

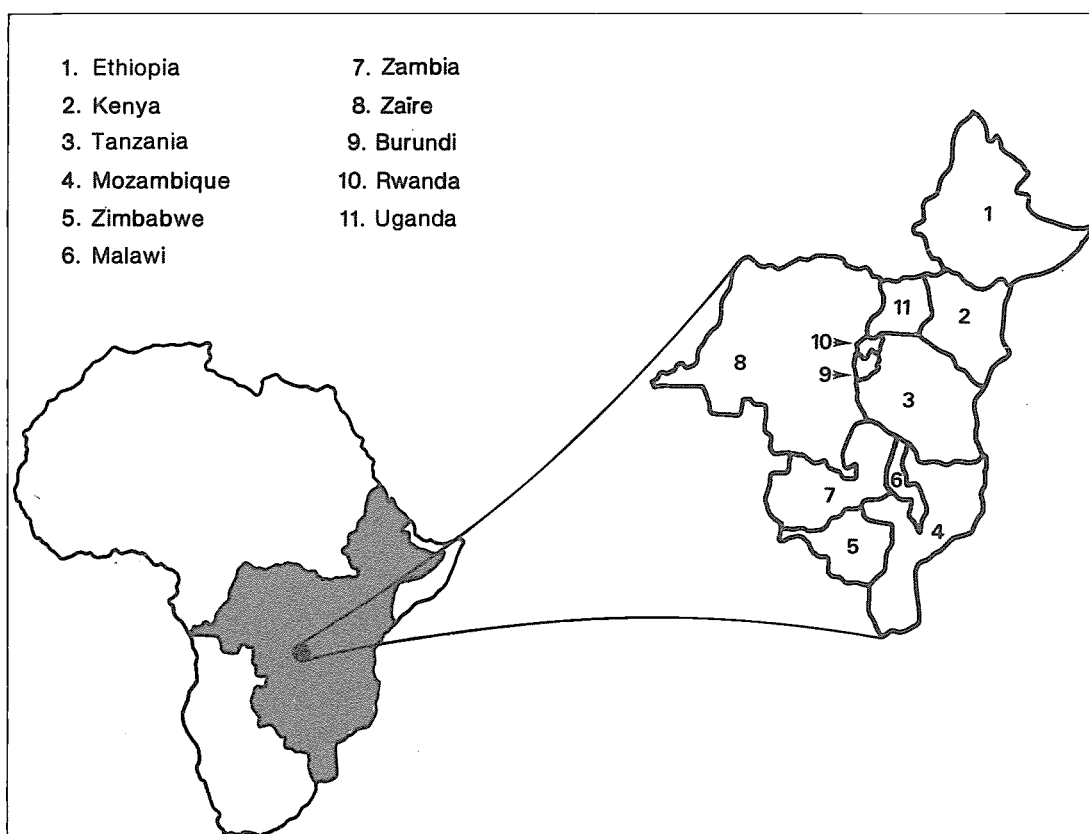
REGIONAL PROJECT FOR INLAND FISHERIES PLANNING, DEVELOPMENT AND
MANAGEMENT IN EASTERN/CENTRAL/SOUTHERN AFRICA (I.F.I.P.)

IFIP PROJECT

RAF/87/099-TD/41/92 (En)

September 1992

The Artisanal Capture Fisheries of Lake Tanganyika, Zambia:
- major socio-economic characteristics of
its fishermen and their fishing units -



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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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The Artisanal Capture Fisheries of Lake Tanganyika, Zambia:
- major socio-economic characteristics of
its fishermen and their fishing units -

by

T.M. Hoekstra ¹

and

J.M. Lupikisha ²

¹ APO Socio-economist, IFIP

² Fisheries Statistician, Fisheries Department Zambia

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PREFACE

The IFIP project started in January 1989 with the main objective of promoting a more effective and rational exploitation of the fisheries resources of major water bodies of Eastern, Central and Southern Africa. The project is executed by the Food and Agriculture Organisation of the United Nations (FAO), and funded by the United Nations Development Programme (UNDP) for a duration of four years.

There are eleven countries and three intergovernmental organisations participating in the project: Burundi, Ethiopia, Kenya, Malawi, Mozambique, Uganda, Rwanda, Tanzania, Zambia, Zaire, Zimbabwe, The Communauté Economique des Pays des Grands Lacs (CEPGL), The Preferential Trade Area for Eastern and Southern African States (PTA) and the Southern African Development Coordination Conference (SADCC).

The immediate objectives of the project are: (i) to strengthen regional collaboration for the rational development and management of inland fisheries, particularly with respect to shared water bodies; (ii) to provide advisory services and assist Governments in sectoral and project planning; (iii) to strengthen technical capabilities through training; and (iv) to establish a regional information base.

PREPARATION OF THIS DOCUMENT

This document presents the results of a socioeconomic survey of fishermen in the Zambian waters of Lake Tanganyika. The study was executed by the Regional Project for Inland Fisheries Planning (IFIP) in collaboration with the Fisheries Department of Zambia. The data presented are stratified according to the employment status of fishermen. The report is structured as follows: summary of the main findings and recommendations; introduction, methodology; characteristics of the fishery (boats, gear, engines, fish processing and marketing, crew size, sharing systems, etc.); and socioeconomic characteristics of the fishery (sociodemographic-sociocultural characteristics of the fishermen and their family, their ownership of assets and use of credit, occupational and geographical mobility, opinions and attitudes and problems identified in the fishery).

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IFIP PUBLICATIONS

Publications of the IFIP project are issued in two series:

A series of technical documents (RAF/87/099-TD) related to meetings, missions and research organized by the project.

A series of working papers (RAF/87/099-WP) related to more specific field and thematic investigations conducted in the framework of the project.

For both series, reference is further made to the document number (41), the year of publication (92) and the language in which the document is issued: English (En) or French (Fr).

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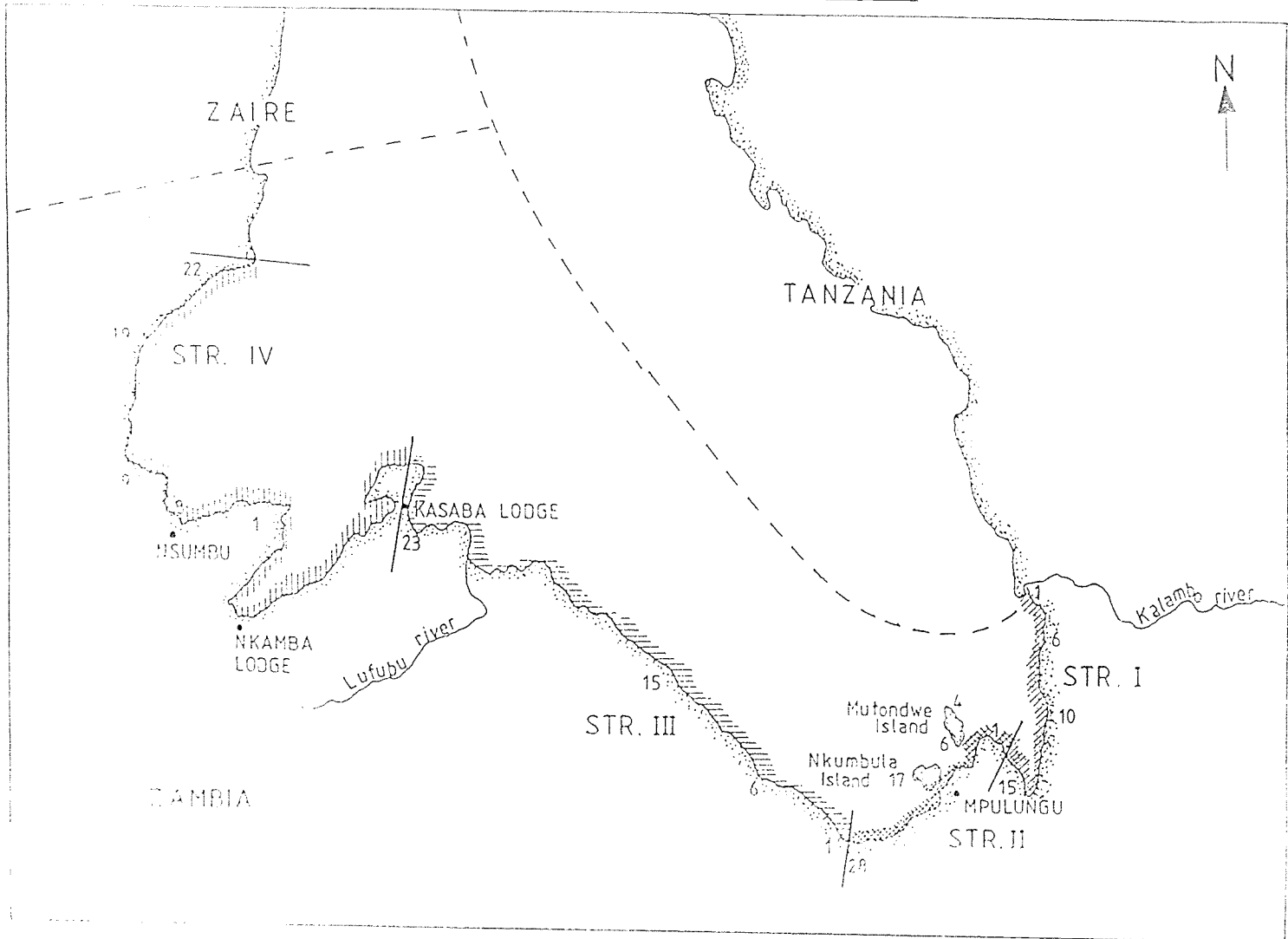
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Map 1: The survey area

LAKE TANGANYIKA (ZAMBIA)



SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

Main findings

1. The large majority of fishing units in the Lake Tanganyika fishery of Zambia are essentially beach seine units operating at night in association with lights targeting for Limnothrissa miodon and Stolothrissa tanganyicae, (kapenta).
2. The majority of the boats in the fishery are so-called light boats which primary function is to (light) attract kapenta and bring it within the range of kapenta seines (essentially a beach seine but without a cod-end).
3. The overwhelming majority of boats are of plank construction and are locally made.
4. The average age of boats is 3.9 years. The age structure of boats displays an image of continuous investment.
5. The kapenta seine (in association with lights) is the most widespread gear type followed by gillnets and handlines. Longlines, beach seines and liftnets are very few.
6. The age structure of kapenta seines, gillnets, handlines and lights display an image of continuous investment. The other gear are too few to reach a firm conclusion on investment trends.
7. Engines are rather common in the fishery. About one-fifth of all fishermen own an engine. About one-quarter of the engines, however, are out of order. Furthermore the majority of engines is not used for fishing operations but for transport.
8. Kapenta catches are usually sundried. Processing (drying and packing) is more often undertaken by the fishermen themselves than their wife(ves).
9. Small-scale female traders are by far the most important marketing outlet for fish.
10. Average weekly home consumption per fisherman household is 19 kilograms.
11. For a typical kapenta seine operation (night) there are, on average, 2.6 light boats and 6.3 lights involved. The average number of net draws is 2.5.
12. Crew changes are not frequent. In other words the fishing units are rather stable.
13. Some 83.3% of the fishermen can be considered as full-time fishermen.
14. Some 96% of the fishermen are from an (original) tribe from the Northern Province.
15. The average age of fishermen is 36.7 years, the absentee owner of fishing boats being the oldest: 42 years, and the lightboat operators being the youngest with 28 years.
16. Out of all fishermen, 18.6% never attended school. Fishermen received on average 5.1 years of schooling.

17. The average number of wives per (married) fisherman is 1.6. Absentee owners have an average of 2 wives.

18. The average number of children per fisherman is 5.6 while the average number of dependent children is 4.6.

19. Ten percent of all fishermen have children engaged in fishing of which 89% in the artisanal fishery and 11% in the industrial fishery.

20. The overall average number of boats owned by fishermen is 1.7. Multiple boat ownership occurs significantly more often among absentee owners of fishing boats who own, on average, 3 boats.

21. In contrast to boats and gear engines are often (22.4%) acquired through credit.

22. About three-quarters of the fishermen own land. The highest rate of land ownership is found among absentee owners of fishing boats.

23. Livestock ownership by fishermen is extremely low.

24. Some 64% of the fishermen do not originate from a family where the father was a fisherman.

25. About half of the fishermen had another main occupation before starting fishing.

26. About half of the fishermen have a secondary occupation, mostly farming but also trading.

27. The majority of fishermen, 89.5%, was born in the Northern Province whereas 83.3% originates from one of the three districts bordering the lake.

28. As opposed to boat owners, operators often (16-23%) originate from an other than the Northern Province, mainly from the Provinces of Luapula and the Copper Belt.

29. More than half of the fishermen do not originate from lake shore villages. The fishery strongly attracts labour from the inland areas.

30. About one-fifth of all fishermen operated in the (seasonal) Chisanse concession in the year preceding the survey.

31. Some 35% of the fishermen would leave the fishery if they had other employment opportunities.

32. If given a loan, 79% of the fishermen would invest in fishing, the remainder in other sectors.

33. The majority of fishermen (62.8%) claimed that catch rates have decreased over the past five years.

34. About half of the fishermen stated that the size of fish has decreased over the past five years.

35. A large majority of fishermen (84.6%) are of the opinion that there are

too many fishermen in the fishery.

36. The major problems in the fishery as seen by the fishermen are input supply (a high discrepancy between supply and demand is observed) and a poor marketing infrastructure.

Recommendations

- This study describes a wide range of socio-economic characteristics of the fishing units and of those who invested their capital in boats and gear and/or who operate the boats as captains. It is recommended that this study be succeeded by a survey of crew members to complementary reflect the "labour side" of the industry.

- Although data are collected on catch and effort there is no information on the income of fishermen. It is recommended to execute a cost and earnings study taking Fishing Economic Units¹ as the unit of inquiry. At a later stage cost and earnings studies could be carried out in the secondary and tertiary sectors (processing, marketing and service activities).

As far as government intervention in the fishing industry is concerned at least the following topics need attention.

- The artisanal fishery is predominantly an inshore fishery using the kapenta seine. Small mesh sizes are used and the seining in shallow waters results in large quantities of juvenile fish being caught. Fishing intensity in the inshore waters is high and appears to be increasing.

As the potential yield of the stocks remains quite uncertain and further apparent entry into the fishery, the effects of further increases in fishing effort should be carefully monitored. Many fishermen noted an increase in fishing effort because of migration of 'outsiders' into the fishery. The findings in this study confirm these statements. The majority of fishermen also stated that catch rates have decreased. It seems desirable to start limiting or actually reducing kapenta seining and to stimulate artisanal fishermen to fish in deeper offshore waters. Fishing in offshore waters should be accompanied by an upgrading of (at least a part of) the artisanal fleet. In this context the Fisheries Department should increase its efforts in the stimulation of lift netting which should be coupled with an introduction of sails, use of outriggers for stability and larger boats. Given the problems of obtaining engines, fuel) and the general lack of spare parts, sail power is probably more desirable than equipping boats with engines.

- Possibilities should be investigated to stimulate the use of gillnets and, the presently hardly used longline.

- Kapenta is currently dried either on prepared smooth clay surfaces, on the beach or on concrete slabs. Support to fishermen in placement of drying racks and/or possibly kiln smoking facilities would significantly improve the quality of the product.

¹ The Fishing Economic Unit presupposes one or more target species requiring a certain type of gear and one or more boats requiring a certain means of propulsion, the whole presupposing a specific crew. The five elements, target species, fishing gear, boat, means of propulsion and crew compose the fishing unit (Horemans, 1989).

1. INTRODUCTION

1.1. General

Lake Tanganyika is one of the great lakes of Africa. It is one of a chain of deep lakes located in the great western rift valley. It is the second deepest lake in the world. Lake Tanganyika is an international water body shared by Burundi, Tanzania, Zaire and Zambia. The Zambian waters cover 2,100 km² or 6% of the entire surface area of the lake. Most of the Zambian shore line, with a total length of 238 km (Pearce, 1992), is steep and rocky. There are few areas of very shallow swampy land and limited stretches of sandy beaches the most important being within the Nsumbu National Park (such as the Chisanse area).

The countryside surrounding the lake is generally mountaneous. Vegetation is limited in extent and found only very close inshore. Rainfall within the area ranges from 48 to 56 inches a year. Annually the strongest winds blow from the Southeast during the dry months (July to October), approximately along the axis of the lake (Mortimer ed. 1965).

Mpulungu is the largest and most important town on the lake shore, the second town is Nsumbu. These towns are mainly inhabited by government staff, industrial fishermen and businessmen. Mpulungu is linked with a tarred road to Kasama, Lusaka and the Copperbelt while Nsumbu is linked by a partly rough road partly tarred road to Mpulungu and Kasama and westwards to the Luapula Province passing by Lake Mweru-Wantipa.

In terms of fish production the greatest potential of all Zambian fisheries lies within the lake Tanganyika fishery. According to official estimates fish production in Zambia in 1990 was 64,481 tons of which 15,418 or about 24% came from Lake Tanganyika (Dep. of Fisheries, 1991).

1.2. Study location

The study location was the entire shore line from the Tanzania border in the east, to the Zairian border in the west and including the islands.

1.3. Background and purpose of the study

In 1990 assistance was requested from the FAO Regional Project for Inland Fisheries Planning, Development and Management in Eastern/Central/Southern Africa (IFIP) in the execution of socioeconomic studies of fisheries in Zambia. It was decided to start with the artisanal fishery of Lake Tanganyika. In this year, 1990, a census of fishing units was already being planned. The socioeconomic study complements this census. Its objectives being to: a.) assess the socioeconomic structure of the Zambian artisanal fisheries of Lake Tanganyika, b.) to gain insight in the performance of fishing units in terms of organization, dimensions of gear, occupations, crew size and sharing systems, status of the fishermen, problems confronted by the fishermen etc.; and c.) to benchmark data for assessment of the evolution of the fishery in the region for the future. As such the study would provide basic socioeconomic parameters on the fishing units and the fishermen.

The census was executed in November 1990 and the results have just been published (Pearce, 1992). The results of the socioeconomic survey, executed in April 1992, are the subject of this report.

2. METHODOLOGY

2.1. Unit of inquiry

The unit of inquiry in this survey was the boat owner or fisherman in charge of a fishing and/or light boat. Owners and operators of light boats were included because the census of the fisheries (Pearce, 1992) revealed that light boats constitute the major share of boats operating in the Lake Tanganyika fisheries of Zambia. These light boats are generally independent units which play the role of light attraction of fish to be caught by the actual fishing boats. These fishing units are essentially beach seine units operating at night targeting for Limnothrissa miodon and Stolothrissa tanganyicae locally referred to as kapenta.

The respondents provided information about the unit(s) operating with his boat(s) and/or the unit he was leading. Furthermore the respondent provided socio-demographic and socio-cultural information about himself and his family. Because of time, funds and manpower constraints only those fishermen accessible on selected beaches were interviewed. As such the results of this survey do not reflect the characteristics of absentee boat owners not resident or not accessible at selected landing sites.

2.2. Questionnaire and pilot survey

During a preparatory mission (November 1991) a list of subjects to be included in the socioeconomic survey was drawn up together with the staff of the Mpulungu Fisheries station. A draft questionnaire was drawn up and field tested (20 interviews) in January 1992. After the field test a final version was designed (see Annex 1). An important feature of the questionnaire structure was the provision to record coded answers to questions.

2.3. Sampling method

Since 1964 the coast has, for statistical purposes, been divided into four strata. These strata are known as the East coast, South coast, West coast and Nsumbu area. The dividing lines between the strata were decided by geographic convenience so the lengths of each coastline are rather different (see Map 1). The results of the census were used to calculate sample sizes per stratum. During the census (Pearce, 1992) the following number of fishing and light boats were enumerated.

Table 2.1 Number of fishing and light boats

	Stratum 1		Stratum 2		Stratum 3		Stratum 4		Total	
	N	%	N	%	N	%	N	%	N	%
FB	53	32.1	112	36.1	83	61.0	58	18.2	306	32.9
LB	112	67.9	198	63.9	53	39.0	260	81.8	623	67.1
TOT	165	100	310	100	136	100	318	100	929	100

Note: FB = Fishing boats, LB = Light boats

Source: Pearce, 1992

As can be seen from the table above the majority of the boats (67.1%) in the

fishery are light boats. The repartition of fishing and light boats by stratum were as follows: Stratum 1: 33.4%, Stratum 2: 14.6%, Stratum 3: 34.2% and Stratum 4: 34.2%.

Field test of the questionnaire revealed an interview duration of about 40 minutes. On this basis and taking into account available resources, it was determined that a sample size of 325 respondents would be feasible. The sample size per stratum was calculated proportionally to the number of boats encountered during the census. This resulted in the following number of respondents per stratum: Stratum 1: 58 respondents, stratum 2: 109 respondents, stratum 3: 47 respondents and stratum 4: 111 respondents. It was realised however that in view of the very high mobility of the fishing units this proportional sampling strategy had only relative meaning. It is known that the fishing units basically follow the fish and can as such suddenly move from one beach or stratum to an other. Taking into account the limited size of many fishing villages and the high mobility of the fishermen it was decided to sample a broad range of villages. Furthermore the study supervisors continuously monitored the number of respondents sampled in every employment status category (Section 2.5) in order to redirect sampling in case too few respondents were sampled in certain categories. A too low number of respondents in a category would limit the possibilities of generalization. The villages sampled and the number of fishermen interviewed are listed in Annex 2.

2.4. Data collection and processing

Immediately prior to data collection a two day training seminar for the five interviewers was conducted in Mpulungu. At the seminar, training manuals were handed out (see Annex 3). After having been trained the team started interviewing in the Easternmost beach and then gradually moved towards Mpulungu. From Mpulungu the team travelled to the Westernmost (sampled) beach and gradually moved East back to Mpulungu. The duration of data collection was about three weeks. The information obtained was checked by the study supervisor immediately after the interview and coded after every interviewing day (see Annex 4 for the code book). Subsequently the data were entered in a database utilizing the software package Dbase III plus. The duration of data inputting was two weeks. The data were processed utilizing the statistical software package Statgraphics, Dbase III plus and Lotus 123. Graphs presented in this report were created with Harvard Graphics.

2.5. Stratification

The data presented in this report are stratified with respect to the employment status of the fishermen. In view of the sample size and the relatively low number of fishing units in fisheries other than kapenta seining it was decided not to stratify on a geographical or fishery type basis.

Initial processing of the data resulted in the following number of respondents per employment status.

Table 2.2. Number of respondents by employment status

Employment status	Number of respondents
Owner - Operator of:	
Fishing boat	78
Light boat	79
Both	10
Owner <u>not</u> Operator of:	
Fishing boat	26
Light boat	14
Both	17
Operator <u>not</u> Owner	
Fishing boat	71
Light boat	17
Both	4
TOTAL	324

Given the generally larger size of fishing boats (involving higher investment costs) compared to light boats, ownership or operation of a fishing boat was judged more significant for a fisherman's status than ownership or operation of a light boat. As such the respondents owning or operating both were reclassified in the group fishing boat owner or operator.

The outcome of this reclassification is given in the table below.

Table 2.3. Number of respondents by employment status after reclassification

Employment status	Number of respondents	Percentage of respondents
1. Owner operator fishing boat	96	29.6
2. Owner operator light boat	79	24.4
3. Owner <u>not</u> operator fishing boat	43	13.3
4. Owner <u>not</u> operator light boat	14	4.3
5. Operator <u>not</u> owner fishing boat	75	23.1
6. Operator <u>not</u> owner light boat	17	5.2
Total	324	100.0

For simplification these groups will hereafter be referred to as: 1. Owner Operators FiB, 2. Owner Operators LiB, 3. Owners FiB, 4. Owners LiB, 5. Operators FiB and 6. Operators LiB.

3. CHARACTERISTICS OF THE FISHERY

3.1. Fishing boats

3.1.1. Boat types

In the questionnaire six boat types were distinguished namely: dugout canoes, planked boats, fibreglass boats, planked catamarans, fibreglass catamarans and metal boats. Table 3.1 gives the incidence of the different boats as encountered during the survey.

Table 3.1. Number of boats by type

Type of boat	Number of boats	Percentage of boats
Dugout canoe	3	0.6
Planked boat	472	96.1
Planked catamaran	16	3.3
Total	491	100.0

Note: The total number of boats exceeds the number of respondents because of multiple boat ownership.

It is obvious that the overwhelming majority of the boats are made of plank construction. The planked boats are locally made. Hardly any dugout canoes were encountered which is not surprising since during the census only 7 dugouts were enumerated (Pearce, 1992).

3.1.2. Use of boats

Boats may exploit several fisheries (the different fisheries are described in more detail in Section 3.2) and can be used for different purposes. The operators and owners were asked to indicate for which purposes the boats were used. Table 3.2. gives the details.

Table 3.2. Use of boats by operators and owners

Gear	Operators		Owners	
	Primary use %	Secondary use %	Primary use %	Secondary use %
Beach seine	1.1	0.0	1.6	0.9
Gill nets	13.0	5.9	11.0	28.2
Kapenta seines	63.0	11.8	20.7	6.0
Lights	21.7	17.6	54.1	8.5
Lift nets	1.1	0.0	1.8	3.4
Hand lines	0.0	29.5	0.8	34.2
Transport	0.0	35.3	7.1	12.0
Long lines	0.0	0.0	0.3	6.0
Shouting *)	0.0	0.0	2.6	0.9
Total %	100.0	100.0	100.0	100.0
Total n	92	17	381	117

*) Fishermen going on the water shouting instructions to the pullers on the beach in which direction to draw the net.

It is not surprising to see a high proportion of kapenta seining and lights as the main purpose of the boats. In fact there are at least twice as much

light boats than fishing boats. Light boats are on high demand by kapenta seine operators and are perhaps the cheapest in the kapenta seine outfit. Table 3.3. gives the details on the use of boats of all (owners and operators) combined.

Table 3.3. First and Second Purpose of all boats

Type of Gear	First purpose		Second purpose	
	n	%	n	%
Beach seines	7	1.5	1	0.7
Gill nets	54	11.4	34	25.4
Kapenta seines	137	29.0	9	6.7
Lights	226	47.8	13	9.7
Lift nets	8	1.7	4	3.0
Hand lines	3	0.6	45	33.6
Transport boats	27	5.7	20	14.9
Long lines	1	0.2	7	5.2
Shouting boats	10	2.1	1	0.7
Totals	473	100	134	100

Most of the boats (all boats combined) (47.8%) are primarily used as light boats followed by kapenta seining (29%) and gillnetting (11.4%). The major secondary use of boats is handlining (33.6%) followed by gillnetting (25.4%).

From table 3.2. it can be seen that operators of boats are mainly (84.7%) involved in the kapenta seine fishery either using the boat to cast the net (63.0%) or to carry lights (21.7%). In the case of operators 18.5% of the boats are used for a secondary purpose: mainly transport (35.5%) and handlining (29.5%).

Owners (also) engage most of their boats in the kapenta seine fishery. Some 54.1% of the boats are primarily used as light boats while 20.7% are primarily used to operate the kapenta seine. During the day many of their boats (30.7%) are used for a secondary purpose mainly for handlining (34.2%) or for setting gillnets (28.2%).

3.1.3. Age of boats

The average age of the boats is 3.9 years old (standard deviation 3.1). The distribution of boat ages is given in figure 1.

