PARTS OF THE FISHERMEN ON BOARD: _____

DO SOME PERSONS ON SHORE RECEIVE PARTS (EXPLAIN): _____

QUESTIONNAIRE N° / / / / /
CRODT/ISRA - SINE SALOUM PROGRAMME

IS THE MAINTENANCE OF THE EQUIPMENTS (THE MENDING OF THE NETS FOR EXAMPLE) REMUNARATED ?: _____

MIGRATIONS OF THE F.U

HAVE YOU BEEN OR ARE YOU GOING TO A FISHING CAMP IN THE ISLANDS THIS YEAR ? –

WHICH CAMP ? _____

IN WHICH SEASON ? _____

FOR HOW LONG ? _____

WHAT TYPE OF FISHING DO YOU PRACTISE THERE ? _____

WHAT IS THE ADVANTAGE OF THIS MIGRATION ? _____

HAVE YOU MIGRATED OUTSIDE THE ISLANDS THIS YEAR ? _____

PLACE: _____

IN WHICH SEASON: _____

FOR HOW LONG: _____

WHAT TYPE OF FISHING DO YOU PRACTICE THERE ? _____

WHAT IS THE ADVANTAGE OF THIS MIGRATION ? _____

IN YOUR OPINION, WHAT ARE THE MOST URGING PROBLEMS TO BE SOLVED FOR THE FISHERMEN OF THE ZONE.

C.R.O.D.T. / I.S.F.A.

SOCIO - ECONOMIE / MF

Lieu :

ENQUETES PRIX POISSON FRAIS

Date :

Enquêteur :

ENQUETE								CODAGE												
N°	REGION	ENCOM	CAT.	L.G.	ESPECE	UNITE	PRIX URCAIRE	DATE	AN	MOIS	JOUR	HEM.	LIT	ESP.	EMBIN	HTP	CAV	PRIX F/Kg	MODE	L.G.

