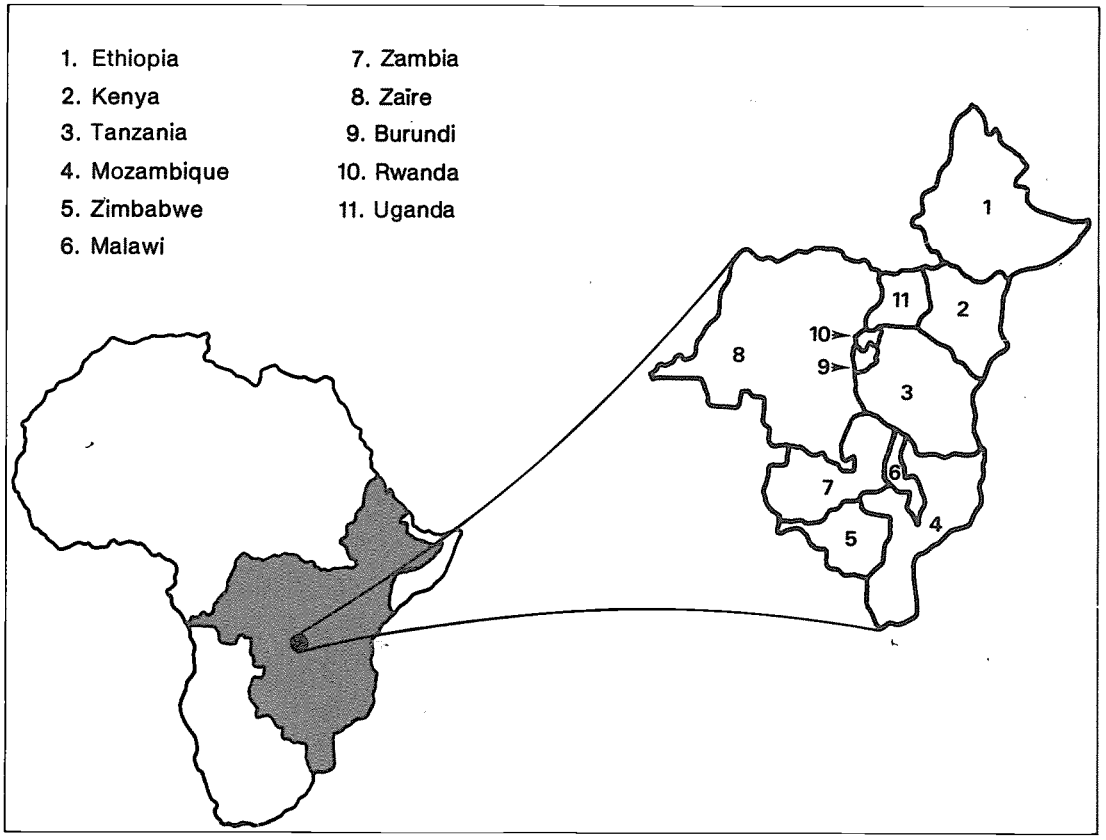
REGIONAL PROJECT FOR INLAND FISHERIES PLANNING, DEVELOPMENT AND MANAGEMENT IN EASTERN/CENTRAL/SOUTHERN AFRICA (I.F.I.P.)

IFIP PROJECT

RAF/87/099-TD/39/92 (En) July 1992

The Artisanal Capture Fisheries of Lake Victoria, Kenya: - major socioeconomic characteristics of its fishermen and their fishing units -



UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

UNDP/FAO Regional Project
for Inland Fisheries Planning
Development and Management in
Eastern/Central/Southern Africa

RAF/87/099-TD/39/92 (En)

RAF/87/099-TD/39/92 (En) July 1992

The Artisanal Capture Fisheries of Lake Victoria, Kenya: - major socioeconomic characteristics of its fishermen and their fishing units -

by

T.M. Hoekstra [1],

1 APO Socio-economist, IFIP

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
UNITED NATIONS DEVELOPMENT PROGRAMME
Bujumbura, July 1992

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 fishing boat owners in the Kenyan waters of Lake Victoria. The study (organized as a follow up to the census of fishing units) was executed by the Regional Project for Inland Fisheries Planning (IFIP) in collaboration with the Kenya Marine and Fisheries Research Institute and the Fisheries Department of Kenya. The data presented are stratified according to six fishery types. The report is structured as follows: Summary of main findings and recommendations, Introduction, Methodology, Characteristics of the fishery (boats, gear, engines, fish processing and marketing, crew size and sharing systems), Socioeconomic characteristics of the fishery (sociodemographic-sociocultural characteristics of the boat owners, their ownership of assets and use of credit, occupational and geographical mobility, opinions and attitudes and problems identified in the fishery)

IFIP PROJECT
FAO
B.P 1250
BUJUMBURA
BURUNDI

Telex : FOODAGRI BDI 5092 Fax : 22 77 05 Tel. : 22 43 28

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 (X), the year of publication (XX) and the language in which the document is issued: English (En) or French (Fr).

For bibliographic purposes this document should be cited as follows:

Hoekstra T.M., 1992 The Artisanal Capture Fisheries of Lake Victoria, Kenya: major socioeconomic characteristics of its fishermen and their fishing units. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099 - TD/39/92 (En): 78p.

ACKNOWLEDGEMENTS

The author wishes to thank Mr. N. Odero, (Director of the Fisheries Department, Kenya), Mr. J. Ogari (Director of the Kenya Marine and Fisheries Research Institute in Kisumu) and Mr. J. Arunga (Director of Fisheries Department in Kisumu) for their support in the execution of this study. Particular thanks are due to their research staff who carried out the interviews in the beaches: Messrs. A. Asila, C. Rabuor, E. Yongo, P. Rambiri and S. Dache. Last but not least the author wishes to acknowledge the Provincial Medical Officer in Kisumu who provided the research team with logistical support.

Conversion rate

July 1991: 1 USD = 27 Kenya shilling

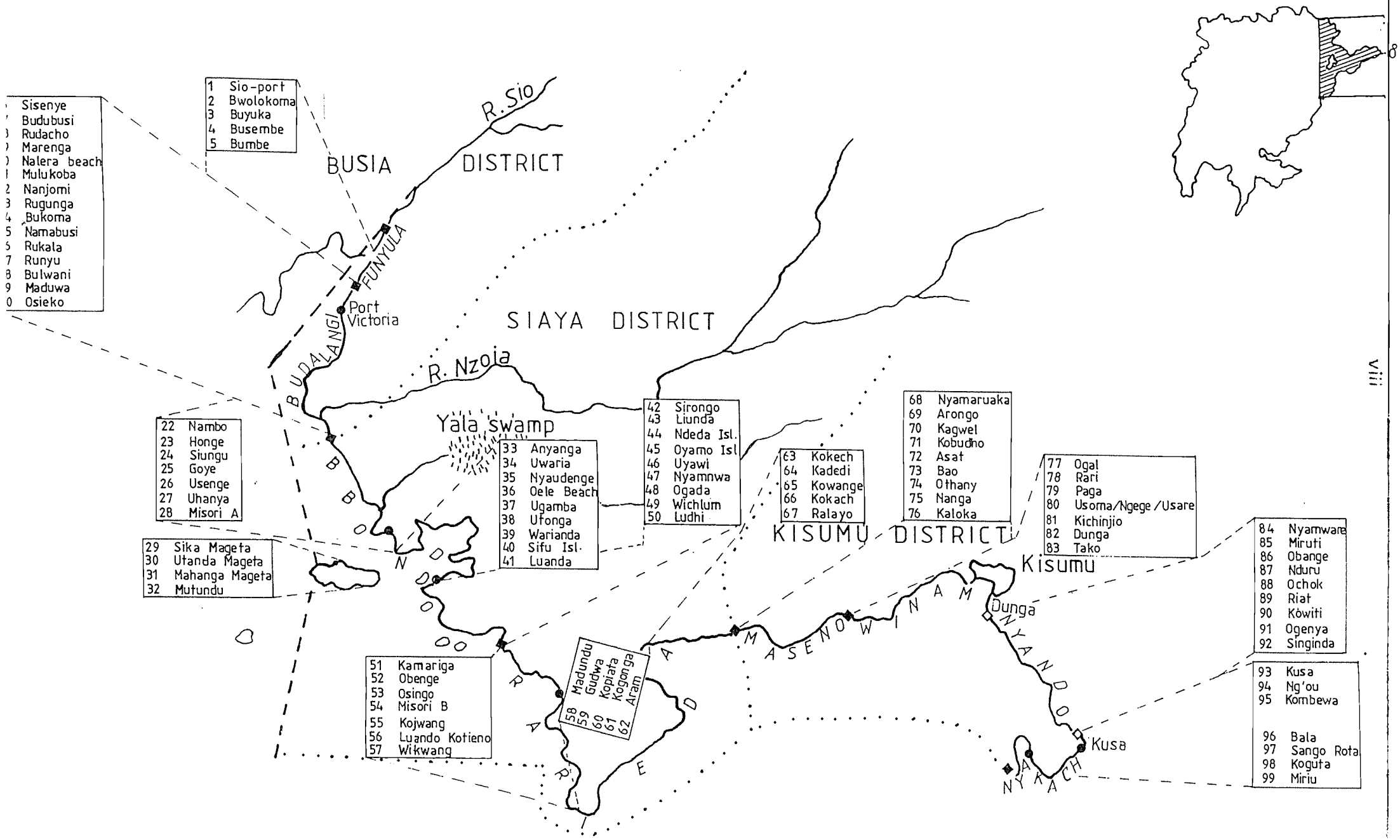
Table of contents

List of tables and figures

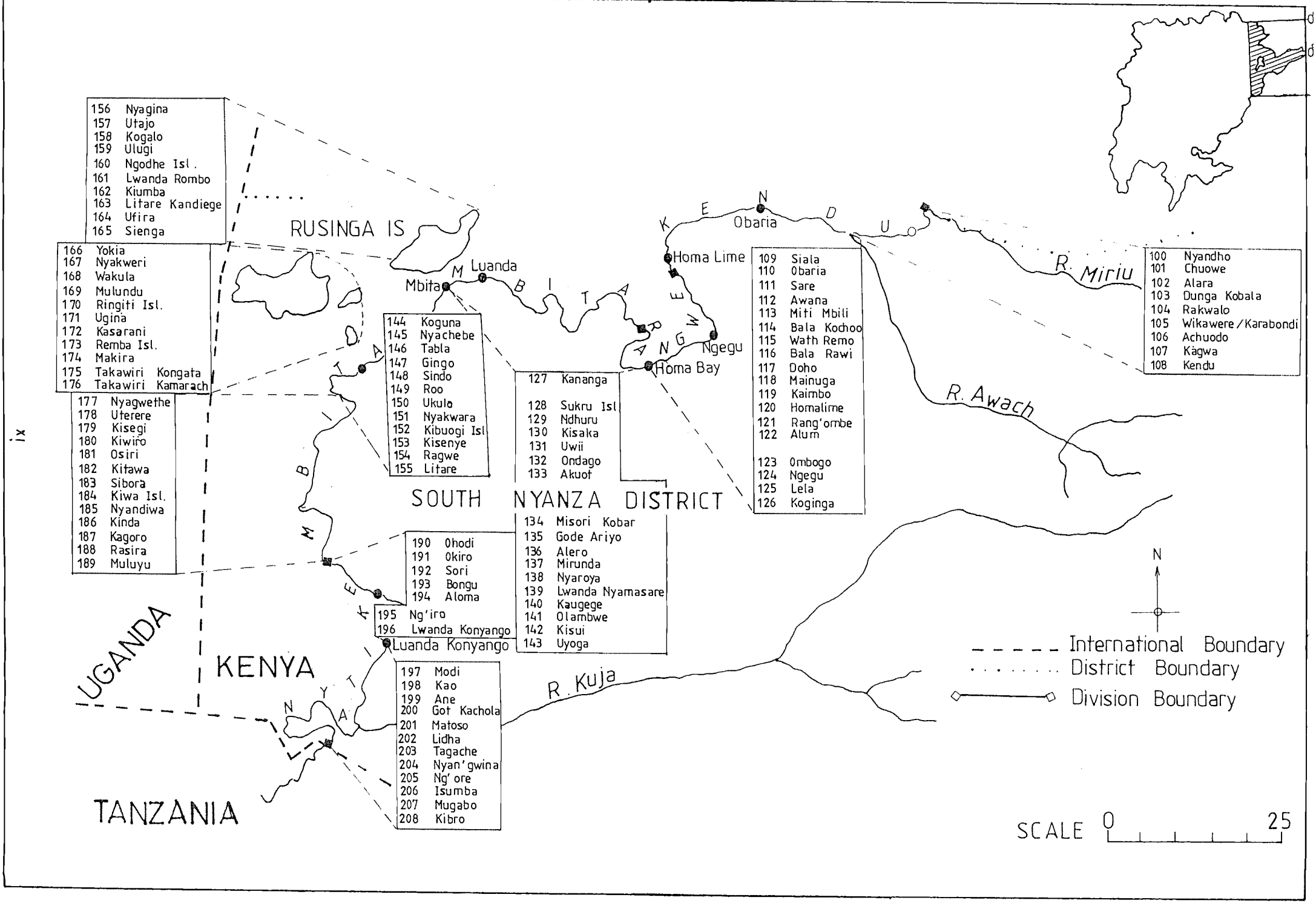
Tables

Figures

Map 1: Landing beaches northern section Kenya waters



Map 2: Landing beaches southern section Kenya waters



SUMMARY OF THE MAIN FINDINGS AND RECOMMENDATIONS

Main findings

1. In this study six fishery types are distinguished. The major fishery type (in terms of sampled boat owners) is the Nile perch gillnet fishery (32.4%), respectively followed by the mosquito seine fishery (19.8%), the tilapia gillnet fishery (15.2%), the longline fishery (14.2%), the (so-called) 'other' fishery (9.9%) and the beach seine fishery (8.5%).

2. Three-quarters of the boat owners own only one type of gear and one-quarter two or more types of gear.

3. Fishermen use essentially four types of boats. The majority (78.8%) of the boats are canoes of the Sesse type.

4. The Taruma canoe is, on average, the longest and most expensive type of boat. It is considered as more appropriate in the Nile perch gillnet - and tilapia gillnet fishery.

5. Almost one-fifth of all boats is one year old or younger. The general age distribution of boats (all fishery types combined) displays a pattern of continuous investment in (new) boats.

6. The largest average number of mounted nets is encountered in the Nile perch gillnet fishery.

7. Total investment and investment per respondent in boat(s), gear and engines is highest in the Nile perch gillnet fishery.

8. The general age distribution of the different gear shows, except for the beach seine fishery, a pattern of continuous investment in gear.

9. There are indications that investment (in boats and gear) is declining in the beach seine fishery.

10. To a large extent fishing activities are not mechanised. Only 5.6% of the boat owners own one or more engines while some 5% of the boats are equipped with an engine.

11. The use of engines is highest in the Nile perch gillnet fishery. Some 12% of the respondents own an engine and 11% of the boats are motorized.

12. Some 40% of the boat owners have a wife who is engaged in processing of fish. Only 15% of the boat owners are themselves engaged in this activity.

13. The integration of fish harvesting and processing is highest in the mosquito seine fishery.

14. The 'female trader' is the main marketing channel for fishing units in the mosquito seine fishery (83.8%), the tilapia gillnet fishery (63.2%) and the beach seine fishery (43.8%).

15. Apart from small and other rejected fish, female traders are virtually excluded from direct purchasing in the Nile perch gillnet - and the longline fishery and consequently from about half of all fishing units.

16. Fishing units in the Nile perch gillnet fishery and the longline fishery mainly depend on refrigerated trucks and pickup traders for the marketing of

their catch. They, therefore, display a high mobility between landing sites.

17. The average crew size is highest in the beach seine fishery, respectively followed by the mosquito seine -, longline -, Nile perch gillnet - and tilapia gillnet fishery.

18. The average crew share is highest in the mosquito seine fishery respectively followed by the beach seine -, longline -, tilapia gillnet - and the Nile perch gillnet fishery.

19. Changes in crew composition are very frequent in the mosquito seine fishery.

20. Some 80% of the boat owners are full-time fishermen while 10% are not engaged in active fishing. The remainder fish on a part-time or occasional basis.

21. Around 5% of the boat owners are women.

22. Some 88% of the boat owners are from the Luo tribe.

23. Kikuyu's entering the fishery appear to be most attracted to the Nile perch gillnet fishery.

24. The average age of boat owners is 41 years while their average fishing experience is 16 years.

25. Some 13% of all boat owners never attended school.

26. Boat owners in the tilapia gillnet - and longline fishery are, on average, the least educated.

27. Some 62% of all boat owners are married to more than one wife.

28. The overall average number of children is 7.0 while the average number of dependent children is 5.8.

29. Some 16% of all boat owners have children actively engaged in fishing but only about 4% have children engaged in fish processing.

30. The highest average number of boats per owner is encountered in the Nile perch gillnet - and 'other' fishery.

31. Utilization of credit to purchase a boat or gear is rather rare. On the other hand many engines (40%) are acquired through the use of credit.

32. Some 91% of the boat owners own land and one-quarter of all boat owners have purchased land.

33. The highest amount of capital accumulated by boat owners in livestock is found in the Nile perch gillnet - and 'other' fishery.

34. There are indications that a long term shift in the employment structure has taken place from farming and livestock rearing into the fishing sector.

35. About half of all boat owners had another major occupation before they

started fishing.

36. Some 88% of all boat owners gain most of their income from fishing.

37. Around 62% of all boat owners have a secondary source of income from either farming, trading, labouring or livestock rearing.

38. Three-quarters of the boat owners cultivate maize and about half of them sorghum. Cotton, cultivated by 12% of the respondents, is the major cash crop.

39. Only 5% of the boat owners are born outside the immediate vicinity of the lake. On the other hand one-third of the boat owners are not born in the beach where they operate. The large majority of these migrants, however, take up residence in these beaches.

40. About one-quarter of the boat owners would divert from fishing in the case of other employment possibilities.

41. About 40% of all boat owners have their major investment priorities outside fishing, farming or livestock rearing. Usually these respondents are interested in construction of rental houses.

42. More than half of all boat owners do not want their son(s) to become fisherman.

43. About 95% of all boat owners evaluated the introduction of Nile perch in lake Victoria as a positive development.

44. The penetration of refrigerated trucks and pickup traders in marketing causes, at times, fish shortages for local consumption.

45. The majority of all boat owners mentioned theft of gear as their major problem. Only few mentioned the lack of ice or the need for an ice plant or cold storage facilities. A more pressing problem seemed the fact that still a large number of beaches does not have sufficient road access. This leads to a lack of competition between large scale fish traders and, at times, the absence of a marketing outlet leading to considerable post harvest losses.

46. There are many indicators of wealth of boat owners (such as capital invested in fishing units, continuity of investment, ownership of other productive assets, number of wives, limited use of credit, educational levels, etc.) displaying a healthy state of the harvesting sector of the lake Victoria fishery.

Recommendations

In the census of fishing units (Hoekstra *et al.* 1991), executed 6 weeks before this study, various fishery types were identified and the number of units in these fishery types were quantified. This study describes a number of basic socioeconomic characteristics of these fishing units and of those who invested their capital in the primary sector of the fishing industry namely the boat owners (who usually are also the managers of the fishing units). As such this study (partly) reflects the "capital side" of the industry. It is recommended that this study be succeeded by a survey of crew members to reflect the "labour" side of the industry. Similarly to the census and the boat owner survey, conducted with the assistance of IFIP, the results

of this study of crew members should be stratified by fishery type.

Although data are collected on catch and effort there is no information on the income of fishermen. The results of this boat owner survey show that there are considerable differences between the various fishery types with respect to the investment levels in fishing units (fishing boats, gear and engines), crew size and sharing systems. It is recommended to execute a cost and earnings study taking Fishing Economic Units[1] in the different fishery types as the unit of inquiry. At a later stage cost and earning 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 require attention.

- On the one hand many more boat owners mentioned the need for better access roads than the need for ice plants or cold storage facilities, on the other hand resources for infrastructure development are limited. In view of this government should make a thorough analysis of the most pressing needs of fishermen before any investment in infrastructure takes place. Given the heavy competition between traders in accessible (usually larger) beaches there seems enough reason to assume that the private sector will spread its range of fish buying activities to a larger number of beaches once they become accessible.

- Given the size of the lake shore area concerned; the remoteness of many beaches; the considerable earnings generated in fishing and the tendency of many fishermen to immediately spend their daily earnings it is recommended to carry out a study into the need and feasibility of establishing more (possibly mobile) banking facilities. This would facilitate saving and the procurement of credit, therefore regulating investment.