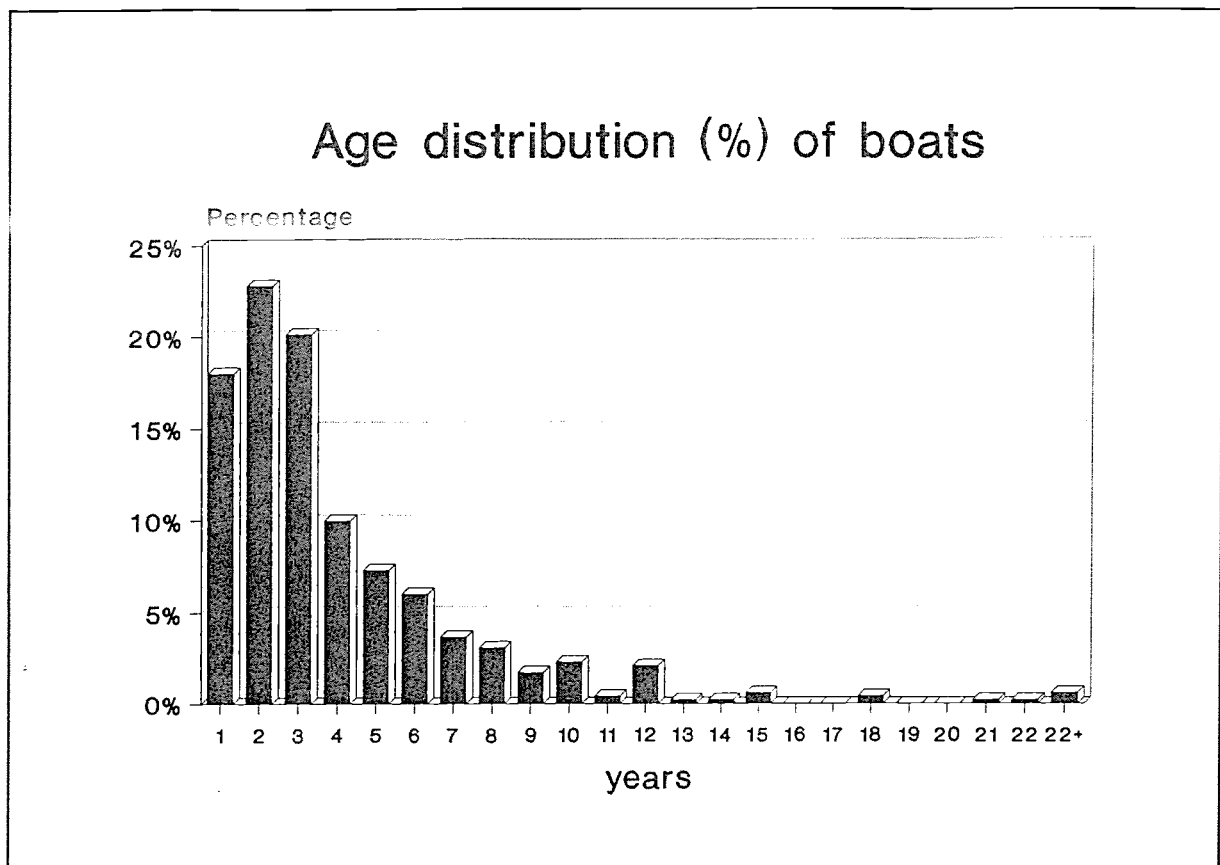


Figure 1 Age distribution (%) of boats

Although a limited number of boats was found with an age of more than 12 years boats are usually removed from the fishery after this age. The age structure of the boats displays an image of continuous investment in new boats. Many boats seem to have been replaced about two to three years ago.

3.1.4. Costs

3.1.4.1. Replacement costs

As far as replacement costs of boats is concerned it can be seen from table 3.4. below that the dugout canoe is (not surprisingly) the cheapest type of boat.

Table 3.4. Average replacement costs (Z. kwacha) of boats by boat type

Type of boat	Average	Standard deviation	Minimum	Maximum	n
Planked boat	18.700	15.090	3.000	100.000	439
Planked catamaran	70.350	35.170	25.000	150.000	14
Dugout canoe	2.600	990	1.800	4.000	3

Dugout canoes however are hardly used these days. A planked boat costs, on average 18.700 kwacha. A planked catamaran is significantly more expensive. Figure 2 below gives the distribution of the replacement costs.

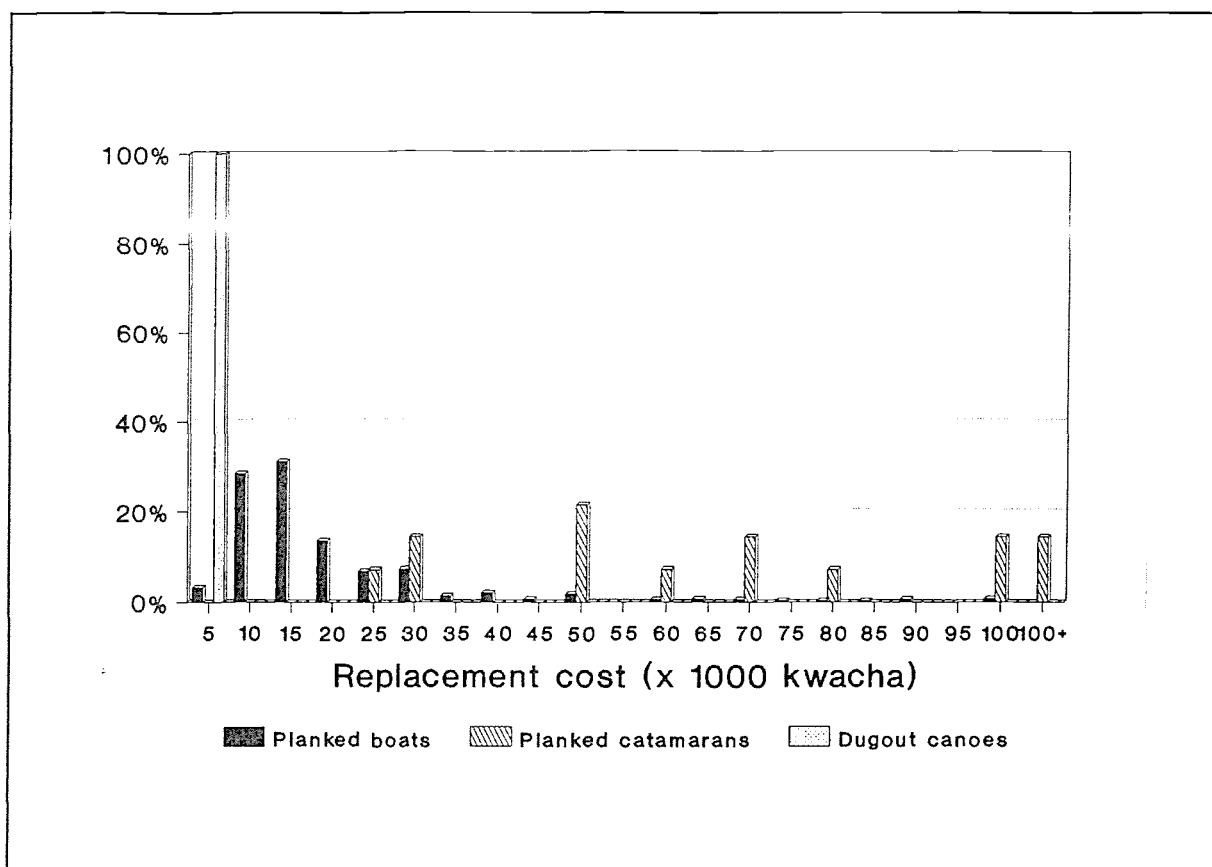


Figure 2 Distribution of boat replacement costs.

The dugout canoes encountered all had a replacement cost of equal or less than 4000 kwacha. Three quarters of the planked boats costed between 10.000 and 20.000 kwacha, the larger sized boats being more expensive. As can be seen from the graph the distribution of the replacement costs of planked catamarans is rather skewed which is mainly caused by differences in boat length and the small sample size.

3.1.4.2. Maintenance costs

As far as maintenance costs are concerned 62.8% of the planked boats and 62.5% of the planked catamarans were not maintained (or at least no cost was involved) during the period of two years preceding the survey. The average amount of money spent on boat maintenance was as follows.

Table 3.5. Average maintenance cost per year by boat type.

Boat type	Average	Standard deviation	Minimum	Maximum	n
Dugout	0	—	0	0	3
Planked boat	1958	2049	25	10000	167
Planked Catamaran	3188	2654	250	7500	4

Figure 3 gives the distribution of the yearly maintenance costs by boat type.

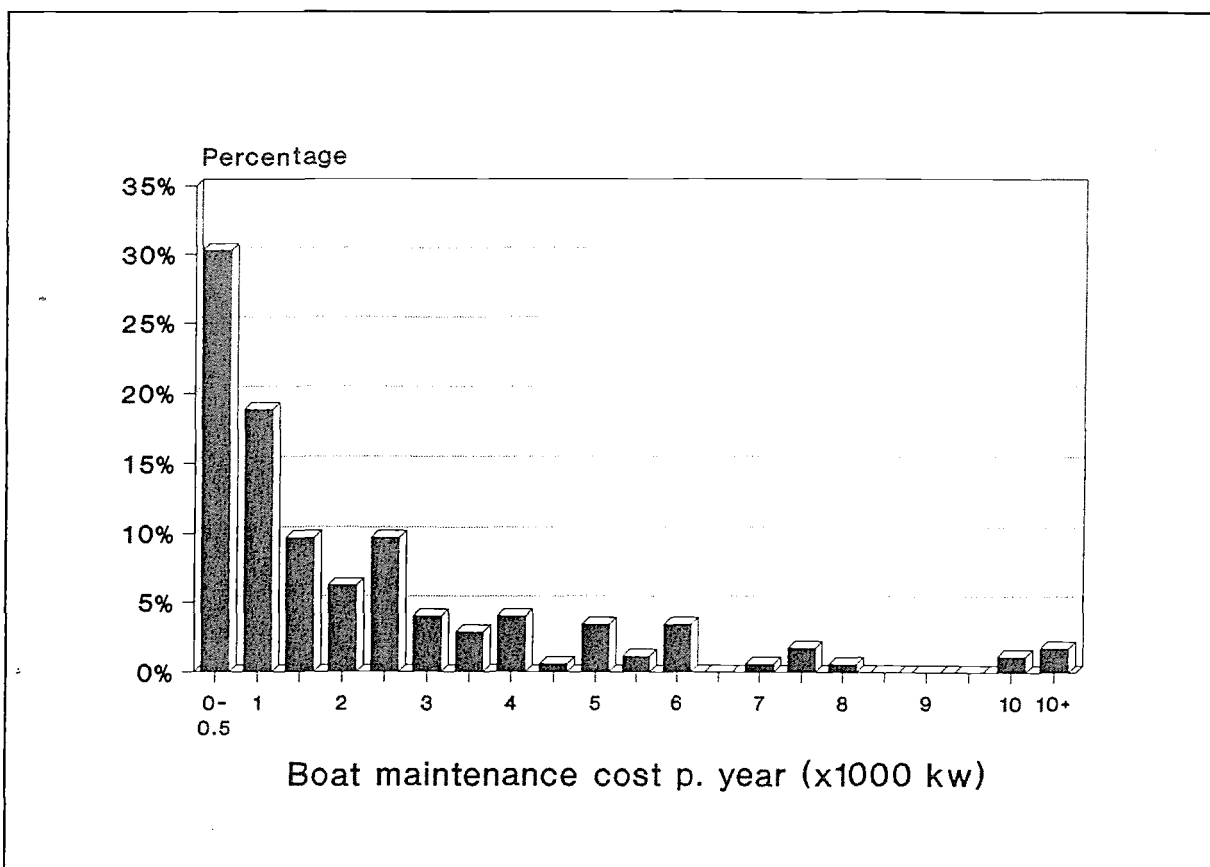


Figure 3 Distribution (%) of boat maintenance costs

3.2. Fishing gear

3.2.1. Description of types of gear

The types of gear encountered in this survey are beach seines, gillnets, kapenta seines, handlines, longlines, lift nets and lights used for attracting the fish at night. Although traps do exist in the area they were not recorded during the survey ².

Kapenta seines

The kapenta seine is the most important gear together with associated lights. Kapenta seines are normally used at night. There are some exceptions, kapenta seines are sometimes also used during the day when a shoal of fish is spotted inshore. A kapenta seine is a draw net without a cod end made of netting with a stretched mesh size of 6-10 mm. The legal minimum mesh size is 10 mm. The net is typically some 10-15 meters deep.

Lights

The lights used in association with the kapenta seine are practically all paraffin pressure lamps of Chinese manufacture. The lamps have a candle power

² The following descriptions are based on Pearce, 1992.

of 350–500. The lamps are locally referred to as Tilley lamps.

Beach seines

Beach seines are relatively uncommon. Most beach seines have a cod end mesh of 37 mm. Typically they are much larger than the kapenta seines. Beach seines are banned in all fisheries in Zambia except for Lake Tanganyika, because there is no evidence that the use is harmful to the commercial stocks.

Gillnets

Gillnets are very common in the Lake Tanganyika fishery. Gillnets are sold in standard lengths of 90 metres, but fishermen often modify the nets by cutting or joining nets. Gillnets are mostly used as bottom set nets overnight. The method locally referred to as "Kutumpula" which consists of encircling the nets and frightening fish into them is practiced, but is not common because of the nature of the coastline and depth of water. This method is illegal in Zambia and accurate figures of how widespread it may be is therefore difficult to obtain. A wide range of mesh sizes is in use from 50 mm to 250+ mm. The smaller mesh sizes are used to catch demersal cichlids, mesh sizes of 75–100 mm are primarily used to catch the Nile Perch species Lates mariae while the largest mesh sizes are specifically meant to catch the large clariid Dinotopterus cunningtoni.

Handlines

Often fishermen do not think of handlines as a significant gear. They are in fact quite common and catch rates are often as high as those achieved with gillnets. Typically a handline contains two or three hooks and is fished for two or three hours a day. There is a specialized handline fishery several miles north of Mutondwe Island that operates over a deep rocky bottom and catches the cichlid Cyphotilapia frontosa. Handlines are sometimes used at night in conjunction with lights.

Longlines

Longlines are few. The lines are often left in the water for a few hours only before checking.

Lift nets

The lift net, popular in other parts of Lake Tanganyika, is not common (yet) in Zambian waters. The first artisanal lift net began operations in 1986. The gear has occasioned a lot of discussion amongst fishermen over its advantages or disadvantages compared to the normal kapenta seine operation. This method is being promoted by the Department of Fisheries.

Traps

Traps of various types exist. The most common type, although not recorded in this survey, is small and is laid in shallow water to entrap the small littoral cichlids. Another trap, called the "Chisowe", is suspended in midwater with a bait of grass or reeds. This trap specifically targets for Dinotopterus cunningtoni which possibly finds a suitable substrate for laying eggs in the grass.

3.2.2. Number of fishing gear

The following number and types of fishing gear were recorded during the survey.

Table 3.6. Number of fishing gear owned or operated by employment status

Employment status	Beach seine	Gill nets	Hand-lines	Kapenta seines	Lights	Long-lines	Lift nets
Owners-operators FiB	3	50	18	35	37	6	1
Owner-operators LB	1	6	16	9	74	3	1
Owners FiB	4	5	3	44	20	0	9
Owners LB	0	2	4	1	13	3	0
Operators FiB	1	15	6	58	7	0	1
Operators LB	0	0	0	0	17	0	0
TOTAL	9	78	47	147	168	12	12

Note: The number of gillnets in this context does not refer to the number of unit lengths of 90 meters but to separate stretches of nets whereby a varying number of units is mounted. The numbers in the column lights does not refer to the number of actual lights but to the number of respondents owning or operating lights.

In figure 4 the numbers of gear owned or operated are related to the total number of fishermen in each employment status category. Ownership of gear is dealt with in more detail in Section 4.1.6.1.

Owners (non-operators) of fishing boats and operators (non-owners) of fishing boats are mainly involved in kapenta seining. All owners (non-operators) own kapenta seines and 46.5% also own lights. The kapenta seining (fishing boat) operators mainly depend on outsiders for light attraction of the fish. Owners of lightboats usually also own the lights themselves. Interestingly owners of fishing boats which operate their boats themselves mainly operate with gillnets. Kapenta seining is secondary in this group.

3.2.3. Length of fishing gear

The respondents were asked the length of the different gear they owned or which were operated from their boats. Length of gear was recorded as follows: the length of the head rope for kapenta seines and beach seines, for gillnets the total length in metres, for longlines the total number of hooks and for the lift nets the length of the circumference. Estimating the length seemed to be difficult at times, especially for respondents which were not actively engaged in fishing operations. Nevertheless the average length of the different gear (as calculated from the responses) is presented below.

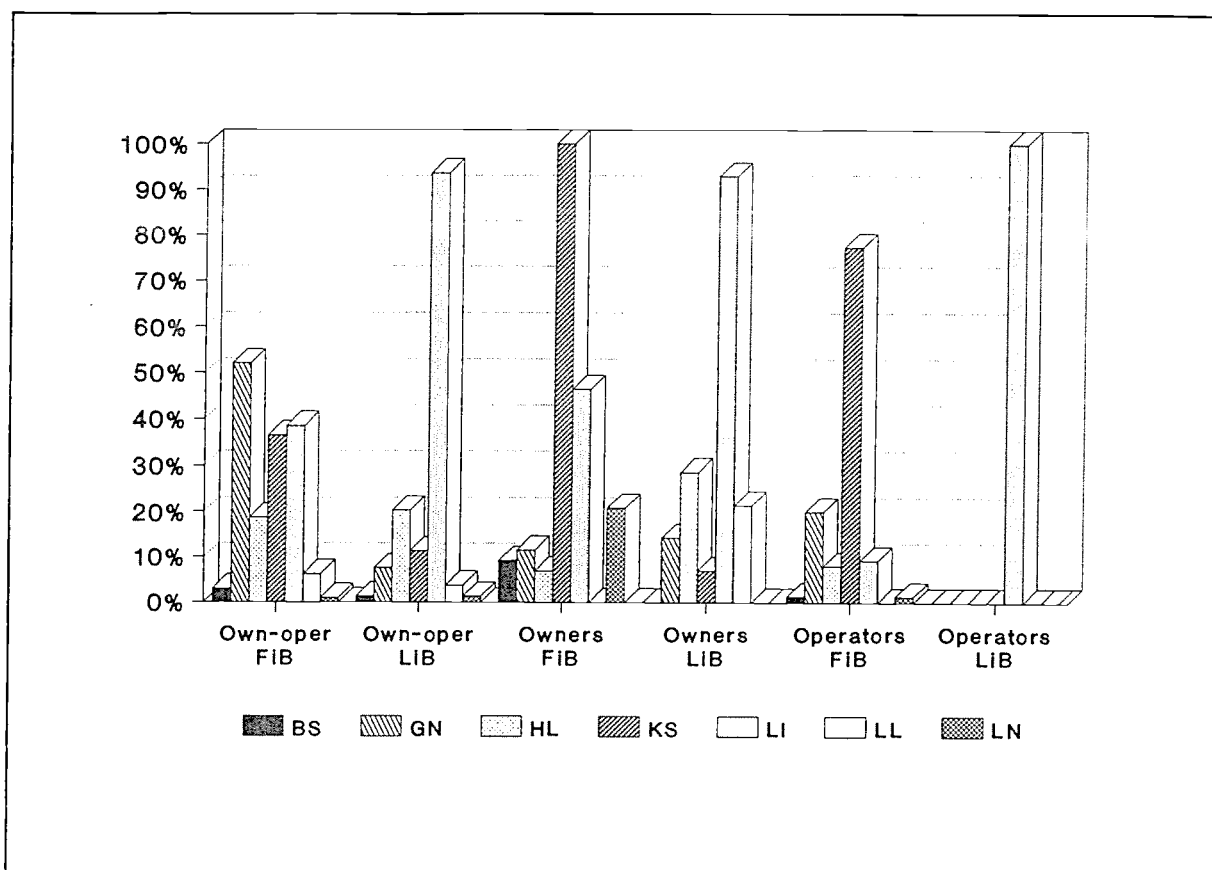


Figure 4 Percentage of fishermen in each category owning or operating gear xx

Table 3.7. Average length of gear

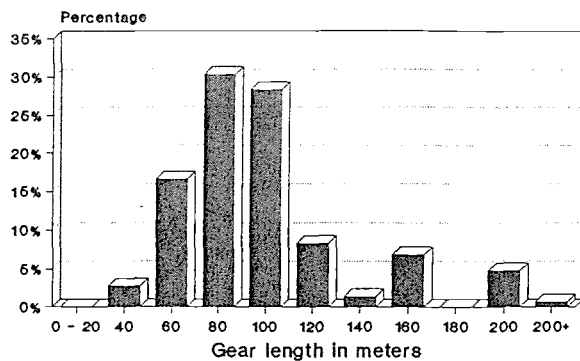
Gear	Average *) length (meters)	Standard deviation	Minimum	Maximum	n
Beach seine	159	99	18	300	9
Gillnet	875	697	40	3000	78
Kapenta seine	94	46	30	450	145
Longline (nb hooks)	180	143	42	500	7
Lift net	80	64	10	180	9

Note that the sample size for lift nets, beach seines and longlines is rather small and the fact the standard deviations are rather high resulting in broad confidence limits for the estimates of the averages in the entire 'population'.

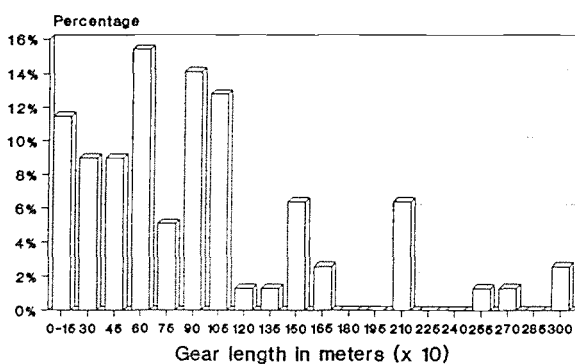
The length distributions are given in figure 5.

Length frequency distributions (%) of gear

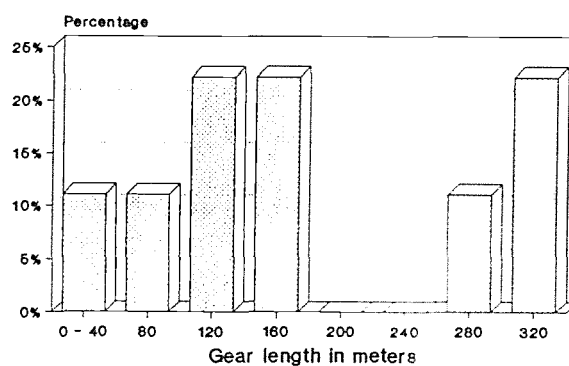
Kapenta seines



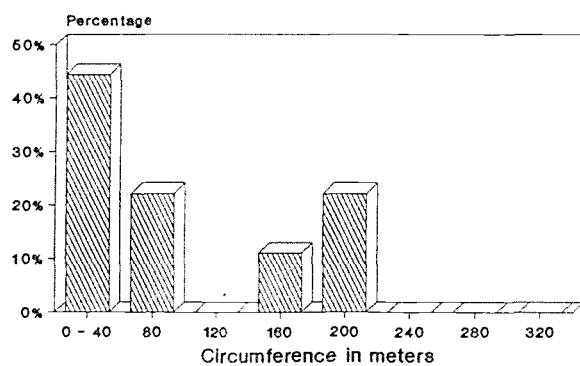
Gillnets



Beach seines



Lift nets



Longlines

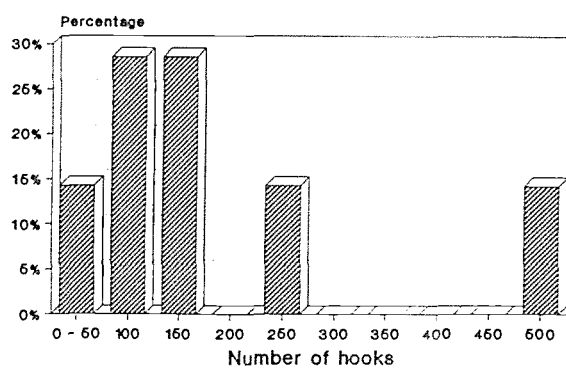


Figure 5 Length frequency distributions of gear

3.2.4. Age of fishing gear

The average age of gear is given in Table 3.8. below.

Table 3.8. Average age of gear in months

Gear	average	standard deviation	minimum	maximum	n
Beach seines	46	40	5	120	9
Gill nets	38	54	1	288	76
Handlines	14	15	1	60	42
Kapenta seines	55	68	1	360	140
Lights	43	46	1	360	166
Longlines	37	20	3	60	8
Lift nets	21	11	2	36	12

Figure 6 gives the age distribution of these gear. Kapenta seines are the oldest gear with an average age of 5.6 years followed by beach seines (3.8 years) and lights (3.5 years). Kapenta and beach seines show a rather long lifespan. This is basically explained by the fact that fishermen continuously repair their nets and replace it piece by piece. The lifespan of handlines is generally one year. Gill nets were also rather new, about 50% of the gillnets were up to one year old. The sample size of beach seines and longlines does not justify any firm conclusion on the trend in investment. The other gear show an image of continuous investment in new gear. The oldest liftnet encountered was 3 years reflecting the recent introduction of liftnets into the fishery.

3.3. Engines

3.3.1. Number of engines by horsepower

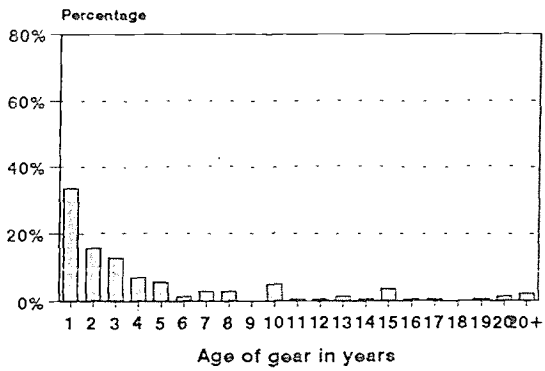
A total of 79 engines were encountered during the survey. The number of engines used and/or owned by employment status category is displayed in Table 3.9.

