

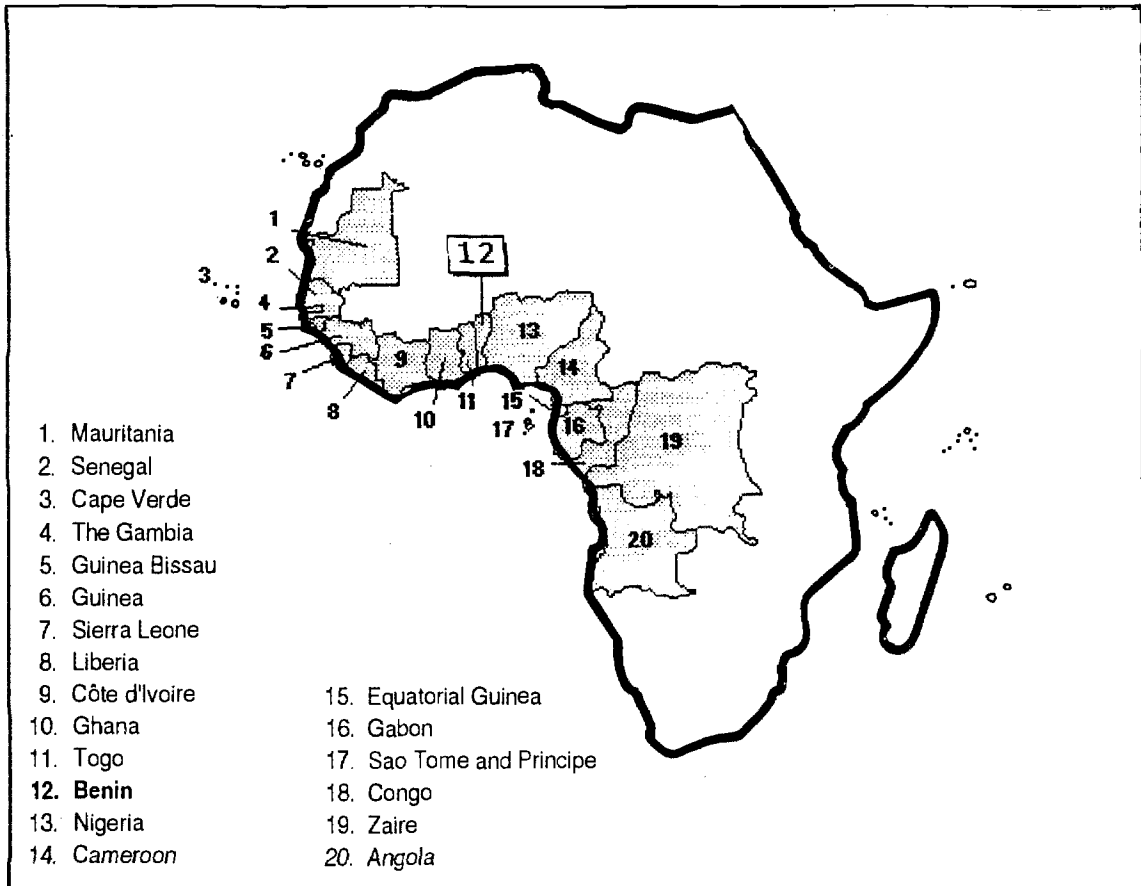
PROGRAMME FOR INTEGRATED DEVELOPMENT OF
ARTISANAL FISHERIES IN WEST AFRICA

IDAF PROGRAMME

Technical Report N° 100

May 1997

**Costs and Earnings in Artisanal Fisheries:
Methodology and Lessons Learned from Case Studies**



DANIDA

DEPARTMENT OF INTERNATIONAL DEVELOPMENT COOPERATION OF DENMARK



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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**Costs and Earnings in Artisanal Fisheries:
Methodology and Lessons Learned from Case Studies**

by

Foday Turay
Economist

and

Karin Verstralen
APO Socio-Economist, IDAF

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IDAF Project
FAO
P.O. Box 1369
Cotonou, Republic of Benin

E-mail: dipafao@bow.intnet.bj

Fax: (229) 33.05.19

Tel: (229) 33.09.25

THE VISION FOR IDAF PHASE III

INTRODUCTION

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

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

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

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

DEVELOPMENT OBJECTIVE

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

The immediate objectives are:

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

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

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

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

EXECUTIVE SUMMARY

From 22 to 24 April 1997, the third meeting of the Working Group on Costs and Earnings in Artisanal Fisheries took place at IDAF Headquarters in Cotonou. During this meeting, researchers presented the results of Cost and Earnings studies in their respective countries and made recommendations for future studies and follow-up activities.

Cost and earnings studies have been conducted in nine countries in the region; Benin, Cameroon, Côte d'Ivoire, The Gambia, Ghana, Guinea, Mauritania, Nigeria and Senegal. The objectives of these studies were: (i) to develop relatively cheap and practical methods for data collection and processing, (ii) to generate quantitative information on the expenditures and revenues in artisanal fisheries and the structure of sharing systems, and (iii) to assess the profitability of the main types of fishing units.

In order to reach these objectives fishing units have been followed during one year to collect information on operational activities, expenses, catches and incomes. Apart from a structured questionnaire to collect this information, in some countries fishermen participated actively by filling in notebooks that were distributed to them. Suppliers of fishing equipment have been the main sources for information on the replacement costs for engines, fishing gear and canoes.

This report presents and compares the results of studies conducted in Benin, Guinea, Senegal, Cameroon, The Gambia, Mauritania and Côte d'Ivoire. The presented results are limited to purse seine fishing units, set gillnet fishing units and handline fishing units.

The investment costs vary according to the fishing technique both within countries and across countries. The investment costs for purse seine fishing are generally highest, varying from \$8,337 in The Gambia to \$23,539 in Cameroon. Gillnet fishing has the lowest investment costs in all countries except Guinea, varying from \$2,835 in Senegal to \$7,318 in Guinea. In handline fishing investment costs range from \$2,705 in Guinea to \$8,522 in The Gambia.

Variable costs refer to operating costs, including the costs of fuel, oil, food, ice, bait, and repairs and maintenance. In most countries handline fishing has the highest annual variable costs (varying from \$6,452 in Benin to \$18,731 in Guinea), whereas apart from seine fishing in Côte d'Ivoire, gillnet fishing generally has the lowest (varying from \$1,304 in Senegal to \$9,146 in Guinea). The annual variable costs of purse seine fishing vary from \$1,915 in The Gambia to \$14,005 in Cameroon. Looking at the variable costs per trip generally gives a less extreme picture.

Annual sales depend on catch, fishing effort and fish price. In purse seine fishing annual sales vary from \$9,287 in Côte d'Ivoire to \$73,979 in Cameroon. In gillnet fishing annual sales vary between \$3,602 in The Gambia to \$23,297 in Guinea, while in handline fishing they range from \$12,535 in The Gambia to \$80,130 in Senegal. Low figures in all types of fishing are often due to the low price of species caught.

Most countries have distinguished between shares allocated to boat-owners and shares allocated to the crew. These refer to shares of the total revenues of the fishing units after the deduction of common costs. Senegal has given more detailed information on sharing systems, including shares allocated to the usual elements, such as canoe, fishing gear, engine and crew. In Benin, all types of fishing units studied allocate 50% to the boat-owner and 50% to the crew. The same system

is applied by purse seine fishing units and gillnet fishing units in Cameroon and by collective seine units in Côte d'Ivoire. Beach seine fishing units in Côte d'Ivoire allocate 27% to the boat-owner and 73% to the crew. In Guinea, purse seine fishing units and gillnet fishing units allocate 60% to the boat-owner and 40% to the crew, while handline fishing units allocate 20% to the boat-owner and 80% to the crew. In Gambian gillnet fishing, 75% is for the boat-owner and 25% for the crew, in handline fishing 40% is for the boat-owner and 60% for the crew, while sharing systems in purse seine fishing differ per unit. Senegalese purse seine fishing units allocate 40% to the boat-owner and 60% to the crew, while gillnet fishing units allocate 58% to the crew. The boat-owner receives 42%. In handline fishing, 82% is allocated to the crew and 18% to the boat-owner.

As a result of the sharing systems described above, monthly revenues of boat-owners in purse seine fishing vary from \$187 in Benin to \$1,370 in Cameroon. In handline fishing monthly revenues of boat-owners vary from \$88 in Benin to \$894 in Senegal, while in gillnet fishing, monthly revenues of boat-owners vary from \$23 in Benin to \$319 in Guinea. Monthly revenues of fishermen are highest in handline fishing, varying between \$21 in Benin to \$515 in Senegal. In purse seine fishing fishermen earn between \$17 in Guinea to \$91 in Cameroon, while in gillnet fishing they earn between \$17 in The Gambia to \$130 in Senegal.

The profitability of a fishing unit can be defined by the yearly net revenues of the boat-owner, divided by the investment costs. The net revenues of boat-owner are the result of deducting the payment of crew members, depreciation costs, fixed costs and the costs of repairs and maintenance from the total revenues. Depending on the type of fishing, boat-owners succeed in realizing profits. In most countries handline fishing gives the highest profitability rates, varying from 14% in Benin to 137% in Senegal. In purse seine fishing profitability rates vary from 19% in Benin to 70% in Cameroon, while gillnet fishing shows profitability rates, varying from 6% in Benin to 84% in Senegal.