- Although not (yet) often mentioned as an issue, the spread of water hyacinth, locally referred to as 'Nile cabbage' or 'floating islands', should receive utmost attention from government. In view of the potential dangers of the water hyacinth for the fishery, a study into the causes and means of controlling the spread of water hyacinth should obtain highest priority.

- Theft of nets, although the major problem indicated by fishermen, is not easy to bring under control. Better policy of illegal fishing practices and theft combined with stiffer control would nevertheless improve the situation.

---

[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 economic unit (Horemans, 1989).

1. INTRODUCTION

1.1. General

Lake Victoria, the second largest fresh water lake in the world, is shared by Kenya, Uganda and Tanzania. It covers an area of 68,800 km^2, the Kenyan portion being 4,100 km^2 or just 6% (Vanden Bossche, 1990). It is a shallow lake with a depth ranging from 4 to 15 metres at the fringes and from 30 to 60 metres in the open lake (Ogutu, 1988). The deepest part of the lake is estimated to be 84 metres (Vanden Bossche, 1990). The Lake Victoria fishery constitutes the most important fishery in Kenya. According to official estimates, fish production in Kenya in 1989 was approximately 146,400 t of which 4,600 came from the marine sector and 138,800 t from inland fisheries and fish farming. Of the inland production, 135,400 t were reported to be from Lake Victoria. Thus Lake Victoria alone accounts for about 90% of all fish production in Kenya (FAO, 1991 in press).

This report presents the results of a socioeconomic survey of fishing boat owners in the Kenyan part of the lake. The survey was undertaken as a joint exercise involving the Department of Fisheries (DoF), the Kenya Marine and Fisheries Research Institute (KMFRI), and the FAO Regional Project for Inland Fisheries Planning, Development and Management in Eastern/Central/Southern Africa (IFIP).

1.2. Study location

The study location was the entire Kenyan shoreline (mainland) of Lake Victoria. The zigzag shoreline with several embayments has a length of approximately 760 km. The lake is the main resource of a highly populated area. There are four districts bordering the lake namely Busia, Siaya, Kisumu and South Nyanza. The preliminary results of the 1989 population census indicate a population of about 5.4 million in an area of 18.766 square kilometres giving a density of 288 people per square kilometre. Ogutu (1988) described the environment as follows: "The immediate hinterland, or fishing locations fall within lake-shore savannah, characterized by low and unreliable rainfall and little arable land. This environment affects agricultural activities around the lake, which is mainly at the subsistence level, involving the keeping of cattle and the growing of maize, potatoes, cassava and various varieties of millet for subsistence. The main cash crop is cotton. Most areas have only one cropping season. Once the crops have been planted, weeded and harvested, the remaining months are spent looking for income generating activities; primary among which is fishing and fish trading". This pattern together with the fact that the lake accounts for about 90% of Kenya's total fish production underscores the significance of fishing as an income generating activity in the lake region as well as for Kenya a whole.

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 a census of fishing units and a socioeconomic survey of fishermen. During the first stage census the number of boats would be assessed including an elementary indication of the gear used from each boat. During the subsequent socio-economic (sample) survey the exact

dimensions of gear, crew size and number of dependents would be assessed. Complementary information on key socio-economic indicators would also be collected in this context. As such the study would provide basic socioeconomic parameters on the fishing units and on the investors (the "capital side") in the industry.
The census was executed in May 1991 (Hoekstra, *et al.* 1991) and the results published in December 1991. The results of the socioeconomic survey, executed in July 1991, are the subject of this report.

2. METHODOLOGY

2.1 Introduction

2.2. Unit of inquiry and definitions

The unit of inquiry in this survey was "the boat owner" (often referred to as 'fisherman' in Kenya) . He would provide information about the fishing unit(s) operating with his boat(s) and himself (sociodemographic, sociocultural etc.). Because of time, funds and manpower constraints only those boat owners accessible or selected in the beaches were interviewed. As such the results of this survey do not reflect the characteristics of absentee boat owners. It is known (Ogutu, 1988) that persons not resident in the beaches but more inland regularly own boats. A significant proportion of fishing units are owned by people who do not usually reside on the shores.

In order to obtain consistency in data collection and the subsequent presentation of the results the following definitions were adopted.

Boat types:

Boat type	Description
Dugout canoe	A boat carved out of a log of wood (tree trunk). It has no joints and no planks.
Karua canoe	A Karua has a flat bottom. It is made of planked wood and is mostly used in shallow(er) waters.
Sesse canoe	A modified dugout canoe pointed at both ends. The bottom is V-shaped. The sides are made of planked wood.
Taruma canoe	An improved Sesse canoe. The bottom is V-shaped. It is mostly used in deeper waters because of its stability. It is made of planked wood and can be modified for use of an outboard engine.
Other	All boats which do not conform to any of the above boat types (e.g. boats made of corrugated iron sheets)

Gear types:

Boats may be used to exploit several fisheries. The major gear involved are described below[2].

Gear	Brief description of gear
Nile perch gillnet	The gillnets for Nile perch have a mesh size from 152 mm to 305 mm, the most common is 178-203 mm. The gillnets are anchored on fishing grounds at a depth of 10-20 m. They are set either close to the surface during the phase of the new moon or not far from the bottom during full moon. The nets are hauled in with the catch in the morning and generally set again either immediately in the morning or in the evening.

[2] For more information on gear used in the Kenyan waters of Lake Victoria refer to Prado *et. al.* (1991) on which these descriptions are based.

	Brief description of gear
Longline	A mainline with short branching lines (snoods) with hooks. Bait is attached to the hook. The longlines are anchored up to 80 m deep, either close to the surface, in midwater during the phase of the new moon or close to the bottom during full moon. Longlines can either be set in the morning or in the evening. Small boats would have some 150 hooks while large ones may operate up to 1200 to 1500 hooks. In Lake Victoria the main target species is Nile perch.
Tilapia gillnet	The most common nets used are 102 mm and 127 mm to 178 mm, sometimes even 229 mm for the bigger fish. As far as the fishing operations are concerned, these nets are used as ordinary set gillnets or sometimes as driftnets, surrounding or drive-in nets.
Beach seine	Beach seines are banned but nevertheless used. Some of them are quite short, around 100 m without a bag. The longer ones, up to 150 m, have a bag in the central part with various mesh sizes in the wings ranging from a few mm (mosquito net) to 40 mm or more (most commonly observed is 28 mm).
Mosquito seine	The seine is made of netting with a hexagonal knotless mesh, 7 mm (4 mm opening) mosquito net. The operation of mosquito seines (without the use of lights) is the same as beach seining often to catch bait for longlines. In the case of mosquito seining with lights, the dimensions of the mounted seine are generally 20 m long x 4 or 5 strips of webbing (350° meshes each) and these are hung on a line of 7 to 8 m deep. Four to six lamps (petrol "Anchor" type) are used to attract the fish. These lamps are lit in a line spaced 50 to 100 m from each other. The catching technique is based on light attraction of the fish. The method can only be used during dark lunar phases (new moon period). The target species is Rastrineobola argentea locally referred to as 'omena'.

Full time fisherman : Someone who is actively engaged in capturing fish for more then 10 days per month.
Part time fisherman : Someone who is actively engaged in capturing fish between 5 and 10 days per month.
Occasional fisherman: Someone who is actively engaged in capturing fish for less than 5 days per month.

2.3. Questionnaire and pilot survey

A first outline of the socioeconomic questionnaire was discussed with staff of the Fisheries Department and the Kenya Marine and Fisheries Research Institute during a prepatory mission (early 1991) for the execution of the census. Following these discussions the questionnaire was modified and field tested in May 1991. 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.

2.4. Sampling method

The preliminary results of the census provided the sampling frame for the survey.

The study area was divided in the following three definite strata:
Stratum 1 North of Nyanza Gulf
Stratum 2 Nyanza Gulf
Stratum 3 South of Nyanza Gulf

During the census the following number of active boats were encountered in these strata:

Stratum	Number of active boats	Percentage of active boats
1. North	2056	33.0
2. Gulf	1976	31.7
3. South	2197	35.3
Total	6229	100.0

On the basis of the field test of the questionnaire, which revealed an interview duration of approximately 40 minutes per questionnaire, and taking into account available resources, it was determined that a sample size of 375 respondents would be feasible. As the number of active boats in each stratum was close to one third of the total number of active boats, the number of respondents (proportionally divided over the strata) per stratum was 125.[3]

In order to avoid a possible bias towards either large or small beaches the average beach size per stratum (number of active boats) was calculated. With these results a sub-sampling frame could be drawn up.

---

[3] It was assumed that the number of active boats was parallel to the number of boat owners or, in other words, that the average number of boats owned per owner was the same in all three strata.

These average beach sizes per stratum were as follows:

Stratum	Average number of active boats per beach
1. North	37.4
2. Gulf	22.7
3. South	33.3

On the basis of this average and the frame of the census, the sub-sampling frame was drawn up classifying the beaches in an 'above average size' and an 'under average size' category. From the resulting list for each stratum 4 small and 4 large beaches were randomly selected. The sum of respondents to be interviewed in the small and the large beaches was proportional to the number of boats in these size classes in each stratum as enumerated during the census. The villages sampled and the number of boat owners interviewed are listed in Annex 2.

2.5. Data collection and processing

Immediately prior to data collection a one day training seminar, for the five interviewers, was conducted in Kisumu. After having been trained the team started interviewing in the Northernmost (sampled) beach and than gradually moved south towards Kisumu. From Kisumu the team travelled to the Southernmost (sampled) beach and gradually moved North towards Kisumu. The duration of data collection was about 4 weeks. The information obtained was coded and entered in a database utilizing the software package Dbase III plus. 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.

2.6. Stratification

The data presented in this report are stratified with respect to 6 fishery types. For fisheries management purposes this was considered more meaningful than stratification on a geographical basis. The sample size did not allow stratification on the basis of both fishery type and area.

The principle determinant of fishery type was the gear owned by the boat owner. Initial processing of the data resulted in the following number of respondents per fishery type.

Fishery type	Number of respondents with one type of gear
Nile perch gillnet fishery	92
Tilapia gill net fishery	49
Longline fishery	41
Beach seine fishery	26
Mosquito seine fishery	69
Subtotal	277
	Number of respondents with at least two types of gear
Other	97
Subtotal	97
TOTAL	374

As can be seen from the table 97 (25.9%) respondents owned at least 2 different types of gear and could, at first hand, not be classified into a definite fishery type. The records of this group were studied in more detail. On the basis of a definite predominance of one gear these records (respondents) were re-classified to one of the above mentioned fishery types. The dominance of one gear was determined by comparing the replacement costs of the different gear. The gear with a clearly higher replacement cost was considered as dominant. If one gear type was not definitely predominant over the other gear type the respondent was classified in the fishery type "Other".

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

Fishery type	Number of respondents
Nile perch gillnet	121
Tilapia gillnet	57
Longline	53
Beach seine	32
Mosquito seine	74
Other	37
Total	374

In conclusion the category "Other" in the table above concerns respondents with at least two (but often more than two) types of gear while no distinct major gear could be identified. In actual fact the boat owners in this group are, on average, rather prosperous. They often own more than one boat and several types of gear representing a substantial investment into the industry.

The proportions of respondents by fishery type (after reclassification) fitted remarkably well with the proportions of boats by fishery type enumerated during the census (Hoekstra *et al.*,1991)

	Number of respondents in socioeconomic survey		Number of boats in census	
Fishery type	n	%	n	%
Nile perch GN	121	35.9	1947	34.0
Tilapia GN	57	16.9	1016	17.7
Longline GN	53	15.7	1048	18.3
Beach seine	32	9.5	570	10.0
Mosquito seine	74	22.0	1140	20.0
Total	337	100.0	5725	100.0

Note: The total number of active boats in the census was 6229. The table above displays only those numbers and ratios where the major gear was declared (census) and where major gear was evident or determined through a comparison of replacement costs (socioeconomic survey).

3. CHARACTERISTICS OF THE FISHERY

3.1. Fishing boats

3.1.1. Boat types

The fishermen in Lake Victoria use essentially 4 different types of boats. These boat types were described in Section 2.2.

The distribution of types of boat by fishery type is given below.

Table 3.1. Distribution of type of boat by fishery type

	Karua		Sesse		Taruma		Total	
Fishery type	n	%	n	%	n	%	n	%
Nile perch GN	23	12.4	133	71.5	30	16.1	186	100.0
Tilapia GN	13	18.6	47	67.1	10	14.3	70	100.0
Longline	6	9.7	53	85.5	3	4.8	62	100.0
Beach seine	2	4.3	45	95.7	0	0.0	47	100.0
Mosquito seine	5	5.3	86	90.5	4	4.2	95	100.0
Others	14	16.9	64	77.1	5	6.0	83	100.0
Total	63	11.6	428	78.8	52	9.6	543*	100.0

* **Note**: The total number of boats exceeds the number of respondents (374) because of multiple boat ownership.

In the sample no dugout canoes were encountered. This is not surprising since the census of fishing boats and gear (Hoekstra et.al.) revealed only 46 dugout canoes along the entire coastline. The Sesse canoe accounts for almost 80 % of the boats. It appears to be especially preferred in the beach seine - and mosquito seine fishery. Compared with the other fishery types the Taruma is more frequently used in the Nile perch and tilapia gillnet fishery, probably

because an engine can more easily be mounted in order to reach more distant waters (see also Section 3.3.1.).

3.1.2. Length of boats

Figure 1 gives the frequency distribution of the length of the different types of boats.

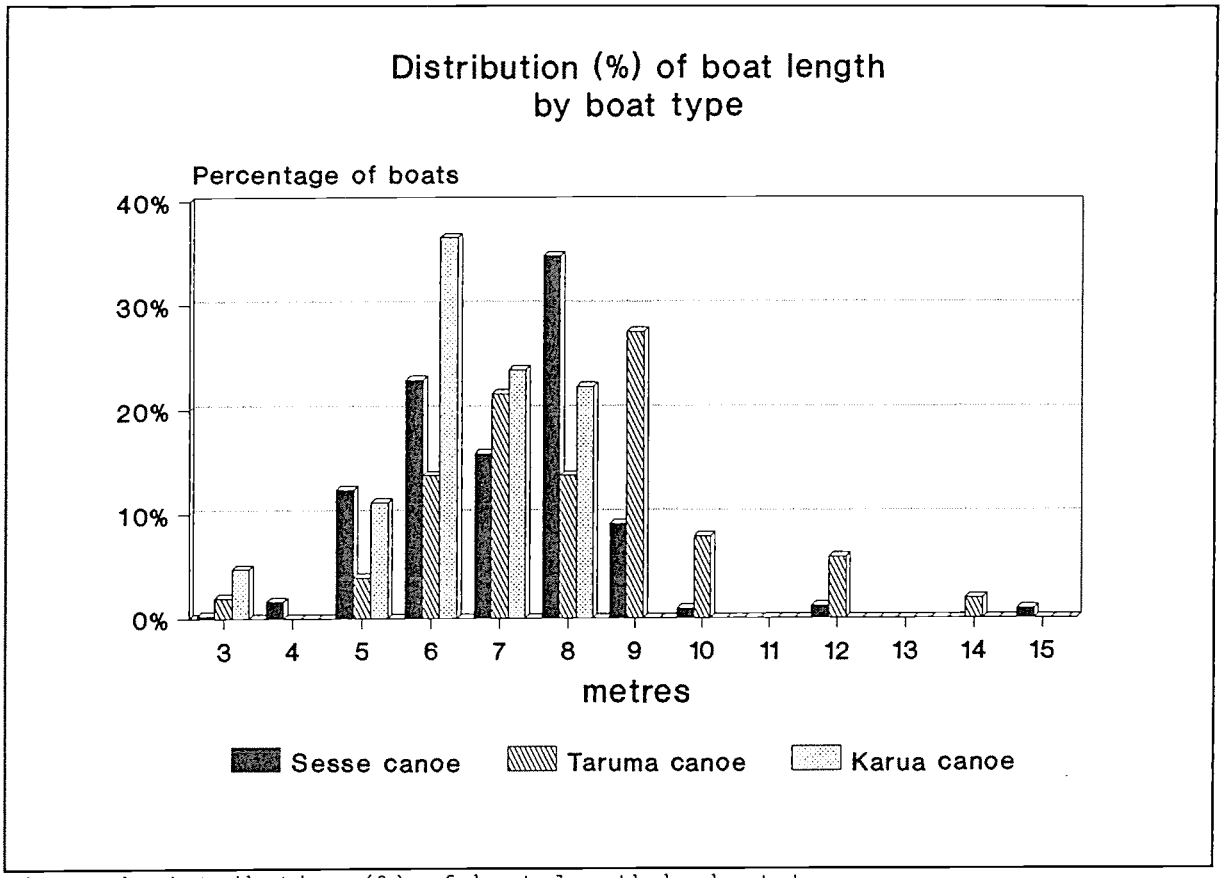


Figure 1 Distribution (%) of boat length by boat type.

As can be seen the canoes differ in length. The Karua canoe is clearly the smallest canoe. Its length varies between 3 and 8 metres while the average length is 6.0 metres. The modal length of the Karua canoe is also 6 metres. The Sesse canoe ranges from 4 metres to 15 metres. The average length is 6.9 metres while the modal length is 8 metres. The Taruma canoes is the longest boat type. Their average length is 8.0 metres while the modal length is 9 metres.

3.1.3. Age of boats

The general age structure of the boats (all fishery types combined) displayed in figure 2 shows a continuous investment in new boats.

Almost 20% of the boats are up to one year old. After one year the boats gradually disappear from the fishery. Only a limited number of boats are found with an age of 15 to 30 years. Generally speaking however boats are removed from the fishery after some 13 years.
The Karua canoes are, on average, the oldest boats, their average age is 6.3 years. The Sesse canoe and the Taruma canoe have an average age of 5.4 and 4.3 years respectively.

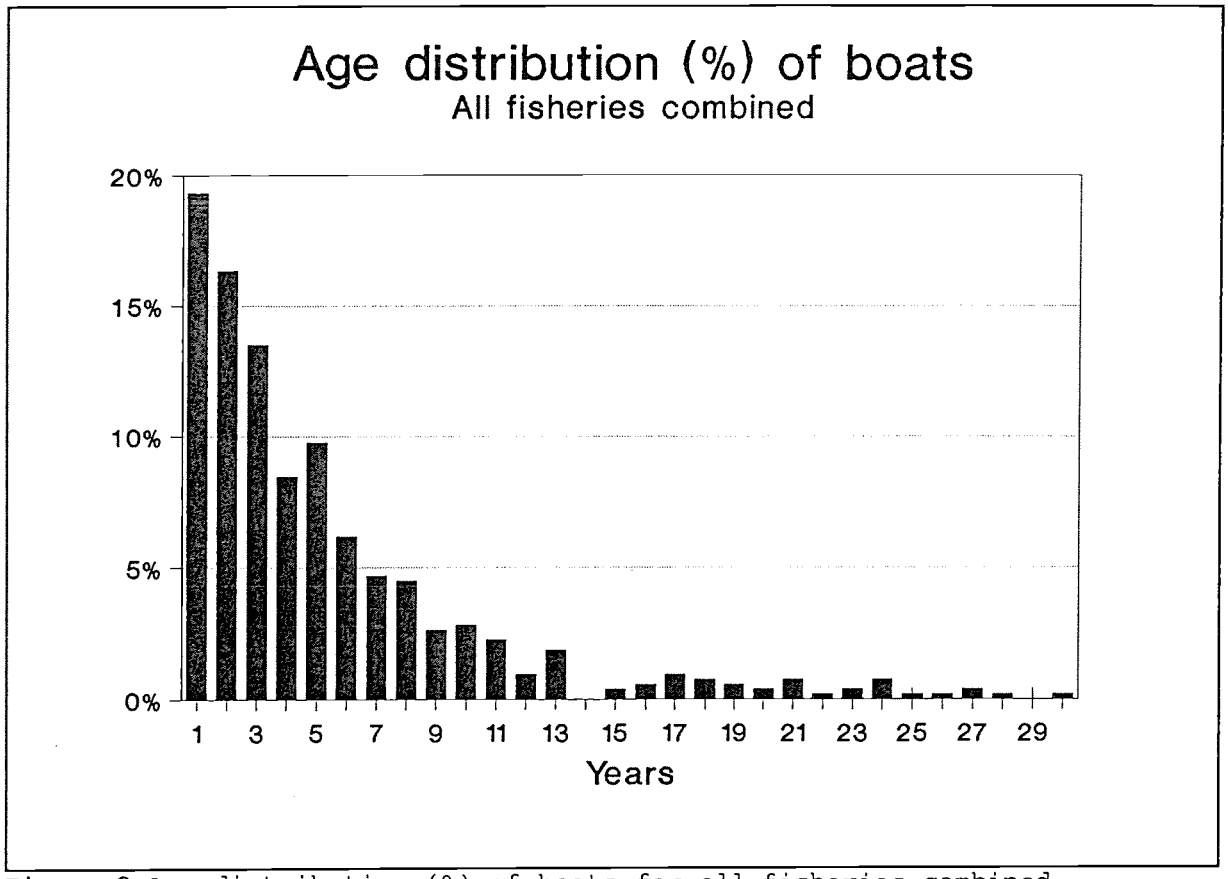


Figure 2 Age distribution (%) of boats for all fisheries combined

To assess the continuity of investment in boats by owners in the different fishery types, the age structure of boats is also plotted (Figure 3) by fishery type.