Table 3.9. Number of engines by employment status

Employment status	Total engines	Total respondents with engines	Total boats	% fishermen with engines	potential % of boats with engines
Own.oper.FiB	21	19	155	19.8	13.5
Own.oper.LiB	8	6	101	7.6	7.9
Owners FiB	34	22	125	51.1	27.2
Owners LiB	2	2	15	14.2	13.3
Operators FiB	14	13	76	17.3	18.4
Operators LiB	0	0	17	0.0	0.0
Total	79	62	489	19.1	16.2

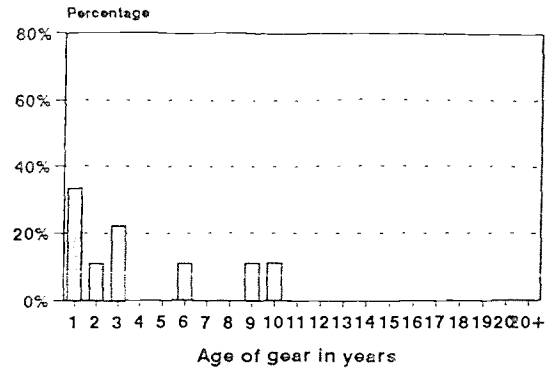
Thirteen respondents were encountered owning two engines and 4 owning three

Kapenta seines

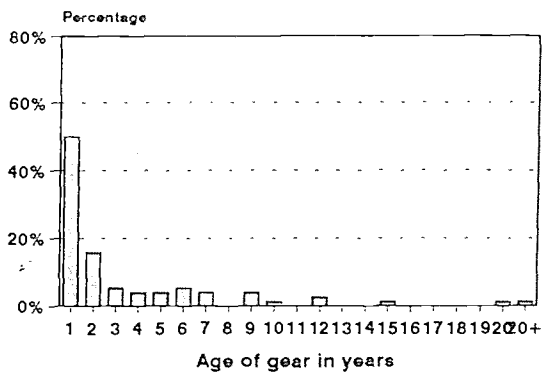


Beach seines

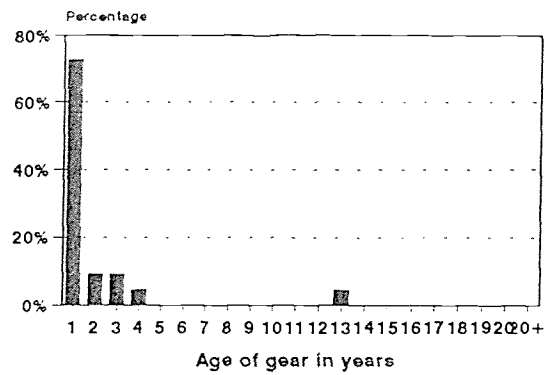
15



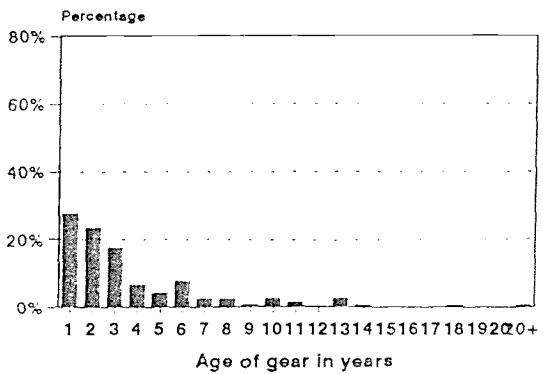
Gill nets



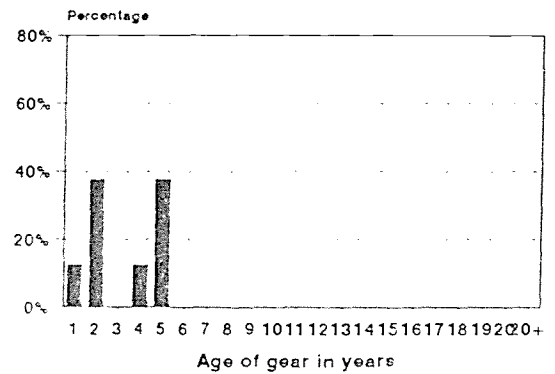
Hand lines



Lights



Long lines



Lift nets

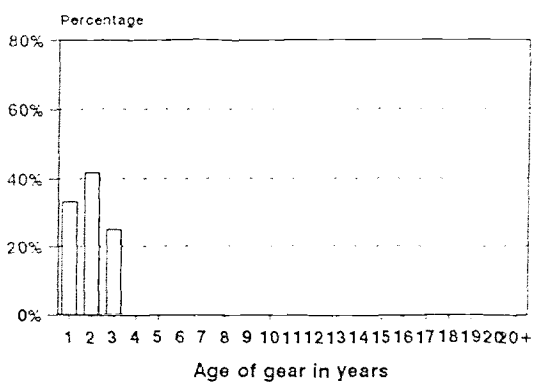


Figure 6 Age distribution of gear

engines. These respondents were almost all owners (non-operators) of fishing boats. It is also in this category that the incidence of engines is highest.

As far as engine brands is concerned 51.9% were Johnsons, 14.0% Yamaha, 11.4% Evinrude, 8.9% Mercuries, 5.1% Seagull, 5.0% Volvo, 2.5% Honda and 1.2% Mariner.

The power of the engines ranges from 3 hp to 45 hp. Table 3.10. below gives the distribution of engines by horsepower.

Table 3.10. Number of engines by horsepower.

Horsepower	Number of engines	Percentage
3	1	1.3
5	1	1.3
6	4	5.1
8	2	2.5
9	3	3.8
10	38	48.1
15	1	1.3
16	1	1.3
20	4	5.1
22	2	2.5
25	20	25.3
35	1	1.3
45	1	1.3
TOTAL	79	100.0

Engines of 10 and 25 horse power are clearly the most wide spread. These two categories of horse power account for three-quarters of all engines.

3.3.2. Age structure of engines

The average age of engines is 6.2 years, which is relatively old. The age structure of engines is displayed in figure 6. It is observed that some 40% of engines are more than 5 years old suggesting that engines are used since quite a number of years or that many engines in the fishery are bought second hand.

3.3.3. Replacement costs of engines

It was difficult to obtain prices of engines in Mpulungu because almost all types of engines were out of stock. Quotations for Johnson engines were as follows: 10 horse power - 110.000 kwacha; 15 horse power - 130.000 kwacha; 25 horse power - 160.000 kwacha.

3.3.4. Use and maintenance costs of engines

The fishermen were asked if they used the engine regularly on their fishing trips. As can be seen from table 3.11. below more than half of the engines are generally not used on fishing trips.

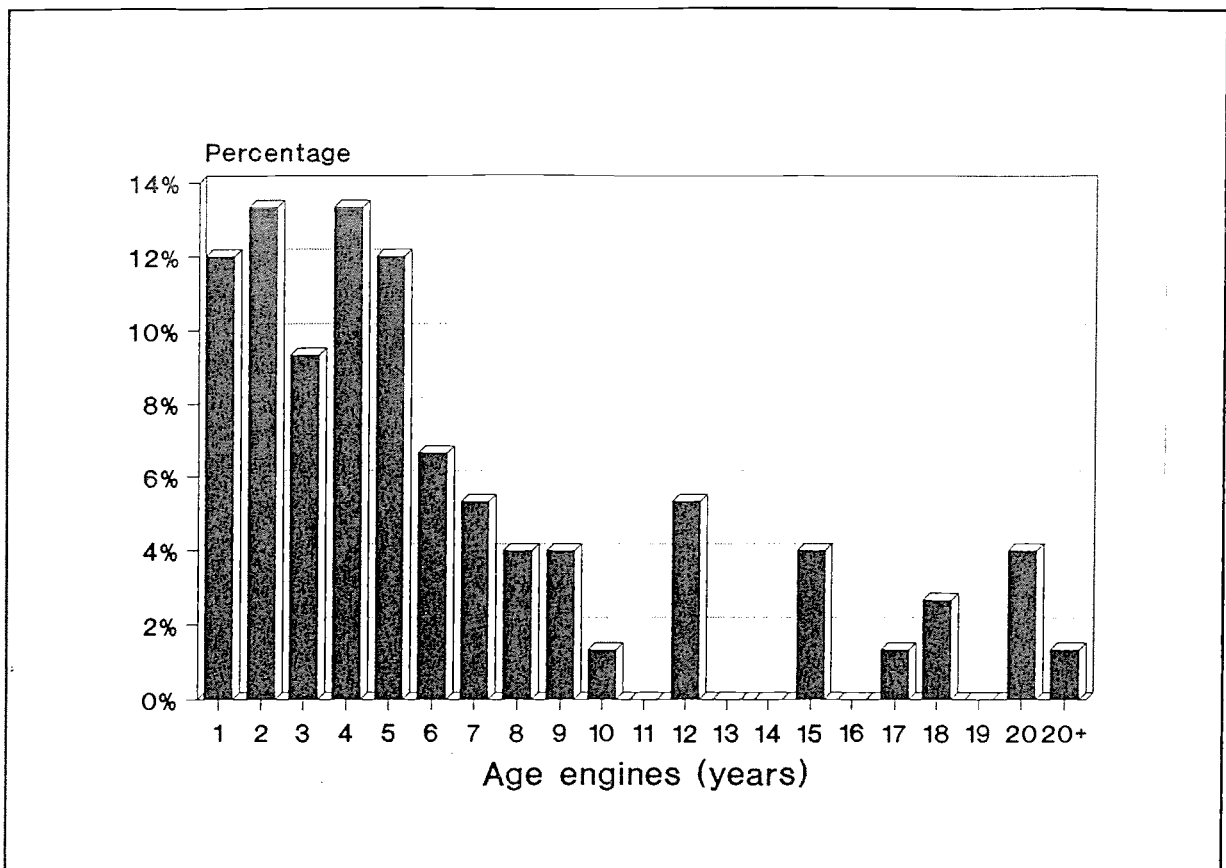


Figure 7 Age distribution (%) of outboard engines.

Table 3.11. Use of engines for fishing by employment status

Employment status	Yes		No		Total	
	n	%	n	%	n	%
Own.oper.FiB	10	52.6	9	47.4	19	100
Own.oper LiB	1	14.3	6	85.7	7	100
Owners FiB	9	47.4	10	52.6	19	100
Owners LiB	0	0.0	2	100.0	2	100
Operators FiB	4	40.0	6	60.0	10	100
Operators LiB	0	0.0	1	100.0	1	100
Total	24	41.4	34	58.6	58	100

The relatively limited use of engines for fishing is explained by several factors. Firstly quite a few engines are broken down. Table 3.12. gives the condition of the engines.

Table 3.12. Number of engines functioning and broken

Employment status	Functioning		Broken		Total	
	n	%	n	%	n	%
Own.oper.FiB	18	78.3	5	21.7	23	100
Own.oper. LiB	6	85.7	1	14.3	7	100
Owners FiB	18	72.0	7	28.0	25	100
Owners LiB	1	50.0	1	50.0	2	100
Operators FiB	8	88.9	1	11.1	9	100
Operators LiB	0	0.0	0	0.0	0	100
Total	51	77.3	15	22.7	66	100

As can be seen from the Table 22.7% of the engines were out of order. Given the age structure of the engines and the fact that spare parts are difficult to obtain it is not surprising to find this rather high percentage of breakdowns. Secondly, in the case of kapenta seining and beach seining only the light boat man and net casters are required to go on the water. These do not need engine power to operate. In case of kapenta seining use of an engine would even scare away the fish. As for the beach seine minimum operation costs are incurred without an engine. In the kapenta seine and beach seine fisheries engines are primarily used for moving between beaches. Thirdly engines are used to transport fish traders and villagers between the beaches and/or to the main settlements, Mpulungu and Nsumbu.

Use of engines for fishing appears more common among gill netters and lift netters. These fishermen go off shore and engine power appears to increase their efficiency.

Despite the limited use of engines for fishing fishermen will try to maintain their engines in good condition. During the year preceding the survey some 63% of the engines were repaired or maintained. The average amount spent on repair and maintenance of the engines was 5343 kwacha (per year). Figure 8 displays the frequency distribution of the maintenance costs.

As far as these repairs and maintenance are concerned, some 7.5% of the respondents stated that they carry out repairs on their engines themselves, 54.8% have them repaired by their dealer, 26.4% have their engine repaired by mechanics of the Fisheries Department and 11.3% have them repaired by others like friends, family members, etc.

3.4. Fish processing

Fish is landed at highly dispersed locations often far from consumer centres. If there is no ready market for the fish landed at the beach, the fisherman is obliged to travel to other landing sites or to process the fish. Kapenta catches, often being fairly small, are usually sundried. Sundrying is done on sandy beaches, prepared smooth surfaces or on concrete slabs. This way of processing is very efficient in the dry season, but difficult to use during the rainy season (especially on clay surfaces). A disadvantage is that the product is often full of sand and easily contaminated. In the rainy season the drying of kapenta meets some difficulties and takes 2 days. The fishermen were asked if they and/or their wife(ves) engaged themselves in the processing of fish before it is sold. Fish processing in this context means basically sundrying and packing. Tables 3.13. and 3.14. give the results.

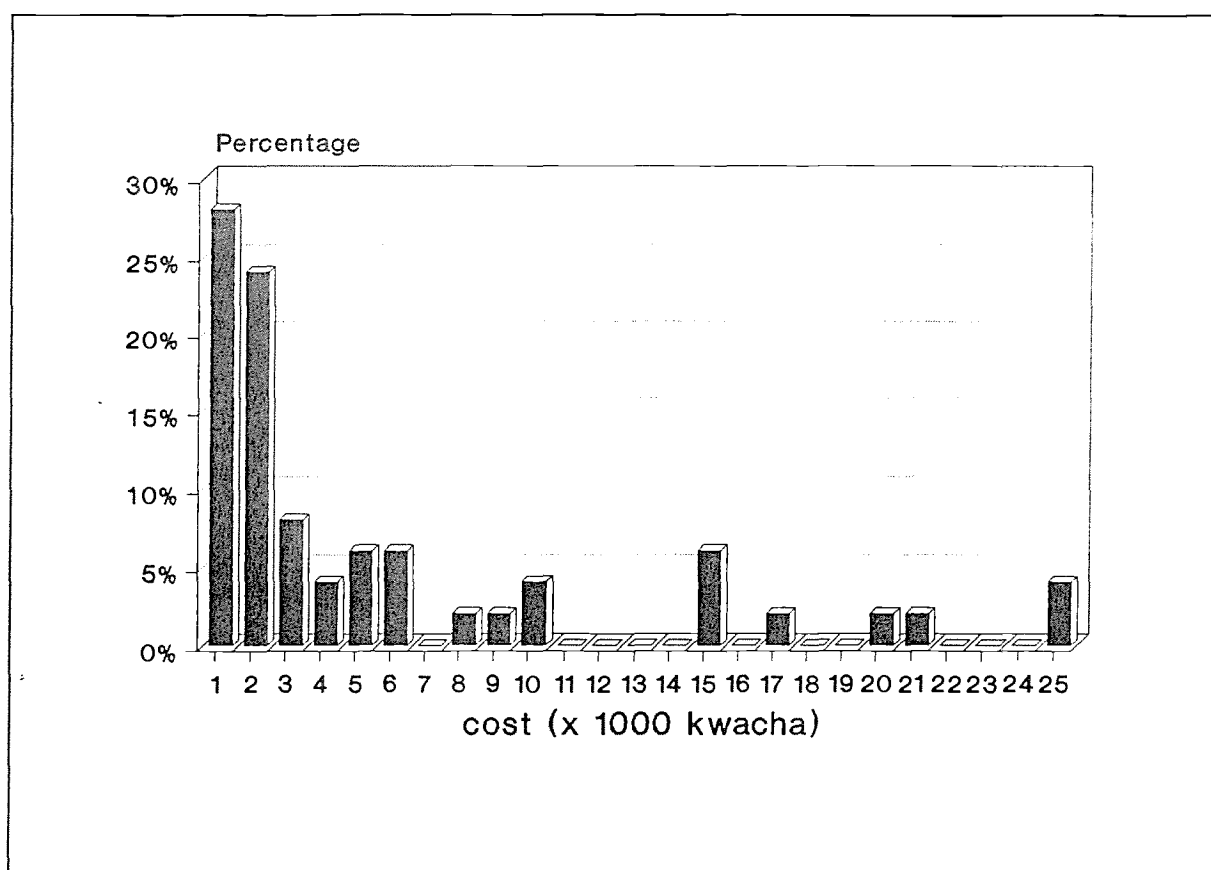


Figure 8 Distribution of yearly engine maintenance costs.

Table 3.13. Frequency of processing by fishermen

Employment status	Yes		No		Total	
	n	%	n	%	n	%
Own.oper.FiB	60	62.5	36	37.5	96	100
Own.oper.LiB	57	72.2	22	27.8	79	100
Owners FiB	24	57.1	18	42.9	42	100
Owners LiB	10	76.9	3	23.1	13	100
Operators FiB	43	57.3	32	42.7	75	100
Operators LiB	11	68.7	5	31.7	16	100
Total	205	63.9	116	36.1	321	100

Table 3.14. Frequency of processing by fishermen's wife(ves)

Employment status	Yes		No		Total	
	n	%	n	%	n	%
Own.oper.FiB	45	46.9	51	53.1	96	100
Own.oper. LiB	45	57.0	33	41.8	78	100
Owners FiB	21	48.8	21	48.8	42	100
Owners LiB	10	71.4	3	21.4	13	100
Operators FiB	28	37.3	46	61.3	75	100
Operators LiB	8	47.1	9	52.9	17	100
Total	157	49.1	163	50.9	321	100

When comparing the two tables above it is observed that, contrary to many other artisanal fisheries, processing is more often undertaken by the fishermen themselves than by their wives. This is mainly explained by the fact that the fishermen are very mobile. Fishing and consequently processing is often done away from the home beach. Wives are often involved in activities such as fetching firewood and farming. In the case of low catches competition among traders increases and they are more willing to buy the fresh fish and drying it themselves.

Processing can be done on a permanent (year round), seasonal or occasional basis.

Table 3.15. Time involvement in fish processing by fishermen and/or wife(ves)

Employment status	Permanent		Seasonal		Occasional		Total	
	n	%	n	%	n	%	n	%
Own.oper.FiB	25	55.6	3	6.7	17	37.7	45	100
Own.oper.LiB	24	52.2	1	2.2	21	45.6	46	100
Owners FiB	6	30.0	7	35.0	7	35.0	20	100
Owners LiB	4	40.0	3	30.0	3	30.0	10	100
Operators FiB	14	51.9	2	7.4	11	40.7	27	100
Operators LiB	3	37.5	0	0.0	5	62.5	8	100
Total	76	48.7	16	10.3	64	41.0	156	100

Fish processing is not really a seasonal activity. Out of those who process fish almost 50% do this on a permanent basis while 41% only occasionally engage themselves in this trade.

3.5. Fish marketing

A diversity of marketing channels is open to fishermen. The fishermen were asked which channels are used. Table 3.16. below gives the results.

Table 3.16. Frequency of use of marketing channels of fish by employment status

Employment status	Male trader	Female trader	Village/ Town Market	Consumers	Fishing Company	Others	Number of respondents
	%	%	%	%	%	%	n
Own.oper.FiB	90.6	91.7	39.6	49.0	8.3	2.1	96
Own.oper.LiB	96.2	96.2	25.3	43.0	10.1	0.0	79
Owners FiB	86.0	93.0	23.3	53.5	23.3	2.3	43
Owners LiB	71.4	85.7	28.6	50.0	7.1	7.1	14
Operators FiB	93.3	96.0	36.0	41.3	6.7	0.0	75
Operators LiB	88.2	94.1	11.8	35.3	0.0	0.0	17
All combined	91.0	93.8	31.2	45.7	9.9	1.2	324

Note: The sum of percentages exceeds 100% as fishermen use more than one marketing channel.

Small-scale male and female traders are the most important marketing outlets for fish. Often nearby fishermen also sell directly to consumers, to a village or town market and to commercial fishing companies. Interestingly owner-nonoperators of fishing boats sell significantly more often to commercial fishing companies compared to the other categories of fishermen. The commercial fishing companies have refrigeration facilities. These can also be of benefit to the small-scale fishermen since they are able to sell their fish wholesale (when they are close enough to Mpulungu or Nsumbu and) at times when they are not able to dry it effectively. Although all these channels indicated above are regularly used, from the following table it can be seen that the small-scale female trader plays by far the major role in direct purchasing of fish.

Table 3.17. Main marketing channels of fish by employment status

Employment status	Male trader	Female trader	Village /Town Market	Consumers	Fishing Company	Others	Number of respondents
	%	%	%	%	%	%	n
Own.oper.FiB	18.8	61.5	10.4	5.2	4.2	0.0	76
Own.oper.LiB	11.4	79.7	5.1	1.3	2.5	0.0	79
Owners FiB	16.3	67.4	2.3	2.3	11.6	0.0	43
Owners LiB	14.3	78.6	0.0	0.0	0.0	0.0	13
Operators FiB	12.0	73.3	10.7	2.7	0.0	0.0	74
Operators LiB	0.0	88.2	5.9	0.0	0.0	0.0	17
All combined	13.9	71.6	7.4	2.8	3.4	0.0	322

About 72% of all fishermen sell their catch mainly to female traders operating in the beaches. The role of women in marketing is enhanced by the fact that there are no well-established marketing mechanisms equivalent to that of the industrial fishery. Although some 10% of the fishermen also sell their catch to the industrial companies in Mpulungu only few fishermen declared this to be their main marketing channel. In these cases the fish has to be transported

by the fishermen to Mpulungu and Nsumbu. Penetration of (refrigerated) trucks or pickup traders in the artisanal sector is clearly not developed due to poorly developed road infrastructure. As with other fisheries in Zambia good access roads to fishing areas will greatly improve the marketing of fish.

Usually the only relationship with the trader is sales of the catch. Only a few cases were encountered where the trader provided (small) credits or gear.

Table 3.18. Relationship of fishermen with traders

Employment status	Provision of credit		Provision of boat		Provision of gear		Total respondents
	n	%	n	%	n	%	n
Own.oper.FiB	4	4.2	0	0.0	1	1.0	96
Own.oper.LiB	3	3.8	1	1.3	2	2.5	79
Owners FiB	0	0.0	0	0.0	0	0.0	43
Owners LiB	0	0.0	0	0.0	0	0.0	14
Operators FiB	8	10.7	1	1.3	7	9.3	75
Operators LiB	0	0.0	0	0.0	1	5.9	17
Total	15	4.6	2	0.6	11	3.4	324

Only two cases were found where the trader provided a boat. Provision of credit and/or gear occurred in only 3% to 5% of the cases. Operators (non-owners) of fishing boats are more often provided with (small) credits and gear compared to the other categories of fishermen. The lack of assistance provided by traders is, among others, explained by their high mobility between fisheries. Fish traders often come from outside the immediate lake shore area. The fish they market goes for sale mostly to the Lusaka area and the Copperbelt. The traders regularly originate from towns along the railway line. They move between different lakes depending on the availability of fish in the different fisheries. As such it is hard to develop longstanding relationships with fishermen, who themselves are also rather mobile.

Fishing is essentially done to obtain a cash income. Part of the catch, however, is destined for consumption in the household. Obviously the amount of fish consumed depends on the family size. The average home consumption per employment status category is given below.

Table 3.19. Home consumption per week by employment status

Employment status	Average	STD	Minimum	Maximum	n
Own.oper. FiB	17.14	12.83	1	70	73
Own.oper. LiB	17.81	14.06	1	91	71
Owners FiB	16.44	10.68	2	35	29
Owners LiB	20.89	10.89	8	40	9
Operators FiB	21.18	12.75	5	70	66
Operators LiB	15.31	15.68	1	60	13
All combined	19.07	15.17	1	91	261

The average home consumption ranged between 15 and 21 kg per week per family. The overall average quantity of fish destined for home consumption per week

is 19 kilograms.

3.5. Crew size and sharing systems

The fishermen were asked how many crew operate the gear. The details are given below. For the kapenta seine and beach seine crew was defined as the number of people on the beach pulling the net.

Table 3.20. Crew size by gear type

Gear	Average	Standard deviation	Minimum	Maximum
Kapenta seines	8.28	2.30	4	24
Beach seines	8.00	3.03	3	13
Lift nets	3.75	2.05	1	8
Long lines	1.77	1.09	1	4
Hand lines	1.58	0.84	1	4
Gill nets	2.32	1.47	1	7
Lights	1.20	0.57	1	4

Figure 9 displays the frequency distribution of crew size by gear.

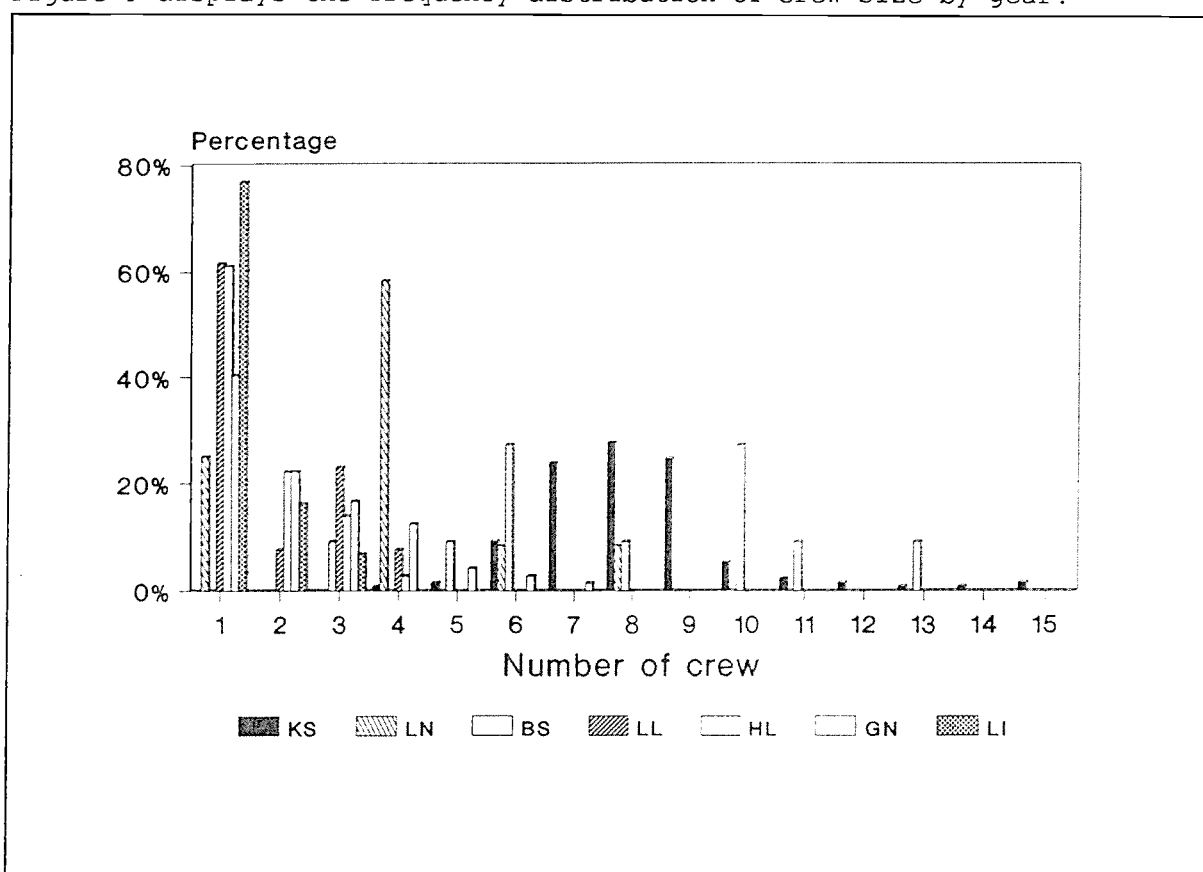


Figure 9 Distribution (%) of crew size by gear type.

The most common crew size for the kapenta seine is 7 to 9. The crew size distribution for the beach seine is rather skewed due to the small number of beach seines encountered in the sample. Generally beach seines are operated with a crew from 6 to 14. Lift nets are usually operated by a crew of 4 while

handlines, longlines and lights are usually operated by one person only. Gillnets are operated by one person or two.

Most crew in the different fisheries are paid on the basis of a share of gross returns. In those operations where there are expenses on inputs these costs are usually deducted before sharing takes place. The likely reasons for a share system are: 1.) risk sharing, 2.) incentive for hard work and careful handling of catches and, 3.) the encouragement of cost minimization in the production of effort. Fixed wages were not recorded.

The main systems of catch sharing encountered are described below.

Kapenta seine

The typical system of catch sharing in the kapenta seining unit is as follows. Sharing of the catch is done immediately after the net has been pulled on the beach. The light boat operator (the one who has attracted the fish and brought it within the range of the net) gets 50% of the total catch. The other 50% is destined for the net pullers and net owner which is usually also the owner of the boat from which the net is casted. The latter two, pullers and owners, share again on a 50%-50% basis. Thus the pullers as well as the net owner finally obtain 25% of the total catch. If the light boat operator is also the owner of the lights and boat he remains with the 50% of the total catch. If he is the operator but not the owner of lights and light boat, he divides his share on a 50%-50% basis with the owner, thus obtaining 25% of the total catch. The light boat operator pays the operational costs (basically paraffin for the lamp) from his own share.

Liftnet

In lift net fishing operational costs are usually deducted before the catch is shared on a 50%-50% basis between the owner and the crew. One case was found where the owner obtained 75% and the crew 25%. In this case operational costs were deducted from the owner's share. In the case where the owner does not participate in fishing 50% is destined for the owner, 25% for the fisherman in charge (captain) and 25% for the crew.

