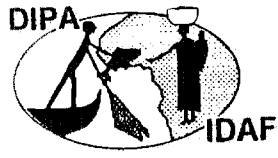


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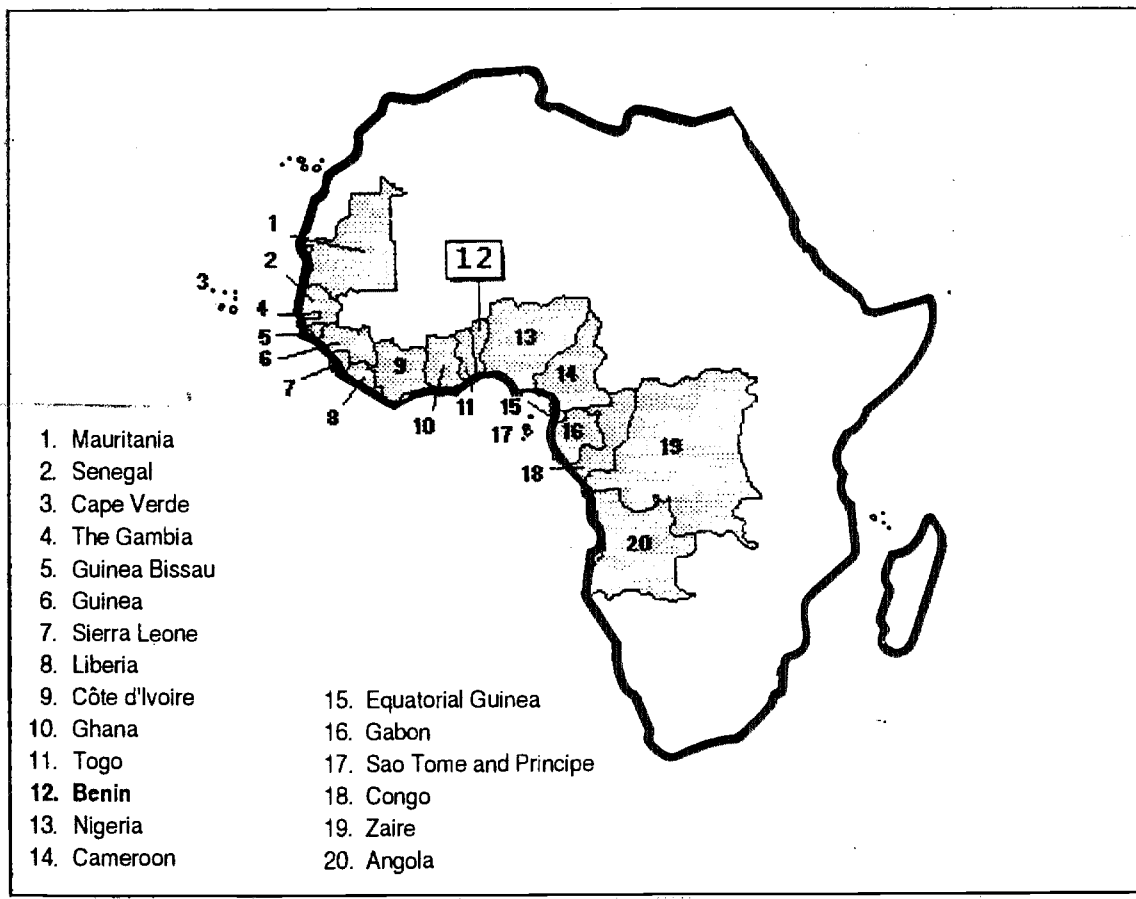
PROGRAMME FOR INTEGRATED DEVELOPMENT OF ARTISANAL FISHERIES IN WEST AFRICA

IDAF PROGRAMME

Technical Report N° 106 July 1997

**Use of Capital Income in Artisanal Fisheries:  
A Case Study of Boat Owners in Elmina, Ghana**

AF



DANIDA

DEPARTMENT OF INTERNATIONAL DEVELOPMENT COOPERATION OF DENMARK



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS



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**Use of Capital Income in Artisanal Fisheries:  
A Case Study of Boat Owners in Elmina, Ghana**

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by

Doris Abena Yeboah  
Economist: Fisheries Department  
Accra, Ghana

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

E-mail: [dipafao@bow.intnet.bj](mailto: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

As a part of its programme to ensure sustainable development of artisanal fisheries in West Africa, the Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) financed a study on the use of capital income in artisanal fisheries in Ghana.

The study focuses on calculating capital income of canoe-owners, assessing their expenditure structure and reviewing the study methodology.

The study is based on the methodological approach developed and tested by the Working Group on Capital Needs and Availability and again validated by the Working Group on Costs and Earnings. The researcher used the database generated during a study on costs and earnings in artisanal fisheries in Elmina which is expected to end in July 1997.

Detailed analysis of the economic performance of the various fishing units shows that purse seine, lagas and beach seine units are profitable, but bottom set gillnet and ordinary handline units are not. The latter are not able to generate enough revenues to cover depreciation, operation and maintenance costs. Lagas fishing units gain the largest profits which can be explained by the high value of target species and its availability all year round. Owners of bottom set gillnet units compensate for their low profitability by generating additional income as masons, canoe carvers, carpenters and crew members on purse seine units during the main fishing season.