Investment in new boats seems most regular in the Nile perch, longline and mosquito seine fishery. The tilapia gillnet fishery experienced a reduction in newly built boats in 1989. In 1990, however, investment took up again. The beach seine fishery displays a very recent reduction in new boats. In view of the relatively small sample size (47 boats) and the fact that still about 25% of the boats is some two years old, there is insufficient justification to conclude that investment in new boats in the beach seining operation is declining. A further investigation into the age structure of gear may provide more answers. An assessment of the age structure of boats in the beach seine fishery in a few years from now may also show whether a declining investment is apparent.

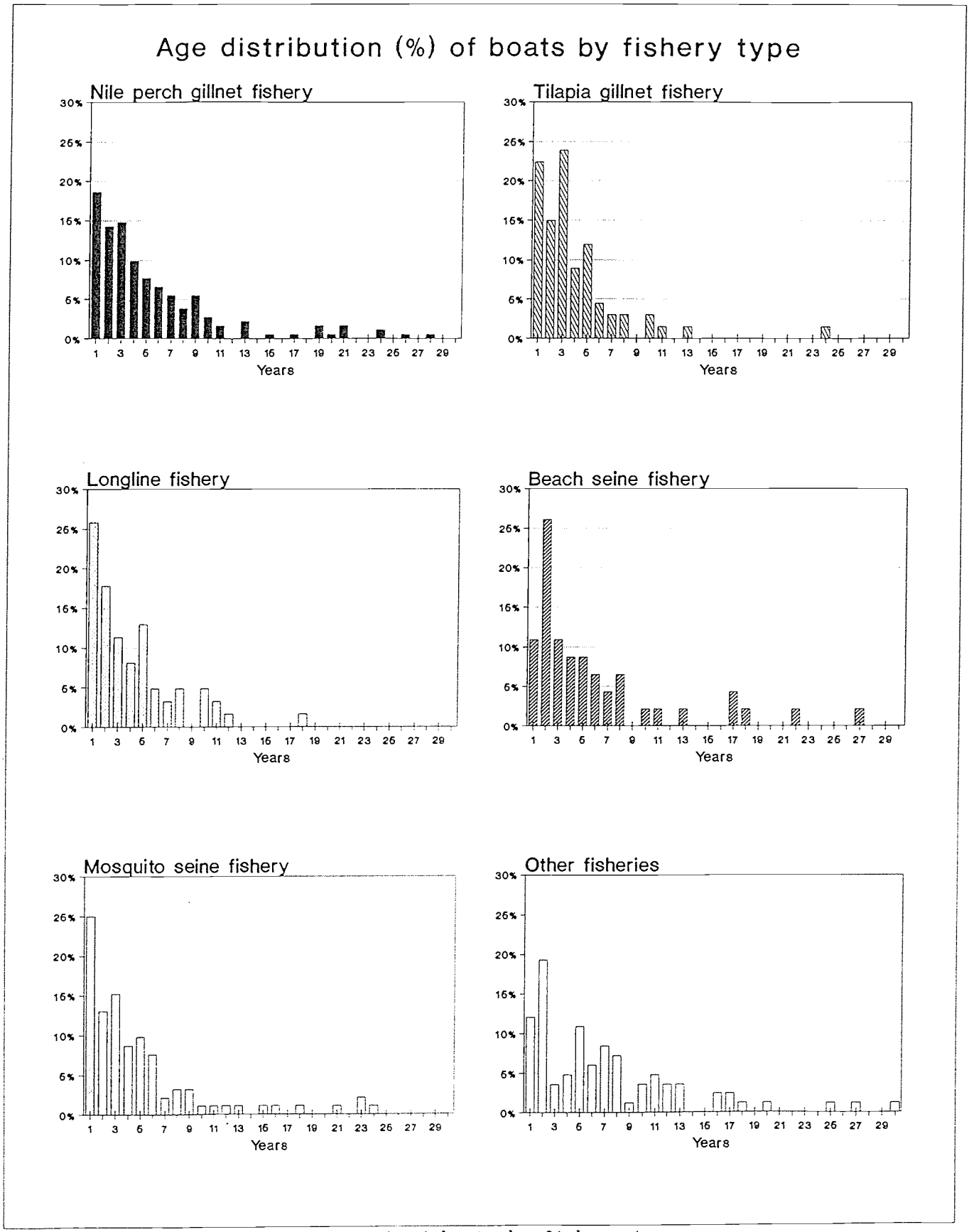


Figure 3 Age distribution (%) of boats by fishery type

3.1.4. Costs

3.1.4.1. Replacement costs

Replacement costs of boats are not displayed by fishery type since they basically depend on the type of boat. Figure 4 gives the distribution of replacement costs for the different boat types.

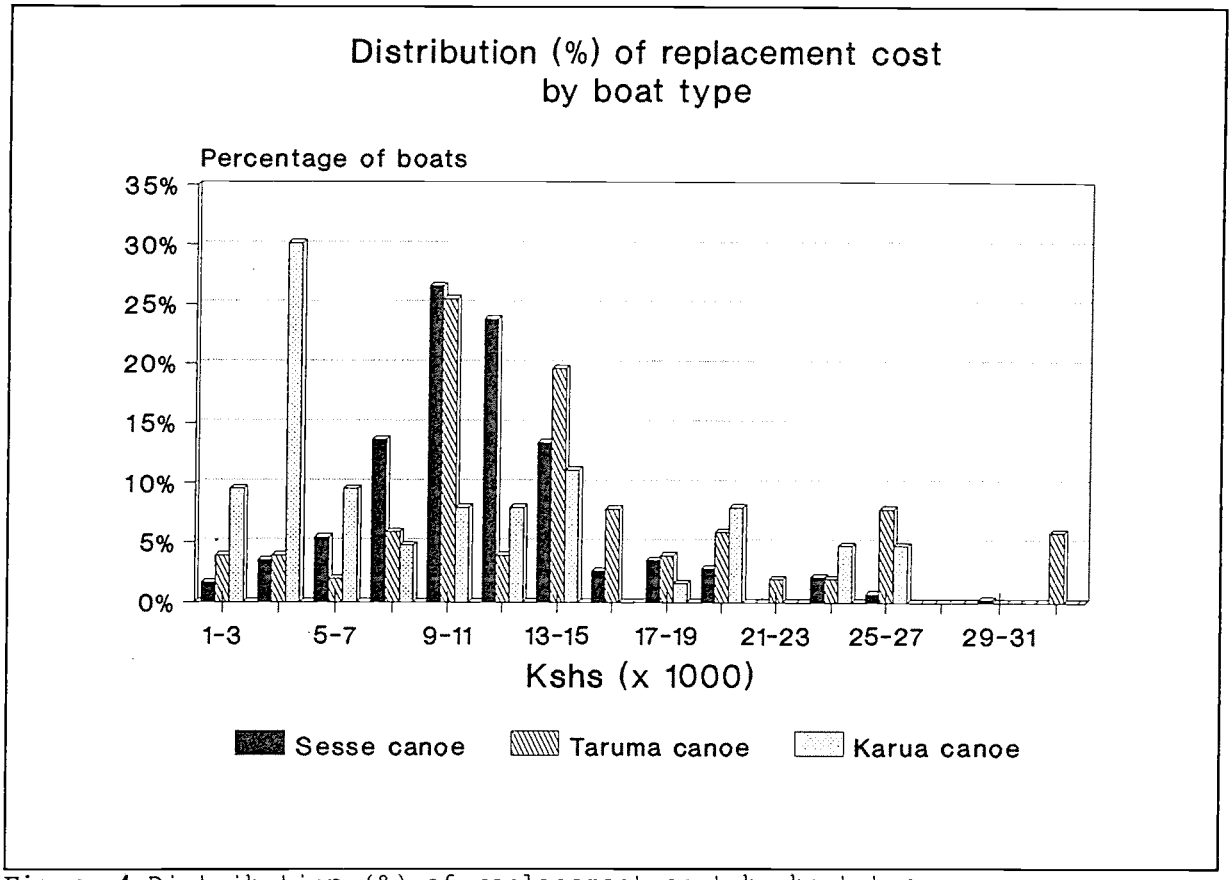


Figure 4 Distribution (%) of replacement cost by boat type.

One third of the Karua canoes have a replacement cost between 3,000 and 5,000 Kshs. The average replacement cost of a Karua, however, is considerably higher with 11,144 Kshs. The average replacement cost of a Sesse canoe is not much higher than that of the Karua canoe. Around half of the Sesse canoes cost between 9,000 and 13,000 Kshs. The Taruma canoe is, on average, the most expensive with a replacement cost of 15,233 Kshs while, similar to the Sesse canoe, the most common (modal) price is between 9,000 and 13,000 Kshs.

3.1.4.2. Maintenance costs

Figure 5 gives the distribution of the yearly maintenance costs by boat type. Out of the 63 Karua canoes, 24 boats (38.0%) were not maintained, at least for these boats no costs were involved. The average amount spent on the remaining 39 Karuas was Kshs 1974 per year. Out of the 428 Sesse canoes, 151 or 35.3% were not maintained. The average amount spent on (the remaining) Sesse canoes, Kshs 1967 per year, was almost the same as on the Karuas.
The Taruma canoe had the highest average maintenance cost namely Kshs 2880 per boat per year. Out of the 52 Tarumas 21 or 40.4% were not maintained.

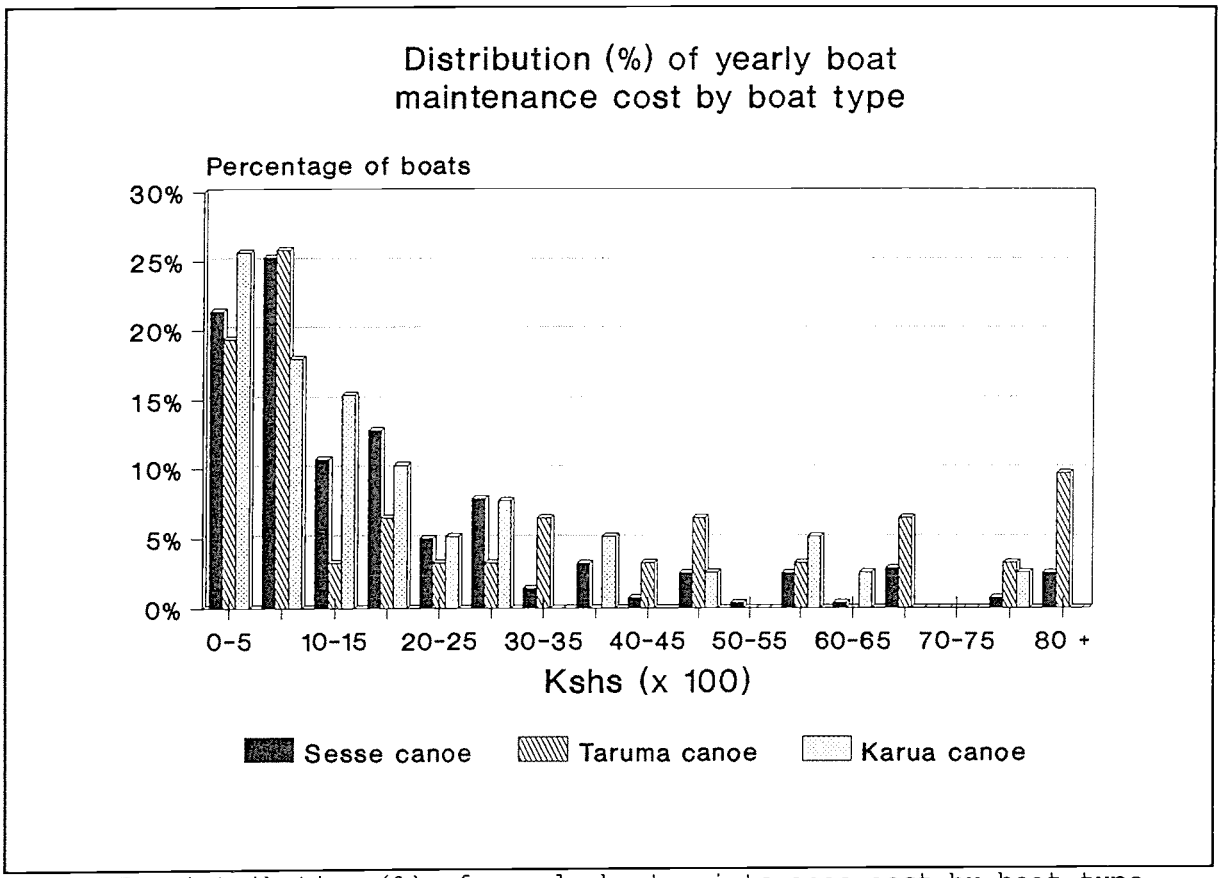


Figure 5 Distribution (%) of yearly boat maintenance cost by boat type.

3.2. Fishing gear

The main types of gear encountered in the Kenyan waters of Lake Victoria were described in Section 2.2. This section gives details about the gear encountered in the survey.

3.2.1. Number and types of fishing gear

Boat owners frequently own more than one boat or gear. Table 3.2. below gives the figures.

Table 3.2. Comparison of the number of respondents and the number of gear used from their boat(s) by fishery type

Fishery type	Number of respondents	Number of gear	Number of boats
Nile perch GN	121	191 Nile perch gillnets*)	186
Tilapia GN	57	83 Tilapia gillnets*)	70
Longline	53	79 Longlines	62
Beach seine	32	39 Beach seines	47
Mosquito seine	74	90 Mosquito seines	95
Other	37	mixed	83

*) 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.

Some of the respondents, classified in the various fishery types in the table above, also own other gear. These gear, associated with their "main" gear, are listed below for each fishery type. The mix of gear for the fishery type "Other" is also detailed in this table.

Table 3.3. Number of associated gear by fishery type

Fishery type	Nile perch gill net*)	Tilapia gill net*)	Longline	Beach seine	Mosquito seine
Nile perch GN	-	0	10	9	11
Tilapia GN	0	-	7	0	1
Longline	0	3	-	0	11
Beach seine	3	0	0	-	4
Mosquito seine	0	0	0	0	-
Other	23	17	31	13	18

*) Note: Again the number of gillnets in this table does not refer to the number of unit lengths of 90 metres but to separate stretches of nets whereby a varying number of units is mounted.

3.2.2. Length of fishing gear

The respondents were asked the length of the different gear they owned or which were operated from their boats. Estimating the length seemed to be difficult at times, especially for boat owners which were not actively engaged in fishing operations. Nevertheless the average length of the different gear (as calculated from the responses) is presented below.

Table 3.4. Average length of gear

Gear	Average *) length (metres)	Number of nets (90 metres)	Standard deviation	Minimum	Maximum
Nile perch GN	2392	26.5	1751	28	8000
Tilapia GN	1073	11.9	1199	20	7300
Longline **)	1359	-	1101	84	4200
Beach seine	202	-	159	20	720
Mosquito seine	76	-	82	9	400

Note *) These averages were calculated only within the classified fishery types in other words the length data of associated gear or those in the group fishery type "Other" were not included.

**) 1.5 metre longline is more or less equivalent to 1 hook.

Note that the standard deviations are rather high resulting in rather broad confidence limits for the estimates of the averages in the entire 'population'. The Nile perch gillnets are the longest nets, with an average length of 2,3 km (26.5 nets). The modal length, however, is considerably lower with a net length of 500 metres (5.5 nets) to 750 metres (8.3 nets).
Figure 6 on the next page gives the length frequency distributions of the

different gear as declared by the respondents.

3.2.3. Age of fishing gear

Figure 7 gives the age distribution of the different gear[4]. As can be seen from the graph, the life span of all gear, except for beach seines, is only a few years. Although some Nile perch gillnets are older than five years they are usually replaced after 2 to 3 years. Tilapia gillnets and longlines are usually replaced after 1 year. The same holds more or less for the mosquito seines. The age distribution of beach seines shows a rather long life span of this gear. Except for the beach seine fishery the age structure of all gear displays the image of continuous investment. As in the case of boats it appears that investment in the beach seine fishery is declining since 2 to 3 years. The average age of the different gear is displayed below.

Table 3.5. Average age of gear in years

Fishery type	average	standard deviation	minimum	maximum	N
Nile perch GN	2.6	1.9	0.08	10	188
Tilapia GN	1.2	1.2	0.08	5	81
Longline	1.1	1.5	0.08	8	77
Beach seine	4.5	3.5	0.08	17	39
Mosquito seine	2.2	3.5	0.08	24	87

3.2.4. Replacement costs

The boat owners were asked the replacement costs of their fishing gear. Figure 8 gives the distribution of replacement cost by gear type.

Table 3.6. below gives an approximation of the average replacement cost (as declared by the respondents) of boat owners in gear.

Table 3.6. Average replacement cost of gear

Gear	Average Replacement cost (Kshs)	Standard deviation	Minimum	Maximum
Nile perch GN	40269	30558	356	204000
Tilapia GN	5011	5929	180	30000
Longline	2253	1965	300	9000
Beach seine	19781	10291	600	45680
Mosquito seine	8811	5750	1200	30000
Other	15661	21064	320	98000

The highest investment in gear is found in the Nile perch gillnet fishery. This is not surprising since these gillnets are generally much longer than the other types of nets. Again it is observed that the standard deviations in this

[4] The age of gear was recorded in months but converted to years in the calculations.

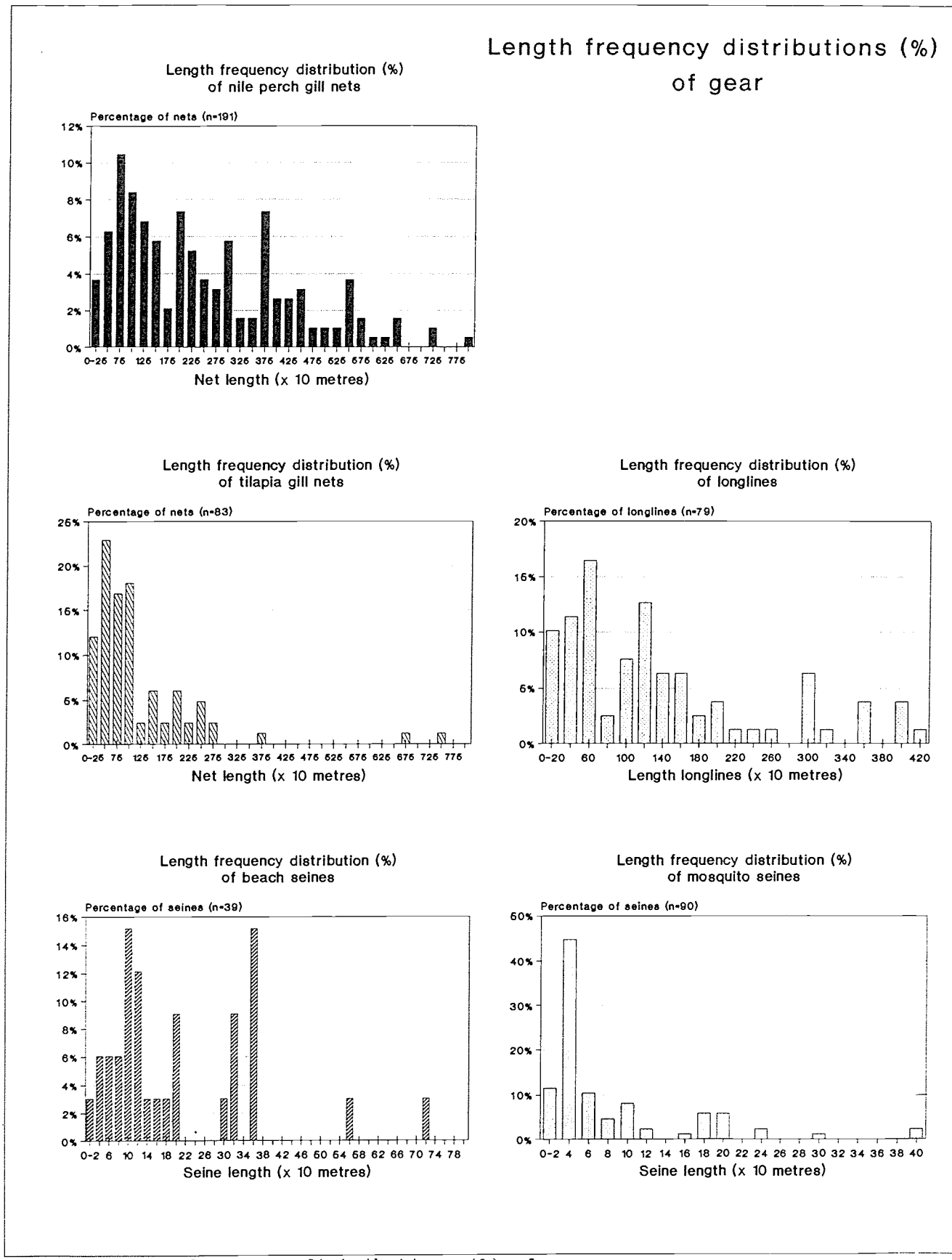


Figure 6 Length frequency distributions (%) of gear.