Beach seine

The catch of all beach seines encountered was divided on a 50%-50% basis between the crew and the owner of the equipment.

Longline

Only few long lines were encountered. The few longliners recorded usually operated alone with their own equipment. In cases where a crew is fishing with an other persons equipment the catch is divided on a 50%-50% basis.

Handline

As in the case of longliners, handliners usually operate on their own with their own equipment whereby they retain 100% of the catch. In cases where they operate with another persons equipment they share on a 50%-50% basis with the owner.

Gillnets

The most common sharing system for gillnets is 50% crew share, 50% owner share after deduction of operational costs. A few cases were found where the crew share was 25% and the owner share 75% or 33% crew share and 67% owner share. In these cases however operational costs remained to be deducted from the owner's share. Two cases were recorded whereby an operator retained 80% of the

catch and contributed 20% to the boat and net owner.

Lights

See kapenta seines.

3.6. Details on the kapenta seine operation

Because of the importance of the kapenta seine fishery some additional data were collected on the operation to have a clearer idea of the effort exerted by the fishing units.

Firstly the fishermen involved in kapenta seining were asked how many light boats took part in the last fishing operation (fishing night). The average number of light boats per operation appeared to be 2.6 boats. Figure 11 a gives the distribution. About one-quarter of the operation involved only one light boat while in 33% of the cases 2 light boats were involved.

The minimum number of lamps used is 2. The large majority of fishing operations (88.1%), however, involves more than two lamps. Figure 11 b gives the distribution of the number of lamps. The average number of lamps used per fishing night was 6.3.

Finally the number of net draws per fishing night was assessed. Figure 11 c gives the distribution of the number of draws per fishing night. In 34.6% of the cases the net was pulled in only once. The average number of draws per night was 2.5. Table 3.21 below summarizes these data collected on the kapenta seine operation.

Table 3.21. Average number of lamps, crew, number of draws and light boats in the kapenta seine operation.

* Component	Average	STD	Minimum	Maximum
Number of lamps	6.30	4.08	2	26
Crew (pulling)	7.90	1.81	4	25
Number of draws	2.40	1.67	1	12
Number of light boats	2.56	1.72	1	12

3.7. Crew changes and crew carrying gear

Depending on whether a crew member is satisfied with the rate of success of the fishing unit and/or his share of the catch he will either change or not change to another fishing unit. To inquire about the stability of the crew the fishermen were asked how often crew members change to other units. Table 3.22. below gives the results.

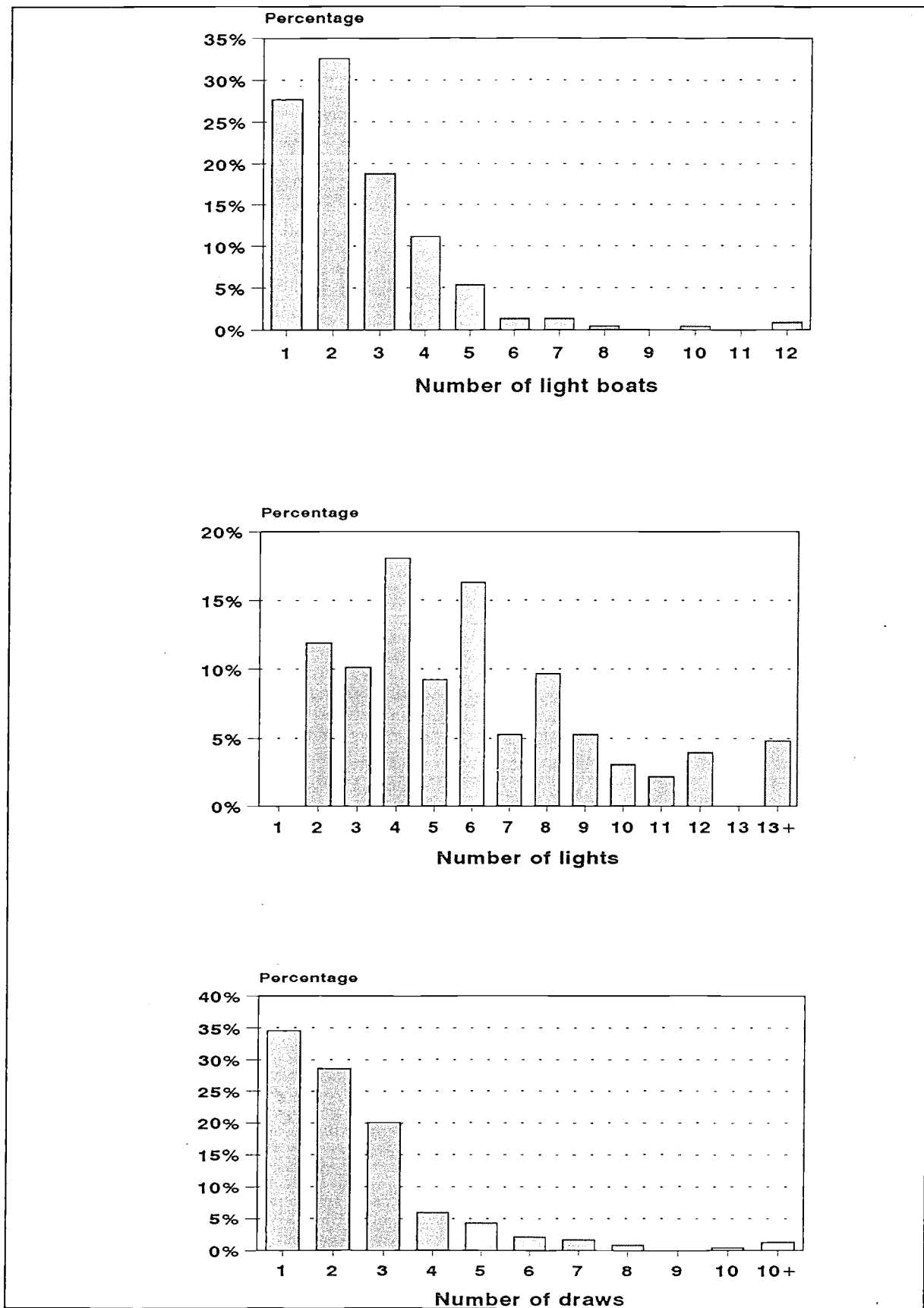


Figure 10 Frequency distribution of number of light boats, lights and net draws per kapenta seining night

Table 3.22. Frequency of crew changes

Employment status	daily		weekly		monthly		limited change		total	
	n	%	n	%	n	%	n	%	n	%
Own.oper.FiB	3	3.1	0	0.0	12	12.5	81	84.4	96	100
Own.oper.LiB	0	0.0	1	1.3	6	7.6	72	91.1	79	100
Owners FiB	0	0.0	0	0.0	5	11.6	38	88.4	43	100
Owners LiB	0	0.0	0	0.0	2	14.3	12	85.7	14	100
Operators FiB	1	1.3	0	0.0	7	9.3	67	89.4	75	100
Operators LiB	1	5.9	0	0.0	0	0.0	16	94.1	17	100
Total	5	1.5	1	0.3	32	9.9	286	88.3	324	100

Crew changes appear to be very limited or in other words the large majority of the fishing units are rather stable. Entire fishing units seem to move together without recruiting new labour in the other beaches. Often crew and light men involved in the operation are members of the same family and apparently crew do not break these family ties in fishing. The distance between fishing villages is another contributing factor. Light men in particular find it difficult to travel for miles to (have only a chance to) join other kapenta seine units. Crew changes appear to occur more frequently when a fishing village is home to several kapenta seine operators.

Fishing can be carried out with gear of a single owner or different owners. The fishermen were asked if crew members bring in their own gear. Results are given below in Table 3.23.

Table 3.23. Frequency of crew carrying gear

Employment status	Always		Sometimes		Never		Total
	n	%	n	%	n	%	n
Own.oper. FiB	10	10.4	6	6.3	80	83.3	96
Own.oper.LiB	3	3.8	6	7.6	70	88.6	79
Owners FiB	4	9.3	5	11.6	34	79.1	43
Owners LiB	3	21.4	1	7.1	10	71.4	14
Operators FiB	2	2.7	3	4.0	70	93.3	75
Operators LiB	0	0.0	1	5.9	16	94.1	17
Total	22	6.8	22	6.8	280	86.4	324

Taking all categories together, almost 14% of the fishermen indicated that the crew also fish with their own gear. Gear are apparently usually owned by the boat owner. Section 4.1.6.1. elaborates more on ownership patterns. The majority of gear brought in by the crew were handlines, 62.8% followed by lights, 23.2% and gill nets, 15.8%.

4. SOCIOECONOMIC CHARACTERISTICS OF THE FISHERY

4.1. The fishermen

4.1.1. Employment

The fishermen distinguished in this survey are not necessarily active or full-time fishermen. Table 4.1. below gives the outcome of our inquiry into the relative time involvement of the fishermen in active fishing.

Table 4.1. Frequency of full-time, part-time and occasional involvement in fishing by employment status

Employment status	Full-time		Part-time		Occasional		Not fishing		Total	
	n	%	n	%	n	%	n	%	n	%
Own.oper.FiB	87	90.6	5	5.2	3	3.1	1	1.1	96	100
Own.oper.LiB	76	96.2	0	0.0	0	0.0	3	3.8	79	100
Owners FiB	10	23.3	2	4.7	1	2.3	30	69.7	43	100
Owners LiB	6	42.9	0	0.0	0	0.0	8	57.1	14	100
Operators FiB	74	98.7	1	1.3	0	0.0	0	0.0	75	100
Operators LiB	17	100.0	0	0.0	0	0.0	0	0.0	17	100
Total	270	83.3	8	2.5	4	1.2	42	13.0	324	100

Six female boat owners were encountered, four in the category Owners (nonoperators) of fishing boats and two in the category light boat owners-nonoperators. The operators-nonowners of fishing and light boats and the owner-operators of lightboats are practically all full-time fishermen. Some 10% of the owner-operators of fishing boats fish less than 10 days per month. As far as owners-nonoperators are concerned most of these are by definition not to be considered as fulltime fishermen. Still we see that 23.3% of the fishing boats owners and 42.9% of the lightboat owners considered themselves to be active in fishing for more than 10 days per month. This often means that the owners travel to supervise the operations of their boats. The boats regularly fish away from the home beach. In these cases the owner follows the unit for a week or two. The owner-nonoperators are often people who are engaged in trading (see section 4.2.2.2). They engage in fish trading and/or own small grocery stores in their home village.

4.1.2. Ethnic background and religion

Figure 11 below gives the frequency distribution of the fishermen according to their ethnic background.

Lungus, Mambwes, Bembas and Tabwas are natives of the Northern province, particularly the Lungus who are the original inhabitants of Mpulungu. It is therefore not surprising that these four tribes constitute the large majority, almost 96%, of the sampled fishermen. Owner-operators and owner-nonoperators of fishing boats originate significantly more often from the Lungu tribe compared to the other categories of fishermen. The light operators have the least roots in the area. One-quarter of the light operators are not from a tribe originating from the northern province. (See also section 4.2.3).

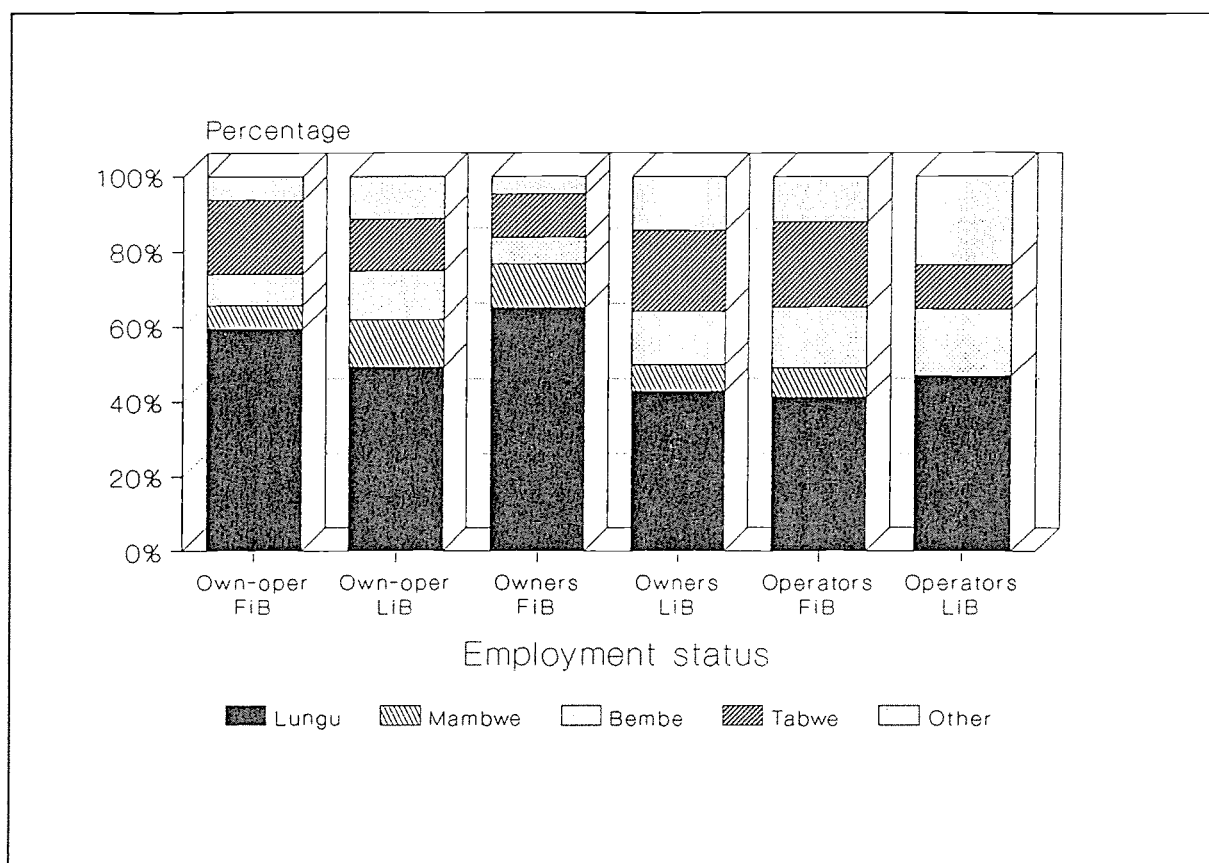


Figure 11 Fishermen by tribe and employment status

4.1.3. Age and fishing experience

Table 4.2. below gives the average age of the fishermen by employment status.

Table 4.2. Average age fishermen by employment status.

Employment status	Average age	Standard deviation	Minimum	Maximum
Own.oper. FiB	41.55	12.82	18	74
Own.oper. LiB	33.61	10.41	16	66
Owners FiB	41.99	13.93	22	72
Owners LiB	35.29	8.94	20	50
Operators FiB	33.11	8.33	18	52
Operators LiB	28.12	8.03	18	45
All combined	36.70	11.62	16	74

As can be seen in the table above there are significant differences in the average age of the fishermen between the different categories. Not surprisingly owner-operators and owner-nonoperators are the oldest. It is in these categories that investment in fishing is highest. In fact boat owners are regularly retired civil servants who had money to invest in the fishery. Others have over the years been accumulating their capital from either fishing or other sources. The easiest entry into the fishery is working as a net puller, crew member or light operator. Fishing boat operators and especially light boat operators are often new entrants in the fishery. These fishermen

have not accumulated enough capital yet to invest in their own boats and nets.

Owners (non-operators) and operators of light boats generally have the least experience in fishing which partly follows from their lower (average) age.

Table 4.3. Years of experience in fishing by employment status

Employment status	Average experience	Standard deviation	Minimum	Maximum
Own.oper.FiB	16.76	12.13	0	47
Own.oper.LiB	11.99	9.86	1	51
Owners FiB	13.30	12.55	0	60
Owners LiB	8.14	8.57	0	33
Operators FiB	11.21	9.36	0	35
Operators LiB	7.18	6.34	1	22
All combined	12.98	10.96	0	60

Comparing the average age of owners non-operators and their fishing experience with that of fishermen in other categories it is noted that they have relatively few years of fishing experience. This category is in fact composed of two groups: fishermen who have fished since a long time and accumulated their capital mainly from fishing, and new entrants who, after retirement, settled in the villages and invested their money in boats.

4.1.4. Educational levels

Information has been gathered on the educational levels achieved by the fishermen. Primary education in Zambia consists of 7 school years. Secondary education extends from form 1 to form 5. Subsequently one can continue into advanced education. The number of years of education have been coded from 1 (primary 1) to 13 (advanced education). Subsequently the average education of the respondents was calculated. Table 4.4. below gives the average number of years of education achieved by the fishermen by employment status.

Table 4.4. Average education of fishermen by employment status (years)

Employment status	Average education	Standard deviation	Minimum	Maximum
Own.oper.FiB	4.7	3.3	0	12
Own.oper.LiB	4.9	2.9	0	10
Owners FiB	5.2	3.8	0	12
Owners LiB	5.7	3.0	0	12
Operators FiB	5.6	3.1	0	12
Operators LiB	4.8	3.2	0	9
All combined	5.1	3.2	0	12

On average the fishermen have received 5.1 years of schooling. Although the differences between the employment status categories are not very large it is noted that owner-operators FiB, owner-operators LiB and operators LiB are less educated than the other categories of fishermen.

Figure 13 gives the distribution of educational-levels achieved by employment status.

Out of all fishermen 18.6% never attended school. The rate of non-schooling is the highest in the categories owner-operators and owner-non operators of fishing boats and operators of light boats. With respect to owner-non operators of fishing boats we see on the other hand that almost one-fifth had 10 to 12 years of education. This group includes a number of retired civil servants.

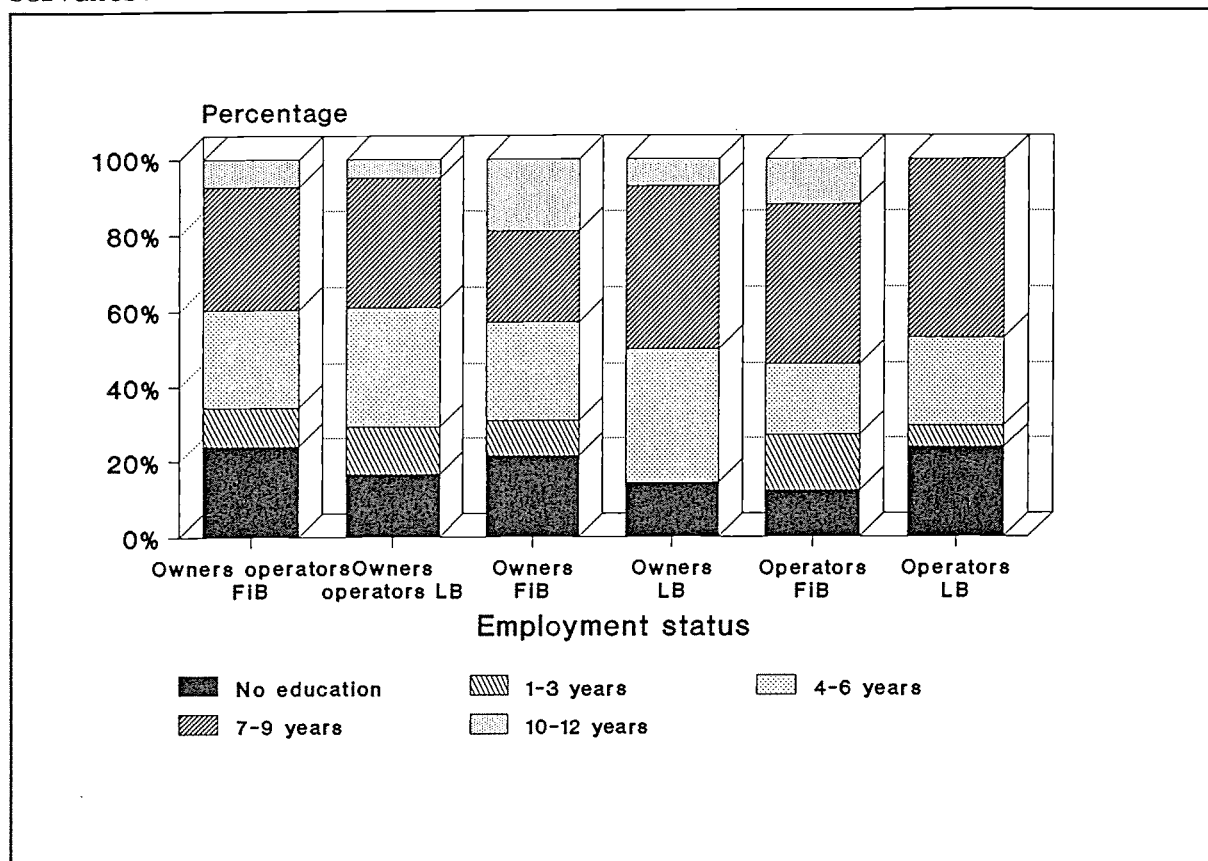


Figure 12 Educational levels achieved by employment status

4.1.5. The fisherman family

The majority of the fishermen, 86.1%, are married as appears from table 4.5. below.

Table 4.5. Marital status of fishermen by employment status

Employment status	Married		Single		Widow (ed)		Divorced		Total	
	n	%	n	%	n	%	n	%	n	%
Own.oper. FiB	89	92.7	4	4.2	2	2.1	1	1.0	96	100
Own.oper. LiB	66	83.5	11	13.9	1	1.3	1	1.3	79	100
Owners FiB	41	95.3	0	0.0	2	4.7	0	0.0	43	100
Owners LiB	13	92.9	0	0.0	0	0.0	1	7.1	14	100
Operators FiB	60	80.0	14	18.7	0	0.0	1	1.3	75	100
Operators LiB	10	58.8	7	41.2	0	0.0	0	0.0	17	100
Total	279	86.1	36	11.2	5	1.5	4	1.2	324	100

There are however significant differences between the employment status categories. Owners (non-operators) are more often married men when compared to the other categories. Especially operators of light boats are often, 41.2%, single men. The same holds for owner-operators of light boats and non-owner operators of fishing boats.

The average number of wives per fishermen is given in table 4.6.

Table 4.6. Average number of wives of fishermen by employment status

Employment status	Number of wives				
	zero wives	average	standard deviation	minimum	maximum
Own.oper. FiB	6	1.7	1.1	1	8
Own.oper. LiB	10	1.5	1.2	1	8
Owners FiB	0	2.0	1.5	1	8
Owners LiB	2	1.2	0.3	1	2
Operators FiB	15	1.4	1.2	1	8
Operators LiB	6	1.7	2.1	1	8
All combined	39	1.6	1.2	1	8

Table 4.7. gives the distribution of the number of wives of the fishermen in the different categories.

Table 4.7. Distribution of number of wives per fisherman by employment status

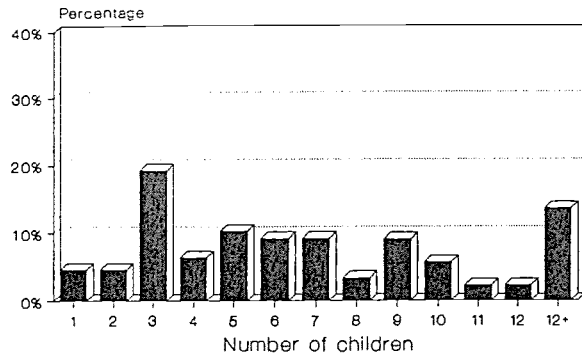
Employment status	One %	Two %	Three %	Four %	Five to eight	Total n	Total %
Own.oper. FiB	53.3	36.7	6.7	0.0	3.3	90	100
Own.oper. LiB	69.6	23.2	4.3	0.0	2.9	69	100
Owners FiB	46.5	32.6	14.0	2.3	4.6	43	100
Owners LiB	83.3	16.7	0.0	0.0	0.0	12	100
Operators FiB	78.3	18.3	0.0	0.0	3.3	60	100
Operators LiB	81.8	9.1	0.0	0.0	9.1	11	100
All combined	63.9	27.0	5.3	0.4	3.5	285	100
n	182	77	15	1	10	285	

As far as the number of wives is concerned we see that the owners (non-operators) are more often married to more than one wife. About half of the respondents in this category married more than one wife following local customs. This means, in the local cultural context, that they have the resources to maintain them.

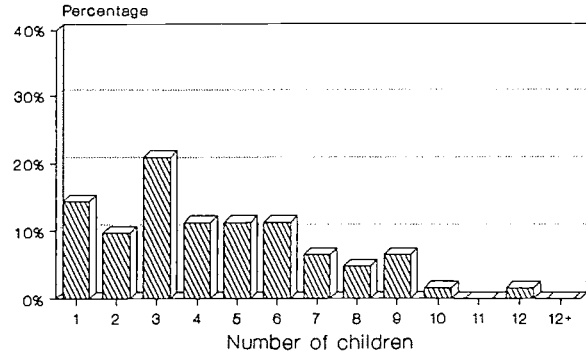
Table 4.8. below gives the average number of children of the fishermen by employment status, figure 14 gives the distribution.

Distribution (%) of number of children by employment status

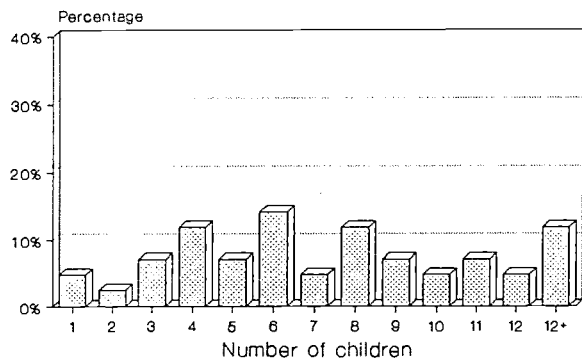
Owner operators of Fishing boats



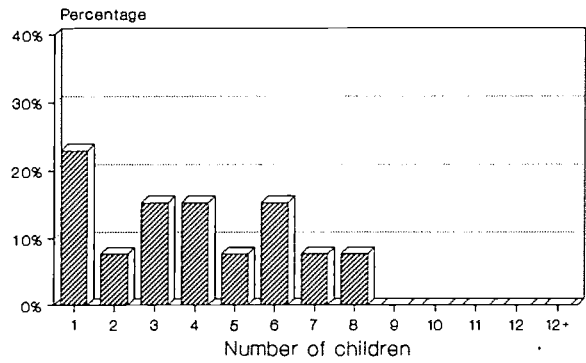
Owner operators of Light boats



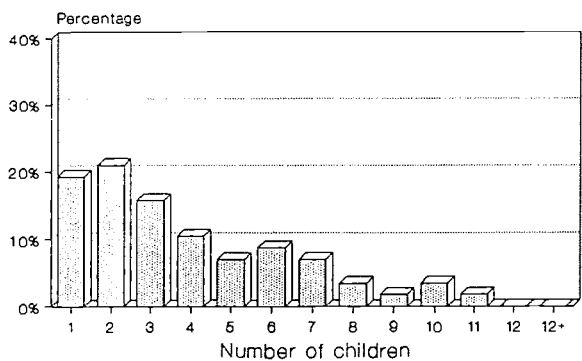
Owners non-operators of Fishing boats



Owners non-operators of Light boats



Operators of Fishing boats



Operators of Light boats

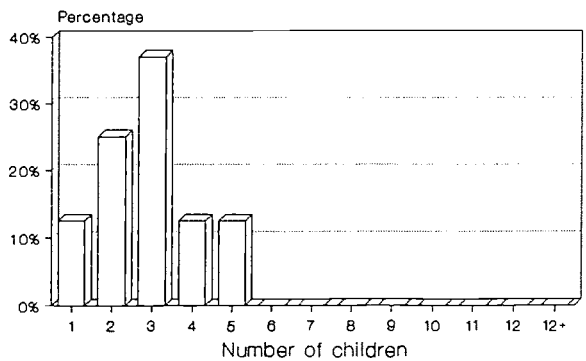


Figure 13 Distribution (%) of number of children by employment status.