In spite of the high investment costs and the high gross value of landings, the profitability of purse seine units ranks only third. The large share allocated to capital is eroded by high costs of maintenance and replacement. Current policy shifts towards the elimination of subsidies on fishing inputs and the depreciation of the cedi have resulted in high costs of fishing inputs.

The main sources of credit for the purchase of fishing equipment and material are canoe-owners' own resources (including personal savings and family inheritance), loans from banks and moneylenders, and credit from fish processors, input dealers, relatives, friends and crew members. Investment costs are relatively high and are mostly financed by a combination of the sources mentioned.

Shares allocated to capital items are 50% for purse seine and beach seine units, 42% for lagas units, 38% for bottom set gillnet units and 20% for ordinary hook and line units. Evidently, capital items of the units with the highest investment requirements are allocated the highest share of revenues.

In all cases annual cash flows generated could not cover investment costs. Seasonality is an important phenomenon affecting capital income management in general. According to the owners of purse seine units they are able to save substantially during the high season (July-October) but these savings completely dissipate during the low season (February-June) when catches are poor. The same applies to owners of beach seine, bottom set gillnet and ordinary hook and line units.

Household expenditure patterns indicate that in all cases expenditure levels were lower than the canoe-owner's net income. This suggests a high propensity to save and an ample capacity for re-investment and expansion. However, owners of lagas, purse seine and beach seine units

estimated their annual savings between ¢100,000 and ¢500,000 only. Owners of ordinary hook and line and set gillnet units argued that they could not save due to their low income.

It must be noted that expenditures declared by canoe-owners do not include expenses on renovation and acquisition of immovable assets such as buildings. It is an open secret that migrant canoe-owners often have huge mansions in their home towns. Informal discussions informed revealed to the frivolous spending sprees in the main fishing season, especially by the younger canoe-owners. Also these are not included in the expenditures declared by fishermen.



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Exchange Rate of cedi to 1 US\$  
1997: 1 US\$ = ₵1956



# 1 INTRODUCTION

As part of its programme to ensure sustainable development of artisanal fisheries in West Africa, the Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) is financing a study on the use of Capital Income in Artisanal Fisheries in Ghana.

During deliberations of the IDAF Working Group on Capital Needs and Availability in the Artisanal Fisheries Sector (Horemans et al, 1994), participants observed that in most cases capital income accruing from fishing covers maintenance and repairs as well as investment depreciation. However, it was also observed that boat-owners have difficulty finding the means to renew their equipment and materials when needed. Consequently, there is a problem which seems to be associated with capital income allocation in artisanal fisheries.

This study is based on the methodological approach developed and tested by the IDAF Working Group on Capital Needs and Availability and validated by activities of the IDAF Working Group on Costs and Earnings (Jallow, 1995 and Turay et al, 1997). The terms of reference for the study were:

- Presentation of a survey questionnaire
- Sensitization of boat owners
- Training of interviewers on data collection on the spot.
- Data analysis
- Elaboration of the methodological recommendation to improve the survey
- To write a 20–25 page report presenting results and methodology.

The study was carried out in Elmina, from 15 May to 15 June 1997. It focuses on calculating capital income, identifying expenditure channels and reviewing the study methodology. The study utilized to a great extent the database generated by the study on costs and earnings in artisanal fisheries currently being conducted in Elmina. That study sought to assess the returns on production factors and to calculate the profitability of the different types of fishing units.

## 1.1 The Artisanal Fisheries Sector

Artisanal fishing in Ghana is very much linked to the two upwelling seasons (major and minor). The major upwelling occurs between June/July and September/October while the minor upwelling is in December or early January. This phenomenon makes artisanal fishing highly seasonal and migratory.

All along the Ghanaian coast, there are 8,641 canoes of which 5,776 are motorised indicating a rate of motorization of 67%. The fleet is divided over 189 villages operating from 310 landing sites. It is estimated that there are about 101,741 artisanal fishermen supporting approximately 1.5 million dependants as fishermen's wives, children, relatives, processors and traders (MFRD, 1995).

Fish production from the artisanal fishing fleet is in a state of gradual decline. It is estimated that the total marine biomass of small pelagic resources ranges from 246,000 to 378,000 metric tonnes, but landings reached a record of 307,931 mt in 1992 and fell to 252,237

mt in 1993 (Quartey 1994). Production levels further declined to 211,746 mt in 1994, 210,659 mt in 1995 and increased to 298,249 mt in 1996 (DOF, 1997).

## 1.2 The Study Area

Elmina is located in the Komenda-Edina-Eguafo-Abrem (KEEA) district in the Central Region of Ghana. It is situated on a narrow peninsular, between the Benya Lagoon and the sea. The historic tourist-fishing town at Elmina was established in the 15<sup>th</sup> century as a result of trading explorations between the Portuguese and the Gold Coast. Currently the old architectural legacies have given way to an overcrowded settlement with a degraded environment (Arhin, 1995).

The population of Elmina is estimated at 24,747 (Ghana Statistical Service, 1997). The main occupation of the people is fishing. The population is concentrated at Bonsuanu the main fish landing site. The predominant ethnic group is the Fante, who are specialized in purse seine fishing. Migrants from the Volta and Greater Accra Regions, who are specialized in beach seine fishing and line fishing respectively, constitute a minor segment of the fishing population.