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1 INTRODUCTION

1.1 Rationale for Costs and Earnings Studies

Following the "Report of the First Meeting of the IDAF Working Group on Costs and Earnings in Artisanal Fisheries in West Africa" (Jallow, 1995), the costs and earnings studies are justified by the dearth of reliable information on the revenue side of fisheries exploitation. Such information is essential for fisheries development planning as well as in explaining the outcomes of development interventions in the fisheries sector. Information on costs and earnings is important in assessing the resource needs of the artisanal fisheries sector and its contributions to socio-economic development. This type of information will also lead to a better understanding of fisherfolk's strategies in response to changing economic policies affecting for example exchange rates, interest rates, taxes and subsidies.

Furthermore, the artisanal fisheries sector plays a significant role in the supply of food and employment in the region. In order to, at least, maintain the contribution of this sub-sector to economic development, development and management efforts need to be based on sound biological and socio-economic data. In general, fisheries data collection in West Africa tends to be biased towards biological characteristics (eg. catch and effort). Costs and earnings data, if available, are usually generated on an ad-hoc basis and thus limiting their usefulness to administrators, planners, researchers and fishersfolk.

Artisanal fisheries development in West Africa is in vogue. However, most efforts are directed towards fisheries expansion. Fisheries, by virtue of its particularities, are highly susceptible to over-exploitation, leading to biological and socio-economic wastage of scarce resources. To minimize the cost of intervention failure, fisheries planners and administrators need both biological and socio-economic information, especially in setting realistic goals and in determining their associated technical and socio-economic interventions.

In order to gain a better understanding of the economic reality of fisherfolk and to improve their capacity to plan interventions more effectively, planners and administrators need more detailed information on costs and earnings. For fisherfolk themselves the information might be useful to get a better insight in the returns on their investments and to give them more control over decisions on resource allocations. Apart from that, it should give fisherfolk the opportunity to participate actively in the planning and development of artisanal fisheries. However, fishermen's access to information is limited mainly because of their low literacy rate (both in absolute and relative terms) and by the absence of accounts on costs and earnings in their operations. Furthermore, the increasing capitalization of artisanal fisheries in at least some parts of the region makes fishing a complex activity, requiring sound management for its financial sustainability. As a result, financial management skills and reliable, up-to-date information on costs and earnings become more and more important.

In view of the value of costs and earnings data to stakeholders, the IDAF Programme in collaboration with National Fisheries Administrations and research institutes in the region, planned and implemented studies on costs and earnings in ten of its twenty associated countries. With this purpose a working group was formed and study coordinators selected. With the inclusion of Ghana in the study, the number of case studies went up to eleven. However, Cape Verde and Sao Tome and Principe and Ghana, their case studies are still to complete.

1.2 Objectives of the studies

Since the beginning of the study on costs and earnings in artisanal fisheries, three meetings have been held; The first in Dakar, Senegal (12-13 June 1995), the second in Banjul, The Gambia (26-28 February 1996) and the third in Cotonou, Benin (22-24 April 1997). The first meeting produced the study methodology, while the second discussed the mid-term progress and problems in the field. The discussion about methodology dealt with conceptual issues such as definitions, measurements, the unit of selection, sample size selection, data collection, and survey instruments. In Cotonou participants discussed the results of the studies and made recommendations for future costs and earnings studies and follow-up activities. By that time all but three of the studies were completed. The Cotonou meeting was opened by the Director of Fisheries of Benin, Mr. Joseph Ouaké, who highlighted his government's commitment to the IDAF Programme in general and the need to conduct costs and earnings surveys on a regular basis in the region more specifically. He thanked the IDAF Programme for initiating the study as well as for technically and financially supporting it.

The studies on costs and earnings in artisanal fisheries were conducted with the following objectives:

- to develop relatively cheap and practical methods for data collection and processing
- to generate quantitative information on the expenditures and revenues in artisanal fisheries and the structure of sharing systems
- to assess the profitability of the main types of fishing units

1.3 Members of the Working Group/Study Coordinators

Nine of the eleven countries participating in the study on costs and earnings were represented at the Cotonou meeting (see annex 1, list of participants). Two fishermen who participated in the study were also present; They are both Beninese, but one of them operates mainly in Cameroon. Nine country reports (including a progress report from Ghana) were presented and discussed. Since the Nigerian study coordinator retired shortly before the Cotonou meeting, his report was presented by one of his former colleagues. While the meeting was co-chaired by B. Horemans (the Officer-in-Charge of IDAF) and A.M. Jallow (IDAF Socio-economist). Karin Verstralen (APO Socio-economist) and Fuday Turay (Economist) served as rapporteurs who became responsible for reporting the meeting.

2 ADOPTED METHODOLOGY AND SURVEY PROBLEMS

2.1 Introduction

The methodology adopted for the study on costs and earnings in the artisanal fisheries is presented in the IDAF Technical Report N° 72 (Jallow, 1995). This section reviews the methodology adopted and highlights differences (if any) between that proposed and the methodology actually followed by the various study coordinators. Since lessons from the field are useful in view of the design and execution of future costs and earnings studies, field experiences are also discussed.

2.2 Study Area

Each of the nine countries participating in the study have produced complete country reports (see annex 3 to 8 for summary data) on studies conducted for a period of one year (except in Ghana and Mauritania) at the following artisanal fisheries landing sites:

- Cotonou, Benin (by F.A. Souradjou)
- Limbé and Idenau, Cameroon (by O. Njifonjou)
- Aby Lagoon, Côte d'Ivoire (by A. Konan and Y. Kouakou)
- Bakau and Tanji, The Gambia (by M. Bah and N. Dampha)
- Elmina and Tema, Ghana (by D.A. Yeboah)
- Boulbinet, Guinea (by M.O. Diallo)
- Nouadhibou, Mauritania (by I. Thiam)
- Orimedu, Nigeria (by M. Okpanefe)
- Hann, Senegal (by M. Kebé)

Except for Orimedu, these are major landing sites for artisanal fisheries in their respective countries. For example, the port of Cotonou accounts for 65% of the total number of canoes in Benin while in Hann, Senegal, 5% of the national catch is landed. At the time of the studies, the size of the fishing fleet was 249, 95, 117, 388, 244 and 148 for the sample sites in Benin, Cameroon, The Gambia, Ghana, Guinea, Nigeria and Senegal respectively.

The survey started during the second half of 1995 in all countries except Ghana where fieldwork commenced in June 1996. Due to practical problems, Mauritania abandoned the proposed methodology in favour of their regular data collection scheme. Some costs and earnings data were extracted from these routine surveys and subsequently submitted to IDAF.

2.3 Methods of Data Collection

This section focuses on the unit of selection, the selection of fishing units, sample size, survey instruments and data collection procedure.

Unit of selection

The fishing unit, defined in terms of gear-boat-mode of propulsion-labour-management regime combinations, forms the base unit of selection (see Jallow, 1995). Information on fishing expenditures and revenues were obtained from the boat owner (for owners active in fishing) or the captain (for absentee owners). Suppliers of fishing equipment and material were the main sources for information

on the replacement costs for engines, fishing gear and vessels. Other important information falling outside the purview of fishermen, such as the opportunity costs of capital and labour, licensing fees, subsidies and taxes were obtained from the appropriate sources.

Selection of fishing units and sample size

Taking into account the need for reliable and high quality information on the one hand and the foreseen reluctance of fishermen to divulge their income and the limited financial resources available to conduct the studies on the other hand, both study sites and fishing units were purposively selected. Although the sample size was biased towards fishermen who were easily accessible and willing to participate, the studies represent the major types of fishing units. With the exception of the Mauritanian sample, a total of 287 fishing units were followed in the eight case studies (Annex 11). In effect, this sample size fell short of that planned, mainly due to the non-cooperative and migratory behaviour of some of the selected fishing units and the abandoning of two of the selected sites (Mabetta in Cameroon and Badagry in Nigeria). On the whole, the number of fishing units retained for the study exceeded 10% of the total units at the landing sites studied.

Survey instruments and data collection procedure

A structured questionnaire, designed by IDAF (Annex 2), was adopted with slight modifications in some cases by all the study coordinators (although later abandoned by Mauritania), and administered by trained data collectors (fisheries enumerators, and/or a combination of fisheries enumerators and fishermen). Fishermen were actively involved in data collection. In some cases notebooks were distributed to them to fill in thereby using them as complementary data collectors. The latter was the case in five of the nine study areas. Apart from the Gambian, Mauritanian and Nigerian study coordinators, all others used the notebook system. However, the experiment failed in Guinea (Boulbinet) and was therefore abandoned. The failure of the notebook system was mainly attributed to the high illiteracy rate of fishermen. Also, the subject of study could be problematic. In cases where fishermen were used as data collectors, fisheries enumerators provided regular supervisory services. In The Gambia, Guinea and Nigeria, where fisheries enumerators were the sole data collectors, the frequency of data collection was three times a week.

2.4 Data Collected

As shown in the questionnaire (see Annex 2), the main information collected can be categorized as general information, operational activities and expenses, fish capture and incomes.

Apart from the identification and description of the fishing assets (boat, gear, engine), *general information* covers the fixed costs (initial purchase and replacement) of boat, gear and engine; mode of propulsion; sources of funds; crew size; the structure of sharing systems; and other costs, such as commercial bank lending rates and opportunity costs of labour. *Operational activities and expenses* concern the number of fishing trips (per month); daily or monthly fishing trip expenses, such as fuel, food, ice, bait, costs of repairs and maintenance, ropes, etc.; weather conditions; and fishing site. *Fish capture and incomes* include the catch (by species, quantity and value); prices of fish; and additional sources of incomes.

2.5 Data Processing

With the help of various spreadsheet programmes (eg., excel, lotus 3.1 and Dbase), the data were processed and presented as tables and indices of fishing profitability (eg., average cost per fishing trip, output, gross margins, returns to capital investment, fishermen's income, boat owner's income). Some of the study coordinators (eg., from Senegal and Benin) analysed the data with the help of resource persons.