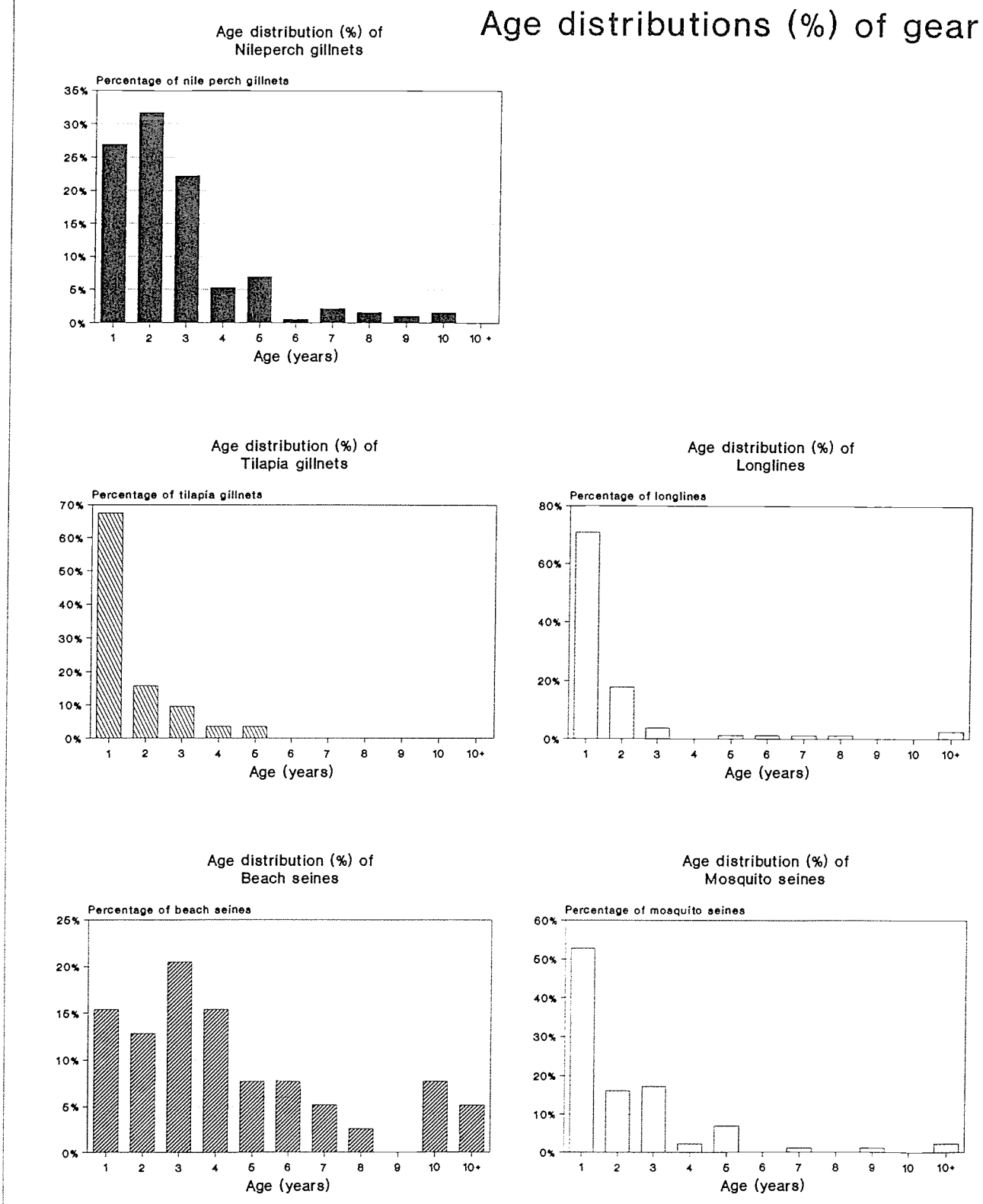


Figure 7 Age distributions (%) of gear.

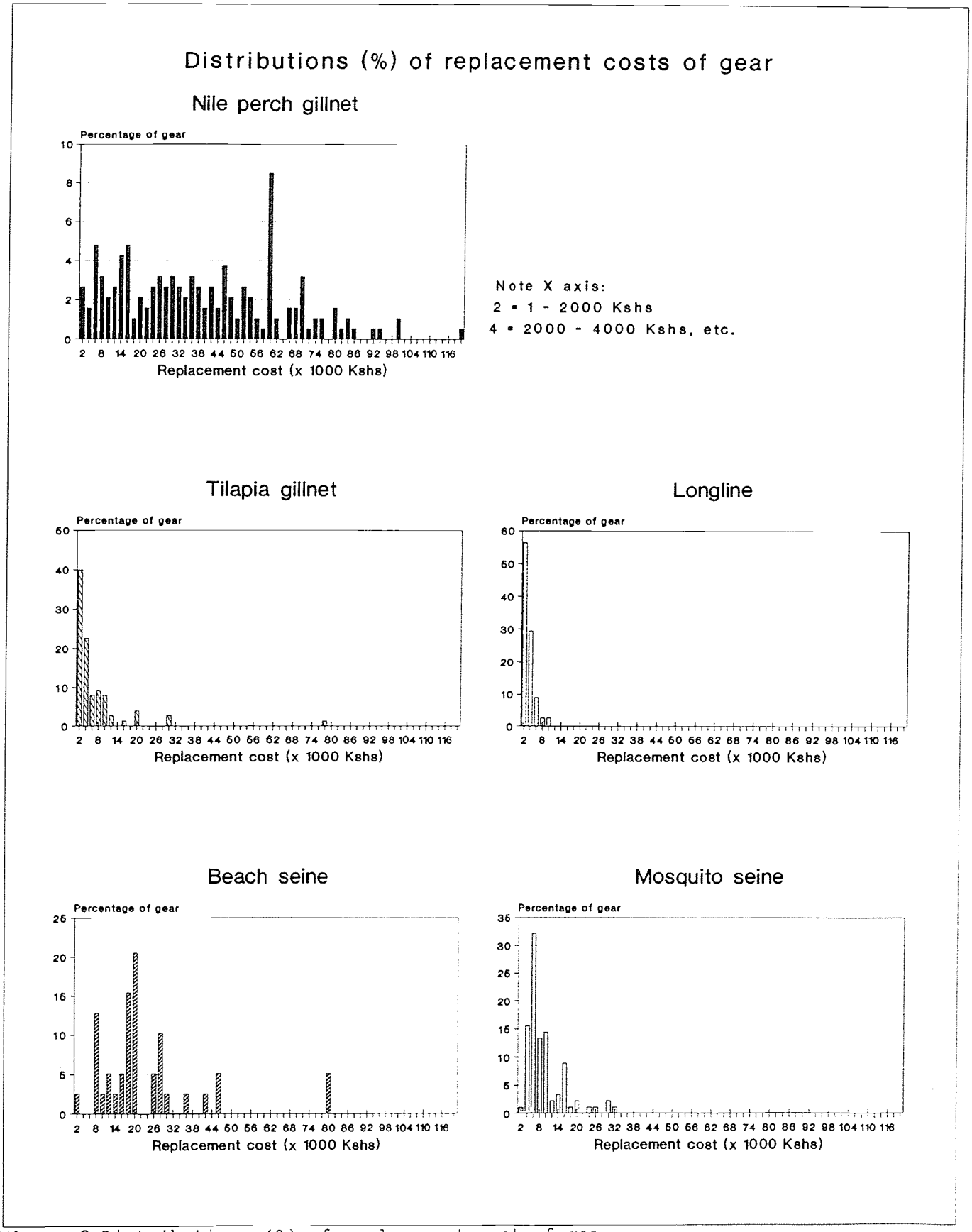


Figure 8 Distributions (%) of replacement cost of gear.

sample are high. Furthermore is noted that the estimates of replacement costs made by the respondents did not correlate significantly with the (stated) length of their gear. Fishermen replace their gear bit by bit and do not have an accurate idea of the total value of their investment in gear.

Notwithstanding these problems and assuming that the order of magnitude is correct it is concluded that the sequence from high to low investment per respondent in gear is as follows.

Table 3.7. Sequence and approximate investment (measured through replacement cost) in gear per respondent by fishery type.

Sequence of investment (rate)	Fishery type	Average value of investment per respondent (Kshs)
No. 1	Nile perch gillnet	63.700
No. 2	Other	39.900
No. 3	Beach seine	24.100
No. 4	Mosquito seine	10.700
No. 5	Tilapia gillnet	7.300
No. 6	Longline	3.400

The highest investment per respondent is recorded in the Nile perch gillnet fishery followed by the "Other" fishery. The longline operation is clearly the least capital intensive.

3.3. Engines

3.3.1. Number of engines by horsepower

To a large extent fishing activities are not mechanised. Only 5.6 % of the respondents own one or more engines. Out of 543 boats only 27 (5%) are equipped with an engine. This percentage is rather close to the results of the census (Hoekstra *et al.*, 1991) where 3.4 % of the boats appeared to be motorized.

Table 3.8. Number of engines by fishery type

Fishery type	Total engines	Total respondents	Total boats	% respondents owning engines	% of boats with engines
Nile perch GN	20	121	186	12.4	10.8
Tilapia GN	4	57	70	5.3	5.7
Longline	0	53	62	0.0	0.0
Beach seine	0	32	47	0.0	0.0
Mosquito seine	1	74	95	1.4	1.1
Other	2	37	83	5.4	2.4
Total	27	374	543	5.6	5.0

The use of engines is highest in the Nile perch gillnet fishery. Some 12 % of the respondents own and 11 % of the boats are equipped with an engine. Only 1.4 % of all boat owners rent an engine.

The power of the engines ranges from 4 hp to 40 hp. Table 3.9. below gives the distribution of engines by horsepower.

Table 3.9. Distribution of engines by horsepower.

Horsepower	Number of engines	Percentage
4	1	3.7
6	2	7.4
7	2	7.4
10	1	3.7
15	10	37.0
20	1	3.7
25	8	29.6
35	1	3.7
40	1	3.7
Total	27	100.0

Engines of 15 hp and 25 hp are clearly the most popular.

3.3.2. Age structure of engines

The engines are relatively new as appears from figure 9.

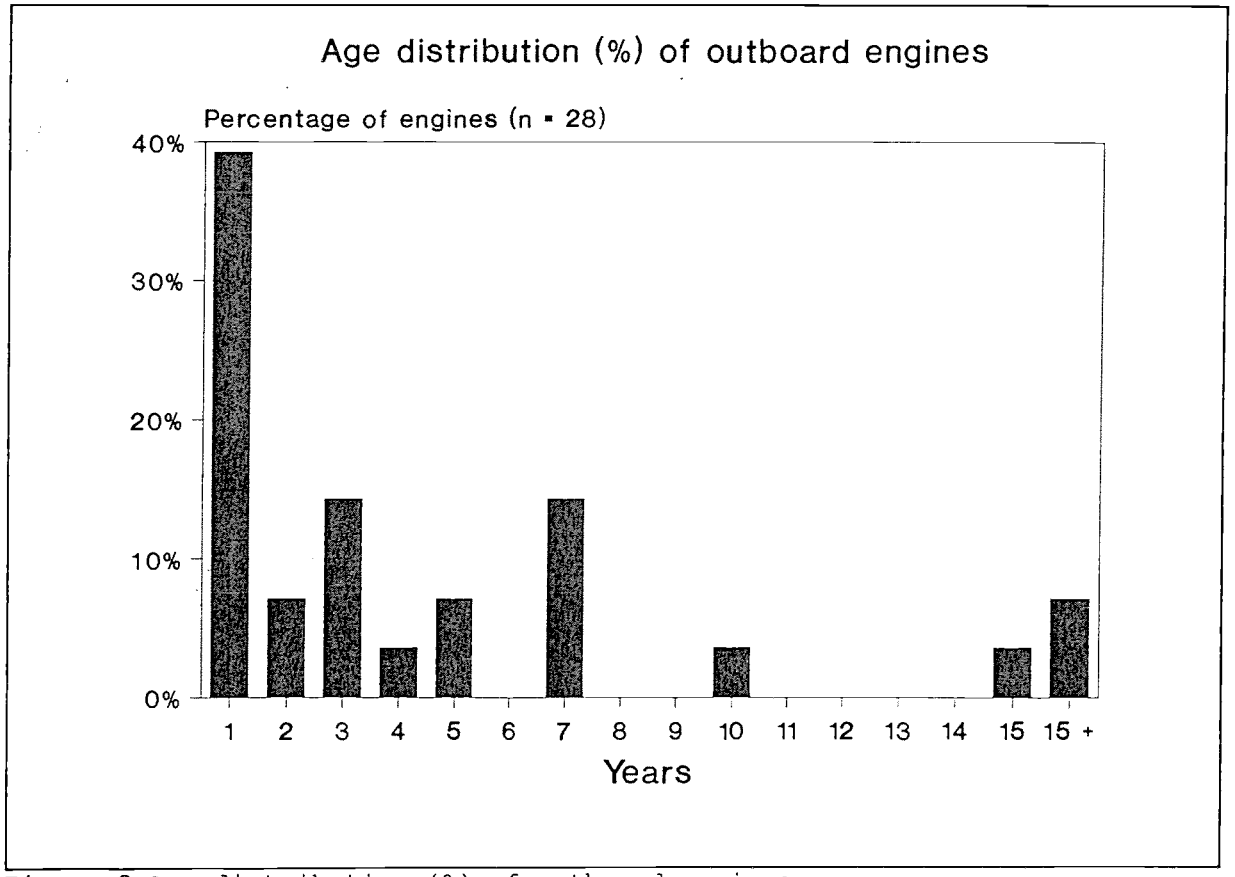


Figure 9 Age distribution (%) of outboard engines.

Investment in engines seems either to be rather recent or fairly continuous but with short life spans of the engines. Almost 40% of the engines are only

one year old while only 33 % are older than 5 years. The average age of engines is 4.3 years.

3.3.3. Replacement costs of engines

Figure 10 displays the replacement costs of engines as declared by the respondents.

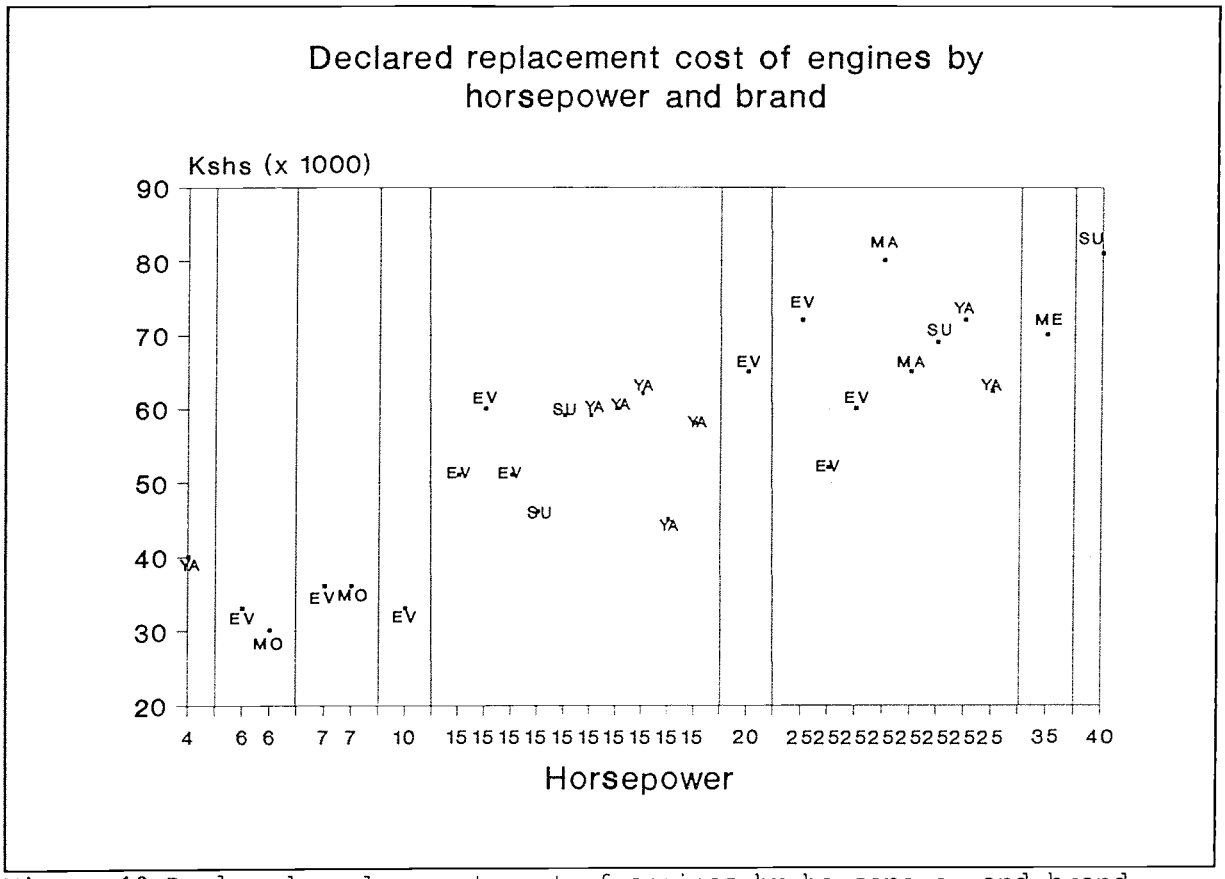


Figure 10 Declared replacement cost of engines by horsepower and brand.

Note: EV=Evinrude, YA=Yamaha, SU=Suzuki, MA=Mariner, ME=Mercury

Engine replacement costs range from Kshs 30.000 for the smallest engines to Kshs. 81.000 for the largest engine. The average replacement cost is 55.830 Kshs.

3.3.4. Maintenance costs of engines

Figure 11 displays the amount spent by the owners on maintenance of the engine during the 12 months preceding the survey. In this figure the maintenance cost is related to the age of the engine. The average maintenance cost per year is 4.835 Kshs.

As far as repairs are concerned, some 33 % of the respondents generally carry out repairs on their engines themselves, 20 % have them repaired by their dealer while 50 % have them repaired by others like friends, family members, etc.

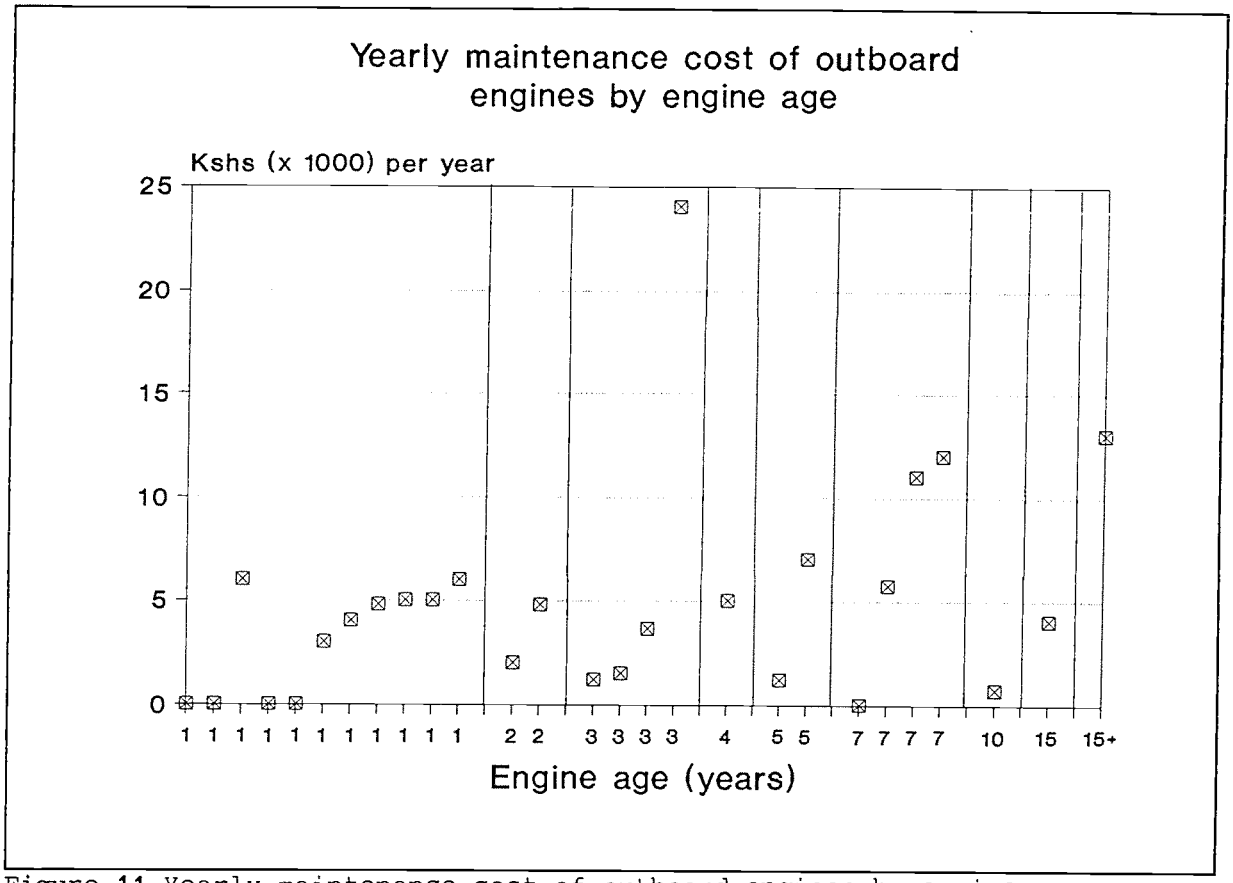


Figure 11 Yearly maintenance cost of outboard engines by engine age.