Fish production in the KEEA district ranks second in the Central Region. It has been relatively stable over the five years. Total canoe landings for 1995 is given as 21,725 mt from a fleet of 1,048 canoes (annex 2). In Elmina, there are 383 canoes, of which 316 are motorized (82%), manned by 4590 fishermen. The fishing methods used include purse seine targeting mainly round and flat sardinella and mackerels; line fishing (with and without ice), fishing for demersals; set nets and beach seine, targeting both pelagics and demersal fishes (MFRD, 1997). The construction of the fish market (Mpoben Fish landing ground) coupled with the ease of landing at the beach has made Elmina a very important fish centre in the central region. Migration into Elmina is very high during the main season between July and October.

Related fisheries activities such as fish processing, fish preservation and fish trade have sprung up in the environs of Elmina. Salt mining in the lagoon and farming on near by agricultural lands are subsidiary occupations that keep the town extremely alive. With the renovation and refurbishing of the St. Georges Castle and forts the tourism industry is booming.

## 2. METHODOLOGY

Data for this study have been collected in Elmina. Further, the results are partly based on data collected during the costs and earnings study, also conducted in Elmina. The five main fishing methods in the area are included in the sample. They are the following (local names are given between brackets):

- purse seine ('poli watsa')
- set gillnet ('toga', 'libyas' or 'apae mboa')
- hook and line with ice ('lagas')
- hook and line without ice ('asuso')
- beach seine fishing ('tsuie')

Data have been collected by a structured questionnaire. This questionnaire covered the following subjects:

- a) General information on the fishing units detected.
- b) Identification of fishing units incomes.
- c) Remuneration of production factors
- d) Capital income management and utilization

At the time of the survey the sample size constituted 15% of the number of fishing units in Elmina. Thus the sample size was 37 out of approximately 252 canoes. The sample size and composition is shown in Table 1.

**Table 1:** Sample Size of the Study.

Fishing Method	Total Number of fishing Units in Elmina*	Sample Size
Purse Seine	159	15
Set Gillnet	52	7
Hook and Line (lagas)	15	5
Hook and Ligne (ordinary)	14	5
Beach Seine	12	5
Total	252	37

\* 1995 Frame Survey.

### 3. SOCIO – ECONOMIC CHARACTERISTICS OF BOAT OWNERS

#### *Ownership of Fishing Units (FU)*

The results of the survey indicates that 80% of canoe owners are sole proprietors, 15% manage family businesses and 5% are employed to manage units. This suggests that the majority of owners interviewed are responsible for decision-making and business management. In addition, 69% of the boat-owners interviewed have one canoe and 31% have two canoes or more to manage.

#### *Age and Experience in Fishing*

The average age of boat-owners interviewed is 50 years. Fifty six percent (56%) of the owners are fairly young; between 26 and 50 years old. The youngest owner in the sample is 26 and the oldest is 75 years old. About 22% are older than 65. Generally, most of the younger owners operate line units. Most of the owners interviewed were born in fisheries and started their career early. Indeed, 56% of the owners have more than 20 years experience in fishing. Only 4 of the 35 owners indicated that they started fishing in the last five years, mainly as a result of redeployment from the public sector.

#### *Ethnicity*

Eighty percent (80%) of the boat-owners interviewed are Fante, 14% are Ga and 6% are Ewe. There is a high degree of specialisation by the various ethnic groups encountered. The Fante specialise in purse seine fishing for pelagic stocks, the Ga are mainly involved in hook and line (lagas) and target demersal species, while the Ewe do beach seine fishing for pelagic and demersal species. This

phenomenon seems to be culturally determined. The two minority groups, the Ga and the Ewe are migrants from the Greater Accra Region and the Volta Region respectively.

#### *Educational Status*

The generally high illiteracy rate in fishing communities is largely confirmed in Elmina by the data collected. Fifty-three percent (53%) of the canoe-owners interviewed are illiterate. Twenty-six percent (26%) have been through first cycle institutions, though a greater proportion of them dropped out of school and are unable to read and write presently.

#### *Household Size*

On average, canoe-owners bear responsibility for 16 people. Of these people 8-11 belong to his own family, 5 of them are extended family and sometimes canoe-owners take care of 1-3 crew members.

#### *Former and other occupations*

About 70% of the sample population had no previous employment. They started fishing as apprentices and crew members. The remaining 30% had worked as masons, carpenters or canoe carvers, mechanics, tailors and teachers. One of them used to be a cashier at the rural bank. Similarly, 70% of the canoe-owners do not engage in other occupations and depend entirely on fishing. Canoe-owners often explained that fishing is the only skill acquired through the long years of traditional apprenticeship. Fishing seems to be their life.

### **4. PROFITABILITY OF FISHING UNITS**

Profitability calculations are based on data generated by the on-going costs and earnings study in Elmina. Additional primary data are collected to fill in the gaps. The costs encountered are disaggregated into initial investment cost and the variable or operating costs.

#### **4.1 Investment Cost and Depreciation**

Investment cost of fishing units vary, depending on the method of fishing (see Table 2). The investment cost refers the replacement cost of equipment and materials used. Calculation of the investment cost of the gear is based on prices prevailing in the stores of the Department of Fisheries. Market prices are expected to be higher.