Table 4.8. Average number of children of fishermen by employment status

Employment status	Zero children	% Zero Children	Average *) number of children	Standard deviation	Min	Max
Own.oper. FiB	8	8.33	6.99	4.56	1	22
Own.oper. LiB	7	8.86	4.44	2.64	1	12
Owners FiB	1	2.32	7.88	4.73	1	20
Owners LiB	1	7.14	3.92	2.36	1	8
Operators FiB	18	24.00	3.86	2.64	1	11
Operators LiB	9	52.94	2.87	1.24	1	5
All combined	54	16.67	5.63	4.03	1	22

*) Note: Average excluding zero's.

Obviously the number of children of a fisherman is not equivalent with the number of children that are still dependent on him. Children leave the household either for study, work or because of marriage. Table 4.9 below gives the average number of dependent children.

Table 4.9. Average number of dependent children of fishermen by employment status

Employment status	Zero children	% Zero Children	Average *) dependent children	Standard deviation	Min	Max
Own.oper. FiB	3	3.41	5.71	3.47	1	19
Own.oper. LiB	2	2.48	3.85	2.41	1	12
Owners FiB	1	2.38	5.80	4.43	1	20
Owners LiB	2	15.38	3.91	2.07	1	7
Operators FiB	2	3.51	3.34	2.38	1	11
Operators LiB	0	0.00	2.77	1.20	1	5
All combined	10	3.57	4.62	3.29	1	20

*)Note: Average excluding zeros

How often do children turn to the occupation of their father? Table 4.10. gives some more insight.

Table 4.10 Frequency of respondents having children involved in fishing.

Employment status	Respondents with fishing children		Respondents without fishing children		Total	
	n	%	n	%	n	%
Own.oper. FiB	15	17.05	73	82.95	88	100
Own.oper. LiB	5	6.94	67	93.06	72	100
Owners FiB	4	9.52	38	90.48	42	100
Owners LiB	2	15.38	11	84.62	13	100
Operators FiB	2	3.51	55	96.49	57	100
Operators LiB	0	0.00	8	100.00	8	100
Total	28	10.00	252	90.00	280	100

Table 4.11. below gives the number of children involved in fishing.

Table 4.11. Number of children in artisanal and industrial fishing by employment status

Employment status	Number of children fishing		
	In Artisanal sector	In Industrial sector	Total
Own.oper. FiB	31	2	33
Own.oper. LiB	8	1	9
Owners FiB	16	2	18
Owners LiB	2	2	4
Operators FiB	6	1	7
Operators LiB	0	0	0
Total	63	8	71

Some ten percent of the fishermen have children engaged in active fishing. Almost all of these are absorbed in the artisanal fishery. Only a few worked as crew member in the industrial sector.

In Section 4.3 we elaborate on the wish of fishermen to have their children engaged in fishing. As in the case of fishing also ten percent of the fishermen had children engaged in fish processing.

Table 4.12. Number of children involved in fish processing by employment status

Employment status	Respondents with fish processing children		Respondents without fish processing children		Total	
	n	%	n	%	n	%
Own.oper. FiB	15	16.7	75	83.3	90	100
Own.oper. LiB	5	7.9	58	92.1	63	100
Owners FiB	4	9.8	37	90.2	41	100
Owners LiB	2	16.7	10	83.3	12	100
Operators FiB	2	3.1	63	96.9	65	100
Operators LiB	0	0.0	10	100.0	10	100
Total	28	10.0	253	90.0	281	100

4.1.6. Ownership of productive assets and credit4.1.6.1. Ownership of fishing equipment and credit**Boats:**

The average number of boats owned by the respondents in the different employment status categories is displayed in Table 4.13. below. The two boat operator categories are not included since these fishermen operate and (per definition) do not own the boats.

Table 4.13. Ownership of boats by employment status

Employment status	Full ownership		Shared Ownership		Number of boats	Number of fisherman	Average number of boats per fisherman
	n	%	n	%			
Own.oper.FiB	94	97.9	2	2.1	155	96	1.6
Own.oper.LiB	79	100.0	0	0.0	101	79	1.3
Owners FiB	42	97.7	1	2.3	125	43	2.9
Owners LiB	12	85.7	2	14.3	15	14	1.1
Total	227	97.8	5	2.2	396	232	1.7

The overall average number of boats owned by the fishermen is 1.7 boats. Multiple boat ownership occurs significantly more often among owner-non-operators of fishing boats. In this category the average number of boats owned is almost 3. This fact is also clearly observed in figure 13 which gives the distribution of the number of boats owned in the different employment status categories.

Some 76% of the owner-non-operators of fishing boats own more than one boat while still as much as 12% own 6 boats representing a considerable investment in the industry. Sharing of boats is very limited; only 5 respondents (2.2%) declared to share ownership of a boat.

Boats are almost always financed directly from the fisherman's own sources.

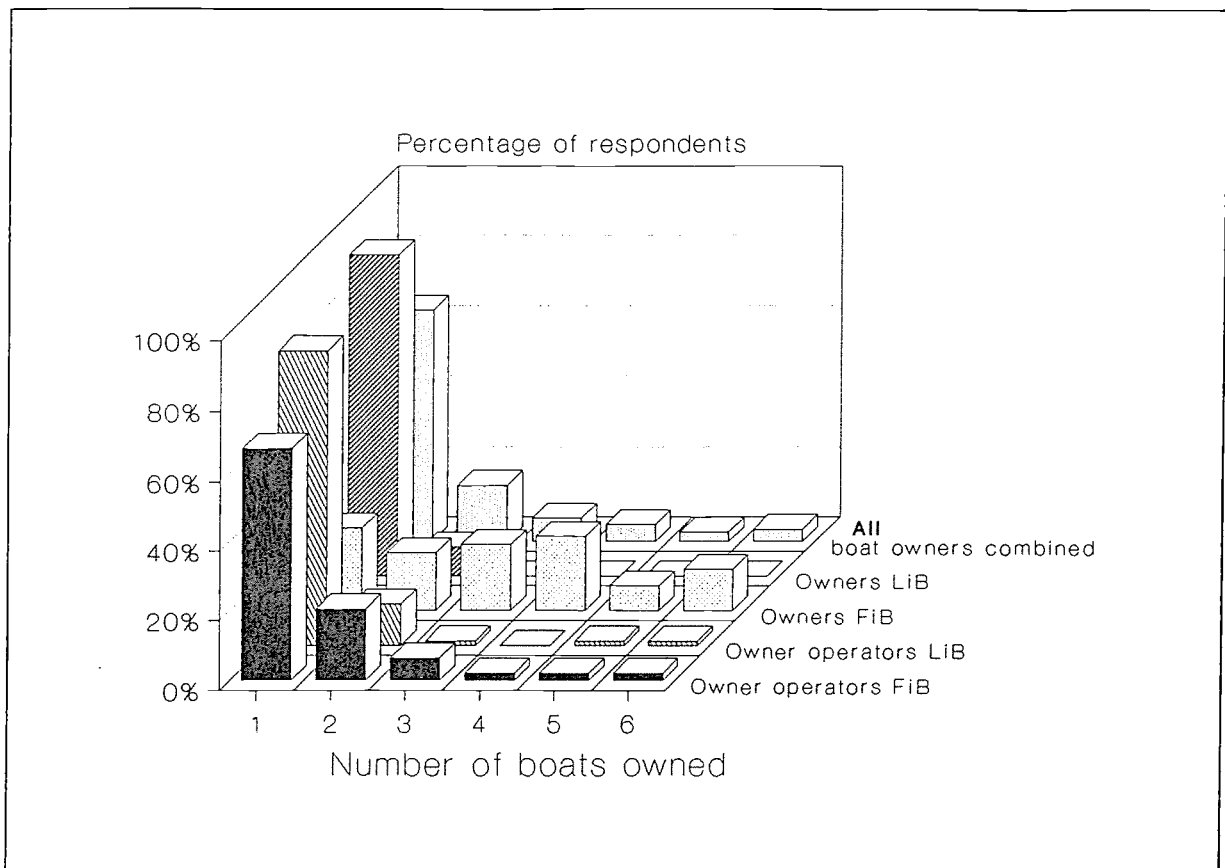


Figure 14 Distribution (%) of number of boats owned per employment status category.

Only 4 boatowners (1.8%) declared to have borrowed money to purchase the boat.

Gear:

Figure 4 (Section 3.2.2.) displays the percentage of fishermen in each employment status category owning or operating the different gear. Table 4.14. below specifies the ownership pattern of these gear.

Table 4.14. Gear ownership (all gear combined) by employment status

Employment status	Not owner	Owning 100% of gear	Sharing gear	Total
Own.oper.FiB	4.0	95.3	0.7	100.0
Own.oper.LiB	4.5	94.5	0.9	100.0
Owners FiB	0.0	100.0	0.0	100.0
Owners LiB	4.3	91.3	4.3	100.0
Operators FiB	72.7	27.3	0.0	100.0
Operators LiB	76.5	23.5	0.0	100.0

It can be seen from the table above that the boat owners also own the gear in the large majority of cases. It is maybe more interesting to look into the last two categories in the table namely the operators (non-owners) of the boats.

With respect to the operators of fishing boats it is noticed that 27.3% of the gear (all gear combined) were owned by themselves while 72.7% were owned by the owner of the boat. There are differences between the different gear: 87.5%

of the gillnets, 83.3% of the handlines and 42.9% of the lights were owned by the operators themselves. In the case of kapenta seines, however, only 8 out of 58 seines were owned by the operator. The remaining seines were owned by the owner of the boat. Some 23.5% of the lights were owned by the operators themselves whereas 76.5% was owned by the owner of the boat.

Gear is hardly ever acquired with credit, only 6 fishermen declared to have borrowed money to purchase the gear.

Engines:

Table 4.15. below gives the ownership pattern of the engines.

Table 4.15. Engine ownership by employment status

Employment status	Not owner		Self 100% owner		Shared		Total	
	n	%	n	%	n	%	n	%
Own.oper.FiB	1	4.8	18	85.7	2	9.5	21	100.0
Own.oper.LiB	0	0.0	7	100.0	0	0.0	7	100.0
Owners FiB	0	0.0	33	100.0	0	0.0	33	100.0
Owners LiB	0	0.0	2	100.0	0	0.0	2	100.0
Operators FiB	12	85.7	2	14.3	0	0.0	14	100.0
Operators LiB	0	0.0	0	0.0	0	0.0	0	100.0
Total	13	16.9	62	80.5	2	2.6	77	100.0

The owners of the boats are in the large majority of cases also the owners of the engines. Out of the 14 fishing boat operators 2 operated with their own engines while the remaining engines were (also) owned by the owner of the boat.

In contrast to boats and gear engines are regularly acquired through the use of credit as can be seen from table 4.16.

Table 4.16. Use of credit in purchase of engines by employment status

Employment status	Yes		No		Total	
	n	%	n	%	n	%
Own.oper.FiB	5	26.3	14	73.7	19	100.0
Own.oper.LiB	1	12.5	7	87.5	8	100.0
Owners FiB	8	23.5	26	76.5	34	100.0
Owners LiB	0	0.0	2	100.0	2	100.0
Operators FiB	1	25.0	3	75.0	4	100.0
Operators LiB	0	—	0	—	0	—
Total	15	22.4	52	77.6	67	100.0

As much as 22.4% of the engines were (partly) financed from credit. The source of credit was usually the Lima bank. Lima bank is a parastatal body that is the successor to the Zambia Agricultural Development Bank (ZADEV). Lima bank took over ZADEV operations in 1987 and part of its inheritance was a credit scheme for the fisheries sector. Nets are given out to those who qualify for loans on a "short term" credit basis, meaning a period of one year. Engines, as well as boats, are provided on a "medium-term" basis, meaning that repayment is to be effected within a three year period. To be granted a short-term loan, the client must provide 5% of the total loan amount as a down payment. Medium term loan clients must furnish a down payment of 20%. Interest

on both sorts of loans is at a rate of 46% per annum. A thirty-day grace period is allowed in the case of short-term loan repayments in order to give clients a chance to mount the nets they receive. A loan applicant's creditworthiness is established through interviews and site visits by the local Lima Bank field officer. This procedure establishes the applicant's bona fides, the nature and scope of his/her operation, current liabilities and assets, etc. (Reynolds et al., 1991)

4.1.6.2. Land ownership

Information on land ownership by fishermen is relevant, not only because it can provide a secondary source of income or food for subsistence but also because land is usually required as collateral in the case of institutional credits as in the case of Lima bank loans described above. Table 4.17. gives the rate of land ownership of the fishermen.

Table 4.17. Land ownership of fishermen by employment status.

Employment status	Owning Land		Not owning land		Total	
	n	%	n	%	n	%
Own.oper. FiB	79	82.3	17	17.7	96	100
Own.oper. LiB	63	79.7	16	20.3	79	100
Owners FiB	35	81.4	8	18.6	43	100
Owners LiB	9	64.3	5	35.7	14	100
Operators FiB	57	76.0	18	24.0	75	100
Operators LiB	8	47.1	9	52.9	17	100
All combined	251	77.5	73	22.5	324	100

Overall 77.5% of the fishermen declared to own land. The highest rate of land ownership is encountered among the owners of fishing boats. Fishermen in the light boat categories own land less frequently especially the light boat operators of which only 47.1% owned land.

Table 4.18. gives the number of separate fields owned.

Table 4.18. Average number of fields held by respondent and wife (ves) by employment status

Employment status	Average fields/family	Standard deviation	Minimum	Maximum
Own.oper. FiB	2.48	1.34	1	6
Own.oper. LiB	2.32	1.64	1	9
Owners FiB	2.75	1.62	1	8
Owners LiB	2.40	1.36	1	5
Operators FiB	2.10	1.09	1	5
Operators LiB	1.13	0.33	1	2
All combined	2.35	1.43	1	9

As it was expected that migrant fishermen own land in their region of origin as well as on the lake shore, fishermen were asked to indicate the rough location of their fields. Table 4.19. and 4.20. list the average number of fields on the lake shore and inland.

Table 4.19. Average number of fields close to beach by employment status

Employment status	Average fields/family	Standard deviation	Minimum	Maximum
Own.oper. FiB	1.88	1.41	0	6
Own.oper. LiB	1.73	1.55	0	9
Owners FiB	2.06	1.33	0	6
Owners LiB	2.10	1.30	1	5
Operators FiB	1.28	1.13	0	4
Operators LiB	1.00	0.50	0	2
All combined	1.71	1.38	0	9

Table 4.20. Average number of fields far from beach by employment status

Employment status	Average fields/family	Standard deviation	Minimum	Maximum
Own.oper. FiB	0.60	1.06	0	5
Own.oper. LiB	0.59	1.32	0	7
Owners FiB	0.69	1.22	0	4
Owners LiB	0.30	0.64	0	2
Operators FiB	0.83	1.25	0	5
Operators LiB	0.13	0.08	0	1
All combined	0.64	1.18	0	7

Although fishermen regularly possess land away from the lake shore land owned is usually found on the shores.

The average acreage owned is displayed in Table 4.21.

Table 4.21. Average surface (acres) of land owned per respondent by employment status.

Employment status	Total surface (acres)	Total respondents	Average acreage per respondent
Own.oper. FiB	1026.76	79	13.0
Own.oper. LiB	249.58	63	4.0
Owners FiB	320.55	35	9.1
Owners LiB	34.25	9	3.8
Operators FiB	141.15	57	2.5
Operators LiB	27.25	8	3.4
All combined	1799.54	251	7.2

The owners of fishing boats are the fishermen who own (on average) most of the land. The operators, being less wealthy in terms of fishing equipment, also appear to be poorer in terms of land ownership.

Table 4.22. below indicates how the land was obtained.

Table 4.22. Mode of acquisition of land in percentages by employment status.

Employment status	Allocated by headman	Inherited	Rented	Bought	Other
Own.oper. FiB	27.7	51.8	0.0	3.6	16.9
Own.oper. LiB	25.8	50.0	0.0	3.2	21.0
Owners FiB	21.6	48.6	2.7	8.1	18.9
Owners LiB	18.2	36.4	0.0	9.1	36.4
Operators FiB	24.1	57.4	1.9	1.9	14.8
Operators LiB	12.5	75.0	0.0	0.0	12.5
All combined	24.7	52.2	0.8	3.9	18.4

Note: The sum of percentages exceeds 100% since respondents can at the same time have inherited and bought land.

The traditional system of land allocation by the village headman is still widespread. About one-quarter of the fishermen declared that they were allocated land. Slightly more than half of the fishermen had inherited land. Buying of land is not widespread which is not surprising given the relatively low population density and poor soils in the region.

Section 4.2.2.2 elaborates on the type of crops cultivated and the respective production levels.

4.1.6.3. Livestock ownership

Animals can be kept for consumption (meat, milk, eggs) and/or used as a stock of capital. Money can be applied to buy animals which later can be sold to acquire cash. The following table gives insight in the stock of capital accumulated in animals by the fishermen.

Table 4.23. Ownership of livestock by employment status

<u>Cattle ownership of fishermen by employment status</u>						
Employment status	zero cattle	% zero cattle	average heads	standard deviation	maximum	Total cattle
Own.oper. FiB	92	95.8	0.80	4.11	30	77
Own.oper. LiB	75	94.9	0.60	3.54	30	47
Owners FiB	40	93.0	0.50	2.06	11	21
Owners LiB	13	92.9	0.14	0.53	2	2
Operators FiB	71	95.5	1.07	6.63	52	80
Operators LiB	17	100.0	0.00	0.00	0	0
All combined	308	95.1	0.70	4.33	52	227
<u>Goat ownership of fishermen by employment status</u>						
Employment status	zero goats	% zero goats	average heads	standard deviation	maximum	Total goats
Own.oper. FiB	83	86.5	1.04	3.39	20	100
Own.oper. LiB	74	93.7	0.63	2.81	18	50
Owners FiB	37	86.0	0.91	2.47	11	39
Owners LiB	13	92.9	0.43	1.60	6	6
Operators FiB	70	93.3	1.33	6.58	45	100
Operators LiB	16	94.1	0.06	0.24	1	1
All combined	293	90.43	0.91	4.03	45	296
<u>Sheep ownership of fishermen by employment status</u>						
Employment status	zero lambs	% zero lambs	average heads	standard deviation	maximum	Total lambs
Own.oper. FiB	96	100.0	0.00	0.00	0	0
Own.oper. LiB	78	98.7	0.08	0.68	6	6
Owners FiB	42	97.7	0.09	0.61	4	4
Owners LiB	14	100.0	0.00	0.00	0	0
Operators FiB	75	100.0	0.00	0.00	0	0
Operators LiB	17	100.0	0.00	0.00	0	0
All combined	322	99.4	0.03	0.40	6	10
<u>Poultry ownership of fishermen by employment status</u>						
Employment Status	zero poultry	% zero poultry	average heads	standard deviation	maximum	Total poultry
Own.oper. FiB	30	31.3	14.67	25.61	200	1409
Own.oper. LiB	18	22.8	10.05	11.89	52	794
Owners FiB	11	25.6	11.49	13.57	70	494
Owners LiB	1	7.1	8.50	9.79	38	119
Operators FiB	26	35.1	14.20	35.98	300	1065
Operators LiB	9	52.9	4.12	5.90	17	70
All combined	95	29.3	12.19	23.69	300	3951

Note: Average including zero's.

Livestock ownership appears to be extremely low. Traditionally people in the

Northern province are not cattle keepers. The land is infested with Tse-Tse flies and very hilly. Therefore it is not surprising to find a low rate of livestock ownership. As can be seen from the table only 5% of the fishermen own cattle, 10% goats, 0.6% goats and 70% poultry. In addition it is also noted that those who declared to own livestock regularly do not have their cattle grazing on the lake shores but more inland. However, due to intermarriages, migration and continued efforts to reduce the Tse-Tse population the trend is slowly changing especially as regards goats which seem to be on the increase.

4.2. Occupational and geographical mobility

4.2.1. Family of origin

Table 4.24 gives the main occupation of the father of the interviewed fishermen. Surprisingly a rather high percentage, 63.5%, of the fishermen do not originate from a family where the fathers occupation was fishing. As much as 44.0% of the fishermen originate from farming families.

Table 4.24. Occupation of father of fishermen in percentages by employment status.

Employment status	Fisher man	Farmer	Tra-der	Animal producer	Labou-rer	Other	Total n	Total %
Own.oper FiB	37.5	44.8	5.2	0.0	10.4	2.1	96	100
Own.oper LiB	42.1	39.5	1.3	0.0	13.2	3.9	76	100
Owners FiB	21.4	54.8	4.8	2.4	14.3	2.4	42	100
Owners LiB	35.7	35.7	7.1	0.0	7.1	14.3	14	100
Operators FiB	36.5	43.2	4.1	1.4	14.9	0.0	74	100
Operators LiB	43.8	43.8	0.0	0.0	12.5	0.0	16	100
Total	36.5	44.0	1.0	0.6	12.5	2.5	318	100

In the employment category owner-not operator of fishing boats even more than half (54.8%) come from farming families and only one-fifth from a fisherman family.

With respect to the occupation of grandfathers farming seemed even to be more important.

Table 4.25. Occupation of grandfather of fishermen in percentages by employment status.

Employment status	Fisher man	Farmer	Trader	Animal producer	Labou-rer	Other	Total n	Total %
Own.oper. FiB	23.2	61.1	3.2	1.1	3.2	8.4	95	100
Own.oper. LiB	27.0	31.1	0.0	1.4	6.8	6.8	74	100
Owners FiB	22.5	67.5	0.0	2.5	2.5	5.0	40	100
Owners LiB	14.3	57.1	0.0	7.1	7.1	14.3	14	100
Operators FiB	26.8	66.2	0.0	0.0	1.4	5.6	71	100
Operators LiB	23.5	70.6	0.0	0.0	0.0	5.9	17	100
Total	24.4	62.7	1.0	1.3	3.5	7.1	311	100

Some 63% of the grandfathers of today's fishermen were farmers. A shift in the

employment structure on the lake shore has indeed taken place. Although fishing for pelagic clupeid (kapenta) stocks has taken place for many years amongst the lakeshore residents, planned development has only occurred during the last thirty years. Some time around 1957 the paraffin pressure light was introduced to the fishing population. This proved very popular and spread rapidly, so that by 1959 the local kapenta fisherman had already reached artisanal level, catching an excess of kapenta beyond his needs (Pearce, 1989). Furthermore an important influx of fishermen from non-fishing families from outside the direct lake-shore area is observed (see Section 4.2.3).

4.2.2. Occupational mobility

4.2.2.1. Previous occupations

In order to be able to invest in boats and gear capital needs to be accumulated. Capital can be accumulated from fishing and/or other occupations. It was found that a large amount of respondents had another occupation before they started fishing.

Table 4.26. Occurrence of previous occupation of fishermen by employment status.

Employment status	A previous occupation		No previous occupation		Total	
	n	%	n	%	n	%
Own.oper. FiB	51	53.7	44	46.3	95	100
Own.oper. LiB	36	45.6	43	54.4	79	100
Owners FiB	31	72.1	12	27.9	43	100
Owners LiB	9	64.3	5	35.7	14	100
Operators FiB	35	47.3	39	52.7	74	100
Operators LiB	7	41.2	10	58.2	17	100
All combined	169	52.5	153	47.5	322	100

Especially owner-non operators of fishing and light boats often had a main previous occupation. In the section on fishing experience it was already noted that there appear to be new entrants in this group of owner-non operators who seemingly were attracted by the potential revenues to be gained in the fishery.

4.2.2.2. Major and secondary occupations

Diversity in sources of income provides a hedge against insecurity and a more productive use of the individuals resources. Multi-job-holding is a general feature of small-scale fisheries especially where there is an excess of fishermen. In order to gain insight in multi-job holding the fishermen were asked from which source they gain their main income and their secondary income. Tables 4.27. and 4.28. give the results.

Table 4.27. Main income of fishermen by employment status.

Employment status	Fishing *)	Farming	Trading	Animal production	Labouring	Other	Total n	Total %
Own.oper. FiB	95.8	4.2	0.0	0.0	0.0	0.0	95	100
Own.oper. LiB	96.2	2.6	0.0	0.0	0.0	1.3	78	100
Owners FiB	88.4	4.7	4.7	0.0	0.0	2.3	43	100
Owners LiB	78.6	14.3	7.1	0.0	0.0	0.0	14	100
Operators FiB	93.2	6.8	0.0	0.0	0.0	0.0	74	100
Operators LiB	100.0	0.0	0.0	0.0	0.0	0.0	17	100
All combined	93.8	4.7	0.9	0.0	0.0	0.6	321	100

*)Note : Including those fishermen who do not actively fish but gain most of their income from the fishing sector.

Combining all fishermen 93.8% of the fishermen gain most of their income from fishing. Only a limited number of cases was found where the main source of revenues was farming.

About half of the total number of fishermen declared to have an income from a secondary activity. Table 4.28. gives the incidence of secondary sources of income by employment status of the fishermen.

Table 4.28. Secondary income of fishermen by employment status

Employment status	Fishing	Farming	Trading	Labouring	Other	None	Total n	Total %
Own.oper. FiB	8.3	20.8	7.3	2.1	3.1	58.3	96	100
Own.oper. LiB	5.2	31.2	9.1	5.2	1.3	48.1	77	100
Owners FiB	11.9	23.8	26.2	2.4	2.4	33.3	42	100
Owners LiB	35.7	7.1	14.3	0.0	7.1	35.7	14	100
Operators FiB	6.8	28.4	12.2	1.4	0.0	41.4	74	100
Operators LiB	0.0	18.8	18.8	0.0	0.0	62.5	16	100
All combined	8.5	24.8	12.2	2.5	1.9	50.1	319	100
n	27	79	39	8	6	160	319	

Owners (non-operators) have more often a secondary source of income when compared to the other categories. Not surprisingly farming is the most important source. Trading (mostly of fish) is also paramount especially among owners-nonoperators where trading is even more significant than farming.

Because of the (expected) significance of farming as a subsistence and income generating activity for fishermen, some additional information was collected on this trade. Firstly information was gathered on the importance of the various crops grown. The results are given in table 4.29.

Table 4.29. Percentage of respondents growing crop X by employment status

Employment status	CROP													
	Maize	Millet	Sorghum	Cassa va	Beans	Sugar cane	Ground nuts	Cabba ge	Potatoes	Pears	Vegeta bles	Rice	Bana nas	other
Own.oper.FiB	40.6	1.0	1.0	79.2	4.2	1.1	7.3	0.0	3.1	0.0	0.0	14.6	2.1	1.0
Own.oper. LiB	36.7	1.3	0.0	73.4	2.5	0.0	12.7	0.0	3.8	0.0	1.3	24.1	0.0	0.0
Owners FiB	37.2	7.0	0.0	74.4	4.7	0.0	11.6	0.0	2.3	2.3	2.3	11.6	0.0	0.0
Owners LiB	28.6	0.0	0.0	64.3	0.0	0.0	14.3	0.0	7.1	0.0	0.0	7.1	0.0	0.0
Operators FiB	42.7	4.0	0.0	72.0	1.3	0.0	6.7	0.0	2.7	0.0	0.0	20.0	0.0	1.3
Operators LiB	17.6	0.0	0.0	41.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0
All combined	38.0	2.5	0.3	72.8	2.8	0.3	9.0	0.0	3.1	0.3	0.6	17.0	0.6	0.6
n	123	8	1	236	9	1	29	0	10	1	2	55	2	2

Note: Category Other includes sunflower and soya beans.