3.3. Fish processing

Landings of fish are made at highly dispersed locations sometimes 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 (see Section 3.4) or to process the fish. Three traditional fish processing methods exist: drying, smoking and frying.
The boat owners were asked if they and/or their wife(ves) engaged themselves in the processing of fish before it is sold. Table 3.10. and 3.11. give the results.

Table 3.10. Frequency of processing by boat owners

	Yes		No		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	17	14.0	104	86.0	121	100.0
Tilapia GN	2	3.5	55	96.5	57	100.0
Longline	7	13.2	46	86.8	53	100.0
Beach seine	6	19.4	25	80.6	31	100.0
Mosquito seine	17	23.0	57	77.0	74	100.0
Other	8	23.5	26	76.5	34	100.0
Total	57	15.4	313	84.6	370	100.0

Table 3.11. Frequency of processing by boat owners wife(ves)

	Yes		No		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	50	42.0	69	58.0	119	100.0
Tilapia GN	16	28.1	41	71.9	57	100.0
Longline	16	30.2	37	69.8	53	100.0
Beach seine	11	39.3	17	60.7	28	100.0
Mosquito seine	40	56.3	31	43.7	71	100.0
Other	11	34.4	21	65.6	32	100.0
Total	144	40.0	216	60.0	360	100.0

Processing of fish by the boat owner and especially his wife(ves) is most frequently encountered in the mosquito seine fishery. In fact capturing and processing appeared to be highly integrated in this fishery. The most widely used method for the small pelagic, *Rastrineobola Argentea*, caught with this gear is sun drying. The fish is spread out on the beach and left to dry. Remarkable is the fact that processing by boat owners and/or his wife(ves) does not occur so often in the tilapia fishery. As we will see in Section 3.4 tilapia is mostly sold directly to small scale traders after landing.

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

Table 3.12. Time involvement in fish processing by boat owner and/or wife(ves)

	Permanent		Seasonal		Occasional		Total	
Fishery type	n	%	n	%	n	%	n	%
Nile perch GN	29	56.9	3	5.9	19	37.3	51	100.0
Tilapia GN	10	71.4	1	7.1	3	21.4	14	100.0
Longline	8	47.1	2	11.8	7	41.2	17	100.0
Beach seine	8	61.5	4	30.8	1	7.7	13	100.0
Mosquito seine	27	71.1	1	2.6	10	26.3	38	100.0
Others	6	46.2	2	15.4	5	38.5	13	100.0
Total	88	60.3	13	8.9	45	30.8	146	100.0

The majority, 60.3%, of those who are engaged in fish processing do this on a year round basis, while 30.8% only occasionally engage themselves in this trade.

3.4. Fish marketing

A diversity of marketing channels is open to fishermen. The boat owners were asked which channels are used. Table 3.13 below gives the results.

Table 3.13. Frequency of use of marketing channels of fish by fishery type

	Women	Bicycle trader	Pickup/ Lorry	Cooperative	Shop	Others	Number of respondents
Fishery type	%	%	%	%	%	%	n
Nile perch GN	89.3	67.8	64.5	30.6	8.3	19.0	121
Tilapia GN	98.2	61.4	17.5	1.8	15.8	21.1	57
Longline	88.7	69.8	62.3	17.0	11.3	22.6	53
Beach seine	100.0	65.6	40.6	6.3	3.1	3.1	32
Mosquito seine	98.6	29.7	21.6	0.0	8.1	20.3	74
Other	93.9	54.5	60.6	18.2	12.1	27.3	33
All combined	93.8	58.1	45.9	14.9	9.7	19.5	370

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

The category 'others' in the above table mainly represents transport boats which tour the lake in search for fish. The fish is bought in the open lake.

Although it is often claimed that women are displaced from their marketing (and processing) role, mainly through the penetration of 'outsiders', the results, displayed in the table above, show that women still play an important role. Around 90% of all boat owners claimed that women on the beach are buyers of the catch. There is no doubt however that their role is proportionately decreasing. When asked about the main outlet for their catch a different picture emerged.

Table 3.14. Main marketing channels of fish by fishery type

	Women	Bicycle traders	Pickup/ Lorries	Cooperatives	Shop	Others	Number of respondents
Fishery type	%	%	%	%	%	%	%
Nile perch GN	10.7	4.1	54.5	24.8	0.0	5.8	121
Tilapia GN	63.2	26.3	10.5	0.0	0.0	0.0	57
Longline	9.4	7.5	60.4	9.4	0.0	13.2	53
Beach seine	43.8	31.3	18.8	3.1	0.0	3.1	32
Mosquito seine	83.8	1.4	13.5	0.0	0.0	1.4	74
Other	18.2	9.1	48.5	9.1	0.0	15.2	33
All combined	36.8	10.3	36.8	10.5	0.0	5.7	370

The 'female trader' is the main marketing channel for fishermen in the mosquito seine - (83.8 %), the tilapia gill net (63.2 %) and the beach seine fishery (43.8 %). In the Nile perch gillnet and longline fishery, however, their participation in marketing is very limited. As can be seen this is clearly due to the penetration of refrigerated trucks. From the census (Hoekstra *et al.*, 1991) it appeared that Nile perch gill netting and longlining boats made up half of the total number of boats. From the figures above it follows that women are virtually excluded from marketing with respect

to some 50 % of the total number of fishing units.

The fact that longliners and Nile perch gillnetters mainly depend on refrigerated trucks for selling their catch explains to a large extent their mobility between landing sites. If they are based at a beach where trucks cannot reach or do not come, they are forced to move to other beaches to sell their catch.

Table 3.15. Occurrence of landing fish in an other than home beach

	Yes		No		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	72	62.6	43	37.4	115	100.0
Tilapia GN	9	17.0	44	83.0	53	100.0
Longline	30	58.8	21	41.2	51	100.0
Beach seine	7	25.0	21	75.0	28	100.0
Mosquito seine	12	17.6	56	82.4	68	100.0
Other	16	51.6	15	48.4	31	100.0
Total	146	42.2	200	57.8	346	100.0

Tilapia gill netters, mosquito seiners and to a lesser extent beach seiners move less to land their catches. Local buyers like women and bicycle traders usually purchase the fish immediately after it is landed (see table 3.14). Nile perch gillnetters, longliners and boats in the fishery type 'other' are often forced to move to other beaches to land their catches.

Usually the only relationship with the trader is sales of the catch. There are a number of cases however where traders provide (small) credits or gear.

Table 3.16. Relationship of boat owners with traders

	Provision of credit		Provision of boat		Provision of gear		Total respond ents
Fishery type	n	%	n	%	n	%	n
Nile perch GN	6	5.0	1	0.8	5	4.1	121
Tilapia GN	2	3.5	0	0.0	3	5.3	57
Longline	5	9.4	0	0.0	1	1.9	53
Beach seine	3	9.4	0	0.0	3	9.4	32
Mosquito seine	6	8.1	0	0.0	6	8.1	74
Other	3	8.1	0	0.0	2	5.4	37
Total	25	6.7	1	0.3	20	5.3	374

Only one case was found where the trader provided a boat. Provision of gear or small credits by traders occurred in only 5% to 7% of the cases. This low proportion of use of credit demonstrates a healthy state of the industry. Fishermen generally finance their equipment themselves, quite independent from the rest of the sector. Credits for boat, gear and engine are also dealt with in Section 4.1.6.1.

3.5. Crew size and sharing systems

The boat owners were asked how many crew operate the gear. The details are

given below.

Table 3.17. Crew size by gear type

Gear	Average	Standard deviation	Minimum	Maximum	Number of gear
Nile perch GN	3.11	1.16	1	8	151
Tilapia GN	2.59	1.12	1	7	63
Longline	2.87	0.82	1	6	82
Beach seine	6.33	2.31	2	16	51
Mosquito seine	4.60	1.47	3	12	107

Figure 12 displays the frequency distribution of crew size by gear.

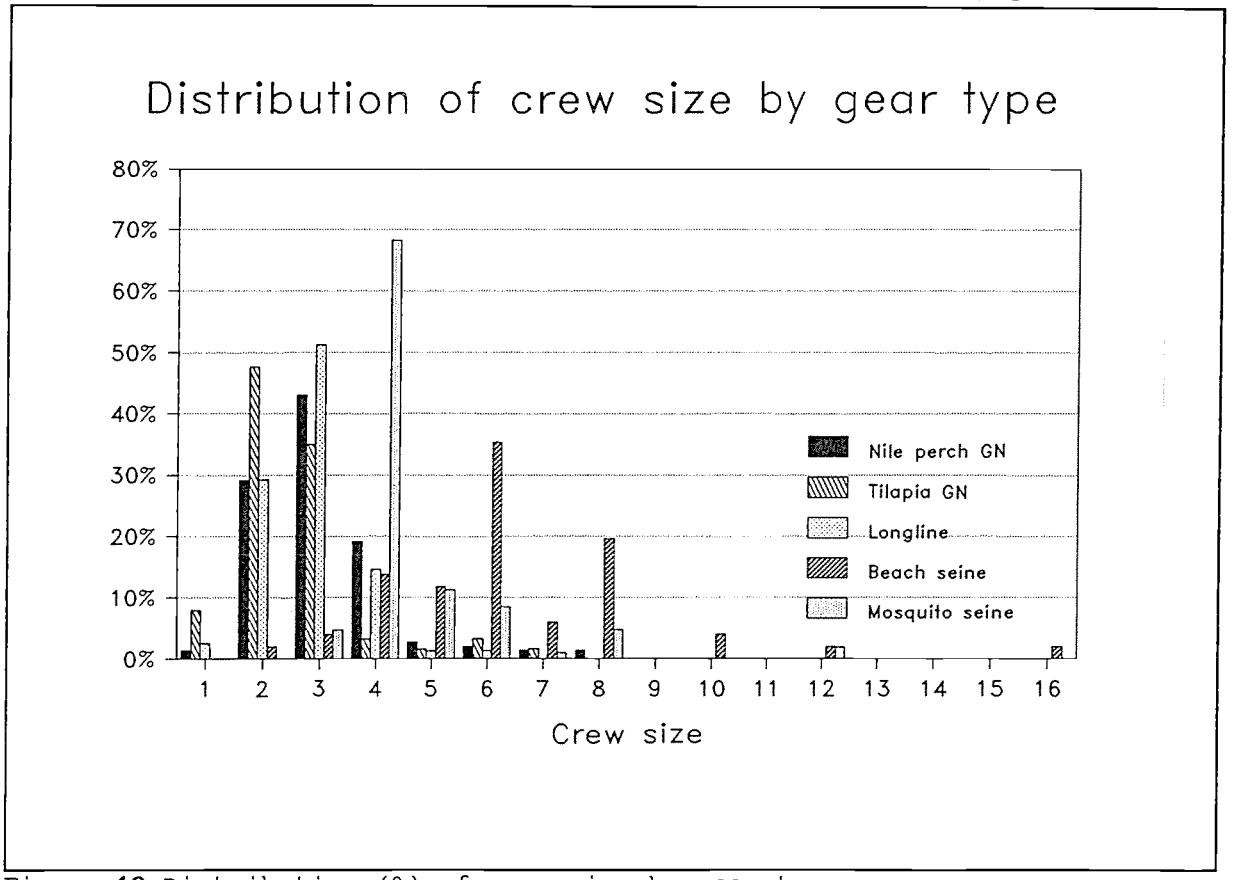


Figure 12 Distribution (%) of crew size by gear type.

The most common crew size for Nile perch gillnets and longlines is 3. The tilapia gillnets are usually operated by 2 crew. Almost 70% of the mosquito seine units work with 4 people on board while beach seines are usually operated by 6 to 8 people.

Care should be taken to apply the average crew sizes given above to calculate total employment or return to labour in the industry. It is known, for example, that in the mosquito seine fishery shifts of crew are quite common. In the nile perch gillnet fishery 4 crew members often work in rotation, with an operative crew of 3. This is also occurs in other fisheries. Although this survey roughly assessed crew changes (see Section 3.6) the data do not permit a straightforward calculation of the total number of fishermen.

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 only encountered in a limited number of cases. This system is usually applied by boat owners who pay their young sons some petty cash for a days work on the boat. Those boat owners which are member of a cooperative usually contribute 10% of the catch value to the cooperative.

Sharing systems vary considerably and can be quite complicated mainly depending on the ownership patterns (full or shared ownership) of boat and/or gear. Furthermore the sharing systems vary according to personal preferences/strategies of the owner and the degree of his active participation in the actual fishing operation.

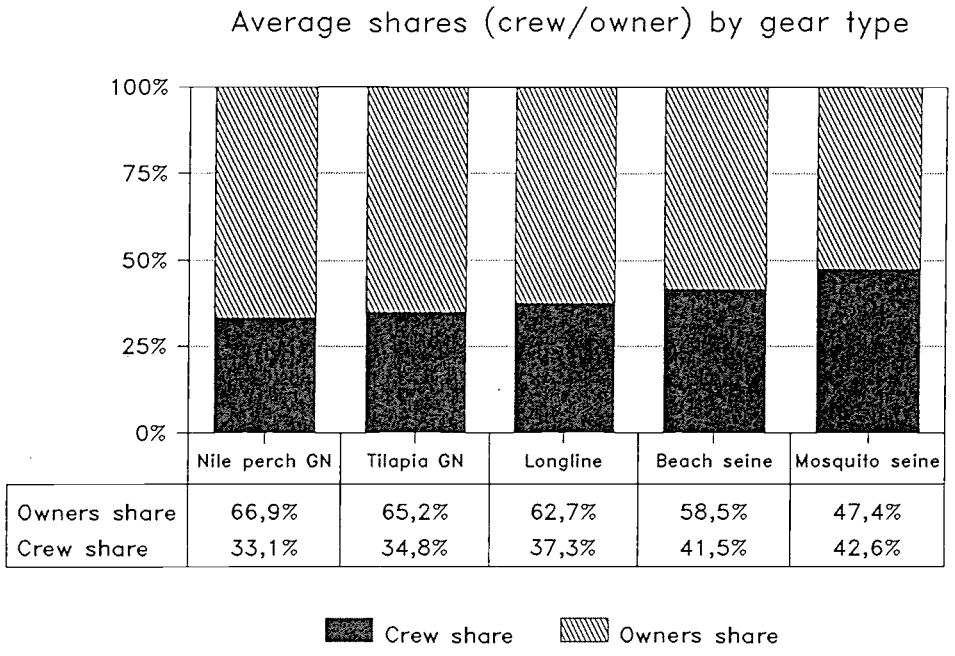
Figures 13 a and 13 b give a concise image of the <u>average</u> crew - and owner shares by gear type and the <u>distribution</u> of the crew share by gear type.

The main systems of catch sharing, encountered during the survey, are described below:

1. Sharing of catch with fixed percentages allocated to crew and owner(s) of boat and gear.
2. Sharing of catch with fixed percentages allocated to crew and owner(s) after deduction of a fixed amount (15 to 50 shilling per day) for the boat, and in a few cases a fixed amount for the gear.
3. Sharing of catch with fixed percentages to crew and owners but at least a one days catch entirely allocated to the boat.
4. Sharing of catch with x days entire catch to crew and y days entire catch to boat and/or gear owner.
5. Fixed wages for crew or crew leader.
6. Each crew acquires the catch from his own gear or from the gear which is allocated to him. Cases were found, for example, whereby crew members were allocated an x number of nets or an y stretch of longline. Their share would be the fish caught with this particular section of the net or line.

It is not possible to precisely indicate the relative importance of the different systems since (contrary to what the questionnaire format suggests) categories for sharing systems could not be established in advance. In other words the question was open ended. The first system is by far the most common with respect to all gear types. An indication of the occurrence of the different systems is provided below.

Nile perch gillnets:
System 1 is the most common. The average crew share was 33.1%
A fixed amount per day allocated to the boat was only encountered in two cases. In 16% of the cases a one days catch was entirely allocated to the boat while a sharing system (system 1) was applied for the remaining days. System 4 was applied in 18% of the cases. Usually 1 day was allocated to crew and 3 to 4 days to (the owner of) boat and/or gear.
A fixed wage for a crew leader was encountered only once (wage 800 Kshs per month). Fixed wages for crew members were observed in two cases.
Three cases were found whereby crew were entitled to the catch of their own



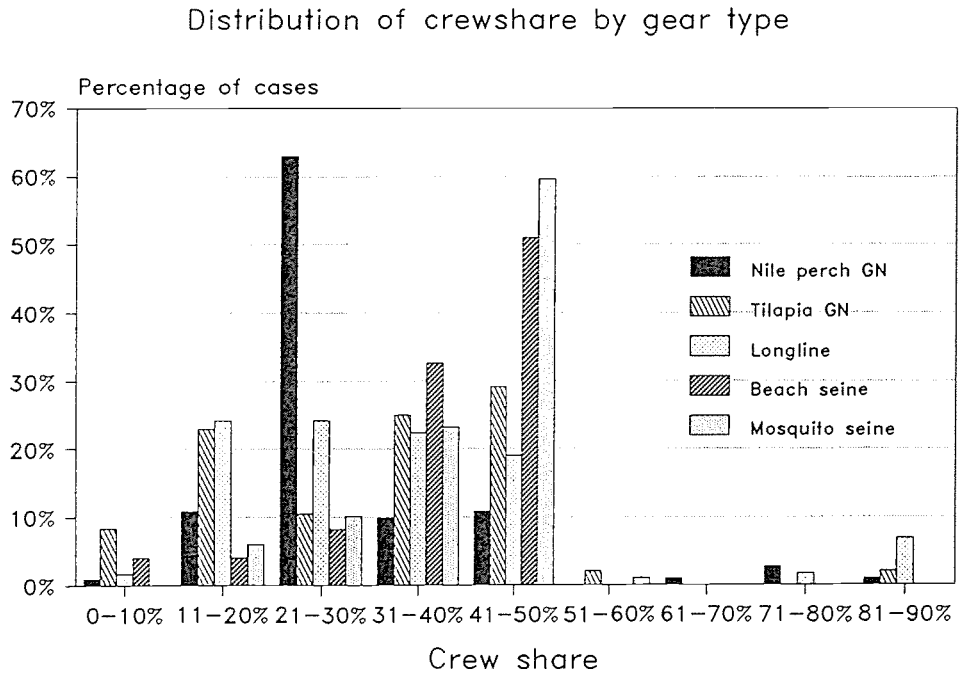


Figure 13 a and b Average crew share and distribution of gear share by gear.

net. These crew usually contribute 10% of their catch to the boat.

Tilapia gillnets:
System 1 was the most common. The average crew share was 34.8%
A fixed amount per day for the boat (15 to 30 Kshs) was encountered in 6% of the cases. There was only one case where the boat was allocated a whole days catch. System 4 was less popular also, only one case was found.
In 10% of the cases crew simply were allocated the fish caught from their own gear. Two fixed wages were encountered.

Longlines:
System 1 was the most common. The average crew share was 37.3%.
In 18% of the cases, however, crew took whatever they gained from their own (part of the) longline after paying 10% to 20% for the boat. Three cases were found with a fixed wage for the crew. In 6% of the cases one day was allocated for the boat while for the rest of the days a sharing system (system 1) was applied.