#### *Canoe*

Sizes of canoes range between 12 and 15 metres for purse seine fishing units to between 5 and 7 metres for set gillnet units. Sixty seven percent (67%) of the canoes have been purchased new while 33% are bought second-hand. From the survey, 49% of the canoe-owners paid for their canoes in installments. Second-hand canoes are usually sold on credit. The life span of a canoe is estimated at 6 years for purse seine fishing units, 7 years for lagas units, 6 years for beach seine units, and 4 years for set gillnet and ordinary line units. Most of the owners of set gillnet and ordinary line units operate a second-hand canoe. This explains the relatively short life span of these canoes.

#### *Outboard Engines*

Purse seine fishing units and lagas units require 40Hp outboard engines. The life span of an engine, depending on the type of fishing and the frequency of maintenance, was estimated at 30 months

by owners of purse seine fishing units and 36 months by owners of lagas units. The average life span of an engine was calculated to be 36 months. However, some canoe-owners claimed their engine to be 5-8 years old.

### *Gear*

The gear used depends on the type of fishing. Investment cost also depends on the size of the gear, i.e. the length of the net. The lifespan of fishing gear is estimated at 5 years by owners of purse seine, beach seine and handline fishing units and 3 years by owners of set gillnet fishing units.

### *Accessories*

Other equipment for the fishing units consists of oars, paddles, anchor, plastic containers for fuel and water, wooden slabs, sail, sail pole and insulated wooden boxes in the cases of lagas. Investment and depreciation costs of capital items of fishing units are presented in Tables 2, 3 and 4.

**Table 2:** Investment Cost of Different Types of Fishing Units (in cedis).

	Engine	Canoe	Fishing Gear	Others*	Total
Purse Seine	4,000,000	5,000,000	10,000,000	356,000	19,356,000
Set Gillnet	-	1,000,000	1,200,000	50,000	2,250,000
Hook and Ligne (Lagas)	4,000,000	4,000,000	250,000	500,000	8,750,000
Hook and Ligne (ordinary)	-	2,500,000	50,000	150,000	2,700,000
Beach Seine	-	4,000,000	8,000,000	500,000	12,500,000

\* Others include oars, paddles, anchor, plastic gallons for fuel and water, wooden slabs, sail, sail pole and an insulated wooden box in case of Lagas.

**Table 3:** Fixed Assets Depreciation (in years).

	Engine	Canoe	Fishing Gear	Others	Depreciation/Investment Cost
Purse Seine	2.5	6	5	4	23%
Set Gillnet	-	4	3	5	29%
Hook & Ligne (Lagas)	3	7	5	3	24%
Hook & Ligne (ordinary)	-	5	5	5	20%
Beach Seine	-	6	5	2	20%

**Table 4:** Annual Depreciation Costs of Capital Items (in cedis).

	Engine	Canoe	Fishing Gear	Others	Depreciation/Investment Costs
Purse Seine	1,600,000	830,000	2,000,000	89,000	4,519,000
Set Gillnet	-	250,000	400,000	10,000	660,000
Hook & Ligne (Lagas)	1,330,000	571,430	50,000	166,670	2,118,098
Hook & Ligne (ordinary)	-	500,000	10,000	30,000	540,000
Beach Seine	-	666,700	1,600,000	250,000	2,516,700

## 4.2 Operating Costs

For purse seine and lagas fishing units the larger part of the operational cost consists of the cost of fuel (see table 5). Expenditure on fuel depends on the number of trips made, the time spent at sea and the state and power of the engine. Additional expenses are made to buy twine for the maintenance of nets, and to buy food, ice and bait in the case of lagas.

In the main fishing season, purse seine units consume on average 135 litres (30 gallons) of fuel per trip. In the low season they consume between 22½-45 litres (5-10 gallons) per trip. The average number of trips per year is 150. Lagas fishing units consume 225-315 litres (50-70 gallons) per trip. One trip takes 3-4 days. The cost of premix fuel is ₵511 per litre or ₵2,300 per gallon, meaning that purse seine and lagas fishing units spend ₵68,985 and ₵114,975 - ₵160,965 per trip respectively.

Another part of the variable cost is gifts or payments in kind. In selling the fish, owners of purse seine and lagas units give discounts of up to 7% of the price of fish and they pay commission to the ones assisting. In the case of lagas fishing units about 31 kilogramme of fish is reserved for the "washman", who is responsible for cleaning and guarding the canoe. Various amounts of fish are given to friends, relations, other fishermen who are not operating, well wishers and disabled members of the community. These amounts vary with the season. Canoe-owners regard this as an important social obligation which sometimes makes it difficult to control their income.

The high miscellaneous cost for beach seine units (Table 5) can be explained by the fact that crew members are given a feeding allowance of between C20,000 to C30,000 per trip. Drinks are also provided before and after fishing trips.

## 4.3 Prices

The high general price level prevailing in Ghana (inflation rate is 60%) has resulted in relatively high prices of fish. At the time of the study, the average price for round and flat sardinella was ₵394, for sea bream ₵1,129 and for grouper ₵1,515 per kilo. However, large variations in price were experienced throughout the year, reflecting excessive supply in the main fishing season and very low supply off-season. The price of round and flat sardinella showed the



largest amplitude of variation within the year. The prices of high value species were relatively stable.