The staple food in the Northern province is cassava which does very well in poor soils. It comes as no surprise that more than 70% of the respondents grow this crop. Immigrants in the area prefer cultivating maize. Groundnuts are mainly grown to be converted to cooking oil. Rice and beans are the major cash crops. The province is known for its 'Chitemene' system of farming where land is used in rotation. This is a form of shifting cultivation whereby the cleaning of land before cultivation is limited to cutting and burning all branches rather than the trees themselves. A piece of land is used for only one year after which the farmer shifts to another plot.

The level of production (as declared by the respondents) for the four major crops was as follows.

Table 4.30. Average yearly production for four major crops.

Crop	Average (kg/year)	Standard deviation	sample size (n)
Cassava	1186	1153	236
Maize	1084	2093	123
Rice	499	400	55
Groundnuts	396	506	29

Note: These production figures are an approximation, the data obtained relied strongly on memory recall of the respondents and should therefore be treated with utmost caution.

4.2.3. Geographical mobility

Geographical mobility is always an important issue in the analysis of a fishery, the theory being that the fishing sector is an 'escape sector' in the national economy. Unemployed people can, because of the 'open access' nature of the resource, always take up fishing as an income generating activity. As such the question is: How many 'outsiders' penetrate the fishery? This issue is also interesting as about seven years ago a Canadian financed Feeder Road Project for Fisheries Development project was finalised linking Nsumbu to Mporokoso and further westwards. Fishermen claimed that this, combined with the rising unemployment in the Copperbelt, caused an influx of fishermen from outside the region. In order to gain a general image of migration the fishermen were first asked their district of birth.

Table 4.31. Number of fishermen by district of birth and employment status

District/Province of birth	Employment status						Total
	1	2	3	4	5	6	
Northern Prov.	90.6	93.7	95.3	85.7	84.0	76.5	89.5
Mbala	74.0	65.8	79.1	64.3	50.7	52.9	65.7
Kaputa	10.4	17.7	14.0	0.0	22.7	5.9	14.8
Mporokoso	2.1	2.5	0.0	0.0	4.0	11.8	2.8
Lwingu	1.0	0.0	0.0	0.0	0.0	0.0	0.3
Kasama	0.0	0.0	0.0	7.1	1.3	0.0	0.6
Isoka	3.1	6.3	2.3	7.1	5.3	5.9	4.6
Chinsali	0.0	1.3	0.0	7.1	0.0	0.0	0.6
Eastern Prov.	0.0	0.0	2.3	7.1	1.3	0.0	0.9
Central Prov.	3.1	0.0	0.0	0.0	2.7	0.0	1.5
Luapula Prov.	3.1	3.8	0.0	7.1	10.7	5.9	4.9
Southern Prov.	1.0	0.0	0.0	0.0	0.0	0.0	0.3
Western Prov.	1.0	0.0	2.3	0.0	0.0	0.0	0.6
Copperbelt Prov.	0.0	1.3	0.0	0.0	1.3	11.8	1.5
Foreign	0.0	1.3	0.0	0.0	0.0	5.9	0.6
Total %	100	100	100	100	100	100	100
n	96	79	43	14	75	17	324

Note: Employment 1=Own.oper. FiB; 2=Own.oper.LiB; 3=Owners FiB; 4=Owners LiB; 5=Operators FiB; 6=Operators LiB.

The first three districts Mbala, Kaputa and Mporokoso in the table above are districts bordering the lakeshore. The majority of fishermen (89.5%) was born in the Northern province whereas 83.3% came from the three districts bordering the lake. Some differences are observed between the different categories of fishermen. Owner-non operators of fishing boats seem to originate more often from the Northern Province and the lake shore districts compared to the other categories. Non-owner operators regularly do not originate from the Northern province. Between 16-23% of the operators come from other provinces mainly Luapula and the Copperbelt.

To have a more precise image of migration the fishermen were also asked how far their village of birth was from the lake shore.

Table 4.32. Distance of village of birth to the lake shore

Employment status	Closer than 20 km		Farther than 20 km		Total	
	n	%	n	%	n	%
Own.oper. FiB	51	53.1	45	46.9	96	100
Own.oper. LiB	42	53.2	37	46.8	79	100
Owners FiB	22	51.2	21	45.8	43	100
Owners LiB	5	35.7	9	64.3	14	100
Operators FiB	29	39.2	45	60.8	74	100
Operators LiB	5	29.4	12	70.6	17	100
Total	154	47.7	169	52.3	323	100

As can be seen from the table more than half of all fishermen appear not to originate from the direct lake shore area. This is especially the case for light boat non-owner operators and, to a lesser extend, for fishing boat non-owner operators and owner-operators of light boats. The fishery apparently strongly attracts people from the inland area who, because of lack of employment opportunities, take up fishing as an occupation. Obviously the easiest entry is operating light boats as this requires minimal investments. The mobility of fishermen is also clearly reflected in Table 4.33. below. Only one-fifth of all fishermen was born in the village where they were interviewed.

Table 4.33. Origin in beach of fishermen by employment status

Employment status	Born in beach of interview		Not born in beach of interview		Total	
	n	%	n	%	n	%
Own.oper. FiB	25	26.0	71	74.0	96	100
Own.oper. LiB	14	17.7	65	82.3	79	100
Owners FiB	11	25.6	32	74.4	43	100
Owners LiB	1	7.1	13	92.9	14	100
Operators FiB	13	17.3	62	82.7	75	100
Operators LiB	1	5.9	16	94.1	17	100
Total	65	20.1	259	79.9	324	100

Table 4.34. below shows, however, that almost 70% had established residence at the beach of interview.

Table 4.34. Residence of fishermen at beach of interview by employment.

Employment status	Resident in beach of interview		Not resident in beach of interview		Total	
	n	%	n	%	n	%
Own.oper. FiB	79	82.3	17	17.7	96	100
Own.oper. LiB	51	64.6	28	35.4	79	100
Owners FiB	33	76.7	10	23.3	43	100
Owners LiB	11	78.6	3	21.4	14	100
Operators FiB	46	61.3	29	38.7	75	100
Operators LiB	4	23.5	13	76.5	17	100
Total	224	69.1	100	30.9	324	100

This is however not the case for the light boat operators. Three-quarters of these fishermen were not resident at the beach where they were interviewed and appear to be extremely mobile.

The fishermen not resident at the beach were asked since when they were operating from the beach (of interview). Their responses are listed in Table 4.35. below.

Table 4.35. Period of stay in beach by employment status

Employment status	Less than week		More than week less than month		More than month		Total	
	n	%	n	%	n	%	n	%
Own.oper. FiB	1	6.3	2	12.5	13	81.2	16	100
Own.oper. LiB	1	4.2	9	37.5	14	58.3	24	100
Owners FiB	2	20.0	3	30.0	5	50.0	10	100
Owners LiB	0	0.0	1	33.3	2	66.7	3	100
Operators FiB	3	10.0	11	36.7	16	53.3	30	100
Operators LiB	3	25.0	4	33.3	5	41.7	12	100
Total	10	10.5	30	31.6	55	57.9	95	100

As appears from the table 57.9% of all fishermen already stayed more than a month at the beach where they operated. These fishermen put up temporary huts and camp at the beaches as long as they are content enough with their catches. Basically fishermen follow the kapenta migrations. When the rumour spreads that catches are higher elsewhere they move to another beach and set up their new camp.

Straddling strata 3 and 4 is the Nsumbu National Park, the coastline of which runs from the estuary of the Lufubu river to Nsumbu. Within this coastline there are no fishing camps or permanently settled population. A single exception is the recently established fishing camp of Kasaba Bay in the Inangu Game Management Area, which supplies the needs of the tourist lodge and crocodile farm. Chisanse beach is a seasonal concession within the Nsumbu National Park where fishermen have traditionally congregated to go fishing. This beach is open from May to November each year and attracts many fishermen. The Department of Fisheries attempts to restrict the number of fishermen

operating in the area by means of a 'fishing permit' to be acquired by the fishermen at a nominal fee (Pearce, 1992).

Table 4.36. gives the number of respondents that operated in the Chisanse concession in the 12 months preceding the survey.

Table 4.36. Number of fishermen who fished in Chisanse concession area

Employment status	Yes		No		Total	
	n	%	n	%	n	%
Own.oper. FiB	15	15.6	81	84.4	96	100
Own.oper. LiB	24	30.4	55	69.6	79	100
Owners FiB	12	27.9	31	72.1	43	100
Owners LiB	1	7.1	13	92.9	14	100
Operators FiB	16	21.3	59	78.7	75	100
Operators LiB	3	17.6	14	82.4	17	100
Total	71	21.9	253	78.1	324	100

Taking all respondents together about one-fifth of the fishermen declared to have operated in the Chisanse concession. Most of these fishermen came from stratum 3 and 4, often from the area around Nsumbu. Fishermen from stratum 1 and 2 who do not possess engines often consider the Chisanse concession as being too far. They are obliged to paddle the whole distance without being sure of enough compensation for this major effort.

The last indicator of mobility used in this survey was the number of beaches fishermen operated from. The fishermen were asked from how many different beaches they operated and/or in how many different beaches they landed their catches during 12 months preceding the survey. Table 4.37. gives the results.

Table 4.37. Number of beaches fished or landed catch

Employment status	Average	STD	Minimum	Maximum	n
Own.oper. FiB	2.21	1.60	1	11	96
Own.oper. LiB	2.77	1.89	1	10	79
Owners FiB	3.09	2.61	1	15	43
Owners LiB	2.36	1.78	1	6	14
Operators FiB	2.84	2.26	1	12	74
Operators LiB	2.29	1.21	1	5	17
All combined	2.59	2.00	1	15	323

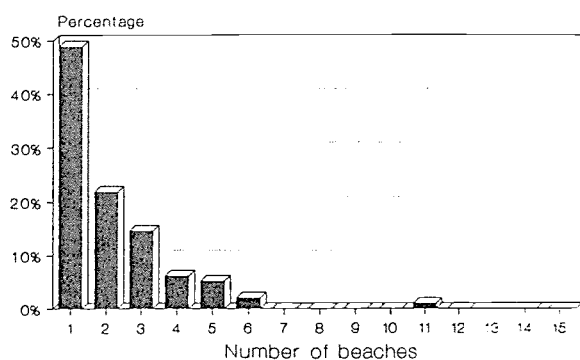
The distribution of the number of beaches fished is given in figure 15.

4.3. Attitudes and opinions

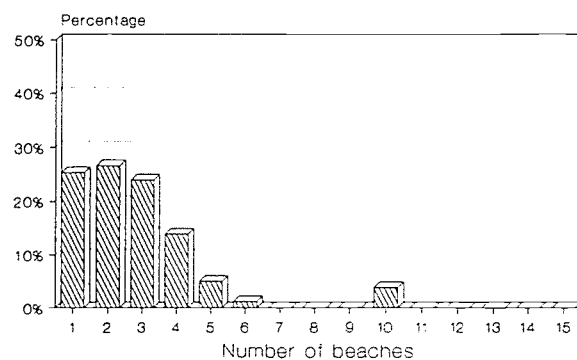
In order to gain some insight in the commitment to and confidence in fishing as an occupation the respondents were asked if they would stay in fisheries or leave the trade if other employment opportunities would come up. There answers are listed in table 4.38.

Distributions (%) of number of beaches fished by employment status

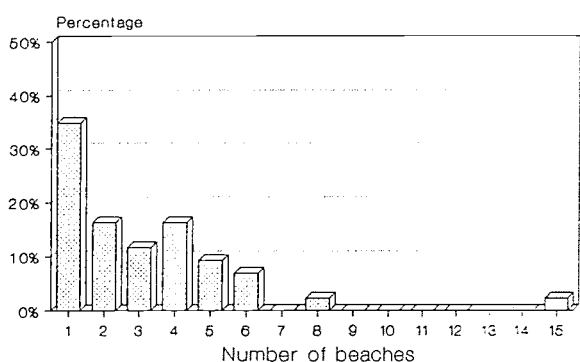
Owner operators of Fishing boats



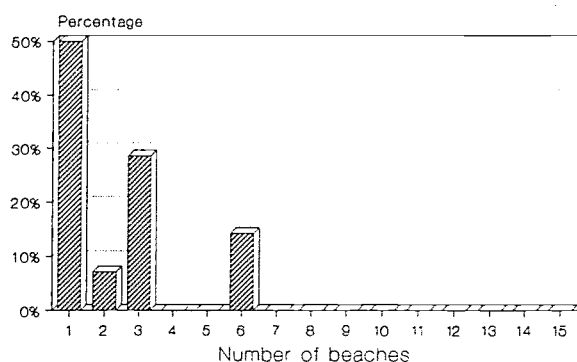
Owner operators of Light boats



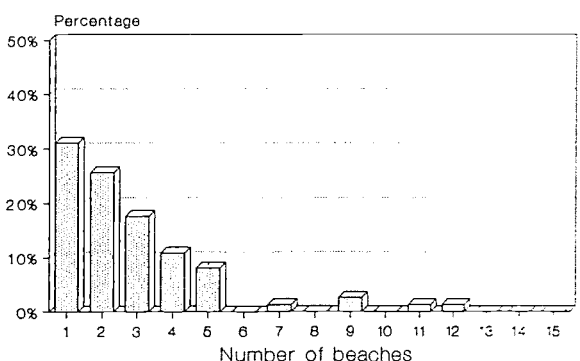
Owner non-operators of Fishing boats



Owner non-operators of Light boats



Operators of Fishing boats



Operators of Light boats

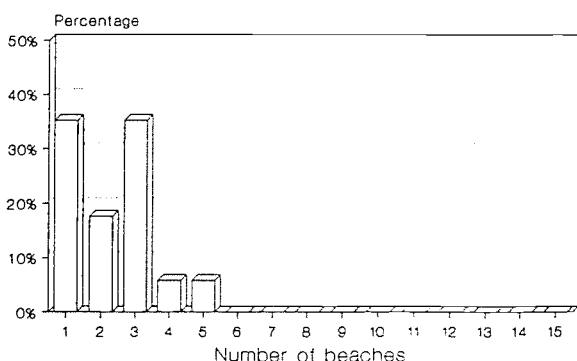


Figure 15 Distributions (%) of number of beaches fished by employment status

Table 4.38. Opinion regarding change of employment by employment status

Employment status	Stay in fisheries		Change employment		No opinion		Total	
	n	%	n	%	n	%	n	%
Own.oper. FiB	71	74.0	24	25.0	1	1.0	96	100
Own.oper. LiB	52	65.8	27	34.2	0	0.0	79	100
Owners FiB	36	83.7	7	16.3	0	0.0	43	100
Owners LiB	5	35.7	9	64.3	0	0.0	14	100
Operators FiB	36	48.0	38	50.7	1	1.3	75	100
Operators LiB	7	41.2	9	52.9	1	5.9	17	100
All combined	207	63.9	114	35.1	3	0.9	324	100

Some 35.1% of the fishermen indicated the wish to change employment. For the owner(s) and owner-operators of fishing boats, the income from fishing seems rather attractive. Less than one-quarter expressed the wish to change employment. This lower percentage can only be partly explained by their more advanced (average) age. The wish to change employment was most pronounced among the light boat owners and fishing/light boat operators. These fishermen especially are faced with heavy competition as well as a more uncertain and unstable flow of income.

The lack of confidence in fishing of the light boat operators is also clearly reflected in the following table.

Table 4.39. Opinion regarding employment of sons by employment status

Employment status	Fishing		Not fishing		No opinion		Total	
	n	%	n	%	n	%	n	%
Own. oper. FiB	80	83.3	16	16.7	0	0.0	96	100
Own. oper. LiB	53	67.1	24	30.4	2	2.5	79	100
Owners FiB	33	76.7	9	20.9	1	2.3	43	100
Owners LiB	10	71.4	4	28.6	0	0.0	14	100
Operators FiB	48	64.0	27	36.0	0	0.0	75	100
Operators LiB	6	35.3	10	58.8	1	5.9	17	100
Total	230	71.0	90	27.8	4	1.2	324	100

Only one-third of the light boat operators reported fishing as a proper occupation for their sons. Not surprisingly a relatively large majority of the fishermen with capital and therewith higher revenues saw fishing as a future occupation for their sons.

Another technique applied to evaluate the interest in fishing was to inquire about fishermen's investment priorities. They were asked to indicate the sector in which they would invest if they were given a loan and were free to choose. Their answers are listed below.

Table 4.40. Investment priority by employment status

Employment status	Farming	Animals	Fishing	Other	Total	
	%	%	%	%	n	%
Own. oper. FiB	12.5	1.0	86.5	0.0	96	100
Own. oper. LiB	22.1	1.3	75.3	1.3	77	100
Owners FiB	25.6	0.0	74.4	0.0	43	100
Owners LiB	21.4	0.0	78.6	0.0	14	100
Operators FiB	20.0	1.3	78.7	0.0	75	100
Operators LiB	25.0	0.0	75.0	0.0	16	100
All combined	19.3	0.9	79.4	0.3	321	100

No significant differences were encountered between the different fisherman categories. Almost one-fifth of all fishermen would invest in farming. The large majority, however, would invest in fishing. Hardly any fishermen mentioned animal husbandry, trading or small business.

The Fisheries station in Mpulungu was keen to have the opinion of fishermen regarding the exploitation status of the stock. The first question related to the trend in catches. Fishermen were asked whether catches had decreased, increased or stayed stable in the past 5 years. Table 4.41. lists their responses.

Table 4.41. Opinion regarding catch trends by employment status

Employment Status	Catch reduced		Catch increased		Catch the same		No opinion		total
	n	%	n	%	n	%	n	%	n
Own.oper. FiB	69	71.9	19	19.8	8	8.3	0	0.0	96
Own.oper. LiB	50	63.3	20	25.3	9	11.4	0	0.0	79
Owners FiB	31	72.1	11	25.6	1	2.3	0	0.0	43
Owners LiB	7	50.0	5	35.7	2	14.3	0	0.0	14
Operators FiB	51	68.0	16	21.3	8	10.7	0	0.0	75
Operators LiB	13	76.5	2	11.8	2	11.8	0	0.0	17
Total	221	68.2	73	22.5	30	9.3	0	0.0	324

About 9% of the fishermen stated that their catch had not changed, about 22% claimed that it had increased. The majority of the fishermen (62.8%) claimed that catches had decreased. There were no large differences in the responses between the different categories of fishermen. It has to be realized here that these figures only indicate the feeling of fishermen. Obviously, and certainly with respect to the species Limnothrissa miodon and Stolothrissa tanganyicae where the size of the stocks strongly fluctuates as a function of environmental factors, indicators of overfishing should be confirmed by scientific research.

As far as the trends in size of fish is concerned the majority of fishermen, 52.8%, stated that the size of fish caught remained unchanged over the past 5 years. A few fishermen, 14.2%, even claimed that the size of fish had increased. Table 4.42. below lists the responses with respect to trend in fish size.

Table 4.42. Opinion regarding size of fish caught over the years by employment status

Employment Status	Size has reduced		Size has increased		Size stayed the same		No opinion		total
	n	%	n	%	n	%	n	%	n
Own.oper. FiB	38	39.6	13	13.5	45	46.9	0	0.0	96
Own.oper. LiB	23	29.1	8	10.1	48	60.8	0	0.0	79
Owners FiB	19	44.2	8	18.6	16	37.2	0	0.0	43
Owners LiB	4	28.6	2	14.3	8	57.1	0	0.0	14
Operators FiB	19	25.3	12	16.0	44	58.7	0	0.0	75
Operators LiB	4	23.5	3	17.6	10	58.8	0	0.0	17
Total	107	33.0	46	14.2	171	52.8	0	0.0	324

One-third of the fishermen claim that the size of the fish has decreased. A fair amount of these fishermen were gillnetters and longliners. The majority however were mainly involved in kapenta seining. A few remarks should be made with respect to their claims of decreasing fish size. Firstly, fishermen all over the world have the tendency to claim that the size of fish caught decreases. Secondly, the main target species in the fisheries are Limnothrissa miodon and Stolothrissa tanganyicae. The maximum length of Limnothrissa is higher than of Stolothrissa. Although Stolothrissa forms the bulk of all kapenta catches, fishermen in the area do not really distinguish between the two species. Thirdly, reduced size of these sweet water sardines would indicate growth overfishing which is very unlikely to occur with short lived species like Limnothrissa and Stolothrissa. It is stressed again that the data presented above are subjective statements of the fishermen, only scientific research can confirm or deny the fishermen's statement concerning the stocks.

A reflection of fishermen's feelings concerning available stocks can also be found in their assessment of effort adequacy to resource availability. Table 4.43. lists the opinion of the interviewed fishermen concerning this issue.

Table 4.43. Opinion regarding the number of fishermen on the Lake by employment status

Employment Status	Too many		Not too many		No opinion		total	
	n	%	n	%	n	%	n	%
Own.oper. FiB	84	87.5	7	7.3	5	5.2	96	100
Own.oper. LiB	64	81.0	11	13.9	4	5.1	79	100
Owners FiB	39	90.7	2	4.7	2	4.7	43	100
Owners LiB	12	85.7	2	14.3	0	0.0	14	100
Operators FiB	63	84.0	8	10.7	4	5.3	75	100
Operators LiB	12	70.6	3	17.6	2	11.8	17	100
Total	274	84.6	33	10.2	17	5.2	324	100

A large majority, 84.6% felt that there were too many fishermen operating in the fishery. Especially owners and owner-operators of fishing boats expressed this opinion. Interestingly lightboat operators were less often of the opinion that there were too many fishermen, maybe because they in fact depend on the actual number of fishermen for their living.

4.4. Problems identified in the fishery and role of government

This last section deals with problems encountered in the fishery as expressed by the fishermen and their ideas on the role of government in the fishery. A wide range of problems was mentioned. They can be classified under the following broad headings.

- a. Socio-economic and socio-cultural environment.
- b. Input supply
- c. Marketing and processing
- d. Resource and incomes
- e. Physical environment and safety

a.) Twentyfive fishermen explicitly mentioned the theft of gear as one of their major problems. This problem was especially mentioned by gillnetters. Although sometimes boat owners referred to practical problems of managing their boats hardly any owners mentioned problems with their crew. This is maybe not surprising since in section 3.7 we have seen that family ties are still important and the large majority of the fishing units appeared to be rather stable.

b.) One of the major, if not the major, problem in the fishery is input supply. More than one-third of all fishermen explicitly mentioned difficulties in obtaining nets, engine spare parts, nails for boat building and spare parts for tilley lamps such as mantels, glass, needles and vaporizers. The lifespan of mantels ranges from 1 to 4 fishing nights and glass may only last for a few weeks. These items are essential in the fishing operation and are in very high demand. As expected many fishermen grieved about high prices of inputs reflecting the discrepancy between supply and demand of inputs. Complaints about the quality of gear were hardly recorded. Only one fisherman mentioned difficulty in obtaining boats.

c.) The isolation and remoteness of most of the beaches creates problems of marketing. A large number of fishermen mentioned the lack of feeder roads and transport facilities to markets. With transport facilities the fishermen basically mean engine powered boats which can transport (fishermen and) fish to the main markets of Mpulungu and Nsumbu. Some 12 years ago a Canadian (CIDA) funded "Feeder Roads for Fisheries Development Project" started. In 5 years 520 km of roads were constructed. One of the roads connected Nsumbu with the hinterland. Despite the fact that this project has significantly stimulated the development of the fisheries, improved road access (at least to major) landing sites is still desirable. Processing of fish is a related issue. A number of fishermen pointed at the improper processing of kapenta and expressed the need for instalment of drying facilities like racks and store houses for dried kapenta.

d.) Fishermen obviously stated the problem (inherent to fishing) of fluctuating catches. Their opinions on stock size was dealt with in Section 4.3. Without having been specifically asked about the catch trends still 20% of the fishermen mentioned decreasing landings. A number of fishermen mentioned the influx of (too) many 'outsiders' resulting in ever increasing competition over the resource and decreasing incomes. In this context fishermen regularly stated their wish to fish more offshore but lacked the engine (and gear) to do so. Furthermore many boats are too small and unseaworthy to take the risk of going far from the beach.

e.) Contrary to the authors' experience in other fisherman surveys, hardly any problems were mentioned related to heavy weather and safety. This might be explained by the fact that (still) most of the fishermen are involved in kapenta seining which takes place very close to the shore.

The fishermen were given the opportunity to express what they thought the government should do to improve their situation. Their responses can be classified under the following headings:

- a. Financial assistance
- b. Infrastructure development
- c. Management measures
- d. Training
- e. Law enforcement and control
- f. Organization of fishermen
- g. Input prices

a.) As expected the majority of the fishermen urged for financial assistance. Loans should be given for the purchase of bigger boats, fishing equipment and engines. In fact the LIMA bank is already active in the region but a number of fishermen disapproved of the bank's approach. In their view the bank is assisting fishermen who already have (enough) capital and means of production. They stressed that, if the bank were to have a development impact, it should not demand collateral as condition for loans. Certain fishermen prefer the Fisheries Department to be the credit agency. Some fishermen stated that loans for non-fishing development, for example farming and small-scale industrial activities should be stimulated. In their view this might encourage fishermen to find employment outside the fishing sector.

As far as loans for fishing is concerned affiliated loans for liftnets plus engines were specifically mentioned. This fishing technique combined with motorized boats would enable fishermen to fish kapenta more offshore.

b.) A second major issue mentioned was infrastructure development. One of the major problems in the area is transport. The road system should be expanded. Specifically mentioned was the need for improvement of the Chisanse feeder road. The respondents, however, also saw room for government action in lake transport development. This was regularly mentioned in relation to marketing problems. The respondents expected that they (the fishermen) would benefit from improved lake transport since it would increase the number of fish buyers therewith reducing post harvest losses and stimulating competition among traders. Furthermore fishermen regularly expressed the wish for assistance in constructing drying racks and storage facilities for dried fish and fishing gear. Government action was also demanded in the fields of medical, sanitary, banking and schooling facilities.

c.) The large number of fishermen mentioning the need for financial assistance might indicate that fishermen are not aware of the dangers of over-capitalization in the industry. It should be realized, however, that fishermen primarily respond from an individual point of view. Fishermen were encountered who did express clear concerns about available stocks and stressed the need for government to manage the fishery. The measures mentioned were: closed seasons, mesh-size regulation, and limitations on in-shore fishing. A few fishermen expressed frustrations about the industrial fishing companies. One even stating that they should be closed while others stated closure for limited periods and prohibition for the industrial vessels to fish too close to the shore.

d.) Training was another issue mentioned. In fact the Fisheries Department already engages in training but fishermen would like to see an expansion of these activities. Training elements mentioned were gear technology and teaching in proper fishing techniques. Liftnetting was specifically mentioned in this context.

e.) A small number of fishermen indicated the need for government operated control boats basically to prevent thefts of gear and penetration of foreigners in Zambian waters.

f.) One respondent mentioned the need for government to assist the artisanal fishermen in organizing themselves in a so-called kapenta association. This fisherman stated that artisanal fishermen are less organized than industrial fishermen (companies). Such an association would have to defend the interest of the artisanal 'kapenta' fishermen.

g.) Understandably fishermen mentioned the lack of inputs and high input prices. Specifically mentioned were the need for government to strengthen gillnet producing factories and subsidies on inputs such as nets and fuel.