2.6 Survey Problems

Survey problems were the subject of the meeting in Banjul (The Gambia). After reviewing the problems, study coordinators discussed appropriate remedies (see Annex 10). Problems discussed concern sample fishermen's withdrawal and migration, the unavailability of regular fisheries data collectors, the use of non-standard units of measurement for fish landings, and the availability of study funds. In addition to the measures taken regarding the quantification of fish landings, future studies should explore the possibility of estimating the relationship between the local units of measurements and the metric weights from relatively small sample studies. The resulting estimated conversion factors (which need to be revised from time to time) will serve as basis for translating fish landings recorded in local units into metric weights.

At the Cotonou meeting, study coordinators and other participants showed concern about the biased sampling method, reflected mainly in the selection of study sites and the non-replacement of drop-out units. The deliberate choice of easily accessible fishing communities resulted in the selection of those near or in big urban centres, for instance Lagos (Orimedu), Dakar (Hann), Conakry (Boulbinet), Cotonou (Benin) and Nouadhibou (Mauritania). Although these sample sites reflected, to a large extent, fishing units in remote parts of their respective countries, their cosmopolitan nature and proximity to the most important markets made them unique. Furthermore, the non-replacement of drop-out units reduced the sample size, hence the degree of its representativeness of the frame of reference. But, although the studies are not representative for the whole country, the coordinators did agree that they do reflect the situation at the sample sites. With the lessons learned from this first experience, extending cost and earnings studies to other landing sites will give a more complete picture. In this respect, the Cameroonian study coordinator reported the approval of his Ministry to finance a study on costs and earnings in another region of the country.

The active participation of fishermen in data collection does not only provide fishermen with information useful in managing their fishing units, but also promotes the practice of record keeping among them. The fishermen present at the meeting were very pleased to have participated in the study. To increase the participation of fishermen in this methodology, initial incentives which could take the form of training may deem necessary. This might increase the cost of the methodology in the short-run, but will decrease them in the long-run.

On the whole, participants at the Cotonou meeting regarded the study methodology as relatively cheap (US\$3 000 for a whole year's study) and effective in generating high quality costs and earnings data on artisanal fisheries. The success of this methodology was attributed to the strong confidence developed between fishermen and data collectors/researchers. This has been possible by the clear explanation given to fishermen (information source) about the objectives of the study and its future benefits to them, coupled with the personal and informal relation between data collectors and fishermen. Consequently, the selection and training of data collectors can be regarded as crucial in the successful application of the methodology in future studies.

3 SUMMARY OF RESULTS AND DISCUSSION OF CASE STUDIES

3.1 Introduction

Having described the methodology of the study, this section will review the results presented during the Cotonou meeting, focusing on case studies in Benin, Guinea, Senegal, Cameroon, The Gambia, Côte d'Ivoire and Mauritania. Since the study in Ghana was still going on at the time of the meeting, their results could not be discussed. Although the Nigerian study has been completed, its data need further validation before usage. As already indicated in the previous section, the Mauritanian data are generated by a different methodology than that agreed upon by the IDAF Working Group. Where appropriate, however, they are included in this section.

3.2 Investment Costs

In order to estimate the investment costs, the replacement costs of fishing equipment and material (canoe, engine, fishing gear) are used rather than the actual purchase price of the assets. This approach avoids the difficulties associated with the general raise in prices and the interest rate of the credit market for financing the fishing investment costs. Table 1 shows the total investment costs for the main types of fishing units across countries, i.e. purse seine, bottom set gillnet and handline.

Table 1 *Investment costs for the main types of fishing gear (in US\$)*

		Investment Costs		
		Purse seine	Gillnet	Handline
Benin		11 607	4 351	7 359
Guinea		11 636	7 318	2 705
Senegal		21 391	2 835	7 835
Cameroon		23 539	3 204	-
The Gambia		8 337	5 072	8522
Mauritania		-	4 033	7 913
Côte d'Ivoire	Beach seine*	21 127		
	Collective seine	7 324		

* This gear is different from the usual beach seine because it is operated in the lagoon from canoes. It however originated from the gear operated from the beach.

Investment costs vary according to the type of fishing both within countries and across countries. Purse seine fishing units, having the highest replacement costs, are the most capital intensive. On average, the investment costs are lowest in gillnet fishing in all the sample countries except in Guinea and in The Gambia. In the latter handline fishing scores the lowest. This may

partly be attributed to differences in fiscal regimes (presence of tax and subsidies). However, the role of fiscal factors explaining the variation in replacement costs across countries is not evident in Table 1. Senegal for example, which provides duty-free imports of engines and fishing gear, shows the lowest and second highest replacement costs for bottom set gillnet and purse seine (or handline) respectively. In fact, Senegal has comparable replacement costs in purse seine and handline fishing units with Cameroon and Benin respectively, countries with no tax exemptions for equipment and material used in artisanal fisheries.

The relatively low figure for handline fishing units in Guinea (US\$ 2,705) and in The Gambia (US\$ 853) cannot be fully compared to the ice carrying handline units used in Benin (US\$ 7,359), Senegal (US\$ 7,835) and Mauritania (US\$ 7,913). Although they carry ice, looking at the number of trips per year, they do not spend more than 1-2 days at sea. Their canoes are probably smaller than the ones used in Benin, Senegal and Mauritania and the number of hooks and the length of lines might be less.

The beach seine and collective seine fishing units in Côte d'Ivoire are both non-motorized. The relatively high investment cost of the beach seine can be explained by the length of the net. The collective seine that requires at least two canoes is the lowest in the purse seine category (US\$ 7,324) and that of Cameroon (US\$ 23,539) the highest. Other factors that might explain the observed variation in investment costs of fishing units include the mode of propulsion (outboard, inboard), the type of engine and the origin of the engine and fishing gear (Africa, Europe, Asia).

3.3 Variable Costs and Fishing Effort

Variable costs refer to operating costs, including the cost of fuel, oil, food, ice, bait, twines, ropes, equipment rental for fishing, and repairs and maintenance (Jallow, 1995). Table 2 gives the variable costs per type of fishing in each country.

Table 2 Annual variable costs for the main types of fishing gear (in US\$)

		Annual Variable Costs		
		Purse seine	Gillnet	Handline
Benin		3682	2 372	6 452
Guinea		10 276	9 146	18 731
Senegal		3 842	1 304	12 201
Cameroon		14 005	1 445	-
The Gambia		1 915	1 321	7 703
Mauritania		-	3 741	8 284
Côte d'Ivoire	Beach seine	493		
	Collective seine	93		

As the table shows, handline fishing units have the highest annual variable costs (varying from US\$ 6,452 in Benin to US\$ 18,731 in Guinea), whereas the seine fishing in Côte d'Ivoire records the lowest (less than US\$ 500). This is understandable, given the fact that beach seine and collective seine units are non-motorized and these fishing gears have a relatively long life span, hence the inclusion of their costs under investment costs. In the case of handline fishing units, the relatively high variable costs are mainly due to the large operating expenses (fuel, oil, ice, food, bait). For fishing gear lasting for a year or less, depreciation is neglected and the cost of repairs and maintenance is maintained to avoid double counting.

Apart from the seine fishing in Côte d'Ivoire, the lowest variable costs per year in purse seine (US\$ 1,915), gillnet (US\$ 1,304) and handline fishing (US\$ 6,452) are associated with The Gambia, Senegal and Benin respectively. However, the case of Benin shows that only looking at the variable costs per year is not adequate. Considering the effort, the number of trips per year shows that the number of trips in Beninese handline fishing is rather low while its variable costs per trip are second-highest (see Table 3). Guinea has the highest variable costs per year for all the three types of fishing units, except for purse seines for which Cameroon shows the highest variable costs (US\$ 14,005). Again, looking at the variable costs per trip gives a less extreme picture.

Table 3 Number of trips per year and variable costs per trip (in US\$)

		Number Of Trips (per year)			Variable Cost (per trip)		
		PS	GN	HL	PS	GN	HL
Benin		131	107	40	28	22	161
Guinea		132	204	144	78	45	130
Senegal		108	132	24	36	10	508
Cameroon		189	192	-	126	8	-
The Gambia		159	121	215	12	11	36
Mauritania		-	240	60	-	16	138
Côte d'Ivoire	Beach seine	174			3		
	Collective seine	148			< 1		

PS = purse seine; GN = gillnet; HL = handline

The variable costs per trip of handline fishing vary from US\$ 36 in The Gambia to US\$ 508 in Senegal. Table 3 further shows that the average number of trips per year in Gambian handline fishing is 215 while in Senegal handline fishing units undertake 24 trips per year. In Senegal however, a trip takes about 10 days. In The Gambia, the exact number of days is not known, but it is usually not more than 1-2 days. The same applies to Guinea.

During the workshop the costs of fuel were argued to weigh heavily on the variable costs. Although Senegal and Ghana are the only countries in the sample with known fuel subsidies, the

impact of this fiscal policy seems to have been reflected in gillnet fishing but not in purse seine and handline fishing. This suggests the important share of other components of the variable costs, such as oil, ice, food and quantities of fuel consumed.

3.4 Sales

Total sales per year depend on the catch, the effort made and the price of fish. The total sales are given in the following table.