#### **4.4 Sharing Systems**

After deducting all operating expenses from the value of landings, the net value is shared according to the sharing system patronized by the fishing unit. In times of low catch, purse seine and lagas fishing units defer operational expenses. If the canoe-owner takes part as a crew member he receives part of the share of the crew in addition to his share as canoe-owner. Also mechanics and supervisors receive shares for their services.

##### *Purse seine*

The net value of landings is divided into two parts; 50% for the crew and 50% for the owner. The 50% for the owner caters for capital and replacement costs. The average crew size is 22. However, due to the increasing cost of maintenance and replacement, the situation seems to change. Two canoe-owners indicated that shares are now being allocated to engines and gears. This would eventually increase the share of capital.

##### *Bottom set gillnet*

In gillnet fishing units 25-40% is allocated to the canoe-owner. The remaining 60-75% is for the crew. The crew consists of 2-3 people.

##### *Hook and line (Lagas)*

Capital items in lagas fishing units take up to 43% of the total net value (7% for the ice container, 14% for the canoe and 22% for the engine). Fifty-seven percent (57%) is allocated to the crew. The average crew size is 8.

##### *Hook and line (ordinary)*

Crew members of the ordinary hook and line units operate individually and contribute to the maintenance of the canoe. Every crew member gives 20% of the value of landings to the canoe-owner for maintenance of the canoe.

##### *Beach seine*

Beach seine fishing units share the value of their catches at the end of a year's fishing expedition. The crew operates as a company. In most cases the crew consists of relatives and friends, brought from the Volta Region to operate the fishing unit. The canoe-owner provides each crew member with accommodation and daily allowances. The net value of landings is shared at the end of the fishing season after which the crew disperse; 50% for the canoe-owner and 50% for the crew. The crew consists of 30-35 people.

**Table 5: Annual Income Status of Fishing Units.**

	Purse Seine	Set Gillnet	Lagas	Ordinary	Beach Seine
i) Revenues from Operations	41,645,352	1,948,320	32,098,736	4,250,000	22,118,800
ii) Operating Expenses					
Fuel	9,594,352	0	4,540,000	0	0
Ice	0	0	2,800,000	0	0
Bait	0	0	2,760,000	0	0
Food	0	0	1,400,000	326,000	0
Gifts	3,040,000	80,000	2,160,000	204,000	1,875,000
Miscellaneous	560,000	275,000	1,400,000	510,000	3,000,000
Total Variable Costs	13,194,352	355,000	15,060,000	940,000	4,875,000
iii) Value Added	28,450,632	1,593,320	17,038,736	4,543,200	17,243,800
(i-ii) In % of Revenues	68%	81%	53%	84%	78%
iv) Crew Remuneration	14,225,316	984,671	9,712,079	3,407,400	8,621,900
v) Gross Operating Surplus	14,225,316	608,648	7,326,654	1,135,800	8,621,900
Depreciation	4,519,000	660,000	2,118,098	540,000	3,583,400
Cost of Capital*	720,000	0	720,000	0	0
Maintenance and Repairs	2,235,000	660,000	1,200,000	340,000	580,000
Total Fixed Costs	7,474,000	1,320,000	4,038,098	880,000	4,163,400
vi) Net Result	6,751,316	-711,351	3,288,556	225,000	4,458,500
vii) Cash Flow	11,270,316	51,351	5,406,664	795,800	8,041,900

\* Interest rate on credit at the bank is 36%

#### 4.5 Profitability

Detailed analysis of the economic performance of the various fishing units shows that purse seine, lagas and beach seine units are profitable, but set gillnet and ordinary units are not able to generate enough to cover depreciation, operational and maintenance costs in a year (see Table 6).

**Table 6:** Annual Income and Return on Investment.

	Purse Seine	Set Gillnet	Hook & Line (Lagas)	Hook & Line (Ordinary)	Beach Seine
Average Annual Turnover	41,645,352	1,948,320	32,098,736	4,250,000	22,118,800
Common Expenses	15,194,200	335,000	15,060,000	1,040,000	4,875,000
Revenue to Share	26,450,632	1,593,320	17,038,736	3,210,000	17,243,800
Crew Size	22	2-3	8	5	30
Total Crew Income	14,225,316	984,671	9,712,079	3,407,400	8,621,900
Income/Crew Member	646,600	328,200	1,214,000	680,948	538,868
Capital Income	14,225,316	608,648	7,326,654	1,135,800	8,621,900
Fixed Costs	7,474,000	1,320,000	4,038,098	1,880,000	4,163,400
Owner's Net Income	6,751,316	- 711,351	3,288,556	225,000	4,458,500
Average Invested Capital	19,356,000	2,250,000	8,750,000	2,700,000	12,500,000
Return on Investment	31%	- 31%	38%	1%	35%
Pay Back Period of Invested Capital	38 months	50 months	30 months	144 months	34 months
Opportunity Costs of Capital *	5,032,560	585,000	2,275,000	702,000	3,250,000

\* Based on interest rate on savings at the bank

The highest initial investments are needed for purse seine, beach seine and lagas fishing units. For purse seine and beach seine units, the fishing gear constitutes the highest investment component.