References

- Beatty D.M.F. Results of a fish marketing survey in Zambia 1964-1965, Ministry
1969 of Rural Development, Department of Wildlife, Fisheries and
National Parks: 94p.
- Bernascek G., Evaluation of the impact of feeder roads for fisheries
1985 development project in Northern Zambia on the fisheries of Lake
Tanganyika, Lake Mweru Wantipa, Lake Mweru and the Bangweulu
Lakes/Swamp complex (with special emphasis on stock assessment),
CIDA: p.205.
- Department of Fisheries, Fisheries Statistics 1991 compiled by Statistics
1991 Section Chilanga: 11p.
- Horemans B., An introduction to cost and earnings studies. In: Papers
1990 presented at the IFIP/SWIOP Workshop on Economic Aspects of 1990
Fisheries Development and Management. UNDP/FAO Regional Project
for Inland Fisheries Planning (IFIP), RAF/87/099-TD/12/90 (En):
122p.
- Mortimer M.A.E. (ed.), Natural Resources Handbook, The Fish and Fisheries Of
1965 Zambia: 98p.
- Pearce M.J., The Results of a Survey of the Fisheries of the Zambian waters
1992 of Lake Tanganyika. UNDP/FAO Regional Project for Inland
Fisheries Planning (IFIP). RAF/87/099-WP/13/92 (En): 44p.
- Pearce M.J., Thirty years of exploitation of the pelagic fish stocks in the
1989 Zambian waters of Lake Tanganyika. In Anon (Ed.), Fisheries of
the African Great Lakes. International Agricultural Center
Wageningen, The Netherlands; Occasional Paper No.3. pp. 16-25
- Reynolds J.E., P. Mannini and D. F. Gréboval, Obscure Waters: The Fisheries
1991 of the Mweru/Luapula Complex, Zambia - Report of an IFIP Review
Mission. UNDP/FAO Regional Project for Inland Fisheries Planning
(IFIP), RAF/87/099-TD/28/91 (En): 87p.
- Vanden Bossche J.P. and G.M. Bernascek, Source book for the inland fishery
1990 resources of Africa:1. CIFA Technical Paper, No.18.1, Rome, FAO,
240p.

Annex 1 The questionnaire

SOCIOECONOMIC SURVEY OF FISHERMEN LAKE TANGANYIKA, ZAMBIA GRZ/IFIP

A. IDENTIFICATION PARTICULARS

1. Stratum :

2. Name of village:

3. Name of beach :

4. Date :

5. Name interviewer:

6. Respondent code :

S V B RES

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B. RESPONDENT IDENTIFICATION

1. a. Is the respondent:

Owner and operator of a Fishing boat 1

or Light boat 2

Owner but not operator of a Fishing boat 3

or Light boat 4

Operator but not owner of a Fishing boat 5

Light boat 6

EMPLSTATUS

b. Is the respondent: male 1 female 2

SEX

2. Is the respondent:

a. Full time fisherman (> 10 days per month) 1

Part time fisherman (5 < <10 days per month) 2

Occasional fisherman (< 5 days per month) 3

Not fisherman 4

FULLPART

b. > If not actively fishing what is his occupation?

3. To which tribe does he belong?

Lungu 1 Mambwe 2 Bembe 3 Tabwa 4

TRIBE

Other (specify)

DISTRICT

4. a. What is his district of birth:

b. What is his village of birth:

c. Indicate if this village is:

less than 20 km from the lake shore 1

more than 20 km from the lake shore 2

VILLDIST

5.a. Did he have a main occupation before his present occupation?

yes 1 No 2

PREVOCC

b. > if yes which occupation

OCCPREV

6. If he is a fisherman how many years ago did he start fishing? years ago

EXPIER

7. What is his age? years

AGE

C. RESIDENTIAL MOBILITY

1. Is the place of interview (beach or immediate vicinity)
the place where he was born?

Yes 1

No 2

PLACEBORN

2.a. Is the place of interview (beach or immediate vicinity)
the place where he normally lives?

Yes 1

No 2

PLACELIVE

b. ->if yes: since birth (enter age)

years or

lived somewhere else and came (back)

years ago

SINCEBIR

CAMEBACK

3.a. If no in (Question 2 a), since when is he in this place?

Less than a week 1

More than a week less than a month 2

More than a month 3

-> Go to D1

SINCEWHE

b. ->How many months? months

MONTHS

D. BOAT INFORMATION

NOTE: CHECK RESPONDENT IDENTIFICATION QUESTION B1: IF THE RESPONDENT IS OWNER OF A BOAT GOTO QUESTION D 4

IF THE RESPONDENT IS NOT OWNER BUT OPERATOR (CAPTAIN) CONTINUE
1. Give the following details of the boat he currently operates: <

*) Boat type	Age (Years)	Replacement cost (kwacha)	Number of times boat maintained in past 2 years	Amount spent on maintenance in past 2 years	Enter the first and second major gear and/or purpose of the boat in the past one year 1 st 2 nd

*) Note: D = Dugout canoe, PB = Planked boat, FB = Fibreglass boat, FC = Fibreglass catamaran
PC = Planked catamaran, MB = Metal boat

2. Is the owner of the boat a family member? Yes 1 No 2

If yes what is the relation?

3. How and how much does he pay the

owner of the boat?

Go to E1

codes

Boat type	Age (Years)	Replacement cost (kwacha)	Number of times boat maintained in past 2 years	Amount spent on maintenance in past 2 years	first and second major gear and/or purpose of the boat in the past one year
NOBOTYPE	NOBOAGE	NOBOREPC	NOBOTMAI	NOBOMACO	NOBOPUR1 NOBOPUR2
			not coded		

NOBOFAMI

NOBOPAY

5. a. Does he hire the boat(s) out sometimes?

Yes 1 ☐ No 2 ☐ → Go to question 6 a.

Payment received in CASH, how much? = kwacha/month

OR

Payment received in FISH, how much? = kwacha/month

6. Does he own or share any engine?

Yes 1 ☐ No 2 ☐ → Go to question 7

Is it:

functioning ☐ or broken ☐

→ Since how many months?

→ Why not repaired?

→ Does he use it on every fishing trip?

Yes 1 ☐ No 2 ☐ → Why not?

7 a. Does he rent an engine sometimes?

Yes 1 ☐ No 2 ☐

b → At which cost? = kwacha per month

HIREYENO ☐

CASKWMON

FISKWMON

OWNENGIN ☐

ENGFUNC ☐

ENGBROKE ☐

EBROKMON

ENGNOTRE _____

USEENG ☐

ENGNOUSE _____

RENTENGI ☐

ENGHIPRI

E. GEAR INFORMATION

- Give the following details of the gear owned by the respondent (for owners) and/or operated by the captain (non-owners)

Gear Type (*)	Total length or number of units	GEAR OWNERSHIP			CREDIT USED TO BUY THE GEAR ?			How Much (kwacha)
		Age (months)	Not Owner (1)-(2)	Self Full 100% Shared (3)	With Whom	Not Owner (1)-(2)	YES (3)	
1								
2								
3								
4								
5								

*) Note: KS = Kapenta seine (incl.Chiriomila), BS = Beach seine, LN = Liftnet, LL = Longline HL = Handline, GN = Gill net, LI = Lights

→ If no Kapenta seine or lights for kapenta seine are entered Go to question F 1

- If a kapenta seine or kapenta seine lights are owned or operated give details on the following.

- How many different light boats took part in the last fishing operation? Light boats LIBOATS
- How many different separate lights (= total number of lights carried by the light boats above) were encircled during the last night fishing operation? Lights LIGHTS
- What was the total number of persons pulling the net on the beach during the last fishing operation? people PULLCREW
- How many net draws were made during the last fishing night operation? draws DRAWS

coding

gety1	ge1len	ge1age	ge1own	ge1cre	ge1crwho	ge1cramo
gety2	ge2len	ge2age	ge2own	ge2cre	ge2crwho	ge2cramo
gety3	ge3len	ge3age	ge3own	ge3cre	ge3crwho	ge3cramo
gety4	ge4len	ge4age	ge4own	ge4cre	ge4crwho	ge4cramo
gety5	ge5len	ge5age	ge5own	ge5cre	ge5crwho	ge5cramo

F. ENGINE INFORMATION

1. Does the respondent own or operate any engine Yes 1 ☐ No 2 ☐ → Go to question G 1
2. Give the following details of the engines he owns or operates:

Brand	Horse power	Age (years)	Number of times maintained during last 2 years	Total money spent on maintenance during last 2 years	OWNERSHIP OF ENGINE				CREDIT USED TO PURCHASE THE ENGINE ?				OPERATIONAL ?	
					Not Owner (1) — (2) — (3)	Self full 100% Owner (2) — (3)	Shared (3)	With whom	Not Owner (1) — (2) — (3)	NO YES (2) — (3)	From whom	How much	Functioning (1) — (2)	Broken (2)
1														
2														
3														
4														
5														

3. Who is usually maintaining the engine(s)? Himself 1 ☐ Family 2 ☐ Dealer 3 ☐ Fisheries 4 ☐ Other Specify ☐ ENGMAINT ☐

4. Are these engines used for: Fishing 1 ☐ Transport 2 ☐ Both 3 ☐ ENGUSE ☐

coding

en1ty	en1hp	en1age
en2ty	en2hp	en2age
en3ty	en3hp	en3age
en4ty	en4hp	en4age
en5ty	en5hp	en5age

en1mainc	en1own	en1shwho
en2mainc	en2own	en2whwho
en3mainc	en3own	en3whwho
en4mainc	en4own	en4whwho
en5mainc	en5own	en5whwho

en1cre	en1cwhom	en1cramo	en1oper
en2cre	en2cwhom	en2cramo	en2oper
en3cre	en3cwhom	en3cramo	en3oper
en4cre	en4cwhom	en4cramo	en4oper
en5cre	en5cwhom	en5cramo	en5oper

G. SHARING SYSTEM AND MOBILITY

1. Give number of crew and explain clearly the sharing system for each gear owned and/or operated!

GEAR	CREW SIZE	EXPLAIN SHARING SYSTEM ^{*)}
Kapenta seine	..	_____
Beach seine	..	_____
Lift net	..	_____
Longline	..	_____
Handline	..	_____
Gill net	..	_____
Other (specify)	..	_____

*) Note: Indicate if operational costs (for example kerosine for lights, light mantels, food) is deducted before or after sharing. Indicate also if the fish or the money (after sales) is shared.

2. a. Does the crew bring its own gear on the boat sometimes?

yes, always 1 ☐ yes, sometimes 2 ☐ No 3 ☐ Go to question G 3

b. → Which gear?

c. → Indicate how is the catch shared in this case:

3. Do the crew members change/shift to other boats sometimes?

YES YES YES
from day from week from month
to day to week to month NO
1 ☐ 2 ☐ 3 ☐ 4 ☐

4. If the respondent is a light operator with how many different net operators did he fish during the past one year?

different net operators (98) is not a light operator

5. Did you fish in the Chisanse concession during the past one year?

Yes 1 ☐ No 2 ☐

6. In how many different beaches have you fished or landed your catch during the past one year?

beaches

KSCREW ☐

BSCREW ☐

LNCREW ☐

LLCREW ☐

HLCREW ☐

GNCREW ☐

OTCREW ☐

CREBRGEA ☐

BROUGGEA ☐

CREWCHAN ☐

DIFNETOP ☐ enter 98 if not light operator

CHISANSE ☐

NUMBEACH ☐

H. DISPOSAL OF THE CATCH

1. To whom is the catch from the boat sold after landing?

Tick all appropriate boxes Who buys most fish? (tick only one box)

To male traders on the beach

1

☐

1

☐

To female traders on the beach

2

☐

2

☐

On village or town market

3

☐

3

☐

Direct to consumers

4

☐

4

☐

To commercial fishing company

5

☐

5

☐

Other (specify) _____

6

☐

6

☐

MATRAD 1

☐

MAI
MARKT

☐

FETRAD 2

☐

MARKET 3

☐

CONSUM 4

☐

COMPAN 5

☐

OTHER 6

☐

2. How much fish is not sold but kept for eating at home per week ?

→ convert to Kg/week

.....kg/week

HOMECONS

3a. Does her/himself dry or smoke fish sometimes? Yes 1

☐

No 2

☐

RESPPROC

☐

b. Does his wife(ves) dry or smoke fish sometimes? Yes 1

☐

No 2

☐

WIFEPROC

☐

(enter
8 if
respondent is
female)

c. → If either of the two is yes is processing

Permanent 1

☐

Seasonal 2

☐

occasional 3

☐

PROCTIME

4. What is the relationship with the fish traders?

(Tick all appropriate boxes)

only to sell fish

☐

they provide credit (money)

☐

they provide fishing boat

☐

they provide fishing gear

☐

SELFIS

☐

CREDIT

☐

PROBOAT

☐

PROGEAR

☐

I. OCCUPATIONS

1. Which was/is his fathers occupation?

Fisherman 1

☐

Crop Farmer 2

☐

Trader 3

☐

FATHOCC

☐

Animal producer 4

☐

Hired worker 5

☐

Other (specify) _____

2. Which was/is his grandfathers occupation?

Fisherman 1

☐

Crop Farmer 2

☐

Trader 3

☐

GRANDFOC

☐

Animal producer 4

☐

Hired worker 5

☐

Other 6

☐

Specify _____

3. From which occupation do you get most of your income?

Fisherman 1

☐

Crop Farmer 2

☐

Trader 3

☐

MAININCO

☐

Animal producer 4

☐

Hired worker 5

☐

Other 6

☐

Specify _____

4. From which occupation do you get your second income?

Fisherman 1

☐

Crop Farmer 2

☐

Trader 3

☐

SECINCOM

☐

Animal producer 4

☐

Hired worker 5

☐

None 8

☐

Other (specify) _____

J. INFORMATION ABOUT THE RESPONDENTS FAMILY

1. a. What is the respondents marital status?

Married 1 ☐ Single 2 ☐ Widower 3 ☐ Divorced 4 ☐

b. -> If married with how many wives? ☐ wives

MARSTAT ☐

NUMWIVES ☐ enter 8
if res-
pondent
is female

2. What is the highest level of education he reached?

EDUCAT ☐

3. How many children does he respondent have? ☐ children

NBCHILD ☐

4. How many children are still dependent on him? ☐ children

DEPCHILD ☐

5.a. Are there any children working as fishermen?

Yes 1 ☐ No 2 ☐

CHILDFIS ☐

b. -> if yes, how many in artisanal fishery? ☐

CHILART ☐

how many in commercial fishery? ☐

CHILCOM ☐

6. Are there any children involved in fish processing/marketing?

Yes 1 ☐ No 2 ☐

CHILPROC ☐

-> if yes how many male ☐ female ☐

PROCMA ☐ PROCFEM ☐

K. FARMING AND BREEDING ACTIVITIES

1. How many fields do he and his wife hold? ☐ fields

NBFIELDS ☐

2. If he has fields how many: close to the beach? ☐

FIECLBEA ☐

far from the beach? ☐

FIFARBEA ☐

3. What is the total surface of these fields?
(enter clearly the units of measurement)

-> convert to acres ☐ acres

SURFACE ☐

4. How did he/they acquire these fields?
(tick all appropriate boxes)

allocated by village headman ☐ inherited ☐

HEADMAN ☐ INHER ☐

rented ☐ bought ☐ Other (specify)

RENT ☐ BOU ☐ OTH ☐

5. Indicate his three main cultures:

a. b. c.

CULA ☐ CULB ☐ CULC ☐

6. What was the production in kilograms during the last harvest?
(enter clearly the unit of measurement)

culture a. -> convert to kg kg

CULAPROD ☐

culture b. -> convert to kg kg

CULBPROD ☐

culture c. -> convert to kg kg

CULCPROD ☐

7. How many of the following animals does he and his wife(ves) hold?

a. Cattle ☐ b. Goats ☐ c. Lambs ☐ d. Pigs ☐ e. Poultry ☐

CATTL ☐ GOATS ☐ LAMB ☐

Other (specify)

PIGS ☐ POUL ☐ OTHANIM ☐

L. ATTITUDES AND OPINIONS REGARDING FISHERY

1. If he would have other employment opportunities would he:

- Stay in fisheries 1 ☐
- Change profession 2 ☐
- Does not know 3 ☐

EMPLOPP ☐

2. Would he like his son(s) to be fisherman?

Yes 1 ☐ No 2 ☐ → If no explain why not? _____

SONFISH ☐

3. If he would experience a significant increase in his earnings how would he use this extra money?
(list various answers in order of importance)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

4. If he would be able to get a loan from an institution in what would what he invest?

Farming 1 ☐ Animals 2 ☐ Fishing 3 ☐ Other ☐

↳ Specify _____

LOANINV ☐

5. If you compare your catch landed of 5 years ago and now would you say that the quantity has:

reduced 1 ☐ increased 2 ☐ stayed the same 3 ☐

QUAFISTR ☐

6. If you compare the fish landed 5 years ago and now would you say that the size of the fish has:

reduced 1 ☐ increased 2 ☐ stayed the same 3 ☐

SIZFISTR ☐

7. What are your main problems with respect to the fishing activities? (list them in order or importance)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

8. Do you think there are too many fishermen for the fish available in the lake? (Tick appropriate box and explain)

Yes 1 ☐ No 2 ☐ No opinion 3 ☐

OPINBFIS ☐

9. What should the government do to solve your problems with respect to the fishing.

Annex 2 List of sampled villages and number of respondents

Stratum	Village name	Number of respondents	Percentage
1	Chipwa	20	
1	Miamba	5	
1	Chitili	2	
1	Chisanse	11	
1	Kabwe	1	
1	Kasakumulwa	9	
1	Chituta	4	
1	Kapata	7	
	Sub-total Stratum 1	59	18.2
2	Chilila	27	
2	Onzye	4	
2	Sondwa	6	
2	Lunkundo	1	
2	Niamokolo	1	
2	Kasasa	5	
2	Muzabwela	5	
2	Musende	4	
2	Kasakalawe	17	
2	Katonya	3	
2	Mbete	8	
	Sub-total Stratum 2	81	25.0
3	Chezi	1	
3	Funda	1	
3	Kasenga	2	
3	Kalala	7	
3	Kapembwa	50	
3	Kabwensolo	2	
3	Mwense	5	
3	Kabyolwe	13	
3	Mupapa	9	
3	Kampentwa	3	
3	Nakaku	2	
3	Nachisa	7	
	Sub-total Stratum 3	102	31.5
4	Kanyegele	9	
4	Teleka	9	
4	Kalomo	7	
4	Mushi	5	
4	Chibengu	25	
4	Chishiki	11	
4	Katete	5	
4	Chibanga	11	
	Sub-total Stratum 4	82	25.3
	Total	324	100.0

Annex 3 Training manual interviewers

TRAINING MANUAL FISHERMEN SURVEY LAKE TANGANYIKA, MPULUNGU, ZAMBIA

INTRODUCTION

The Fisheries Department of Zambia and the FAO/UNDP Project for Inland Fisheries Planning (IFIP) in Eastern, Southern and Central Africa based in Bujumbura Burundi, have joined efforts to execute a survey of fishermen in the Zambian waters of Lake Tanganyika.

The questionnaire used to collect information from the fishermen includes a number of questions to assess some basic socio-economic parameters on the fishing units and the fishermen. As such this survey can be seen as a baseline survey used to assess the socio-economic status of the fishermen. A repetition of this survey in a number of years from now will enable an assessment of changes in the fishery.

The respondents (fishermen) in this survey are **boat owners** (fishing and/or light boats) and **non-owner operators** of fishing and/or light boats. A survey of crew members may be executed at a later stage.

This training manual is written for the enumerators who are going to carry out the interviews in the beaches. Its main purpose is to provide guidance on how to fill in the questionnaire.

A FEW NOTES ON INTERVIEWING

Interviewing can be defined as a dialogue between an interviewer and a respondent with the purpose of obtaining information from the latter.

Always remember that you as the interviewer are asking a favour from the respondent. You ask him or her to make time available for you and to provide you with (often personal) information.

Before starting the interview take some time to explain the purpose of the study. Stress to him or her that the information provided will be treated confidentially (that is also why the name of the respondent is not recorded on the questionnaire). Try to take the respondent apart so you can talk with him/her privately without curious people hanging around and over hearing your dialogue.

Take a modest attitude. Remember to speak clearly and to phrase the questions as they are written on the questionnaire. If you have doubts about the meaning of a question and/or what to enter on the questionnaire consult your supervisor. Enter the answers with a pencil. Ignore the coding column on the right hand side of the questionnaire. This column will be completed by the supervisor.

SAMPLING AND SELECTION OF RESPONDENTS

Instruction in the field.

THE QUESTIONNAIRE**SECTION A IDENTIFICATION PARTICULARS:**

1. Fill in the stratum number where the beach is located.
2. Fill in the name of the village where the beach is located.
3. Fill in the name of the beach which is often but not necessarily the same as the village name.
4. Fill in the date.
5. Write your own name.
6. Leave "respondent code" open this will be filled in by the supervisor.

NOTE FOR SUPERVISOR: START RESPONDENT NUMBER IN EVERY BEACH WITH 01, 02, 03 ETC. UP TO THE NUMBER OF INTERVIEWS HELD IN THE PARTICULAR BEACH. IN A NEW BEACH YOU START AGAIN WITH 01, 02, 03 ETC.

SECTION B. RESPONDENT IDENTIFICATION:

- 1.a. Tick the appropriate box(es).

In case the respondent owns or operates fishing and light boat tick both fishing and light boat(s) boxes.

In the case that the respondent is not owner interview the most important/major operator.

IMPORTANT: ONLY ONE OF THE THREE MAIN CATEGORIES CAN BE APPLICABLE!

- b. Tick box male or female.
2. a. Tick (one) appropriate box. Note category 4 meaning that the respondent does not actively fish himself.
b. If he does not actively fish himself ask him his main occupation. This might even only be "Managing the boat(s)."
3. Tick the box of the tribe to which he belongs.
4. a. Write the name of the district where the respondent was born.
b. Write the name of the village where the respondent was born.
c. Assess with the respondent if his village of birth was less or more than 20 kilometres from the lake shore and tick the appropriate box.
5. a. Tick appropriate box.
b. If yes write his previous occupation. Fisherman, Crop farmer, Trader, Animal producer, Hired worker, Other specify.
6. Enter the number of years of experience in fishing of the respondent.
7. Enter his age. Asking his identity card is strongly discouraged.

SECTION C. RESIDENTIAL MOBILITY

1. Tick the appropriate box. Place of interview is really the beach or its immediate vicinity up to 5 km from the beach where you are currently interviewing.
- 2.a. Tick the appropriate box.
b. If "YES" go to question b. and indicate since birth or that he came (back) here. Enter the number of years.
If "NO" go to question 3.
- 3.a. If he does not normally live in this place (he may have migrated temporarily) tick the appropriate box 1, 2, 3
b. If box 3 was ticked go to b. and enter the number of months he is in this beach.

SECTION D BOAT INFORMATION

NOTE: IF THE RESPONDENT IS OWNER OF A BOAT (CHECK QUESTION B 1) PROCEED TO QUESTION D 4.

NOTE: IF THE RESPONDENT IS NOT OWNER BUT OPERATOR (ONLY CAPTAIN) CONTINUE WITH THE NEXT QUESTION D 1.

1. Enter all details in the matrix with respect to the fishing or light boat that the respondent operates (of which he is captain).
TYPE OF BOAT: D = Dugout canoe, PB = Planked boat, FB = Fibre glass boat, FC = Fibre glass catamaran, PC = Planked Catamaran, MB = Metal boat

AGE:

Enter the age of the boat in years.

REPLACEMENT COST:

Ask him if he would have to buy exactly the same type of boat now (same material, same length etc.) how much he would have to pay in kwacha.

NUMBER OF TIMES MAINTAINED IN THE LAST TWO YEARS:

Enter the number of times that he had to bring the boat for maintenance during the last two years (painting, caulking etc.)

MONEY SPENT ON MAINTENANCE DURING THE PAST TWO YEARS:

Enter how many kwacha he had to pay for this maintenance during the past two years.

MAIN GEAR OR PURPOSE OF THE BOAT DURING THE PAST YEAR:

Enter the main and the second most important gear with which that particular boat

fished during the past one year and / or its main purpose. If it was for light boating enter "LI" for light, if for kapenta seining enter "KS", if for gill netting enter "GN" enter transport if it was also for transport etc. Try to probe these uses of the boat. In the case of kapenta seining the boat can even be used to shout instructions in this case just enter "shouting".

2. Tick the appropriate box if boat owner is a family member. If yes give the relation to the family member for example: father, brother etc.

3. Indicate here how the boat owner is paid for using his boat.

NOTE: BECAUSE THIS SECTION WAS FOR NON-OWNER OPERATORS PROCEED NOW TO QUESTION E 1.

NOTE: IF THE RESPONDENT IS HIMSELF OWNER GIVE DETAILS OF THE BOATS HE OWNS IN THE MATRIX QUESTION 4

4. a. Enter how many fishing and/or light boats he (share) owns how many transport boats he (share) owns.

b. Enter how many transport boats he owns or shares.

c. Fill out this matrix for all the boats he owns in the same way as described above for non-owner operators. Every line represents one boat. For the owner two additional items are now included namely details on ownership and the use of credit.

AGE:

Enter the age of the boat.

REPLACEMENT COST:

Ask him if he would have to buy exactly the same type of boat now (same material, same length etc.) how much he would have to pay in kwacha.

NUMBER OF TIMES MAINTAINED IN THE LAST TWO YEARS:

Enter the number of times that he had to bring the boat for maintenance during the last two years (painting, caulking etc.)

MONEY SPENT ON MAINTENANCE DURING THE PAST TWO YEARS:

Enter how many kwacha he had to pay for this maintenance during the past two years.

OWNERSHIP:

- Tick column "Full 100%" if the respondent is the only owner of the boat or,
- Tick column "shared" if he shares the boat with somebody
- If he shares with somebody indicate with whom for example, brother, father, friend, crew etc.

MAIN GEAR OR PURPOSE OF THE BOAT DURING THE PAST YEAR:

Enter the main and the second most important gear with which that particular boat fished during the past one year and / or its main purpose. If its was for light boating enter "LI" for light, if for kapenta seining enter "KS", if for gill netting enter "GN" enter transport if it was also for transport etc. Try to probe these uses of the boat. In the case of kapenta seining the boat can even be used to shout instructions in this case just enter "shouting".CREDIT

USED TO PURCHASE BOAT:

- Ask if he has borrowed money to buy the boat. If not tick the column "NO" otherwise,
- If yes tick column "YES"
- If he borrowed money indicate from who for example father, brother, friend, bank, cooperative etc.
- If he borrowed money to buy the boat indicate how much he borrowed.

5. a. Tick the appropriate box "YES" or "NO". If "NO" proceed to question 6.

b. If yes indicate how the owner is being paid either in cash or in fish and how much. Try to find out how many kwacha this is or would be per month.

6. a. Tick the appropriate box "YES" or "NO".

b. If "YES" is it broken or functioning: Tick appropriate boxes.
If it is broken enter since when and why it was not repaired.

c. Does he use it on every fishing trip? Tick appropriate boxes. If not explain why not. In other words what are the reasons not to use it on every trip.

7. a. If "NO" in question 6 a. Ask if he rents an engine sometimes. Tick appropriate box.

b. If "YES" enter against which cost.

SECTION E GEAR INFORMATION

1. This matrix should be filled in for all the gear the respondent owns or shares. Every line represents one gear. If the respondent is a non-owner operator fill in the matrix for the gear he operates.

GEAR TYPE:

Enter the gear type by its abbreviation:

KS = Kapenta seine, BS = Beach seine, LN = liftnet, LL = Longline, HL = Handline, GN = Gillnet, LI = Lights (for use in Kapenta seining and lift netting).

TOTAL LENGTH OR UNITS:

For Kapenta seine (regarded as same as Chiromila) and Beach seine enter the length in meters of the head rope.

For Gillnet enter total length in meters. If the fisherman answers in number of units multiply the units by 90 meters to arrive at the total length in meters.

For longline enter the number of hooks.

For handline enter the number of separate lines.

For liftnet enter the length of the circumference.

For lights enter the number of lights.

AGE:

Enter the age of the gear in number of months. A complication can arise with respect to the age of gear. Nets for example can be made up of parts with a different age. In this case enter the age of the oldest part and the age of the newest part. In this way we can calculate the average. The same holds for lights. In the case where somebody owns different lights some may be old and some new. Enter the oldest and the newest in the appropriate column.