Table 4 Annual catch, price per kilo and annual sales for the main types of fishing

	Annual Catch (kg)			Price Per Kilo (US\$)			Annual Sales (US\$)		
	PS	GN	HL	PS	GN	HL	PS	GN	HL
Benin	19 053	3 959	7 520	0,70	1,38	1,67	13 249	5 444	12 551
Guinea	82 938	22 566	44 043	0,48	1,31	1,74	21 951	23 297	37 837
Senegal	-	-	-	-	-	-	37 520	10 670	80 130
Cameroon	178 875	3 078	-	0,47	1,41	-	73 979	3 855	-
The Gambia	97 614	3 566	16 070	0,37	1,01	0,78	36 285	3 602	12 535
Mauritania	-	5 280	10 980	-	2,45	2,26	-	13 036	24 815
Côte d'Ivoire	BS	166 344		0,15			24 629		
	SS	104 784		0,09			9 287		

PS = purse seine; GN = gillnet; HL = handline; BS = beach seine; SS = collective seine

In comparing the results per country, in two cases the relatively low sales are mainly due to low prices for the species caught, i.e. Côte d'Ivoire and The Gambia. For the other countries prices do not show much difference. Here it is rather the effort and the total catch that seem to determine the total sales per year.

In purse seine fishing the total sales per year vary from US\$ 9,287 in Côte d'Ivoire to US\$ 73,979 in Cameroon. As already said, the low figure in Côte d'Ivoire can be at least partly explained by the relatively low price of the fish caught. The high figure in Cameroon seems to be the result of the high number of trips (189) they undertake. However, during the workshop the study coordinator for Cameroon added that in 45% of the trips the nets were almost empty.

In gillnet fishing the total sales vary from US\$ 3,602 in The Gambia to US\$ 29,561 in Guinea. The low figure in The Gambia is partly due to the relatively low price of the fish caught, while the high figure in Guinea can be explained by the quantities caught.

In handline fishing the total sales vary from US\$ 12,535 in The Gambia to US\$ 80,130 in Senegal (Table 4). Again, The Gambia gives a much lower price for species caught than the other countries. In Benin, the effort in handline fishing as well as purse seine fishing seems to be relatively high compared to production.

3.5 Financial Returns

3.5.1 Sharing Systems

The following table gives an overview of the sharing systems found in the sample studies.

Table 5 Sharing systems per type of fishing

		Canoe (owner)	Net	Engine	Crew	Average Crew Size
Benin	Purse seine	50%	-	-	50%	16
	Gillnet	50%	-	-	50%	6
	Handline	50%	-	-	50%	12
Guinea	Purse seine	60%	-	-	40%	23
	Gillnet	60%	-	-	40%	5
	Handline	20%	-	-	80%	6
Senegal	Purse seine	3%	33%	3%	60%	20
	Gillnet	14%	14%	14%	58%	4
	Handline	9%	-	9%	82%	9
Cameroon	Purse seine	50%	-	-	50%	23
	Gillnet	50%	-	-	50%	2
The Gambia	Purse seine	40% - 75%	-	-	25% - 60%	7
	Gillnet	75%	-	-	25%	2,3
	Handline	40%	-	-	60%	6
Mauritania	Gillnet	17%	-	17%	66%	4
	Handline	12,5%	-	12,5%	75%	6
Côte d'Ivoire	Beach seine	27%	-	-	73%	20
	Collective seine	50%	-	-	50%	8

Most countries have distinguished between shares allocated to the boatowners and those allocated to the crew. These are shares of the total revenue of the fishing unit after the deduction of common costs. Senegal has given more detailed information on sharing systems, including shares allocated to the usual elements: the canoe, fishing gears, the engine and the crew. At the

same time they give the dynamics in the structure of sharing systems. The given example is the introduction of navigational aids, such as echo-sounders, in the structure of sharing systems. This shows that the intensification of capital in artisanal fisheries is beginning to influence the structure of sharing systems.

3.5.2 Return to Labour and Capital

The total revenues of a fishing unit can be defined as the value of the catch sold. The net revenues of a fishing unit are the total revenues minus the common costs (Jallow, 1995). Sharing, according to the systems described above, gives the monthly revenues of boatowners and fishermen as shown in Table 6.

Table 6 Monthly revenues of boatowners and fishermen per type of fishing (in US\$)

		Average Revenues of Boatowners (per month)			Average Revenues of Fishermen (per month)		
		PS	GN	HL	PS	GN	HL
Benin		187	23	88	25	21	21
Guinea		256	319	289	17	96	160
Senegal		993	224	894	85	130	515
Cameroon		1 370	24	-	91	50	-
The Gambia		432	116	153	25	17	44
Mauritania		-	240	327	-	120	163
Côte d'Ivoire	Beach seine	397			64		
	Collective seine	730			92		

PS = purse seine; GN = gillnet; HL = handline

Comparing the average net revenues of boatowners and fishermen per country to government salaries and farmer's income shows that at least the income of boat owners is relatively high (Table 7). The monthly revenues of fishermen, however, are in most cases far less than salaries earned in the public sector. In Senegal and in Mauritania they seem to be relatively better. Although the figures for farmers' revenues are limited, the data suggest that, in general, revenues in fisheries are superior to those in farming.

Table 7 Average revenues (per month) in artisanal fisheries compared to government salaries and farmer's incomes (in US\$)

	Boatowners	Fishermen	Government Employees	Farmers
Benin	99	22	36 (minimum)	-
Guinea	288	91	100 - 200	17 - 70
Senegal	704	245	70 - 370	35 - 123
Cameroon	697	25	62 - 317	-
The Gambia	233	31	626	185
Côte d'Ivoire	564	78	106 - 880	-
Mauritania	284	142	120	-

3.5.3 Net Profit and Returns on Investment Capital

The net profit or profitability of a fishing unit can be defined by the yearly net revenues of boatowner, divided by the investment costs. The net revenues of the boatowner are the result of deducting the payment of crew members, depreciation costs, fixed costs and the costs of maintenance from the total revenues of the fishing unit. The investment costs refer to the replacement costs of fishing equipment and material (see Table 1). Table 8 shows the net revenues of boatowners and consequently, the average profitability rates for the main types of fishing units.

Table 8 Net revenue of boatowners (in US\$) and profitability per type of fishing

		Net Revenues of Boatowners (per year)			Profitability		
		PS	GN	HL	PS	GN	HL
Benin		2 249	274	1 058	19%	6%	14%
Guinea		3 072	3 829	3 466	26%	52%	128%
Senegal		11 912	2 693	10 729	56%	84%	137%
Cameroon		16 435	291	-	70%	10%	-
The Gambia		5 185	1 396	1 836	62%	28%	22%
Mauritania		-	2 880	3 920	-	214%	198%
Côte d'Ivoire	Beach seine	4 765			21%		
	Collective seine	8 755			52%		

The lowest profitability rates for purse seine fishing (19%), gillnet fishing (6%) and handline fishing (14%) are found in Benin. This seems to be related to the relatively low annual catches discussed in section 3.4. Comparing the profitability rates to the investment costs of the types of fishing units studied shows very different results. Benin and Cameroon are the only countries where profitability rates grow according to the amount invested. In these two cases both the investment costs and the profitability rate are the highest for purse seine fishing. Guinea however, shows the contrary. Investment costs of US\$ 11,636 for purse seine fishing, US \$ 7,318 for gillnet fishing and US\$ 2,705 for handline fishing (Table 1) show profitability rates of 26%, 52% and 128% respectively. In Senegal and The Gambia, the fishing units with the highest investment costs (purse seine and handline fishing units respectively) show the lowest profitability rates (68% and 22%). Obviously, high investment costs do not automatically guarantee large profits. During the meeting, the profitability rates in purse seine fishing were argued to be the result of the high quantities landed, while the profitability of handline fishing rather seems the result of the species targeted, and accordingly, their price in the market (see Table 4).

During the meeting in Cotonou several factors influencing the profitability rate of fishing units have been discussed. The importance of taking the replacement costs of fishing equipment and material, rather than the real costs has already been discussed in section 3.2. The same applies to the repair and maintenance costs of fishing gear. In calculating them as operational costs, the costs are shared by boatowner and crew. Calculating them as depreciation costs puts them on the account of the boatowner only, reducing his net revenues and thus affecting the profitability rate.

It must also be noted that, in general, no share has been explicitly allocated to the boatowner for managing the fishing unit. However, one of the fishermen who was attending the meeting, noted that some fishing units in Cameroon have started allocating 5% of the total revenue to the boatowner for managing the fishing unit. This is usually common in cases where owners manage more than one fishing unit. Allocating a share for the boatowner reduces the net revenues of capital and that affects the profitability rate.

4 CONCLUSIONS AND RECOMMENDATIONS

In general, the methodology applied in costs and earnings studies has proved to be very useful. Participants at the meeting were very enthusiastic about the distribution of notebooks for fishermen to fill in. Using the note book system successfully, creates an essential relationship between enumerators and fishermen. However, the relationship has its own problems. One way of improving this relationship and building confidence has been the training of fishermen before they fill in the notebooks. The fishermen at the meeting highly appreciated this method of involving them in the study. They argued that this type of investment is obviously useful to the researchers and the fishermen. Another way of actively involving fishermen in the study is to present the results of the study to them and ask for assistance in analysing them. In Côte d'Ivoire this method was very successful. In some cases, the use of fishermen as enumerators clearly decreased the social, economic and cultural distance between researchers and fishermen.