The most profitable fishing unit is hook and line operating with ice (lagas). This can be explained by the high value of target species and its availability all year round. The volume of landings of the ordinary line units account for the low profitability of the unit. Average annual turnover for ordinary hook and line is  $\phi$ 4,250,000 compared to  $\phi$ 31,000,000 for hook and line units with ice even though the target species are the same. Indeed, the fishing method is rudimentary and cannot sustain the enterprise. It was not surprising that one of the owners interviewed had started using ice to prolong his trips and increase the volume of catch.

Owners of bottom set gillnet fishing units compensate for low profitability of their fishing units by working as masons, canoe carvers, carpenters and as crew on purse seine fishing units in the main fishing season. Others use three or more nets to expand the volume of landings. The main risk in the fishing method is the high incidence of destruction of nets by large demersals and industrial trawler vessels.

In spite of the high initial cost of capital and the high gross landed value, the profitability of the purse seine units rank third. The high income allocated to capital is eroded by high cost of maintenance and replacement. Current policy shifts towards the elimination of subsidies on fishing inputs and the depreciation of the cedi has resulted in high cost of fishing inputs.

The prevailing lending rate for agriculture was used as the current cost of capital. In all cases, the rate of return on investment is lower than the opportunity cost of capital (40% as at April 1997). Return on investments of the artisanal fishing units are high compared to the 1.41% of semi-industrial and 21.4% of industrial tuna vessels, 11.4% of trawlers and 22.2% of shrimpers (Afful, 1995).

The high costs of inputs have resulted in a drop in the number of the purse seine units from 2,573 in 1989 to 2,166 in 1992. The number of beach seine units decreased from 852 in 1989 to 775 in 1992. At the same time the number of set gillnet and one man canoes, not requiring huge investments, have increased from 1,300 to 1,408 and 162 to 580 respectively within the same period. The figures will be updated with input from 1995 from the Research unit of the Department of Fisheries in due course.

## 5 CAPITAL INCOME MANAGEMENT

### 5.1 Source of finance

Capital flow into artisanal fisheries is provided by both public and private channels. The main sources of capital consist of people's own resources (this includes personal savings and family inheritance), loans from banks and money lenders, credit provided by fish mongers, fish processors, input dealers, friends and crew members. Investment cost in artisanal fisheries is relatively high and is mostly financed by a combination of the available sources.

Sixty four percent (64%) of the canoe-owners interviewed finance outboard engines with a combination of personal resources and loans from financial institutions, mainly the Agricultural Development Bank (ADB). The bank finances the purchase of outboard engines, distributed through fishermen's associations. A prospective buyer pays 50% of the investment as down payment and the balance is staggered over two fishing seasons. The interest rate charged is the prevailing rate on lending to agriculture which was 36% in 1996 and 40% in 1997 (April) at the Edinaman Rural Bank in Elmina.

Canoes are mainly financed through canoe-owners' own savings or by informal credit from family and canoe dealers, without interest. A prospective canoe buyer pays more than half the cost of the canoe as down payment and pays the rest after the fishing season. This system is gradually being phased out because of the high demand for dugout canoes. According to the canoe-owners the "wawa tree" (*Triplochiton scleroxylon*), used for dugout canoes, has become scarce due to deforestation and competition in demand from loggers and sawmillers. In combination with the high demand for this type of canoe, canoe dealers are less willing to sell on credit. Seventy-five percent (75%) of the canoe-owners interviewed paid their canoe by a combination of their own resources and credit from family members, the former always being larger than the latter.

Similarly, about 80% of the fishing gears is financed through canoe-owners' own resources in combination with credit from relatives. This applies to set gillnets, purse seines and

beach seines. Fifteen percent (15%) of the canoe-owners financed their fishing gear by credit from fish mongers.

In 60% of the cases, variable cost such as fuel and other operational expenses is financed through credit arrangements with fish mongers. Thirty-seven percent (37%) of the canoe-owners use their own resources, i.e. income derived from previous trips. Canoe-owners relying on financial arrangements from fish mongers are obliged to sell the catch to the creditor at a mutually agreed price. On average, this price is 7-10% lower than the prevailing beach price.

## 5.2 Allocation of Capital Income

A summary of the net income of canoe-owners and the cash flow generated over a year is presented in table 7. Shares allocated to the canoe-owner (capital items) are 50% for purse and beach seine units, 42% for lagas units, 38% for gillnet units and 20% for ordinary hook and line units. Evidently, capital items of fishing units with the highest investment requirements are allocated the highest share of revenue.

**Table 7:** Cash Flow Analysis per Year

	Purse Seine	Bottom Set Gillnet	Hook & Line (Lagas)	Hook & Line (Ordinary)	Beach Seine
Share Canoe- Owners	14,225,316	608,648	7,326,654	980,640	8,621,900
Canoe-Owners Net Income	6,751,316	-711,351	3,288,556	225,000	4,458,800
Cash Flow (CF)	11,270,316	-51,351	5,406,654	765,000	8,042,200
Investment Capital (IC)	19,356,000	2,250,000	8,750,000	2,700,000	12,500,000
CF/IC	58%	-	61%	28%	64%

The annual cash flow generated by canoe-owners refers to their net income without taking into account depreciation costs. In all cases the cash flow generated over a year cannot cover investment cost. Seasonality is an important phenomenon affecting capital income management in general. According to owners of purse seine units they are able to save substantially during the high season (July to October), but these savings completely dissipate during the off-season (February to June) when catches are poor. The situation is similar for owners of beach seine, set gillnet and ordinary line units.