Beach seines:
System 1 was the most common. The average crew share was 41.5%. In 18% of the cases (system 2) sharing took place after a fixed amount (20 to 50 Kshs) was deducted for the boat. Other systems were not encountered.

Mosquito seines:
System 1 was the most common. The average crew share was the highest of all gear namely 42.6%. In 26% of the cases a fixed amount (30 to 50 Kshs) for boat and/or gear was deducted before sharing, according to fixed percentages, took place. Some crew were simply allocated all the fish caught around their own lamp. System 4 was applied in one case. Fixed wages were not encountered.

3.6. 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 other fishing units. To inquire into the stability of the crew the boat owners were asked how often crew members change from his boat to other boats. Table 3.18. below gives the results.

Table 3.18. Frequency of crew changes

	daily		weekly		monthly		limited change		total	
Fishery type	n	%	n	%	n	%	n	%	n	%
Nile perch GN	6	5.0	4	3.4	23	19.3	86	72.3	119	100.0
Tilapia GN	2	3.6	7	12.5	11	19.6	36	64.3	56	100.0
Longline	2	3.8	2	3.8	4	7.5	45	84.9	53	100.0
Beach seine	4	12.9	8	25.8	5	16.1	14	45.2	31	100.0
Mosquito seine	20	27.0	11	14.9	21	28.4	22	29.7	74	100.0
Other	2	6.1	4	12.1	8	24.2	19	57.6	33	100.0
Total	36	9.8	36	9.8	72	19.7	222	60.7	366	100.0

Taking all fishery types together it is concluded that the majority (60.7%)

of the fishing units are rather stable. There are however considerable differences between fishery types. The longlining units are the most stable. This is partly explained by the sharing system employed on these units and the technique involved. Often crew members bring there own gear on these units and take whatever catch they get with their gear. Nile perch gillnet and tilapia gillnet units are also rather stable. In these fisheries daily and weekly changes are comparatively limited. About one fifth of these units are confronted with monthly changes in the composition of their crew. The most frequent crew changes occur in the beach seine and mosquito seine fishery. Assisting in beach seining is rather easy for beach residents. Whoever wants to give a hand in pulling in the net can do so. With respect to the mosquito seines only 30% of the units are relatively stable. This may be due to the fact that fishing depends on the lunar phases of the moon and only takes place during 20 days per month. In almost 30% of the units the composition of the crew changes after 20 days of fishing. Furthermore fishing is carried out at night and consequently daily shifts of crew are either organized or occur spontaneously.

Fishing can be carried out with gear of one single owner or different owners. The boat owners were asked if crew members bring in their own gear. Results are given below in Table 3.19.

Table 3.19. Frequency of crew carrying gear

	Always		Sometimes		Never		Total
Fishery type	n	%	n	%	n	%	n
Nile perch GN	27	22.3	14	11.6	80	66.1	121
Tilapia GN	12	21.4	4	7.1	40	71.4	56
Longline	25	47.2	5	9.4	23	43.4	53
Beach seine	1	3.1	0	0.0	31	96.9	32
Mosquito seine	9	12.2	4	5.4	61	82.4	74
Other	14	41.2	3	8.8	17	50.0	34
Total	88	23.8	30	8.1	252	68.1	370

Taking all fishery types together, one-quarter of the boat owners indicated that the crew also fishes with their own gear. There are however considerable differences between the fishery types.
On almost 50% of the longlining units crew bring in their own gear. Two factors contribute to this high frequency. Firstly longlines are not too expensive and relatively easy to acquire. Secondly the fishing operation allows the use of different longlines. From one boat different longlines are set in different fishing grounds and the fish caught is collected thereafter.
Not surprisingly crew hardly bring in gear for the beach seine fishery, since this operation is usually carried out with only one net. The same applies more or less for the mosquito seine fishery. Crew can bring in their own lights however. Around 70% of the boat owners in the Nile perch gillnet - and tilapia gillnet fishery declared that crew never bring in any gear. In these fisheries the crew is always (also) fishing with their own gear in about one-fifth of the fishing units. The gillnets are rather expensive while, because the nets are set, the danger of theft and therewith considerable loss of capital is often considered to high by the crew members. Consequently crew members usually prefer to fish exclusively with gear of the (boat) owner.

4. SOCIOECONOMIC CHARACTERISTICS OF THE FISHERY

4.1. The boat owners

4.1.1. Employment

A boat owner is not necessarily an active or full-time fisherman. Ogutu (1988) refers to owners of fishing boats as being entrepreneurs and notes: " The entrepreneurs include seasoned fishermen often with three to five fishing units; wealthy fish traders, retired public servants and people on regular wage employment operating as absentee owners. For these people, monetary gains are significant 'pull factors' ". Table 4.1. below gives the outcome of our inquiry into the relative time involvement of the boat owners in active fishing.

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

	Full-time		Part-time		Occasional		Not fishing		Total	
Fishery type	n	%	n	%	n	%	n	%	n	%
Nile perch GN	91	75.2	6	5.0	8	6.6	16	13.2	121	100
Tilapia GN	46	80.7	1	1.8	2	3.5	8	14.0	57	100
Longline	48	90.6	2	3.8	3	5.7	0	0.0	53	100
Beach seine	24	75.0	2	6.3	6	18.8	0	0.0	32	100
Mosquito sein	62	83.8	1	1.4	1	1.4	10	13.5	74	100
Other	28	75.7	1	2.7	3	8.1	5	13.5	37	100
Total	299	79.9	13	3.5	23	6.1	39	10.4	374	100

Note: The column "not fishing" includes 16 female boat owners.

Active involvement of boat owners in fishing is highest in the longline - and beach seine fishery in the sense that in these fisheries none of the boat owners are completely uninvolved in active fishing. With respect to the beach seine fishery however almost one-fifth only participates in fishing on an occasional basis. (In Section 4.2 more details are discussed on the mobility of labour of the boat owners.) In the Nile perch gillnet-, tilapia gillnet - and mosquito net - and 'other' fishery, 13% to 14 % of the boat owners never fish themselves. These boat owners employ captains on a full-time basis or rent their boat(s) out. The percentage of full-time involvement in fishing is highest in the longline - and mosquito seine fishery. Table 4.2. below gives the number of boats rented out in each fishery.

Table 4.2. Number and percentage of boat owners renting out boat(s)

Fishery type	Number of owners renting boat(s) out	Percentage of owners renting boat(s) out	Total number of boat owners
Nile perch GN	28	23.1	121
Tilapia GN	13	22.8	57
Longline	9	17.0	53
Beach seine	8	25.0	32
Mosquito seine	9	12.2	74
Other	15	40.5	37
Total/All combined	82	21.9	374

One-fifth of all boat owners rents (at least one) boat(s) out. The high percentage (40.5 %) of leasing boats in the fishery type "Other" is explained by two factors. Firstly the comparatively low percentage of full-time involvement in active fishing (75.7 %) and secondly the high rate of multiple boat ownership in this fishery (See also Section 4.1.6.1).

There are basically two ways of payment in the case of renting boats: payment as share of catch or cash payment. Table 4.3. below lists the frequency of the payment systems and the boat hire prices per month, as stated by the boat owners.

Table 4.3. Mode of payment and hire price for fishing boats

Payment as percentage of catch		
	Number of boat owners	%
10%	6	7.3
20%	1	1.2
Payment in cash		
Kshs	Number of boat owners	%
125	1	1.2
150	1	1.2
200	2	2.4
250	4	4.9
300	17	20.7
325	1	1.2
350	2	2.4
400	11	13.4
450	6	7.3

(table continued)

500	5	6.1
550	2	2.4
600	13	15.9
700	2	2.4
900	1	1.2
1800	1	1.2
2000	2	2.4
3000	1	1.2
Unknown	3	3.7
TOTAL	82	100.0

4.1.2. Ethnic background and religion

Table 4.4. below gives the frequency distribution of the boat owners according to their ethnic background.

Table 4.4. Boat owners by tribe and fishery type

	Luo		Luhya		Kikuyu		Other		Total	
Fishery type	n	%	n	%	n	%	n	%	n	%
Nile perch GN	106	87.6	6	5.0	9	7.4	0	0.0	121	100
Tilapia GN	54	94.7	3	5.3	0	0.0	0	0.0	57	100
Longline	41	77.4	12	22.6	0	0.0	0	0.0	53	100
Beach seine	30	93.8	2	6.3	0	0.0	0	0.0	32	100
Mosquito seine	69	93.2	3	4.1	2	2.7	0	0.0	74	100
Other	30	81.1	7	18.9	0	0.0	0	0.0	37	100
Total	330	88.2	33	8.8	11	2.9	0	0.0	374	100

Not surprisingly a high percentage, 88.2 %, of the boat owners are from the Luo tribe, the main tribe around the lake. Interestingly the Luhya seem to be rather attracted to the longline fishery. The few Kikuyu's entering the Lake Victoria fisheries seem mainly attracted to the most prestigious and profitable Nile perch fishery.
As far as religion is concerned 363 boat owners (97.1 %) are christians the remainder being muslims.

4.1.3. Age and fishing experience

Table 4.5. below gives the average age of the boat owners by fishery type.

Table 4.5. Average age and age range of boat owners by fishery type.

Fishery type	Average age	Standard deviation	Minimum	Maximum
Nile perch GN	40.4	11.2	20	70
Tilapia GN	44.9	13.3	21	89
Longline	39.6	11.2	24	69
Beach seine	39.2	13.9	22	77
Mosquito seine	39.3	10.3	21	70
Other	42.0	12.9	20	82
All combined	40.8	11.9	20	89

The average age of boat owners is 40.8 years. Boat owners in the tilapia gillnet fishery are, on average, 4 years older then those in the other fisheries reflecting the experience needed in this more specialized fishery. No significant differences are noted between the remaining fishery types.

Figure 14 shows the distribution of the age structure of the respondents by fishery type. Table 4.6. gives the average fishing experience of the respondents.

Table 4.6. Years of experience in fishing by fishery type

Fishery type	Average experience	Standard deviation	Minimum	Maximum
Nile perch GN	17.7	11.7	1	51
Tilapia GN	18.8	13.6	1	50
Longline	17.7	12.5	1	46
Beach seine	15.1	13.0	1	52
Mosquito seine	11.4	9.7	1	43
Other	17.8	10.5	1	34
All combined	16.4	12.0	1	52

Similar to the average age of the respondents there are no large differences in the average fishing experience. The higher level of experience of boat owners in the tilapia gillnet fishery is mainly explained by their more advanced (average) age.
By subtracting the average fishing experience from the average age of the respondents it follows that entry into the fishery usually occurs at an age between 22 and 28 years. Entry into the fishery however does occur earlier also as can be seen from figure 14.

4.1.4. Educational levels

Primary education in Kenya consists of 8 school years. Secondary education extends from form 1 to form 4. Subsequently one can continue in advanced education. The number of years of education have been coded from 1 (primary 1) to 13 (higher than secondary education). Subsequently the average education

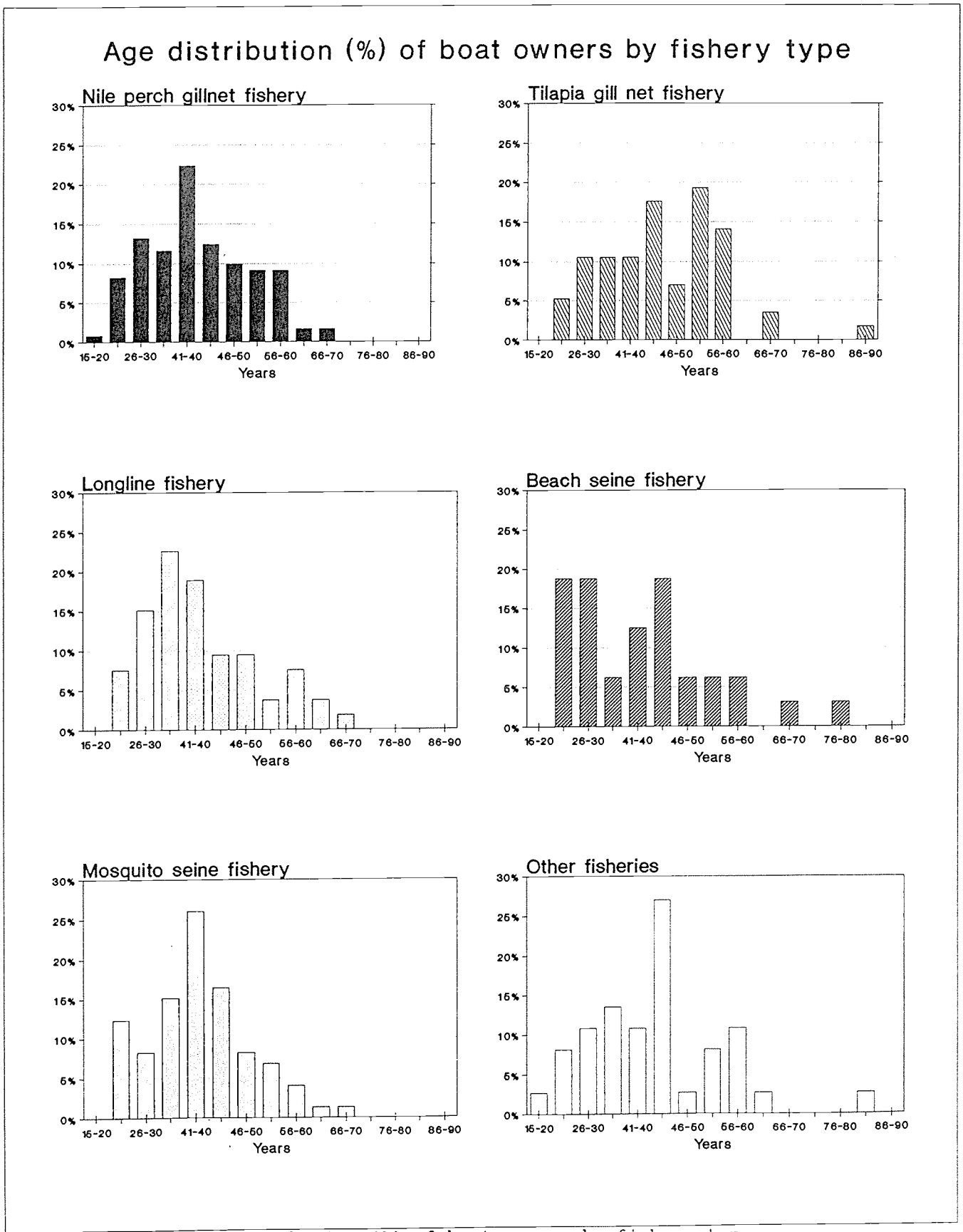


Figure 14 Age distribution (%) of boat owners by fishery type.

of the respondents was calculated by fishery type. The average education is listed in table 4.7. below.

Table 4.7. Average education of boat owner by fishery type (years)

Fishery type	Average education	Standard deviation	Minimum	Maximum
Nile perch GN	6.4	4.1	0	13
Tilapia GN	5.0	3.4	0	12
Longline	5.0	3.8	0	12
Beach seine	6.4	3.2	0	13
Mosquito seine	6.4	3.2	0	12
Other	6.2	3.2	0	12
All combined	6.0	3.4	0	13

Although the differences in educational levels are not very large, it is noted that boat owners in the tilapia and longline fisheries are, on average, less educated. If we look, however, at the distribution of educational levels a major difference is observed.

Table 4.8. Distribution of educational levels attained by boat owners by fishery type

Education class		Nileperch GN %	Tilapia GN %	Longline %	Beach seine %	Mosquito seine %	Others %
None		6.6	19.3	15.1	15.6	13.7	14.7
Prima-	1	0.0	1.8	0.0	0.0	0.0	0.0
ry	2	4.1	0.0	0.0	3.1	1.4	2.9
	3	2.5	7.0	13.2	3.1	2.7	5.9
	4	15.7	8.8	18.9	15.6	6.8	8.8
Subtotal		22.3	17.6	32.1	21.8	15.0	17.6
	5	7.4	12.3	15.1	3.1	9.6	5.9
	6	13.2	12.3	5.7	9.4	9.6	11.8
	7	19.0	21.1	17.0	9.4	26.0	8.8
	8	10.7	7.0	3.8	12.5	11.0	14.7
Subtotal		50.3	52.7	41.6	34.4	56.2	41.2
Secon-	1	1.7	3.5	1.9	0.0	2.7	2.9
dary	2	8.3	3.5	0.0	6.3	5.5	2.9
	3	1.7	1.8	1.9	6.3	2.7	2.9
	4	6.6	1.8	7.5	12.5	8.2	17.6
Subtotal		18.3	10.6	10.3	25.1	19.1	26.3
Advanced		2.5	0.0	0.0	3.1	0.0	0.0
Total %		100.0	100.0	100.0	100.0	100.0	100.0
Total No.		121	57	53	32	73	34

Overall 12.6% of the boat owners did not receive any formal education. It appeared that the rate of non-schooling is definitely the lowest in the Nile perch gillnet fishery. Only 6.6 % of the boat owners in this fishery never attended school.
The rate of non-schooling is rather high in the tilapia gillnet fishery. About one-fifth of the boat owners in this fishery never attended school. This may partly be explained by their more advanced average age. In conclusion there is a clear difference in educational levels of (new) investors in the Nile perch gillnet fishery and the remaining fisheries (especially in the tilapia gillnet fishery).

4.1.5. The boat owners family

Information has been gathered on the boat owners family. As appears from table 4.9. below, 94.9 % of the boat owners are married. Only minor differences are observed between the different fishery types.

Table 4.9. Marital status of boat owners by fishery type

	Married		Single		Widow (ed)		Unknown		Total	
Fishery type	n	%	n	%	n	%	n	%	n	%
Nile perch GN	117	96.7	4	3.3	0	0.0	0	0.0	121	100
Tilapia GN	56	98.2	0	0.0	1	1.8	0	0.0	57	100
Longline	53	100.0	0	0.0	0	0.0	0	0.0	53	100
Beach seine	28	87.5	3	9.4	1	3.1	0	0.0	32	100
Mosquito s.	69	93.2	4	5.4	0	0.0	1	1.4	74	100
Other	32	86.5	2	5.4	0	0.0	3	8.1	37	100
Total	355	94.9	13	3.5	2	0.5	4	1.1	374	100

Table 4.10. below gives the status of the respondents in the household in which they lived.

Table 4.10. Status of boat owner in his household by fishery type

	Head household		Not head household		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	116	97.5	3	2.5	119	100.0
Tilapia GN	56	98.2	1	1.8	57	100.0
Longline	52	98.1	1	1.9	53	100.0
Beach seine	28	90.3	3	9.7	31	100.0
Mosquito seine	64	91.4	6	8.6	70	100.0
Other	30	90.9	3	9.1	33	100.0
Total	346	95.3	17	4.7	363	100.0

Only 4.7 % of the boat owners are not the head of the household in which they lived.
Although there are no significant differences noted between the fishery types concerning the marital status and position in the household, the following table shows some interesting differences between the boat owners in the different fishery types with respect to the number of wives they married.

Table 4.11. Distribution of number of wives per (male) boat owner by fishery type

Fishery type	One	Two	Three	Four	Five to seven	Total n	Total %
Nile perch GN	30.2	45.7	18.1	5.2	0.9	116	100.0
Tilapia GN	50.0	30.4	14.3	1.8	3.6	56	100.0
Longline	50.0	44.2	3.8	0.0	1.9	52	100.0
Beach seine	41.7	29.2	20.8	8.3	0.0	24	100.0
Mosquito seine	29.2	44.6	13.8	10.8	1.5	65	100.0
Other	40.6	18.8	37.5	3.1	0.0	32	100.0
All combined	38.0	39.1	16.5	4.9	1.4	345	100.0
n	131	135	57	17	5	345	

The average number of wives is displayed in table 4.12. below.

Table 4.12. Average number of wives of boat owners by fishery type

	Number of wives				
Fishery type	zero wives	average	standard deviation	minimum	maximum
Nile perch GN	3	2.0	0.9	1	5
Tilapia GN	0	1.8	1.1	1	7
Longline	0	1.6	0.7	1	5
Beach seine	2	2.0	1.0	1	4
Mosquito seine	4	2.1	1.0	1	5
Other	1	2.0	1.0	1	4
All combined	10	1.9	1.0	1	7

The majority (62.0%) of all boat owners married more than one wife. Especially boat owners in the Nile perch gillnet fishery and the mosquito seine fishery appeared to be rather polygamous following tribal customs. Some 70% in both fishery types are married to more than one wife which, in the local cultural pattern, indicates that they are capable of raising the necessary cash or to possess the necessary resources to maintain them. The number of wives one has married is therefore considered as an indicator of a persons wealth and (although they should be compared with data for the overall region) reflect the healthy state of the fishing sector.

Table 4.13 below gives the average number of children of the boat owners by fishery type, figure 15 gives the distribution.