Another important outcome of the study is the financial attractiveness of artisanal fisheries. Depending on the type of fishing, boatowners do get considerable profits. Comparing revenues in artisanal fisheries to government salaries or incomes from farming shows that boatowners have higher incomes. The answer to why fisherfolk are not rich, why they do not have money in their pockets, why they cannot replace fishing equipment and material when needed, and why they have a poor loan repayment record can only be found by combining the results of costs and earnings studies with results from other studies that deal with socio-economic issues in artisanal fisheries. Related studies can be on the use of income (conducted in Senegal and Ghana), on fiscal policies (conducted in Senegal and Ghana), on credit and savings in artisanal fisheries (conducted in Senegal and Ghana), and on costs and earnings of fish processors (conducted in Nigeria, Guinea, and Côte d'Ivoire).

In view of extending costs and earnings studies to countries in the region, it is important that the methodology is adopted by Fisheries Departments in the respective countries. In some countries they have been actively involved during the studies, but in countries where they have not been, the study coordinators should present the methodology to the IDAF Liaison Officers. The Liaison Officers would then introduce the methodology to the Fisheries Departments. The Departments should be familiar with the methodology so that the collection of this type of information can be integrated in their regular monitoring activities (eg., data collection on catch and effort) to guarantee continuity. Since these Departments often face budgetary restrictions, it was agreed that it is better to collect costs and earnings data at least at long intervals rather than not collecting the data at all. That will subsequently provide an essential reference for the planning and development of artisanal fisheries, and baseline information for future studies.

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**MEETING OF THE IDAF WORKING GROUP ON COST AND EARNINGS IN
ARTISANAL FISHERIES IN WEST AFRICA**

COTONOU, 22 - 24/4/1997

LIST OF PARTICIPANTS

Pays	Noms et Prénoms	Adresse
Côte d'Ivoire	KONAN Angaman	BP: 84 Adiaké tel: 53 70 29
Côte d'Ivoire	KOUAKOU Yao	Projet Pêche Lagune Aby CI BP: 84 Adiake Tel: (225) 53 70 65/29
Nigeria	ISEBOR Catherine	NIOMR 234-1-619517
Ghana	BORTEY Alabi	Dept. of Fisheries, Box 630, Accra
Ghana	ABEWA YEBOAH Doris	Dept. of Fisheries, Box 630, Accra
The Gambia	BAH Matarr	6 Marina Parade, Banjul
Senegal	KEBE Moustapha	ISRA/PASE BP: 3120 Dakar, Sénégal
Senegal	NDIAYE Yoro Diaw	CN CAS - BP 3890 Dakar
Cameroon	NJIFONJOU Oumarou	CRHOL/IRZV PMB 77 Limbe
Sierra Leone	TURAY Foday	Dept. of Econs, Fourah Bay College, PMB Freetown, Sierra Léone
Guinea	DIALLO Mamadou Oury	C.N.S.H. Boussoura Conakry
Guinea	TOURE Nahcissé Tounkara	DNPAM, Conakry
Benin	FOUSSENI Souradjo	Direction des Pêches, BP 383 Cotonou
Benin	PORYON Ide Alfonse	Fisherman at Cotonou Harbour
Benin	AMOUSSOMBO Augustin	Fisherman at Limbé, Cameroon
Benin	HOREMANS Benoit	IDAF, BP 1369, Cotonou
Benin	JALLOW Alhaji	IDAF, BP 1369, Cotonou
Benin	GALLENE Jean	IDAF, BP 1369, Cotonou
Benin	AKAMBI Lassissi	IDAF, BP 1369, Cotonou
Benin	VERSTRALEN Karin	IDAF, BP 1369, Cotonou
Mauritania	THIAM Ismaila	CNROP BP 22 Tel: 45-124 Nouadhibou* Fax: 45-081

Annex 2: Adopted questionnaire

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:
 Type of engine: 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:
 Sharing system:

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 Costs:

<u>INCOME:</u>	Target	Species	Weight (kg)	Value
.....
.....
.....
.....

By - Catch

.....
Total Value:

Fish given out to friends and relatives etc.:

Species	Weight (kg)	Value
.....
.....
.....

<u>Price per species:</u>	Species	Price

<u>Extra Earnings:</u>	Source	Amount

Additional Information:

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Annex 3: Summary data for Benin

N°	DESIGNATION	FILET DORMANT	SENNE TOURNANTE	PALANGRES
1	Coûts d'investissement en FCFA	2.471.542	6.592.844	4.180.044
2	Capture moyenne/marée en Kilogramme	37	146	188
3	Nombre de marée/an	107	131	40
4	Prix moyen/kilogramme en FCFA	781	395	948
5	ventes annuelles	3.091.979	7.525.395	7.128.960
6	Nombre de mois de pêche/an	12	12	10
7	Coût commun de fonctionnement/an	1.347.451	2.091.284	3.664.880
8	Dividendes du revenu net	1.744.528	5.434.111	3.464.080
9	Part de l'équipage	872.264	2.717.055	1.732.040
10	Part du propriétaire	872.264	2.717.055	1.732.040
11	Amortissement et frais d'entretien et de réparation	716.697	1.439.361	1.131.297
12	Profit net du propriétaire	155.567	1.277.694	600.743
13	Nombre d'équipage	6	16	12
14	Revenu net du pêcheur/an	145.377	169.816	144.337
15	Revenu net du pêcheur/mois	12.115	14.151	12.028
16	rentabilité du capital investi	6%	19%	14%

Annex 4: Summary data for Guinea

COMPTE D'EXPLOITATION DES UNITES DE PECHE ARTISANALE PAR TYPE D'ENGIN (FG)

Filets Maillants Calés, Filets Maillants Dérivants et Filet Tournant:

Types d'engin de pêche	FMCgsm			FMCtgm			FMDEm			FMDEnm			FT		
	sortie	mois	an	sortie	mois	an	sortie	mois	an	sortie	mois	an	sortie	mois	an
Données moyennes															
Chiffre d'Affaires	125 619	2135 523	25 628 276	249 569	4 242 873	50 912 076	42 083	757 494	9 089 928	8 495	152 910	1 834	482 929	2 012 219	24 146 628
Consommations intermédiaires	49 317	838 389	10 060 868	120 063	2 041 071	24 492 852	23 210	417 780	5 013 360	8 980	71 640	920	85 639	942 029	11 304 348
Résultat brut de l'unité	76 302	1 297 134	15 565 608	129 506	2 201 602	26 419 224	18 873	339 714	4 076 568	4 515	81 270	859 680	97 290	1 070 190	12 842 280
Rémunération Travail (40%)	80 521	518 654	6 228 243	51 802	880 841	10 567 690	7 549	135 866	1 630 627	4 806	32 508	975 240	88 916	428 076	5 136 912
Effectif de l'équipe		5			6			3			2			23	
Revenu par marin embarqué	6 220	105 738	1 268 855	8 634	146 773	1 761 282	2 289	41 198	494 378	903	16 254	4 657	4 657	18 222	218 668
Rémunération Capital (60%)	45 781	778 280	9 339 365	77 704	1 320 961	15 851 534	11 324	203 828	2 445 941	2 709	48 762	195 048	58 374	642 114	7705 368
Amortissement du capital	1 752	29 784	357 408	8 946	67 082	804 984	602	10 836	130 032	454	2 772	585 144	8 093	34 023	408 276
Impôts et Taxes	490	8 330	99 960	490	8 330	99 960	490	8 820	105 840	490	8 820	33 264	490	5 390	64 680
Grandes Réparations	22 891	389 140	4668 682	88 852	660 481	7 925 767	5 662	101 914	1 222 970	4 355	24 361	105 840	29 187	321 057	3 852 684
Résultat net de l'armateur	20 649	351 026	4212 314	84 416	585 069	7 020 823	4 570	82 258	987 088	7 111	12 789	282 572	25 604	281 644	3 379 728
Sorties effectives (Pechart)		17	204		17	204		18	216		18	153 468		11	132
Sorties observées									181						61
Investissement															
Taux de rentabilité annuelle		8050 000			8940 000			4 437 500			1710 000			12 800 000	
Revenu armateur/Revenu marin		52%			79%			22%			9%			26%	
Flux Net de Trésorerie		3			7825 807			1 117 130			186 732			3 788 004	
Délai de récupération (mois)		6			6			21			16			11	

EXPLICATIONS

RESULTAT BRUT UNITE	=	Chiffre d'Affaire - Consommations intermédiaires
REMUNERATION TRAVAIL	=	Résultat Brut Unité* 40%
REMUNERATION CAPITAL	=	Chiffre d'Affaire - Rémunération Travail
RESULTAT NET DE L'ARMATEUR	=	Rémunération Capital - (Amortissements du Capital + Impôts et Taxes + Grandes Réparations)
1 US \$ = 1000 FG		
TAUX DE RENTABILITE ANNUELLE	=	Résultat Net Armateur/Investissement
FLUX NET DE TRESORERIE	=	Résultat Net Armateur + Amortissements
DELAI DE RECUPERATION	=	Investissement/Résultat Net Armateur

COMPTE D'EXPLOITATION DES UNITES DE PECHE ARTISANALE PAR TYPE D'ENGIN (FG)

Lignes Glacières et Palangres:

Type d'engin	LIG			Pa		
	sortie	mois	an	sortie	mois	an
Données moyennes						
Chiffre d'Affaires	289 029	3 468 348	41 620 181	225 821	1 806 571	21 678 857
Revenu brut de l'équipage (80%)	231 223	2 774 679	33 296 145	180 657	1 445 257	17 343 086
Consommations Intermédiaires	143 087	1 717 039	20 604 467	143 087	1 144 693	13 736 311
Revenu net de l'équipage	88 137	1 057 640	12 691 678	37 571	300 565	3 606 775
Effectif de l'équipage		6			4	
Revenu par march embarqué	14 689	176 273	2 115 280	9 393	75 141	901 694
Résultat brut de l'armateur	57 806	693 670	8 324 036	45 164	361 314	4 335 771
Amortissement du capital	1 731	20 774	249 288	2 763	22 104	265 248
Impôt et Taxes	694	8 333	99 996	694	5 555	66 664
Grandes Reparations	28 903	346 835	4 162 018	22 582	180 657	2 167 886
Résultat net de l'armateur	26 477	317 728	3 812 734	19 125	152 998	1 835 974
Sorties effectives (Pechart)		12	144		8	96
Sorties observées		156			35	
Investissement	2975 000			30 550 00		
Taux de rentabilité annuelle	128%			60%		
Revenu armateur/Revenu marin	2			2		
Flux Net de Tresorerie	21 015 714			7 942 546		
Delai de récupération (mois)	5			7		