During almost two months per year, i.e. in the rainy season (from July to September) and in times of extremely bad weather conditions, beach seine, set gillnet and ordinary line units are not able to operate. The beach seine units compensate for this by operating on average twice a day in their main season (from August to November), with a peak in November.

Like in a study on the use of capital income in artisanal fisheries in Senegal (Ndiaye, 1996), the annual income of a crew member aboard an industrial vessel serves as a reference for the opportunity cost of work. This is quoted at  $\text{CFA } 5,000,000$  per annum and is indeed higher than

the net revenue of owners of all types of fishing units studied, except purse seine units. The net income of owners of purse seine units is ₱6,511,000 per year.

Comparing the annual net income of canoe-owners to the annual income of crew members (Table 6), shows that canoe-owners earn more than crew members, except in the case of set gillnet and the ordinary line units. The yearly net income of owners of set gillnet fishing units is negative (-₱711,350) while his crew members earn ₱328,200 per year. The yearly net income of owners of ordinary line units is ₱225,000 compared to ₱680,000 for a crew member. At least for the gillnet fishing units this can be explained by the fact that canoe-owners are old men (often former owners of a more profitable type of fishing unit) who are mainly interested in sustaining themselves. Their equipment is usually old and they no longer bother to replace it. However, without taking into account depreciation costs, their annual income (cash flow) is still negative (-₱51,351). The only way of sustaining himself is to take active part as a crew member, which will bring his cash flow up to ₱276,849 per year. The annual cash flow for ordinary hook and line units is ₱765,000 which is a little bit higher than the annual income of a crew member.

Canoe-owners main expenses, apart from their fishing activity, are given below (in order of importance). Table 8 shows a quantitative summary.

- 1 family feeding expenses
- 2 education
- 3 funerals and other social commitments
- 4 clothing
- 5 domestic bills

**Table 8:** Annual Expenditure Pattern of Canoe-Owners.

	Purse Seine	Bottom Set Gillnet	Hook & Line (Lagas)	Hook & Line (Ordinary)	Beach Seine
Feeding	2,520,000	1,042,858	2,037,000	1,095,000	2,378,000
Religion/Family Ceremonies	360,000	180,000	-	184,000	380,000
Health	170,000	76,000	190,000	87,000	100,000
Education	700,000	106,371	128,400	156,800	288,000
Clothing	500,000	175,000	250,000	200,000	150,000
Household Bills	104,426	85,000	210,633	68,000	50,000
TOTAL	4,354,000	1,665,229	2,816,033	1,790,000	3,346,000

NOTE: The figures are based on the period May 15 to June 15. The figures have been multiplied by twelve to get the annual figures. May to June falls in the low fishing season with relatively low expenditure levels. Actual annual expenditure levels are expected to be much higher.

Canoe-owners do not differentiate between business income and personal income. Some of them set funds aside for replacement of equipment and material during the high season, but

during low season most of this money is used to supplement the household budget. Apart from men, women also finance household expenditure.

Table 8 shows that in all cases expenditure levels are lower than the canoe-owners net income. This suggests a high propensity to save and ample capacity for re-investment and expansion. However, owners of lagas, purse seine and beach seine units estimated their annual savings between ₪100,000 and ₪500,000 only. Owners of ordinary hook and line and set gillnet units argued that they could not save due to their low income.

It must be noted that expenditures declared by canoe-owners do not include expenses on renovation and acquisition of immovable assets such as buildings. It is an open secret that migrant canoe-owners often have huge mansions in their home towns. Informal discussions informed revealed to frivolous spending sprees in the main fishing season, especially by the younger canoe-owners. Also these are not included in the expenditures declared by fishermen.

In order to make sure that crew members stay, canoe-owners incur what they refer to as incidental expenses on the crew. These amounts can be high, but they found it difficult to recollect the exact amounts. In some cases this expenditure post includes even hospital bills of crew members' wives.

The amount of money owed by fish processors, fish mongers, relatives and crew members varies between ₪20,000 and ₪2,000,000 with an average of ₪416,560. There is no strict enforcement of repayment of loans taken from relatives and crew members. Debts to crew members are repaid during the main fishing season. Generally, canoe-owners were reluctant to disclose savings and could not recollect accurately the total reinvestments made within the year. In ranking capital income utilization, reinvestment in fishing equipment and material was next to household expenditure and social commitments.

## 6. OBSERVATIONS AND RECOMMENDATIONS

- The study partly used the database generated by the study on costs and earnings, conducted from August 1996 - July 1997. This gave the rare opportunity to capture costs and revenues over a complete annual fishing cycle.
- The case study on the use of capital income was carried out in the off-season from May to June 1997. This explains the low expenditure levels declared. In an eventual follow-up it is important to avoid biases due to seasonality and to collect data during the different seasons.
- To get a more accurate picture of revenues derived from fishing activities, future studies should take into account that fishermen do not rely on one type of gear. Many of them use different types of fishing methods.
- Quantitative methods and structured interviews do not suffice when collecting data on sensitive and personal issues such as how much one saves or spends on building. This methodology must be complemented by a more flexible qualitative methodology to get details on savings, buildings and indebtedness etc. Most important of all will be to create a forum to present income and expenditure levels to fishermen and ask for explanations

from their own perspective. There seems to be a lot of gaps in the study concerning the relationship between incomes and the expenditure levels. The study should be supported with a more flexible qualitative survey to understand these relationships.