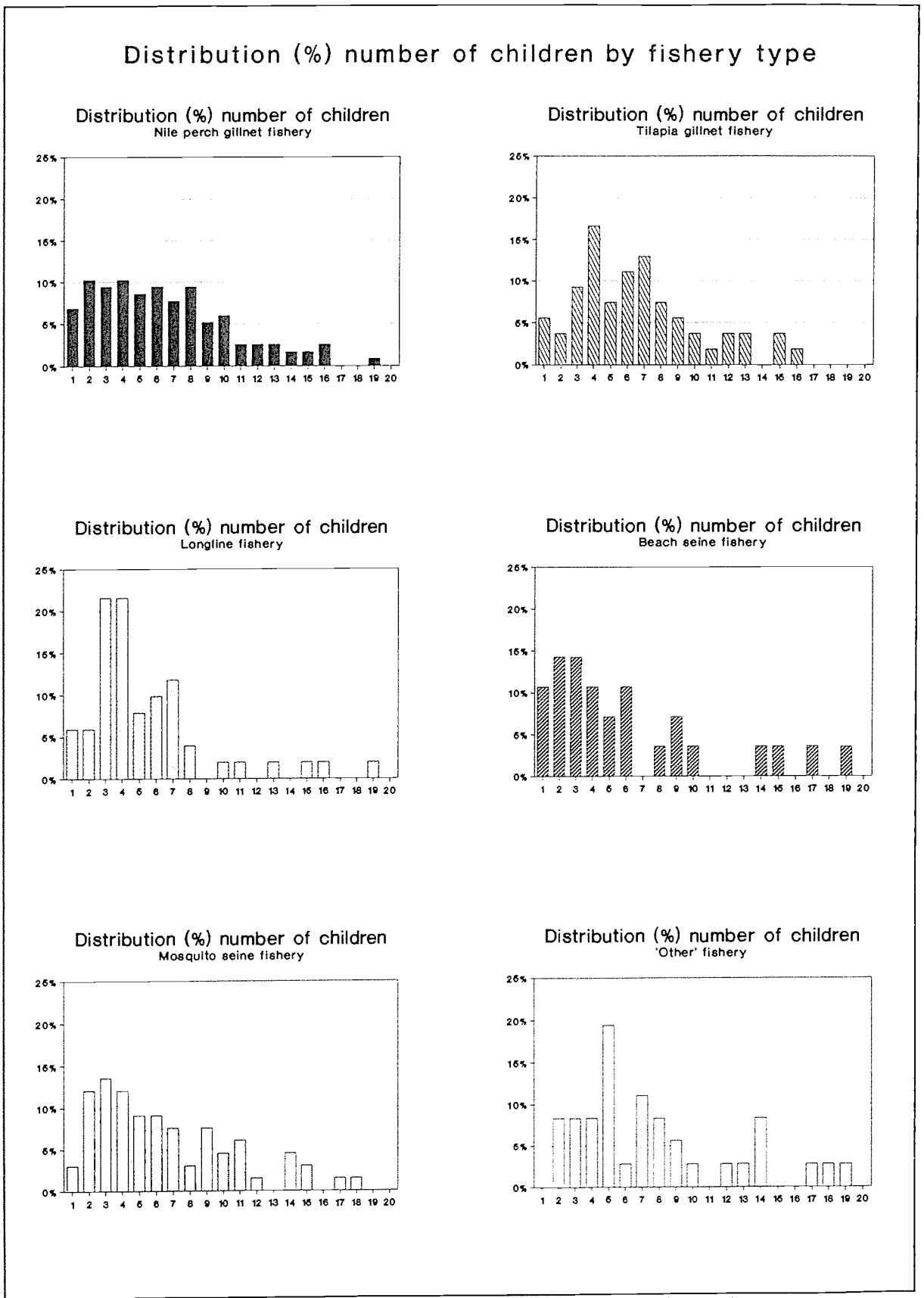


Figure 15 Distribution (%) of number of children by fishery type.

Table 4.13. Average number of children of boat owners by fishery type

Fishery type	Zero chil dren	% Zero Children	Average *) number of children	Standard deviation	Min	Max
Nile perch GN	4	3.3	7.0	5.3	1	36
Tilapia GN	3	5.3	7.2	5.8	1	40
Longline	2	3.8	5.5	4.5	1	19
Beach seine	4	12.5	7.0	3.7	1	31
Mosquito seine	7	9.5	6.5	4.2	1	18
Other	2	5.4	7.7	4.7	2	19
All combined	22	5.8	7.0	5.1	1	40

*) **Note**: Average excluding zero

Boat owners in the tilapia gillnet fishery have, on average, most children. This is likely to be explained by their more advanced age. Longliners are the youngest and have the least number of wives, consequently they have, on average, the lowest number of children.

Obviously the number of children of a boat owner is not equivalent with the number of children which are still dependent on him. Children leave the household either for study, work or because of marriage. Table 4.15. below gives the average number of dependent children.

Table 4.15. Average number of <u>dependent</u> children of boat owners by fishery type.

Fishery type	Zero children	% Zero Children	Average *) dependent children	Standard deviation	Min	Max
Nile perch GN	7	5.8	6.0	3.9	1	24
Tilapia GN	4	7.0	5.8	4.1	1	24
Longline	2	3.8	4.6	2.6	1	14
Beach seine	4	12.5	5.9	5.1	1	22
Mosquito seine	8	10.8	5.9	3.5	1	15
Other	2	5.4	6.5	4.2	2	19
All combined	27	7.2	5.8	3.9	1	24

*)**Note**: Average excluding zero

How often do children turn to the occupation of their father? Table 3.16. gives some more insight.

Table 4.16. Frequency of respondents having children involved in fishing.

	Respondents with fishing children		Respondents without fishing children		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	15	12.8	102	87.2	117	100.0
Tilapia GN	8	14.8	46	85.2	54	100.0
Longline	11	21.6	40	78.4	51	100.0
Beach seine	6	20.7	23	79.3	29	100.0
Mosquito seine	8	11.9	59	88.1	67	100.0
Other	7	22.6	24	77.4	31	100.0
Total	55	15.8	294	84.2	349	100.0

Combining all fishery types some 16% of the boat owners have least one child which is engaged in active fishing. Children turning to the occupation of fishing is most frequent in the longline - , beach seine and 'other' fishery.

Table 4.17. below gives the number of children involved in fishing.

Table 4.17. Frequency of the number of 'fishing' children by fishery type

	Number of children fishing							Total children fishing
Fishery type	1	2	3	4	5	6	7	
Nile perch GN	7	6	2	1	0	0	0	29
Tilapia GN	6	2	0	0	0	0	0	10
Longline	6	5	0	0	0	0	0	16
Beach seine	2	3	1	0	0	0	0	11
Mosquito seine	5	1	1	1	0	0	0	14
Others	4	2	0	0	0	0	1	15
Total frequency	30	19	4	2	0	0	1	95

In Section 4.3 we elaborate on the wish of boat owners to have their children engaged in fishing.

Children of boat owners turning to fish processing is much less frequent as shown in Table 4.18.

Table 4.18. Frequency of children involved in fish processing

	Respondents with fish processing children		Respondents without fish processing children		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	5	4.3	112	95.7	117	100.0
Tilapia GN	1	1.9	53	98.1	54	100.0
Longline	1	2.0	50	98.0	51	100.0
Beach seine	1	3.4	28	96.6	29	100.0
Mosquito seine	2	3.0	65	97.0	67	100.0
Other	3	9.4	29	90.6	32	100.0
Total	13	3.7	337	96.3	350	100.0

Only 3.7 % of the boat owners have children engaged in fish processing. The total number of children involved in processing were 12 males and 8 females. This low number of boat owners with children engaged in fish processing suggests that this activity is either quite disconnected from the harvesting sector or that others, for example children of crew or old(er) people take up the trade.

4.1.6. Ownership of productive assets and the use of credit

4.1.6.1. Ownership of fishing equipment and use of credit

The average number of fishing boats owned by the respondents in the various fishery types is displayed in table 4.19. below.

Table 4.19. Average number of boats owned by boat owner by fishery type

Fishery type	Type of boat				
	Karua	Sesse	Taruma	Total	Average nb. of boats per boat owner
Nile perch GN	23	133	30	186	1.54
Tilapia GN	13	47	10	70	1.23
Longline	6	53	3	62	1.17
Beach seine	2	45	0	47	1.47
Mosquito seine	5	86	4	95	1.28
Other	14	64	5	83	2.44
Total	63	428	52	543	1.45

The overall (all fisheries combined) average number of boats owned by the respondents is 1.5. The average number of boats owned is highest in the 'Other' and Nile perch gillnet fishery, 2.4 and 1.5 boats respectively. Ownership of boats means in most cases full (100%) ownership by one person. Sharing of boats however does occur on a limited scale. In the beach seine fishery 15.6% of the boat owners declared to (also) share a boat with others, usually one or two family members. In the longline - , Nile perch - and 'other' fisheries 11.3%, 8.5% and 8.1% of the boat owners respectively declared to share at least one boat with either a family - or crew member.

Utilization of credit for the purchase of a boat is rare. Combining all fishery types, only 17 boat owners (4.5%) declared to have received credit,

from either a family member, fish processor or local shopkeeper, for the purchase of a boat.

Ownership of gear, in terms of capital invested, has already been dealt with in Section 3.2. As in the case of boats, sharing of gear is equally limited. The respondents usually bought gear from their own savings. Combining all fishery types, only 3.2% of the respondents declared to have received some credit for the purchase of the gear.In the Nile perch gillnet fishery 6.6% of the respondents declared to share (at least one) gear with a family - or crew member. In the 'Other' fishery, 13.9% of the boat owners also declared to share with family or crew. Sharing of gear is virtually non-existent in the remaining fishery types.

The number of respondents owning engines have been listed in Section 3.1.1. Seven percent of the engines are shared. Contrary to boats and gear, engines are often acquired through utilization of credit. About 35% of the engines are at least partly financed from external sources. These credits often originate from fish traders.

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.
Ownership of land was found to be very common among boat owners around the lake as can be seen from table 4.20.

Table 4.20. Land ownership of boat owners by fishery type.

	Owning Land		Not owning land		Unknown		Total	
Fishery type	n	%	n	%	n	%	n	%
Nile perch GN	111	91.7	9	7.4	1	0.8	121	100.0
Tilapia GN	51	89.5	4	7.0	2	3.5	57	100.0
Longline	48	90.6	3	5.7	2	3.8	53	100.0
Beach seine	31	96.9	1	3.1	0	0.0	32	100.0
Mosquito seine	67	90.5	4	5.4	3	4.1	74	100.0
Other	34	91.9	2	5.4	1	2.7	37	100.0
All combined	342	91.4	23	6.1	9	2.4	374	100.0

As much as 91.4 % of the boat owners own land. The highest rate of landownership is found in the beach seine fishery. No significant differences are observed between the remaining fishery types.

The average acreage owned is displayed in table 4.21.

Table 4.21. Average surface (acres) of land owned per respondent by fishery type

Fishery type	Total surface	Total respondents	Average acreage per respondent
Nile perch GN	865.25	111	7.80
Tilapia GN	266.25	51	5.22
Longline	270.75	48	5.64
Beach seine	255.00	31	8.23
Mosquito seine	464.00	67	6.93
Other	284.75	34	8.38
All combined	2406.00	342	7.04

Respondents in the 'other', beach seine and Nile perch gillnet fisheries own, on average, the largest amount of land.

Table 4.22. below indicates how the land is obtained.

Table 4.22. Mode of acquisition of land in percentages by fishery type.

Fishery type	Allocated by headman	Inherited	Rented	Bought	Other
Nile perch GN	3.6	83.8	2.7	29.7	2.7
Tilapia GN	5.9	94.1	0.0	11.8	0.0
Longline	0.0	97.9	0.0	14.6	2.1
Beach seine	0.0	90.3	0.0	25.8	0.0
Mosquito seine	1.5	92.5	1.5	25.4	1.5
Other	0.0	79.5	0.0	35.3	0.0
All combined	2.3	90.1	1.2	24.3	1.5

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

Usually land is obtained through inheritance. The second way of obtaining land is through buying, about one quarter of the boat owners have bought land. Buying of land is, compared with the other fishery types, less common in the tilapia gillnet - and longline fishery. The traditional system of land allocation by village headman has virtually disappeared indicating that, among others, land is becoming scarce. Land has a definite economic value and is traded. 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 boat owners.

Table 4.23. Ownership of livestock by fishery type

Cattle ownership of boat owners by fishery type

	zero cattle	% zero cattle	average heads	standard deviation	maximum	Total cattle
Nile perch GN	10	8.3	9.6	12.0	97	1167
Tilapia GN	19	33.3	6.5	7.1	34	246
Longline	19	35.9	4.8	4.6	25	164
Beach seine	3	9.4	8.1	7.4	30	236
Mosquito seine	26	35.6	8.0	6.9	45	385
Other	8	21.6	7.6	10.9	60	197

Goat ownership of boat owners by fishery type

	zero goats	% zero goats	average heads	standard deviation	maximum	Total goats
Nile perch GN	41	33.9	9.3	11.8	97	745
Tilapia GN	28	49.1	9.1	10.3	57	263
Longline	20	37.7	5.7	4.7	20	187
Beach seine	9	28.1	9.5	10.4	40	218
Mosquito seine	25	34.3	7.0	5.2	21	344
Other	8	21.6	8.2	9.1	40	212

Sheep ownership of boat owners by fishery type

	zero lambs	% zero lambs	average heads	standard deviation	maximum	Total lambs
Nile perch GN	68	56.2	7.8	9.8	70	411
Tilapia GN	37	64.9	4.7	3.1	13	93
Longline	39	73.6	4.0	2.3	8	56
Beach seine	24	75.0	4.9	2.9	12	39
Mosquito seine	51	69.9	5.8	3.1	12	133
Other	18	48.7	6.7	7.4	25	107

Poultry ownership of boat owners by fishery type

	zero poultry	% zero poultry	average heads	standard deviation	maximum	Total poultry
Nile perch GN	8	6.6	16.5	12.8	97	1870
Tilapia GN	7	12.3	12.2	9.9	50	610
Longline	5	9.4	12.5	11.8	50	601
Beach seine	7	21.9	21.0	24.1	97	524
Mosquito seine	14	19.2	14.4	10.8	50	865
Other	4	10.8	16.0	9.3	40	479

If we accept that ownership of animals reflects wealth of the boat owner it can be concluded that the boat owners engaged in the Nile perch gillnet fishery are significantly more wealthy than boat owners in the other

fisheries. Apart from goat ownership these respondents always have the lowest percentage of non-ownership and one of the highest average (head) ownerships.

4.2. Occupational and geographical mobility

4.2.1. Family of origin

The majority of the boat owners (62.2 %) originates from a family where the father is/was a fisherman.

Table 4.24. Occupation of father of boat owners in percentages by fishery type.

Fishery type	Fisher man	farmer	trader	animal producer	labou-rer	other	Total n	Total %
Nile perch GN	60.0	21.7	1.7	3.3	7.5	5.8	120	100.0
Tilapia GN	70.2	8.8	8.8	3.5	1.8	7.0	57	100.0
Longline	54.7	20.8	1.9	1.9	9.4	11.3	53	100.0
Beach seine	54.8	19.4	3.2	9.7	9.7	3.2	31	100.0
Mosquito seine	56.8	18.9	6.8	1.4	10.8	5.4	74	100.0
Others	91.2	2.9	2.9	0.0	2.9	0.0	34	100.0
Total	62.2	17.1	4.1	3.0	7.3	6.0	369	100.0

Boat owners in the "other" and tilapia gill net fishery originate significantly more often from a 'fisherman family' compared to the other fishery types. A comparison of table 4.23. above and 4.24. below suggests that there has been a gradual shift in the employment structure. When looking into the employment structure of the grandfathers it is noted that farming and livestock rearing was more important before. In other words sons of farmers and animal producers have been gradually shifting to fishing.

Table 4.25. Occupation of grandfather in percentages by fishery type.

Fishery type	Fisher man	farmer	trader	animal producer	labou-rer	other	Total n	Total %
Nile perch GN	50.0	30.5	0.8	11.9	2.5	4.2	118	100.0
Tilapia GN	54.0	22.0	0.0	22.0	0.0	2.0	50	100.0
Longline	56.5	23.9	2.2	15.2	2.2	0.0	46	100.0
Beach seine	50.0	40.0	0.0	10.0	0.0	0.0	30	100.0
Mosquito seine	57.5	29.6	1.4	8.5	2.8	0.0	71	100.0
Others	52.9	29.4	0.0	14.7	2.8	0.0	34	100.0
Total	53.3	28.9	0.9	13.2	2.0	1.7	349	100.0

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. The details, by fishery type, are given in table 4.26.

Table 4.26. Occurrence of previous occupation of boat owners by fishery type in percentages.

	A previous occupation		No previous occupation		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	54	44.6	67	55.4	121	100.0
Tilapia GN	27	47.4	30	52.6	57	100.0
Longline	28	52.8	25	47.2	53	100.0
Beach seine	16	50.0	16	50.0	32	100.0
Mosquito seine	45	61.6	28	38.4	73	100.0
Other	18	48.6	19	51.4	37	100.0
All combined	188	50.4	185	49.6	373	100.0

About half of the boat owners declared to have had a major occupation before there present occupation. The occurrence of a previous occupation is clearly highest in the mosquito seine 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 boat owners were asked from which source they gain there main income and their secondary income. Tables 4.26. and 4.27. give the results.

Table 4.27. Main income of boat owners by fishery type.

Fishery type	Fishing *)	Farming	Trading	Animal production	Labouring	Other	Total n	Total %
Nile perch GN	89.3	5.8	1.7	0.0	2.5	0.8	121	100.0
Tilapia GN	80.7	14.0	5.3	0.0	0.0	0.0	57	100.0
Longline	94.3	3.8	1.9	0.0	0.0	0.0	53	100.0
Beach seine	90.6	0.0	6.3	0.0	0.0	3.1	32	100.0
Mosquito seine	86.5	2.7	6.8	0.0	2.7	1.4	74	100.0
Others	91.2	2.9	2.9	0.0	2.9	0.0	34	100.0
All combined	88.4	5.4	3.8	0.0	1.6	0.8	371	100.0
n	328	20	14	0	6	3	371	

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

Overall 88.4 % of the respondents mentioned to gain most of their income from fishing. Regularly, however, farming and trading provides most of the income. One-fifth of the boat owners in the tilapia gillnet fishery gain most of their income outside their fishing activities, especially from farming.
The boat owners in the mosquito- and beach seine fishery regularly gain most of their income from trading.

Some 62 % of the respondents declared to have an income from a secondary occupation.

Table 4.28. Secondary income of boat owners by fishery type

Fishery type	Fish-ing	Farming	Tra-ding	Animal produc-tion	Labou-ring	Other	Total n	Total %
Nile perch GN	13.3	52.0	18.7	0.0	1.3	14.7	75	100.0
Tilapia GN	25.6	56.4	7.7	2.6	2.6	5.1	39	100.0
Longline	9.1	66.7	15.2	0.0	0.0	9.1	33	100.0
Beach seine	10.5	52.6	21.1	0.0	10.5	5.3	19	100.0
Mosquito seine	18.4	59.2	16.3	0.0	2.0	4.1	49	100.0
Others	5.6	61.1	22.2	0.0	0.0	11.1	18	100.0
All combined	15.0	57.1	16.3	0.4	2.1	9.0	233	100.0
n	35	133	38	1	5	21	233	

As we have seen in Section 4.1.6., 91.4 % of the boat owners own land. As such it is not surprising to find that farming is clearly the most important secondary source of income. Many boat owners, however, also engage in trading (fish trade, retail shops, etc.) especially in the Nile perch -, beach seine and 'other' fisheries. These observations on primary and secondary sources of income confirm the comment (quoted in Section 4.1.1.) made by Ogutu (1988).

Because of the (expected) significance of farming as an income generating (side) activity of the fishermen, some additional information was collected on this trade. Firstly information was collected on the importance of the various crops grown such as maize, millet, sorghum etc. The results are displayed in table 4.29.