OWNERSHIP:

Tick the appropriate column as described under boat ownership. In this case of gear one column is added however for the cases where the respondent operates but does not own the gear. If this is the case tick the column "NOT OWNER".

CREDIT:

Tick as described under boat ownership. In this case of gear one column is added however for the cases where the respondent operates but does not own the gear. If this is the case tick the column "NOT OWNER".

NOTE:

IF NO KAPENTA SEINES OR LIGHTS FOR KAPENTA SEINES ARE ENTERED IN THE MATRIX PROCEED TO QUESTION F 1.

IF HOWEVER KAPENTA SEINES OR LIGHT FOR KAPENTA SEINES ARE ENTERED CONTINUE WITH QUESTION 2 FOR SOME DETAILS ON THE KAPENTA SEINE OPERATION.

2. Enter the answers a to d.

SECTION F ENGINE INFORMATION

1. Tick appropriate box if the respondent owns or shares an engine or operates an engine. If "NO" proceed to question G 1.

2. If "YES" fill in the matrix. Every line represents one engine.

BRAND:

Enter for example "YAMAHA", "MARINER" etc.

HORSEPOWER:

For example 10, 15 or 25 hp.

AGE:

Age of the engine in years.

NUMBER OF TIMES MAINTAINED IN THE LAST TWO YEARS:

Enter the number of times that he had to bring the engine for maintenance during the last two years.

MONEY SPENT ON MAINTENANCE DURING THE PAST TWO YEARS:

Enter how many kwacha he had to pay for this maintenance during the past two years. This includes the amount spent on spare parts.

OWNERSHIP:

Tick the appropriate column as described under boat ownership. In this case of engine one column is added however for the cases where the respondent operates but does not own the engine. If this is the case tick the column "NOT OWNER".

CREDIT:

Tick as described under boat ownership. In this case of engine one column is added however for the cases where the respondent operates but does not own the engine. If this is the case tick the column "NOT OWNER".

FUNCTIONING/BROKEN DOWN

Tick the appropriate column.

3. Tick the appropriate box on who maintains the engine.

4. Tick the appropriate box. Used exclusively for fishing, for transport or for both.

SECTION G SHARING SYSTEM AND MOBILITY

1. Indicate for the gear types owned or operated by the respondent:

- the number of crew (including the captain) involved in operating the gear and,
- describe accurately how the catch is shared among, boat owner, net owner and crew.

Indicate if the operational costs (for example kerosine for lights, light mantels and food) are deducted before or after sharing. Also indicate if the fish or the money (after selling the catch) is shared.

NOTE: For number of crew in the kapenta seine operation give only the number of people pulling on the beach but indicate what goes to the light owners, independent men shouting instructions, boat owner, net owner and the people pulling on the beach.

2. a. Tick the appropriate box. In the kapenta seine operation crew in this case is considered as pullers, light men, independent shouters and crew working on the boat carrying the net. If "NO" proceed to question G 3.

b. If "YES" indicate which gear is brought in by the crew. This may be more than one gear.

c. Explain for this case the sharing system.

3. Tick the appropriate box. Crew in the kapenta seine and beach seine operation are in this case those pulling the net on the beach. If crew changes take place with a frequency of more than one month tick the box "NO".

4. If the respondent is a light operator enter the number of different nets with which he fished during the past one year. If he is not a light operator tick the box "NOT LIGHT OPERATOR".

5. Tick the appropriate box if he fished in the Chisanse concession during the

past one year. "YES" or "NO".

6. Enter the number of different beaches where he has fished or landed the catch during the past one year.

SECTION H DISPOSAL OF THE CATCH

1. Tick all appropriate boxes to whom the catch from the boat(s) is sold. The question refers to the first step in the marketing chain not what happens after.

Tick only one box for the one category who buys most of the catch.

2. Try to find out how much fish he/she keeps for him/her self and his/her family (which is not sold) per week. You may have to probe quite a bit here. Fishermen may answer in terms of buckets, trays or whatever unit. Convert this answer to kilograms per week.

3. a. Tick appropriate box.

b. Tick appropriate box. If he is not married tick box.

c. Tick appropriate box. Permanent means all year round. Seasonal means only certain periods or months of the year (for example rainy season). Occasional means only now and then.

4. The catch is sold to traders indicate the relation the fisherman has with these traders. Tick all appropriate boxes.

By credit is meant credit in terms of money or food to cover, for example, difficult periods of the year.

SECTION I OCCUPATIONS

1. Tick the box of the occupation of the father of the respondent. If there is no applicable box write the answer under "Other (specify)". If the respondent does not know write "does not know".

2. Tick the box of the occupation of the grandfather of the respondent. If there is no applicable box write the answer under "Other (specify)". If the respondent does not know simply write "does not know".

3. Tick the appropriate box. This will often be fishing but this is not necessarily the case. For example in the case of a shopkeeper who is also involved in fishing.

4. Tick the appropriate box. If he has no other income apart from his first occupation tick the box "None".

SECTION J INFORMATION ABOUT THE RESPONDENTS FAMILY

1 a. Tick appropriate box on respondents' marital status.

b. If respondent is male and married enter the number of wives. If respondent is female write "not applicable"

2. Enter the highest level of education he reached. If he had no education write "NONE".

3. Enter the number of children he has.

4. Enter the number of children which are still depend on him. In other words those who he is still supporting with his income.

5.a. Tick "YES" if any children are working as fisherman. This includes fishermen on commercial boats. If no children work as fisherman tick "No"

b. Specify how many in artisanal and how many in commercial fishery.

6. Tick appropriate box for processing and marketing. If "YES" indicate how many male and how many female. If no tick the box "NO"

SECTION K FARMING AND BREEDING ACTIVITIES

1. Enter how many fields the respondent and wife(ves) or husband hold.
2. Indicate whether this is near to the beach or elsewhere (for example inland at home village).
3. Try to establish the total surface of these fields. If the fisherman answers in local units (for example lima which is one-quarter of a hectare) convert this to acres.
4. Tick all appropriate boxes on how these fields were acquired.
4. Write the three most important crops. For example: Cassava, Maize, Rice cultivated on these fields.
5. Try to establish the yield of these crops during the last harvest. The respondent will often answer in terms of bags. Convert the units to kilograms.

NOTE: IF THE RESPONDENT APPEARS TO HAVE LAND AND A YIELD FROM THE LAND CHECK IF INCOME FROM THIS HAS BEEN MENTIONED IN QUESTION 3 AND/OR 4 IN SECTION I OCCUPATIONS

6. Write in each box the number of animals that he and his wife(ves) own.

SECTION L ATTITUDES AND OPINIONS

This section is included to investigate how the respondents 'view'/'evaluate' the business of fishing.

1. Tick the appropriate box.
2. Tick the appropriate box. If the fisherman does not want his sons to be fisherman explain why.
3. Enter the answers in order of priority from the most important to the least important: a,b,c,d etc.
4. Ask the respondent in which sector/activity he would invest if he would get a loan from an institution and was free to decide how to invest. He should not feel obliged to say fishing.
5. Tick the appropriate box if the quantity of fish landed increased, reduced or stayed the same.
6. Tick the appropriate box if the size of fish (mainly applicable for the non-kapenta species) increased, reduced or stayed the same.
7. List the problems in order of importance a,b,c,d, etc.
8. Do you think there are too many fishermen for the fish available in the lake? Tick the appropriate box and write his answer.
9. What should the government do to help solving his fishing problems? Write his answers.

FINAL NOTE TO THE INTERVIEWER.

Feel free to ask your own questions and write the information you get on the space remaining on the form. Do not forget to thank the fisherman for making time available for you.

O-O-O-O-O-O-O-O-O

Annex 4 Code book
CODE BOOK SOCIOECONOMIC SURVEY LAKE TANGANYIKA, MPULUNGU, ZAMBIA

Introduction

In order to be able to enter the answers, given by the respondents, into a computer program these answers have to be coded. Coding is not done by the interviewer but by the study supervisor.

Coding may be defined as allocating a number to each of the answer categories. Codes are entered in the right hand coding column of the questionnaire. Coding should be done at the end of every interviewing day. It is (also) a good way of checking the correctness of the filled in questionnaire. If anything is not clear or incorrect the interviewer has to clarify to the supervisor.

After the codes are entered on the questionnaires they can be typed into the database.

Inputting the data into DBASE III plus

The codes are entered in 2 different (dBase III+) databases.

The first database has the name SOCZAM1.DBF the second is SOCZAM2.DBF. The dbase program and an input program is provided on floppy disk. The input program links the two databases. The input program has the name INPZAM.PRG.

When starting inputting data into the computer the dbase program first has to be loaded. To charge the dbase program enter from the DOS prompt:

C:\dbase [press return]

After the dbase program is charged and you are in the dbase dot prompt:

.

type:

.do inpzam [press return]

This command charges the input program and you can start typing the codes in the database. The last number entered into the first database (SOCZAM1.DBF) is the number of draws on page 6 of the questionnaire. The input program will lead you automatically to the second database (SOCZAM2.DBF) to continue inputting the codes from page 7 of the questionnaire to the end.

IMPORTANT: After the number of draws have been entered and the input program has brought you into the second database (SOCZAM2.DBF) you first have to enter again the field SVBRES found on top of page 1 of the questionnaire. This field is used to link the two databases.

Coding manual and the database fields

This codebook describes how the answers have to be coded and which codes have to be entered in the fields of the computer database.

- If a box on the questionnaire is preceded by a number for example:

No 2 ☐ the number of the box, which is ticked i.e. 2, is entered in the database.

for example: ☐ 2 and this number is entered in the database.

- If a box is not preceded by a number for example: Age ☐ the number written in the box is entered in the database for example:

Age ☐ 36 . Enter 36 in the database.

- Sometimes a short description is needed in a so-called character field, you will

have fields of a length of 10 or 15 characters to describe in short what was entered on the questionnaire.

The way the fields have to be coded and entered in the database is described below.

First database SOCZAM1.DBF

SVBRES S is the stratum number (1,2,3 or 4), V is the village number in the stratum, B is the beach number in the village and RES is the respondent number in the beach. In each stratum the village number starts from 1, in each village the beach number starts from 1. In each beach the respondent number starts from 1. In this way every questionnaire (so every respondent) acquires a unique number. This is important because in this way we can always trace back the questionnaire.

- 1 = Stratum 1, East coast
- 2 = Stratum 2, South coast
- 3 = Stratum 3, West coast
- 4 = Stratum 4, Nsumbu

EMPLSTATUS Enter the number(s) of the box which is (are) ticked in the code box.
For example 1 or 1 2, 3 or 3 4, 5 or 5 6

SEX Enter the number of the box which is ticked in the code box

FULLPART Enter the number of the box which is ticked in the code box

TRIBE Enter the number of the box which is ticked in the code box

DISTRICT

1 = Mbala district	9 = Eastern province
2 = Kaputa district	10 = Central province
3 = Mporokoso	11 = Luapula province
4 = Lwingu	12 = Southern province
5 = Chilubu	13 = Western province
6 = Kasama	14 = Copperbelt province
7 = Isoka	15 = Foreign
8 = Chinsali	

VILLDIST Enter the number of the box which is ticked in the code box

PREVOCC Enter the number of the box which is ticked in the code box

OCCPREV

- Enter 1 for fisherman
- 2 for crop farmer
- 3 for trader
- 4 for animal producer
- 5 for hired worker
- 6 for other

EXPIER Enter the number of years experience

AGE Enter the age (number of years)

PLACEBORN Enter the number of the box which is ticked in the code box

PLACELIVE Enter the number of the box which is ticked in the code box

SINCEBIR If since birth enter age

CAMEBACK Enter number of years

SINCEWHE Enter the number of the box which is ticked in the code box

MONTHS Enter the number of months

NOBOTYPE Enter the two character boat code

NOBOAGE Enter the age of the boat (years)

NOBOREPC Enter the replacement cost in kwacha

NOBOMACO Enter the maintenance cost in kwacha

NOBOPUR1 Describe short the first purpose

NOBOPUR2 Describe short the second purpose

NOBOFAM Enter the number of the box which is ticked

NOBOPAY Describe in short the way and amount of payment

FILIBOATS Enter the number of fishing plus lightboats.

TRABOATS Enter the number of transport boats.

B01 Enter the two character boat code

B1AG Enter the age of the boat (years)

B1REPCOS Enter the replacement cost of the boat in kwacha

B1AMOMAI Enter the maintenance cost of the boat

B1PUR1 Describe in short the first purpose of the boat
 B1PUR2 Describe in short the second purpose of the boat
 B02 Enter the two character boat code
 B2AG Enter the age of the boat (years)
 B2REPCOS Enter the replacement cost of the boat in kwacha
 B2AMOMAI Enter the maintenance cost of the boat
 B2PUR1 Describe in short the first purpose of the boat
 B2PUR2 Describe in short the second purpose of the boat
 B03 Enter the two character boat code
 B3AG Enter the age of the boat (years)
 B3REPCOS Enter the replacement cost of the boat in kwacha
 B3AMOMAI Enter the maintenance cost of the boat
 B3PUR1 Describe in short the first purpose of the boat
 B3PUR2 Describe in short the second purpose of the boat
 B04 Enter the two character boat code
 B4AG Enter the age of the boat (years)
 B4REPCOS Enter the replacement cost of the boat in kwacha
 B4AMOMAI Enter the maintenance cost of the boat
 B4PUR1 Describe in short the first purpose of the boat
 B4PUR2 Describe in short the second purpose of the boat
 B05 Enter the two character boat code
 B5AG Enter the age of the boat (years)
 B5REPCOS Enter the replacement cost of the boat in kwacha
 B5AMOMAI Enter the maintenance cost of the boat
 B5PUR1 Describe in short the first purpose of the boat
 B5PUR2 Describe in short the second purpose of the boat
 B06 Enter the two character boat code
 B6AG Enter the age of the boat (years)
 B6REPCOS Enter the replacement cost of the boat in kwacha
 B6AMOMAI Enter the maintenance cost of the boat
 B6PUR1 Describe in short the first purpose of the boat
 B6PUR2 Describe in short the second purpose of the boat
 B00WSE If this column was never ticked enter 0 if the column was ticked, even when only once, enter 1.
 B00WSH If this column was never ticked enter 0 if the column was ticked, even when only once, enter 1.
 B0SHWHO Enter 1 when family member was mentioned, 2 for bank, 3 for cooperative, 4 for trader/company, 5 for other
 B0CREDNO If this column was never ticked enter 0 if the column was ticked, even when only once, enter 1.
 B0CREYE If this column was never ticked enter 0 if the column was ticked, even when only once, enter 1.
 B0CRWHO Enter 1 when family member was mentioned otherwise 2 for other
 HIREYENO Enter the number of the box which is ticked in the code box
 CASKWMO Enter the monthly hire price in kwacha when payed cash
 FISKWMO Enter the (approximate) hire price in kwacha when paid in share of fish
 OWNENGIN Enter the number of the box which is ticked in the code box
 ENGFUNC Enter a 1 if box is ticked
 ENGBROKE Enter a 1 if box is ticked
 EBROKMON Enter the number of months
 ENGNOTRE Describe short why not repaired
 USEENG Enter the number of the box which is ticked
 ENGNOUSE Describe short why engine(s) are not repaired
 RENTENGI Enter the number of the box which is ticked
 ENGHIPRI Enter the monthly engine hire price in kwacha
 GETY1 Enter the two character gear code (See questionnaire)
 GE1LEN Enter the length or the number of units as follows:
Total length of the headrope in metres for:
Kapenta seine (regarded as same as chiromila)
Beach seine
 Total net length in metres for Gillnets
 Total number of hooks for longlines
 Number of separate lines for handlines
 Length of circumference for Liftnet
 Number of separate lights for lights

GE1AGE Enter age of gear in number of months
 GE1OWN Enter the number (see top column) of the box which is ticked
 GE1CRE Enter the number (see top column) of the box which is ticked
 GE1CRWHO Enter 1 if credit was obtained from a family member, 2 for bank, 3 for cooperative, 4 for trader/company, 5 for other.
 GE1CRAMO Enter the credit amount in kwacha which was received
 GETY2 As above
 GE2LEN As above
 GE2AGE As above
 GE2OWN As above
 GE2CRE As above
 GE2CRWHO As above
 GE2CRAMO As above
 GETY3 As above
 GE3LEN As above
 GE3AGE As above
 GE3OWN As above
 GE3CRE As above
 GE3CRWHO As above
 GE3CRAMO As above
 GETY4 As above
 GE4LEN As above
 GE4AGE As above
 GE4OWN As above
 GE4CRE As above
 GE4CREWHO As above
 GE4CRAMO As above
 GETY5 As above
 GE5LEN As above
 GE5AGE As above
 GE5OWN As above
 GE5CRE As above
 GE5CREWHO As above
 GE5CRAMO As above
 LIBOATS Enter the number of lightboats
 LIGTHS Enter the number of lights
 PULLCREW Enter the number of crew
 DRAWS Enter the number of draws

Here follows the second database, **SOCZAM2.DBF**

SVBRES Enter (again) the first (identification) field on page one of the questionnaire.
 EN1TY Enter the first two characters of the engine brand. For example YA for Yamaha, EV for Evinrude, MA for Mariner etc.
 Always use the same characters for the engine of the same type.
 YA = Yamaha
 EV = Evinrude
 MA = Mariner
 JH = Johnson
 SE = Seagull
 ME = Mercury
 VO = Volvo
 HO = Honda

 EN1HP Enter the number of horsepower
 EN1AGE Enter the engine age in years
 EN1MAINC Enter the maintenance cost in kwacha
 EN1OWN Enter the number (see top column) of the box which is ticked
 EN1SHWHO Enter 1 if shared with family otherwise enter 2 for other
 EN1CRE Enter the number (see top column) of the box which is ticked
 EN1CWHOM Enter 1 if credit received from family, 2 for bank, 3 for cooperative, 4 for trader/company and 5 for other.
 EN1CRAMO Enter the amount of credit received in kwacha
 EN1OPER Enter 1 if engine is functioning or 2 if not functioning.
 EN2TY As above
 EN2HP As above

EN2AGE	As above
EN2MAINC	As above
EN2OWN	As above
EN2SHWHO	As above
EN2CRE	As above
EN2CWHOM	As above
EN2CRAMO	As above
EN2OPER	As above
EN3TY	As above
EN3HP	As above
EN3AGE	As above
EN3MAINC	As above
EN3OWN	As above
EN3SHWHO	As above
EN3CRE	As above
EN3CWHOM	As above
EN3CRAMO	As above
EN3OPER	As above
EN4TY	As above
EN4HP	As above
EN4AGE	As above
EN4MAINC	As above
EN4OWN	As above
EN4SHWHO	As above
EN4CRE	As above
EN4CWHOM	As above
EN4CRAMO	As above
EN4OPER	As above
ENGMAINT	Enter the number of the box which is ticked in the code box.
ENGUSE	Enter the number of the box which is ticked in the code box.
KSCREW	Enter the number of crew
BSCREW	Enter the number of crew
LNCREW	Enter the number of crew
LLCREW	Enter the number of crew
HLCREW	Enter the number of crew
GNCREW	Enter the number of crew
OTCREW	Enter the number of crew
CRBRGEA	Enter the number of the box which is ticked in the code box.
BROUGHGEA	Enter the abbreviations of the gear for example: LL/GN
CREWCHAN	Enter the number of the box which is ticked in the code box.
DIFNETOP	Enter the number of different net operators. If respondent is not a light operator enter "98"
CHISANSE	Enter the number of the box which is ticked in the code box.
NUMBEACH	Enter the number of beaches
MATRAD	Enter a 1 if the box was ticked otherwise a 0
FETRAD	Enter a 1 if the box was ticked otherwise a 0
MARKET	Enter a 1 if the box was ticked otherwise a 0
CONSUM	Enter a 1 if the box was ticked otherwise a 0
COMPAN	Enter a 1 if the box was ticked otherwise a 0
OTHER	Enter a 1 if the box was ticked otherwise a 0
MAIMARKT	Enter the number of the box (only one box) which was ticked.
HOMECONS	Enter the number of kilograms
RESPPROC	Enter the number of the box which was ticked
WIFEPROC	Enter the number of the box which was ticked. If the respondent is female enter 8 (for not applicable)
PROCTIME	Enter the number of the box which was ticked
SELFIS	Enter a 1 if the box was ticked otherwise a 0
CREDIT	Enter a 1 if the box was ticked otherwise a 0
PROBOAT	Enter a 1 if the box was ticked otherwise a 0
PROGEAR	Enter a 1 if the box was ticked otherwise a 0
FATHOCC	Enter the number of the box which was ticked
GRANFFOC	Enter the number of the box which was ticked
MAININCO	Enter the number of the box which was ticked
SECINCOM	Enter the number of the box which was ticked
MARSTAT	Enter the number of the box which was ticked
NUMWIVES	Enter the number of wives. If the respondent is female enter an 8 (for not applicable)

EDUCAT	Primary 1 = 1	Secondary 1 = 8
	Primary 2 = 2	Secondary 2 = 9
	Primary 3 = 3	Secondary 3 = 10
	Primary 4 = 4	Secondary 4 = 11
	Primary 5 = 5	Secondary 5 = 12
	Primary 6 = 6	Advanced Educ. = 13
	Primary 7 = 7	
NBCHILD	Enter the number of children.	
DEPCHILD	Enter the number of <u>dependent</u> children	
CHILDFIS	Enter the number of children engaged in fishing	
CHILART	(Specify) Enter the number of fishing children in the artisanal fishery.	
CHILCOM	(Specify) Enter the number of fishing children in the commercial fishery.	
CHILPRO	Enter the number of children engaged in fish processing	
PROCMA	(Specify) Enter the number of males in fish processing	
PROCFEM	(Specify) Enter the number of females in fish processing	
NBFIELDS	Enter the number of fields.	
FIECLBEA	(Specify) Enter the number of fields close to the beach.	
FIFARBEA	(Specify) Enter the number of fields far from the beach.	
SURFACE	Enter the total surface of the fields in acres.	
HEADMAN	Tick 1 if the box was ticked. Tick 0 if not ticked.	
INHER	Tick 1 if the box was ticked. Tick 0 if not ticked.	
RENT	Tick 1 if the box was ticked. Tick 0 if not ticked.	
BOU	Tick 1 if the box was ticked. Tick 0 if not ticked.	
OTH	Tick 1 if the box was ticked. Tick 0 if not ticked.	
CULA	Enter codenumbers according to the following list	
CULB	Enter codenumbers according to the following list	
CULC	Enter codenumbers according to the following list	
	Maize = 01	
	Millet = 02	
	Sorghum = 03	
	Cassava = 04	
	Beans = 05	
	Tomatoes = 06	
	Sugarcane = 07	
	Groundnuts = 08	
	Cabbage = 09	
	Potatoes = 10	
	Peas = 11	
	Greengrams = 12	
	Cotton = 13	
	Vegetables = 14	
	Rice = 15	
	Bananas = 16	
	Sunflower = 17	
	Soya beans = 18	
	Cowpeas = 19	
	Onions = 20	
	Trees = 21	
	Oranges = 22	
	Mango's = 23	
	Yam = 24	
	Arrowroots = 26	
	This list may extended with more types of crops.	
	In the case of unknown enter "99"	
CULAPROD	Enter the number of kilograms of last harvest.	
CULBPROD	Enter the number of kilograms of last harvest.	
CULCPROD	Enter the number of kilograms of last harvest.	
CATTL	Enter the number	
GOATS	Enter the number	
LAMB	Enter the number	
PIGS	Enter the number	
POUL	Enter the number	

OTHANIM	Describe short
EMPLOPP	Enter the number of the box which was ticked.
SONFISH	Enter the number of the box which was ticked.
LOANINV	Enter the number of the box which was ticked.
QUAFISTR	Enter the number of the box which was ticked.
SIZFISTR	Enter the number of the box which was ticked.
OPINBFIS	Enter the number of the box which was ticked.

LIST OF IFIP REPORTS - LISTE DES RAPPORTS PPECI. TECHNICAL DOCUMENTS / DOCUMENTS TECHNIQUES

- Gréboval D., A. Bonzon, M. Giudicelli and E. Chondoma, Baseline Survey
1989 report (1987) on inland fisheries planning, development and management in Eastern/Central/Southern Africa. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/01/89 (En): 104p.
- Gréboval D., A. Bonzon, M. Giudicelli et E. Chondoma, Rapport de l'étude de
1989 base (1987) sur la planification, le développement et l'aménagement des pêches continentales en Afrique Orientale/Centrale/Australe. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/01/89 (Fr): 110p.
- Gréboval D., and B. Horemans (eds), Selected Papers presented at the
1989 SADC/FAO Training Workshop on Fisheries Planning, Victoria Falls, Zimbabwe, 15-24 November 1988. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/02/89 (En): 138p.
- Horemans B., et Maes M. (éds), Rapport de la Consultation technique sur les
1989 lacs Cohoha et Rweru partagés entre le Burundi et le Rwanda (Bujumbura, 13 et 14 Décembre 1989). Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/03/89 (Fr): 94p.
- Gréboval D., Management of the New Fisheries of Lake Victoria: Major socio-
1989 economic issues. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/04/89 (En): 25p.
- Gréboval D. (ed), Principles of fisheries management and legislation of
1990 relevance to the Great Lakes of East Africa: Introduction and case studies. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/05/90 (En): 41p.
- Report of the IFIP/SWIOP Workshop on Economic Aspects of Fisheries
1990 Development and Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/07/90 (En): 22p.
- Corsi F., Evaluation des pêcheries zaïroises des lacs Idi Amin/Edouard et
1990 Mobutu Sese Seko. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/08/90 (Fr): 64p.
- Corsi F., Evaluation of the Zairian Fisheries of Lakes Edward and Mobutu.
1990 UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/08/90 (En): 60p .

- Rapport de la première réunion du Comité consultatif du projet régional pour la planification des pêches continentales. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/09/90 (Fr): 24p.
- Report of the First Meeting of the Advisory Committee of the Regional Project for Inland Fisheries Planning. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/09/90 (En): 22p.
- Report of the Symposium on Socio-economic aspects of Lake Victoria Fisheries. A Symposium organized by the IFIP Project under the framework of the CIFA Sub-committee for Lake Victoria, 24-27 April, Kisumu, Kenya, UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/10/90 (En): 24p.
- Maes M. (ed), Report on the Technical Consultation on Lake Mweru shared by Zaire and Zambia, 08-10 August, Lusaka, Zambia, UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/11/90 (En): 44p.
- Maes M. (éd), Rapport de la Consultation technique sur le lac Mweru partagé entre le Zaïre et la Zambie, 08-10 août, Lusaka, Zambie, Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/11/90 (Fr): 45p.
- Papers presented at the IFIP/SWIOP Workshop on Economic Aspects of Fisheries Development and Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/12/90 (En): 122p.
- Case studies presented at the IFIP/SWIOP Workshop on Economic Aspects of Fisheries Development and Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/13/90 (En): 115p.
- Ssentongo G.W. (ed), Report of the First Workshop on Fisheries Statistics and Information Systems for Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/14/90 (En): 72p.
- Rapport de la consultation Technique sur l'aménagement des pêcheries des lacs Edouard et Mobutu, 17-21 septembre 1990, Kampala, Ouganda, Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/15/90 (Fr): 30p.
- Report of Technical Consultation on Management of the Fisheries of Lakes Edward and Mobutu, 17-21 September 1990, Kampala, Uganda, UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/15/90 (En): 26p.

- Report of the National Workshop on Fishery Statistics and Information Systems, 22-26 October 1990, Addis Ababa, Ethiopia, UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/16/90 (En): 33p.
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- Report of the Second Technical Consultation on the Management of the Fisheries of lakes Edward and Mobutu, 27-29 May 1991, Kinshasa, Zaire. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/21/91 (En): 28p.
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- Proceedings of the Symposium on Socio-economic aspects of Lake Victoria
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1992 summary of IFIP Programme'. UNDP/FAO Regional Project for
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