It will be interesting to study men's contribution to the household from a women's point of view, women's contribution to the household and to assess the mutual arrangements they have to meet household needs.



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**Annex 1: Questionnaire on the use of capital income of canoe-owners.**

Town..... Date .....

**1. General Information on Fishing Units Surveyed**

1.1 Identification No ..... a. own business      b. family      c. others,  
.....

1.2 a Name of Owner ..... 1.2 b migrant/ non migrant

1.3 Fishing technique      Main      Others

a. Poli/Watsa .....  
b. Hook and Line (ordinary) .....  
c. Hook and line (lagas) .....  
d. Beach seine .....  
e. Bottom set gill net .....

1.4 Number of Boats .....

1.5 Age of canoe owner: .....

1.6 Ethnic group:

- |               |                           |
|---------------|---------------------------|
| a. Fante      | d. Ewe                    |
| b. Ga/Adangbe | e. Nzema                  |
| c. Guan       | f. Others (Specify) ..... |

1.7 Educational Level:

- |                 |                   |
|-----------------|-------------------|
| a. Tertiary     | d. Islamic        |
| b. Second cycle | e. Illiterate     |
| c. First cycle  | f. Adult Literacy |

1.8 Size of Direct Household

1.9 Number of Dependents .....

1.10 Years in the Profession .....

1.11 Former Occupations

1. None 3. ....  
 2. .... 4. ....

1.12 Other Occupations

1. None 3. ....  
 2. .... 4. ....

1.13. Crew size

Technique	Crew Size
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

II. IDENTIFICATION OF FISHING UNITS INCOME

2.1 Fixed Costs (assets).

	Engines	Canoes	Fishing gear	Other materials
Purchase cost				
Purchase date				
Condition when Purchased				
Mode of payment				
Life expectancy				
Resale value (declared)				
Resale value (calculated)				

2.2 How do you finance these items

a. Outboard Motor .....

Canoe .....

Gear .....

Petrol .....

Ice and bait .....

f. Others .....

2.3 a. Number of trips per month

Fishing Techniques	No. of Trips per month	
	Major	Minor

c. Targets species: .....

b. Average Operational Costs.

	Amount per Trip	Unit Cost	Total Cost/Trip
Fuel(including Oil)			
Repair/maintenance			
Ice			
Food			
Fixed remuneration			
Bait			
Other operation costs			
Total cost			

c. Average Revenue per trip.

Species	Number of crates	Wt	Value

e. Average sale per trip .....

2.4. Destination of Fish .....

Source of Capital Available

SOURCE	AMOUNT
1. Family	
2. Friends	
3. Bank	
4. Own Resources	
5. Others	

2.6 Total Debts due  $\leq$  1 year: -----

2.6 Pressing debts to be paid within the year -----

2.7 Identification of Debtors.

Type Of Debtor	Amount
1. Bank	
2. Fish Processors	
3. Fish Mummies	
4. Input Dealers (Specify)	
5. Money Lenders	
6. Relatives/Friends	
7. Others	

Identification of Creditors:

Type of Credit	Amount
1. Fish processors	
2. Traditional Caterers	
3. Fish Mummies	
4. Others (Specify)	



## House hold expenditure

Food: -----

Funerals -----

Out-dooring Ceremonies -----

Health: -----

Education -----

Clothing

Transportation

Church donations

Bills:     — Housing / Rent

-           Light Bills

            Water

            Public latrine

            Electricity bills

            Alcohol

            Entertainment

### 5.0 Rank capital income utilization

#### 5.1 Rank the house hold expenditure

**Annex 2: Canoe Landings (m/tons) in the Central Region of Ghana.**

	1990	1991	1992	1993	1994	1995
Efutu-Awatu-Senya	15009.6	13253.41	17875.8	14801.01	15150.36	13064.82
Gomoa	24636.44	21753.87	29341.04	25215.3	25810.46	22257.48
Mfantseman	17977.01	15873.63	21409.92	31343.32	32083.12	27666.67
Abura-Asebu-Kwamankese	11317.58	9993.377	13478.8	12356.5	12648.15	10907.05
Cape Coast	7349.527	6489.601	8752.999	4889.022	5004.419	4315.528
Komenda-Edina-Eguafo-Abrem	17459.44	15416.61	20793.51	24612.54	24612.54	21725.43



**Annex 3: Estimated Fish Production (m/tons) by Ghanaian Vessels 1991-1997.**

Fleet	1991	1992	1993	1994	1995	1996	1997*
Canoe	215847	307931	257237	211747	210659	298249	247005
Inshore	7357	10768	5230	6037	6371	8352	8837
Industrial (Ghana waters)	27892	20933	18323	18966	20047	2590	22950
Industrial (foreign waters)	n-a	n-a	n-a	11001	62817	76454	n-a
Shrimpers	785	386	1548	2442	2689	2590	1700
Tuna	337795	30776	36856	36973	33905	37254	35400
TOTAL (Ghana waters)	289676	370794	329194	276165	273672	371550	315892
TOTAL (foreign waters)	n-a	n-a	n-a	11002	62817	76454	n-a
GRAND TOTAL	289676	370794	329194	287167	336489	448004	n-a

\* Projection for 1997.

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