EXPLICATIONS

REVENU BRUT EQUIPAGE = Chiffre d'affaire* 80%
 REVENU NET EQUIPAGE = Revenu Brut de l'équipage - Consommations Intermédiaires
 RESULTAT BRUT DE L'ARMATEUR = Chiffre d'affaire - Revenu Brut de l'équipage
 RESULTAT NET DE L'ARMATEUR = Résultat Brut Armateur - (Amortissements du Capital + Impôts et Taxes +
 Grandes Réparations)

1 US \$ = 1000 FG

TAUX DE RENTABILITE ANNUELLE = Résultat Net Armateur/Investissement
 FLUX NET DE TRESORERIE = Résultat Net Armateur + Amortissement
 DELAI DE RECUPERATION = Investissement/Résultat Net de l'Armateur

Annex 5: Summary data for Senegal

Compte d'exploitation par unité de pêche (FCFA)

Unité de pêche	Filet dormant	Pirogue glacière	Senne tournante
Chiffre d'affaires	6.060.289	45.513.978	21.311.418
Frais communs	741.608	6.929.606	2.182.090
Produit net à partager	5.318.681	38.584.372	19.129.328
Part de l'équipage	3.545.787	31.569.032	11.593.532
Revenu brut du propriétaire	1.772.894	7.015.340	7.535.796
Coûts fixes	243.399	921.000	769.000
Revenu net d'exploitation	1.529.495	6.094.340	6.766.190
Revenu mensuel du travail	295.485	2.630.753	966.128
Revenu mensuel par pêcheur	73.871	292.306	48.306
Revenu par pêcheur et par marée	6.716	146.153	5.367
Revenu par pêcheur et par jour de mer	6.716	14.615	5.367
Revenu mensuel du propriétaire	127.458	507.862	563.849
Revenu du propriétaire par marée	11.587	253.931	62.650
Revenu du propriétaire par jour de mer	11.587	25.393	62.650

Détermination des principaux indicateurs financiers et économiques par type d'unité de pêche

Unité de pêche	Pirogue glacière	Filet dormant	Senne tournante
Revenu net du capital (FCFA)	6.094.340	1.529.495	6.766.190
Capital investi (FCFA)	4.450.000	1.815.000	12.150.000
Taux interne de rentabilité (%)	137%	84%	56%
Délai récupération du capital (mois)	9	8	8
Revenu du travail	31.569.032	3.545.787	11.593.532
Valeur ajoutée nette (FCFA)	37.663.372	5.075.282	18.359.722
Chiffre d'affaires (FCFA)	45.513.978	6.060.289	21.311.418
Valeur ajoutée nette/Chiffre d'affaires (%)	83	84	86
Revenu du travail/Valeur ajoutée nette (%)	84	70	63
Nombre de pêcheurs	9	4	20
Capital investi par tête (FCFA)	497.312	245.087	220.732

Annex 6: Summary data for Cameroon.

Répartition des revenus tirés de la vente des produits de pêche: charges totales d'exploitation et rémunération du capital et du travail

DESIGNATION	AWASHA	TMS	FMF
Ventes annuelles	42 020 035	2 465 233	2 189 837
Taille de l'échantillon suivi	11	10	10
Effort de pêche (Nombre de sortie/an)	189	173	192
Nombre de mois de pêche	12	12	12
Charges totales annuelles de production	13 509 706	834 221	838 239
Part de l'équipage	14 310 227	816 502*	677 005*
Part du propriétaire	14 310 227	816 502	677 005
Amortissement total de l'unité de pêche	4 225 000	538 334	511 668
Recrutement des pêcheurs à l'étranger	666 667	-	-
Profit net du propriétaire	9 334 999	278 168	165 337
Taille de l'équipage	23	2	2
Revenu net du pêcheur	622 184 Mensuel: 51 849	408 251 Mensuel: 34 021	338 502 Mensuel: 28 208

* Les patrons des unités FMF et FMS font généralement partie de l'équipage sauf quand ces derniers possèdent plus d'une unité de pêche, ou sont uniquement des hommes d'affaire du secteur.

Débarquements, effort de pêche et quantités vendues par type d'unité de pêche.

Unité de pêche	Nombre de sorties/an (effort)	Prise par sortie (kg) (pue)	Quantité totale débarquée (kg)	Auto-consommation (kg) et dons de poisson	Prix / kg poisson (FCFA)	Quantité vendue (kg)
AWASHA	189	946	178 875	21 465	268	157 413
FMF	192	16	3 078	369	802	2 709
FMS	173	63	10 825	1 299	257	9 526

Annex 7: Summary data for Mauritania.

Les embarcations en bois.

Caractéristiques Physiques:

Zone de pêche: Cap blanc	Nombre de sortie/mois: 20
Longueur : 11m	Echantillon: 78 sur 443
Equipage : 5	

Les investissements

Embarcation (11m):	344 000 UM
Moteur hors-bord (40cv):	343 000 UM
Engins de pêche:	176 000
Total:	863 000 UM

Production

Nombre de sorties:	20/mois
En moyenne nombre de kg/sortie:	31 kg
Prix moyen en UM/kg:	750 UM
Valeur de la Production mensuelle: 750x31x20 =	379 500 UM

Frais d'exploitation (coûts variables)/mois

Carburant 22197 UM/sortie x 20	=	44 380 UM
Vivres 535 UM/sortie x 20	=	10 700 UM
Entretien/Réparation		
Embarcation 844 UM/sortie x 20	=	16 880 UM
Moteur 448 UM/sortie x 20	=	8 960 UM
Engin 67 UM/sortie x 20	=	1 340 UM
Total		82 260 UM

Taxes annuelles moyennes de trésorerie 15232 UM/embarcation c'est-à-dire une taxe de 1269 UM/mois.

Revenu Brut d'Exploitation (RBE)

379 500 UM - 82 260 UM	=	297 240 UM
Amortissement	=	7000 UM
Revenu Net propriétaire		
297 240 UM - (15 232 + 7000)	=	275 000 UM
TIR (Taux Interne de Rentabilité)	=	32%
Délai de récupération du capital	=	6 mois

Les Pirogues en Aluminium

Caractéristiques Physiques:

Zone de pêche: Cap blanc	Nombre de sorties/mois: 20
Longueur: 11m	Echantillon: 24 sur 149
Equipage : 6	

Les investissements

Embarcation (11m):	1 545 000 UM
Moteur hors bord (40cv):	466 000 UM
Engins de pêche:	319 000 UM
Total	2 330 000 UM

Production

Nombre de sorties:	20/mois
En moyenne nombre de kg/sortie:	32 kg

Prix moyen en UM/kg: 750 UM
Valeur de la Production $750 \times 32.22 \times 20 = 483\,300$ UM

Frais communs d'exploitation (coûts variables)

Carburant 2124 UM/sortie x 20 = 42 480 UM
 Vivres 528 UM/sortie x 20 = 10 560 UM
 Entretien/Réparation
 Embarcation 267 UM/sortie x 20 = 5 340 UM
 Moteur 520 UM/sortie x 20 = 10 400 UM
Total 68 780 UM

Taxes annuelle de trésorerie 9682 UM/embarcation c'est-à-dire une taxe de 807 UM/mois.

Revenu Brut d'Exploitation (RBE)

483 300 UM - 68 780 UM = 414 520 UM
 Amortissement = 26 200 UM
 Revenu Net propriétaire
 414 520 UM - (807 UM + 26 200 UM) = 388 000 UM
 TIR = 16%
 Délai de récupération du capital = 6 mois

Les embarcations en acier ont été assimilées à celles en aluminium, car elles présentent les mêmes caractéristiques physiques et occasionnent les mêmes dépenses.

Les Canots

Caractéristiques Physiques:

Zone de pêche: - Nombre de sorties/mois: 20
 Longueur: 6m Echantillon: 4 sur 30
 Equipage: 6

Les investissements

Embarcation 750 000 UM
 Moteur hors bord 40 cv 370 000 UM
 Engins de pêche 225 000 UM
Total 1345 000 UM

Production

Nombre de sorties: 20/mois
 En moyenne nombre de kg/sortie: 23kg
 Prix moyen en UM/kg: 750 UM
Valeur de la Production $750 \times 21 \times 20 = 337\,500$ UM

Frais communs d'exploitation (coûts variables)

Carburant 1799 UM/sortie x 20 = 35 980 UM
 Vivres 569 UM/sortie x 20 = 11 380 UM
 Entretien/Réparation
 Embarcation 750 UM/sortie x 20 = 15 000 UM
 Moteur 1267 UM/sortie x 20 = 25 340 UM
 Engin 833 UM/sortie x 20 = 16 660 UM
Total 104 369 UM

Taxe annuelle de trésorerie: 9682
 UM/embarcation c'est-à-dire une taxe de 807 UM/mois.

Revenu Brut d'Exploitation (RBE)		
227 500 UM - 104 369 UM	=	233 130 UM
Amortissement	=	11 400 UM
Revenu Net propriétaire		
233 130 UM - (807 UM + 11 400 UM)	=	221 000 UM
TIR	=	16%
Délai de récupération du capital	=	6 mois

Pirogue de Marée

Il s'agit de grandes pirogues en bois équipée d'une cale à glace.

Caractéristiques Physiques:

Zone de pêche:	-	Nombre de sorties/mois:	5
Longueur:	14	Echantillon:	25 sur 103
Equipage:	6		

Les investissements

Embarcation	735 000 UM
Moteur	350 000 UM
Engins de pêche	102 000 UM
Total	1 187 000 UM

Production

Nombre de sorties/mois	5
En moyenne nombre de kg/sortie:	183 kg
Prix moyen en UM/kg:	339 UM
Valeur de la Production 339x183x5 =	310 185 UM

Frais communs d'exploitation (coûts variables)

Carburant 5977 UM/sortie x 5	=	29 885 UM
Vivres 4153 UM/sortie x 5	=	20 765 UM
Glace 4353 UM/sortie x 5	=	21 765 UM
Appât 1200 UM/sortie x 5	=	6 000 UM
Entretien/Réparation		
Engin 5027 UM/sortie x 5	=	25 135 UM
Total		103 550 UM

Taxe annuelle de trésorerie 19039 UM/embarcation c'est-à-dire une taxe de 1587 UM/mois.

Revenu Brut d'Exploitation (RBE)

310 185 UM-103 550 UM	=	207 000 UM
Amortissement	=	11 000 UM
Revenu Net d'Exploitation		
207 000 UM-(1587 UM + 11000 UM)	=	196 000 UM
Revenu Net du marin		
196 000/8	=	24 500 UM
TIR	=	16%
Délai de récupération du capital	=	6 mois

Filet Langouste

Il s'agit de pirogues en bois qui pêchent la langouste verte.

Caractéristiques Physiques:

Zone de pêche: Guerra	Nombre de sorties/mois: 10	
Longueur: 12	Moteur:	40 CV
Equipage: 5	Echantillon:	-

Les investissements

Embarcation:	628 000 UM
Moteur:	264 000 UM
Engins de pêche:	94 000 UM
Total	986 000 UM

Production

Nombre de sorties/mois:	10/mois
En moyenne nombre de kg/sortie:	10.34 kg
Prix moyen en UM/kg:	1 000 UM
Valeur de la Production 1 000 x 20 x 10.34 =	206 800 UM

Frais communs d'exploitation (coûts variables)

Carburant 1807 UM/sortie x 10	=	18 070 UM
Vivres 444 UM/sortie x 10	=	4 440 UM
Entretien/Réparation		
Embarcation 1778 UM/sortie x 10	=	17 780 UM
Moteur 1621 UM/sortie x 10	=	16 210 UM
Engin 1355 UM/sortie x 10	=	13 550 UM
Total		47 540 UM

Taxe annuelle de trésorerie 17838 UM/embarcation soit une taxe de 1487 UM/mois.

Revenu Brut d'Exploitation (RBE)

206 800 UM - 47 540 UM	=	159 260 UM
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Revenu Net d'Exploitation

159 260 UM - 1487 UM	=	157 773 UM
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Filet Sole

Il s'agit de pirogues en bois qui pêchent la sole.

Caractéristiques Physiques:

Zone de pêche: Baie Etoile	Nombre de sorties/mois: 20	
Longueur: 11	Echantillon:	2 sur 47
Equipage: 4		

Les investissements

Embarcation	305 000 UM
Moteur 15 cv	235 000 UM
Engins de pêche	65 000 UM
Total	605 000 UM

Production

Nombre de sorties/mois:	20/mois
En moyenne nombre de kg/sortie:	22 kg
Prix moyen en UM/kg:	367 UM
Valeur de la Production $367 \times 22 \times 20 =$	162 948 UM

Frais communs d'exploitation (coûts variables)

Carburant 1769 UM/sortie x 20	=	35 380 UM
Vivres 369 UM/sortie x 20	=	7 380 UM
Entretien/Réparation		
Moteur 100 UM/sortie x 20	=	2 000 UM
Engin 100 UM/sortie x 20	=	2 000 UM
Total	=	46 760 UM

Taxe annuelle de trésorerie 9682 UM/embarcation c'est-à-dire une taxe de 807 UM/mois.

Revenu Brut d'Exploitation (RBE)

162 948 UM - 46 760 UM	=	116 188 UM
Amortissement	=	7 500 UM
Revenu Net d'Exploitation		
116 188 UM - (807 UM + 7 500 UM)	=	108 000 UM
Revenu Net du marin		
108 000 UM / 6	=	18 000 UM
TIR	=	19%
Délai de récupération du capital	=	6 mois.

Annex 8: Summary data for Côte d'Ivoire

Compte d'exploitation d'une UDP-senne de plage (filet "Aly")

	Montant (f cfa)
Chiffre d'affaires	13.989.500
Charges diverses	326.000
Charges "salariales" (équipage)	9.974.000
Total	10.310.000
Revenu brut d'exploitation	3.689.500
Amortissement	
- filets et accessoires	1.000.000
- pirogues	200.000
Total	1.200.000
Revenu net d'exploitation	2.489.500
Capital investi	
- filets et accessoires	10.000.000
- pirogues	2.000.000
Total	12.000.000
Taux de rentabilité	20,7%
Délai de récupération du capital investi	5 ans

Compte d'exploitation d'une UDP-senne syndicat

	Montant (f cfa)
Chiffre d'affaires	5.275.725
Charges diverses	32.500
Charges salariales	2.654.250
Total	2.686.750
Revenu brut d'exploitation	2.588.975
Amortissement	
- filets et accessoires	4.000.000
- pirogues	16.000
Total	416.000
Revenu net d'exploitation	2.172.975
Capital investi	
- filets et accessoires	4.000.000
- pirogues	160.000
Total	4.160.000
Taux de rentabilité	52,2%
Délai de récupération du capital investi	2 ans

Compte d'exploitation d'une UDP-filets maillants à Ethmalose (Bonga)

	Montant (f cfa)
Chiffre d'affaires	1.952.562
Charges diverses	59.527
Charges salariales	916.830
Total	976.357
Revenu brut d'exploitation	976.205
Amortissement	
- filets et accessoires	134.000
- pirogue	10.000
Total	144.000
Revenu net d'exploitation	832.205
Capital investi	
- filets et accessoires	200.000
- pirogues	50.000
Total	250.000
Taux de rentabilité	334%
Délai de récupération du capital investi	4 mois

Compte d'exploitation d'une UDP-filets maillants à Tilapia

	Montant (f cfa)
Chiffre d'affaires	389.000
Charges diverses	52.000
- Achat filets et accessoires	150.000
- Charges salariales	194.700
Total	396.700
Revenu brut d'exploitation	-7.300
Amortissement	
- pirogues	10.000
Total	10.000
Revenu net d'exploitation	-12.300
Capital investi	
- pirogue	50.000
Total	50.000

Récapitulatif (en f cfa).

	UDP-SP	UDP-SS	UDP-FME	UDP-FMT
Revenu du propriétaire non pêcheur (f cfa)	2.489.500	2.172.975	832.205	-12.000
Revenu du propriétaire-pêcheur (f cfa)	2.923.153	2.800.047	1.290.620	221.346
Revenu du pêcheur	433.653	627.072	458.415	233.646
Capital investi	12.000.000	4.160.000	250.000	200.000
Chiffres d'affaires	13.989.500	5.275.725	1.952.562	389.000
Revenu net d'exploitation	2.489.500	2.172.975	832.000	-12.000
Taux de rentabilité	20,7%	52,2%	334%	
Délai de récupération du capital	5 ans	2 ans	4 mois	

Annex 9: Report of the second Meeting of the Working Group on costs and earnings in artisanal fisheries in West Africa (Banjul, The Gambia).

REPORT OF THE SECOND WORKING GROUP MEETING ON COSTS AND EARNINGS IN ARTISANAL FISHERIES IN WEST AFRICA

FRIENDSHIP HOTEL, February 26 - 28 - 1996

BANJUL, THE GAMBIA

INTRODUCTION

The IDAF Programme is collaborating with national fisheries administrations and research institutions in the region to assess the cost structure, the sharing system, and the profitability of artisanal fisheries operations for a year. Ten of its twenty associated countries are involved. A Working Group on Costs and Earnings on Artisanal Fisheries in West Africa has been constituted through official nominations of the respective collaborators. The Group's first meeting was held in Dakar in June 1995.

Since then the Study Coordinators have been organising and supervising the field data collection. As agreed at the first meeting, a review meeting was organised in Banjul, The Gambia, on the 26-28 February 1996 to jointly review the field work and exchange information and experience.

MEETING

This review meeting was attended by seven of the ten collaborating countries and Ghana as an observer. Coordinators from Sao Tome and Cape Verde could not attend due to flight complications. Information on the field work in Cape Verde was not available for this meeting. It is also still not received at the Programme Office. The Benin Coordinator could not attend due to conflicting official engagements. The participants were addressed on the opening day by the Gambian Director of Fisheries, Ousman Drammeh. He elaborated on his Government's commitment and efforts in developing artisanal fisheries to provide food, employment, and foreign exchange earnings. He advised the participants to diligently work with their colleagues in the review of the work so far done on data collection in their respective countries. In concluding his brief address he expressed appreciation and gratitude to IDAF for initiating the study and DANIDA for financing the IDAF Programme.

FIELD WORK

Except Sao Tome, where the field data collection started in December, field work in all the collaborating countries started by September 1995. The varying experiences triggered lively exchanges of questions and answers among the participants.

All the data collectors used the IDAF designed questionnaires, though some modified portions of it to fit the respective local situations. In Benin (information in submitted report), Senegal, Côte d'Ivoire, Guinea, and Cameroon these questionnaires were bound into special

notebooks and issued to the fishermen to fill in themselves (if literate) or to ask for assistance from literate crew or family members to record their daily costs and earnings. In Côte d'Ivoire all the fishermen involved fill in the notebooks. No loose leaflets are used in their data collection. The notebooks are collected every month, the data are compiled, and the notebooks returned to the fishermen. In some sites the notebooks were replaced every two months. In Senegal they are gradually being tried. They did not succeed in Guinea and have since been abandoned. In Cameroon and Benin the notebooks have been accepted and are being encouraged.

In Nigeria, Badagry has been dropped as a selected study site and only Orimedu is now being covered. At this site the effort is also being monitored for subsequent extrapolation. The number of fishing units that operate for the data collection day is recorded. Out of the total units the collector selects four units to record the required data elements. According to the submitted report from Sao Tome, San Pedro has been replaced by Angolares to complement Neves as two sites agreed in Dakar. No data was obtained from Nouakchott in Mauritania because the enumerators, who did not receive their promised allowances from the Nouadhibou based research institute, refused to submit any field information they might have collected. The Coordinator's tact and commitment produced data from Nouadhibou for August to December 1995. The three times a week data collection continues in all the selected sites in spite of local problems and some delays or modifications in the selection of data collectors.

PROBLEMS ENCOUNTERED

The problems discussed ranged from the attitude of the fishermen towards the study, their migration pattern, the selection of enumerators, standardized weights and measures, and the availability of funds.

Attitude

All the Coordinators confirmed their meeting with targeted fishermen. In these meetings the objectives of the study were explained to the fishermen and they embraced the initiative to involve them in the recording of their own costs and earnings. Many of them volunteered at the beginning and some received notebooks. But with time some, for reasons that can only be assumed, left the scheme. The assumed reasons include expected financial rewards that they never received. In some cases, the fishermen were willing to collaborate with the local institution to gain recognition that can give them an advantage. They feel that the advantage can be useful in getting credit or specialised training. Those fishermen who left the scheme early in the study were replaced. To avoid distorting the comparison of the units selected, the ones who left later, at least a month after the data collection began, were never replaced.

In Cameroon, where there is a large immigrant fishermen population, there were difficulties to involve the fishermen at Mabetta. The situation got aggravated by the political conflict between Cameroon and Nigeria (country of origin of most of the foreign fishermen). So only minimum information is being collected from these nervous fishermen.

Migration

Migration has not been a major problem in the study sites. In Guinea, the selected fishermen who migrated were abandoned by the Coordinator. In Senegal, the records of migrant fishermen are retained and the migration noted under observation in the questionnaires. This mode has been accepted at this review meeting.

Selection of Enumerators

At the Dakar meeting it was recommended that the field data collectors be recruited from among the field staff of the respective collaborating institutions. This idea was not practical in all the sites. In some countries trained collectors were not available. The Coordinators resorted to hiring, training, and supervising non-institutional collectors who are paid directly from the study funds. This alternative, as much as it exerts some pressure on the limited financial resources, has been adopted as a suitable strategy to not only keep the study going but also to increase the availability of trained field oriented personnel.

Weights and Measures

All the countries involved use the metric system of weights and measures. The kilogram is used for catch landings. The problem many data collectors have is weighing the catch at the landing sites. Fishermen sometimes land catch at odd times and in quantities that cannot all be recorded by one or two data collectors. The presence of collectors at night or late evening landings has been difficult in many sites. The difficulties create a dependence on information supplied by the fishermen. As most, if not all, the artisanal fishermen do not weigh or measure their catch, the information is usually given in container measures (baskets, buckets, etc), which are then recorded as given or converted into kilogram weights by the data collectors. The time taken to weigh a fisherman's catch can be long if he lands pelagics like bonga. In some cases of demersal landings, individual species are weighed and recorded. When the catch is good, the time factor, lack of appropriate scales, and speed for better coverage of selected units compel the collectors to use eye estimation. In Guinea length-weight relationship has been used to record weights of landings. As this method is very technical it can only be used by collectors who have a research background, who had relevant training, or who are closely supervised. The exchange of experience on this matter helped many Coordinators to find a way out of their dilemma. It has been agreed that in cases where the price is not readily available it can be reconstituted from the market average price of the species being recorded.

The consensus achieved on the classification of fish given out as gift to crew members, friends, or relatives was to record the quantity under production, to mention it in additional information section, and to ignore the value in the recording of earnings.

Availability of Funds

The late arrival of IDAF funds caused discomfort to the Coordinators, some of whom did not receive the complementary funds promised by their institutions. They had to wait for the IDAF transfer payments and consequently delayed the beginning of the field work and the hiring of data collectors. Some of them used their own money to ensure that they started the study early enough. The problem got more serious in Mauritania where the Nouakchott site was paralysed for lack of money to encourage the data collectors. The field work had a rough start in Guinea,

but the situation was corrected by November 1995. In Nigeria, Badagry was sacrificed for lack of adequate funds to cover the two sites agreed in Dakar. After frank discussions on the financial aspect of the study, it is believed that the work will be smoother now for the partners.

LESSONS LEARNED

The lessons so far learned are extracted from the experiences of the Coordinators during the six months that most of them spent in the field. The areas of interest are information exchange, data collection, and sharing system.

It has been established as necessary to have a meeting with the operators involved and give them adequate information on the objective of the exercise and the consequent mutual benefits. The partnership element should be emphasized. Once they are adequately informed the cooperation becomes very strong and useful for information gathering.

The number of literate artisanal fishermen seems to be increasing. Therefore, some fishermen can now take records on their own. At a time that cost is hindering some investigative work in artisanal fisheries, the notebook system of data collection is offering us a channel of cost reduction in man-hours of regular field staff. The supervisory role of the staff can give them more time for routine functions. The notebooks are also serving as a training tool for the accounting of fishermen's operations.

Sharing systems vary in artisanal fisheries. The variation is interesting and useful, especially in analysing credit repayment means and equipment replacement.

DATA PROCESSING AND PRESENTATION

To facilitate the comparison of the different units and landing sites, the primary and secondary data elements have been discussed and agreed. Primary data to be collected will continue as given in the guidelines in Dakar. In cases where the fishing gear lasts for less than one year it should not be depreciated but considered as a variable cost element.

The analysis will be based on the information required to fill the presentation form that was discussed and accepted (see annex). The analysed data for at least six months will be reviewed at a meeting to be held in Cotonou, Benin in April 1997.

OTHER MATTERS

The observer from Ghana had very useful exchanges with the Coordinators and she benefitted from their experiences. That will give her a strong background when she starts the study in Ghana. She did express interest in beginning the field work in Ghana as early as March so that she can have some information to share at the review meeting scheduled for June 1996. So far, though, there has been no communication from her.

The network link was stressed by all the participants and IDAF has been committed to being the transmitter for relevant documents that the members would like to share. Mr Kebe of Senegal promised to provide a bibliography that will be useful to the members of the Working Group. This has not yet been received by IDAF. As all the participants expressed interest in getting a copy of IDAF Technical Report N° 65 (Working Group on Capital Needs and Availability in Artisanal Fisheries: Methodology and Lessons Learned from Case Studies), copies have been despatched to all of them.

All the meeting participants agreed that the study of the social aspect of revenue should be made a complementary part of the study on costs and earnings. This will be discussed in more detail at the June meeting.

Annex 10: Types of fishing units studied per country.

	PURSE SEINE	LONG ligne Normal I.C.	GILL NET	ENCIR. GILL NET	DRIFT NET	BEACH SEINE	POTS (Octopus)	CRAYFISH NET	TOTAL
BENIN	4	6	0	-	8	-	-	-	18
CAMEROON	16	-	8	-	17	-	-	0	41
COTE D'IVOIRE	-	-	16	-	-	14	-	-	30
THE GAMBIA	-	3	3	6	6	-	-	-	18
GHANA	3	-	5	-	8	-	-	-	24
GUINEA	23	-	50	8	0	-	-	-	81
NIGERIA	12	-	7	-	-	-	30	-	49
MAURITANIA*	14	10	9	-	5	8	-	-	50
SENEGAL	5	0	13	-	-	-	-	-	25

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

* The IDAF proposed methodology was abandoned, and the data submitted to IDAF was extracted from the regular data collection exercise which had a wider scope and higher sample size.

Annex 11: Exchange rates of national currencies to the US Dollar (US\$) and F CFA (Avril 1997)

Benin, Senegal, Cameroon, Côte d'Ivoire:

1 US\$ = 568 FCFA

Guinea:

1 US\$ = 1100 GF (Guinea Francs)

1000 FCFA = 2000 GF

The Gambia:

1 US\$ = 10 D (Dalasi)

1000 FCFA = 19 D

Mauritania:

1 US\$ = 150 UM (Unité Monétaire)

1000 FCFA = 264 UM

Nigeria:

1 US\$ = 82 N (Naira)

1000 FCFA = 145 N

Ghana:

1 US\$ = ₵1800 (cedis)

1000 FCFA = ₵3400

LISTE DES RAPPORTS DIPA - LIST OF IDAF REPORT

I. Documents techniques / Technical documents

- De Graauw, M.A., Etude de préfactibilité technique de l'aménagement d'abris pour la pêche maritime artisanale au Bénin. Cotonou, Projet DIPA, 55p., DIPA/WP/1.
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