Table 4.29. Percentage of respondents growing crop X by fishery type

Fishery type	CROP													
	Maize	Sorghum	Millet	Beans	Cassava	Cotton	Ground - nuts	Rice	Toma- toes	Sugar -cane	Vege- tables	Fruit	Other	Un- known
Nile perch GN	81.0	57.0	21.5	15.7	14.0	5.8	5.8	0.8	2.5	2.5	5.8	2.5	1.7	2.5
Tilapia GN	73.7	47.4	26.3	10.5	7.0	10.5	5.3	10.5	5.3	1.8	5.3	0.0	5.3	0.0
Longline	69.8	52.8	22.6	9.4	15.1	24.5	13.2	3.8	3.8	1.9	5.7	1.9	0.0	0.0
Beach seine	75.0	50.0	34.4	9.4	12.5	0.0	3.1	0.0	0.0	0.0	15.6	6.3	0.0	9.4
Mosquito seine	74.3	50.0	23.0	9.5	1.4	17.6	12.2	2.7	2.7	0.0	8.1	0.0	2.7	8.1
Other	67.6	37.8	27.0	21.6	18.9	18.9	16.2	0.0	0.0	2.7	13.5	0.0	0.0	0.0
All combined	75.1	51.1	24.3	12.8	11.0	12.3	8.8	2.9	2.7	1.6	7.8	1.6	1.9	3.2
N	281	191	91	48	41	46	33	11	10	6	29	6	7	12

Maize is by far the most important crop grown by the fishermen. Three quarters of all respondents declared to grow this crop. The second most important crop is sorghum, cultivated by 51 % of all surveyed boat owners. Maize, sorghum, millet, cassava and beans are mainly grown for subsistence. The main cash crop is cotton which is grown by 12 % of the respondents.

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

Table 4.30. Average yearly production for five major crops.

Crop	Average (kg/year)	Standard deviation	sample size (n)
Maize	687	926	275
Sorghum	738	955	183
Millet	725	820	90
Beans	337	603	48
Cassava	1134	1531	34

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.

The data do not allow calculation of land productivity.
Figure 16 gives the distribution of the total yearly production levels of the five major crops as attained by the respondents.

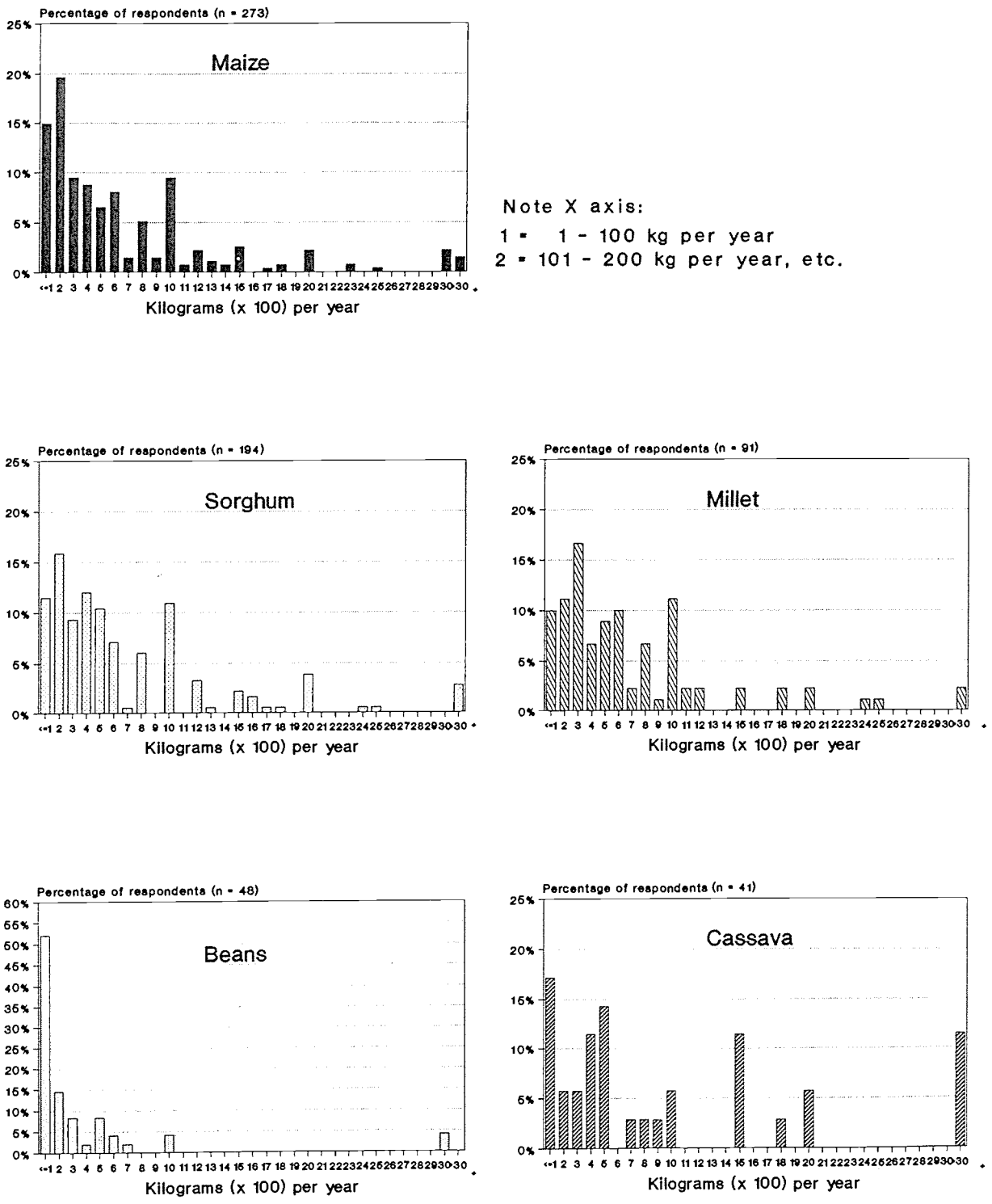


Figure 16 Production levels attained by respondents (per year), 5 major crops.

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?
In order to gain a general image of migration the boat owners were asked their district and division of birth.

Table 4.31. Number of boat owners by district of birth and fishery type.

	DISTRICT						
Fishery type	Busia	Siaya	Kisumu	South Nyanza	Kakamega	Mara	Total
Nile perch GN	6	37	10	66	1	1	121
Tilapia GN	4	21	14	18	0	0	57
Longline	12	9	6	26	0	0	53
Beach seine	2	9	1	20	0	0	32
Mosquito seine	3	21	9	41	0	0	74
Other	7	12	1	17	0	0	37
Total	34	109	41	188	1	1	374

The first four districts listed in the table above are the districts bordering the lake. Only two respondents were encountered which were not born in the lake region. The districts are rather large. One administrative level below the district we find the (smaller) division. There are in total 11 divisions bordering the lake. To have a more precise image of migration the boat owners were also asked their division of birth. We will not list the responses but from the analysis of the data it appeared that only 18 respondents (4.8%) were born in a division not bordering the lake. It is thus concluded that penetration from 'outsiders' into the fishery and resident in the beaches is very limited.[5]
As far as mobility around the shore itself is concerned a rather different picture emerged. Combining all fishery types, one-third of the respondents declared not to originate from the beach where they were active at the time of the survey. This is in accordance with the findings of the census (Hoekstra *et al.*, 1991) where it was discovered that there is considerable interdistrict migration around the lake shore.

[5] The execution of a crew member survey would be interesting as it is suspected that crew more often come from outside the immediate vicinity of the lake for either occasional or permanent fishing.

Table 4.32. Origin in beach of boat owners by fishery type

	Born in beach of interview		Not born in beach of interview		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	79	65.3	42	34.7	121	100.0
Tilapia GN	49	86.0	8	14.0	57	100.0
Longline	34	64.2	19	35.8	53	100.0
Beach seine	23	71.9	9	28.1	32	100.0
Mosquito seine	40	54.1	34	45.9	74	100.0
Other	23	67.6	11	32.4	34	100.0
Total	248	66.8	123	33.2	371	100.0

These migrants, however, usually take up residence in the beaches as can be seen from table 4.32.

Table 4.33. Residence in beach of interview by boat owner

	Resident in beach of interview		Not resident in beach of interview		Total	
Fishery type	n	%	n	%	n	%
Nile perch GN	116	95.9	5	4.1	121	100.0
Tilapia GN	55	98.2	1	1.8	56	100.0
Longline	52	98.1	1	1.9	53	100.0
Beach seine	32	100.0	0	0.0	32	100.0
Mosquito seine	70	94.6	4	5.4	74	100.0
Other	31	91.2	3	8.8	34	100.0
Total	356	96.2	14	3.8	370	100.0

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.

Table 4.34. Opinion regarding change of employment

	Stay in fisheries		Change employment		No opinion		Total	
Fishery type	n	%	n	%	n	%	n	%
Nile perch GN	93	79.5	20	17.1	4	3.4	117	100.0
Tilapia GN	40	71.4	15	26.8	1	1.8	56	100.0
Longline	35	66.0	16	30.2	2	3.8	53	100.0
Beach seine	22	68.8	10	31.3	0	0.0	32	100.0
Mosquito seine	47	64.4	25	34.2	1	1.4	73	100.0
Other	31	86.1	5	13.9	0	0.0	36	100.0
Total	268	73.0	91	24.8	8	2.2	367	100.0

The results suggest that boat owners in the Nile perch gillnet - and 'other' fisheries are quite content with their returns. Only 17.1% and 13.9% respectively declared to leave fishing if other opportunities would present

themselves. In the remaining fisheries about one-third declared to change employment.

Another technique to assess the (future) interest or confidence in fishing as opposed to other sectors was to evaluate investment priorities. The boat owners were asked in which sector they would invest given that they would be in the position to acquire a loan and were free to choose the sector of investment. Figure 17 gives the frequency distributions of these investment priorities by fishery type.

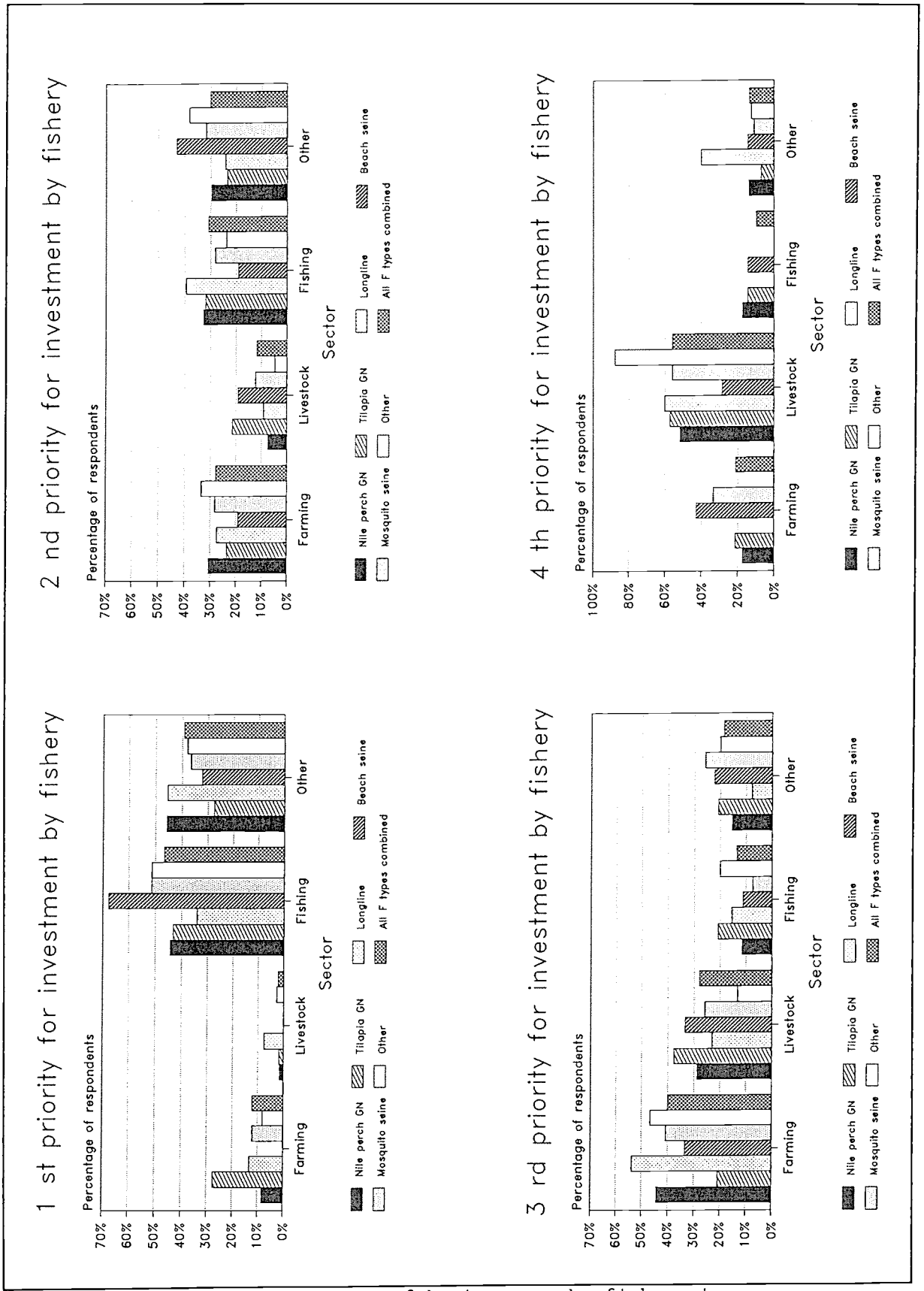


Figure 17 Investment priorities of boat owners by fishery type.

Combining all fishery types it is noted that about half of the respondents would invest in fishing. As can be seen from the graphs, the category 'other', meaning a sector outside the traditional sectors of farming, livestock and fishing, is very popular. The majority of the respondents in this category expressed interest to invest in construction, usually rental houses, shops and/or restaurants etc.. It can actually be noted that during the past decade many permanent buildings have been put up on the lake shores. There is no doubt that substantial amounts of money earned in fishing have been invested in the construction sector.

The third and last technique applied in assessing the respondent's interest or confidence in fishing was an investigation into their ideas on the future of their sons. Although almost three-quarters of the respondents expressed their wish to stay in fisheries themselves (see above) only one-third perceived fishing as a future for their sons.

Table 4.35. Opinion regarding employment of sons

	Fishing		Not fishing		No opinion		Total	
Fishery type	n	%	n	%	n	%	n	%
Nile perch GN	36	30.3	65	54.6	18	15.1	119	100.0
Tilapia GN	20	35.1	30	52.6	7	12.3	57	100.0
Longline	14	27.5	27	52.9	10	19.6	51	100.0
Beach seine	17	54.8	13	41.9	1	3.2	31	100.0
Mosquito seine	25	33.8	37	50.0	12	16.2	74	100.0
Other	13	35.1	22	59.5	2	5.4	37	100.0
Total	125	33.9	194	52.6	50	13.6	369	100.0

More than half of the boat owners explicitly expressed the wish to see their sons employed in other sectors. Some 14% of the respondents do not have a fixed view on the issue. Reasons given for a different future for their sons related to the wish to educate them, the fact that fishing is a very insecure occupation, lack of confidence in the sustainability of the stocks and the low status of fishing as a profession.

It is widely known that the introduction and subsequent proliferation of the Nile perch in lake Victoria has induced much controversy in the population and among scientists. Here we will not elaborate on the different effects of the introduction of Lates and its various blessings and drawbacks. They have been reported in many publications as well as in the popular press[6]. In this survey we were interested in the general view of the fishermen themselves. In order to obtain the respondent's opinion on the issue the following (open ended) question was put across: "There are people who say that the introduction of the Nile perch in Lake Victoria has not been a good development for the people in the fishing communities. What is your opinion? Explain."

About 5% of the respondents evaluated the introduction of Nile perch as a negative development. Usually these boat owners were engaged in tilapia gillnetting or mosquito seining (for Rastrineobola argentea) and claimed that Nile perch has diminished the stocks of their target species. A few respondents pointed at the decreased variety of fish in the lake.
The overwhelming majority (95%), however, evaluated the development as

[6] A comprehensive overview of the controversy is given in Reynolds and Gréboval (1988).

positive although some pointed out that Nile perch is disproportionately benefitting those who have enough (starting) capital to venture into this fishery. Others drew attention to the fact that, although they favoured Nile perch, it has displaced small scale traders (especially women) from processing and marketing. The bulk of statements in support of Nile perch related to increased food availability and increased incomes and savings generated in the fishing communities. Much of the earnings were re-invested in fishing and many rental houses, shops, small restaurants etc. have been constructed with income from Nile perch fishing. Fishermen also referred to the fact that it is now easier to pay for the education of their children and other dependents. Many fishermen also invested in land and/or livestock from their increased fishing income.

The respondents were also asked their view on the consequences of the penetration of 'outsiders' in marketing. The question was: "There are people who say that because refrigerated trucks and pickup traders buy all the fish being landed there is not enough fish available for consumption by the local people. What is your opinion? Explain". About one-fifth of the respondents directly agreed with the statement. They pointed out that, at times, real shortages of fish occur, especially for those not engaged in fishing and those who live in the immediate hinterland. The remainder of the boat owners tended to deny the statement. From their responses, however, it was evident that many were more answering out of self interest than objectively giving a general view. Because the penetration of 'outsiders' does not occur every day in every beach the effects on local fish availability varies in space and time. Beaches were indeed encountered where respondents did not have any view on the issue simply because an influence from trucks and pickup traders was not felt. It is clear however that the phenomenon of fish shortages for local consumption does exist. Fish below 1 kg is generally refused by the large scale traders and thus left for local traders and/or consumers. Spoilt and other fish rejected by the large scale traders is also absorbed in the local market. This fish is than usually bought by women who smoke the fish. Fishermen also stated that fish like Labeo sp., Tilapia/Oreochromis spp., Protopterus sp. and Haplochromines are not bought by the trucks and thus left for local traders. The involvement of refrigerated trucks and pickup traders in marketing is definitely seen as a positive development by the majority of the respondents. Refrigerated trucks and pickup traders offer higher prices than local traders. Furthermore Local traders cannot absorb the large quantities of fish landed. The fact that fish is now sold per kilogram is seen as more convenient than the previous system. A number of boat owners pointed out that there is a moral obligation for fishermen to set fish aside for local trade and consumption. Beaches were indeed encountered where fishermen stated to serve local traders first or where the beach leader dictated the rule to sell to local traders first and verified that it was respected. These traders would then often (also) sell to the trucks.

4.4. Problems identified in the fishery

This last section deals with the problems encountered in the fishery. The respondents were asked to list their problems with respect to their fishing activities. A wide range of problems was mentioned. They can be classified under the following broad headings.

Problems related to the:
a.) socioeconomic and sociocultural environment
b.) price and quality of inputs (specifically nets and seines)
c.) resource
d.) market and infrastructure
e.) physical environment and safety in the lake

f.) health situation
g.) border situation
h.) role of government

a.) Some 70% of the boat owners explicitly mentioned the theft of gear (and/or fish) as their major problem. One boat owner, for example, claimed that in a period of six years he had been stolen nets 10 times. The total value of his losses amounted to some Kshs. 300.000. During the first 6 months of 1991 he claimed to have been stolen nets with a total value of Kshs. 123.000.
Problems were also expressed concerning the boat owner's relations with the crew, crew instability and supervision of the boat(s) in the case of disobedient crew. Some boat owners obviously suspected their crew of stealing. Sometimes licenses for crew are paid just to see them leave after a short time. A frequently recorded complaint was the selling of fish to transport boats in the open waters of the lake leaving a small(er) share for the owner. Some boat owners also expressed shortages of labour with the consequent difficulties of crew recruitment. This problem is especially encountered in the mosquito seine fishery. Only five fishermen referred to trawlers destroying their gear as being one of their problems. Another issue mentioned was the fact that some beaches refuse ,or heavily limit, access to migrant fishermen. More educated boat owners pointed at the fact that fishermen are paid on a daily basis and tend to spend their earnings immediately after cashing. In other words these respondents referred to the low propensity to save of many of their fellow fishermen. The scarcity of banking facilities to deposit savings was seen as a related problem.

b.) As expected many fishermen (40%) criticized the high price of inputs, specifically nets, seines and outboard engines. Respondents also regularly grieved about the decreasing quality of nets. Although complaints of high boat prices were recorded they were far less frequent.

c.) Fishermen obviously stated the problem (inherent to fishing) of fluctuating catches and at times losses because of a low catch. Worries were also recorded about the decreasing size of fish and diminishing stocks. Longliners frequently mentioned the trouble of obtaining bait (specifically haplochromis spp.). It was also regularly claimed that the closure of the Mbita channel has reduced stocks in the Nyanza gulf.

d.) The isolation and remoteness of many beaches creates problems of marketing. A large number of fishermen mentioned the lack of marketing outlets, especially during the rainy season when the roads are in such a bad state that traders can not reach the beach[7]. In these conditions post harvest losses increase. During the rainy season fishermen are often forced to travel far to dispose their catch. Especially mosquito seiners targeting for 'omena' (Rastrineobola argentea) frequently complained about strong price fluctuations and the fact that the market for this fish is not 'organized'. Lack of competition in the market was also encountered. In a number of (more isolated) beaches fishermen complained about the monopsonistic power of a large scale trader. Their daily worry was if a truck would be at the landing site to purchase their catch. Hardly any fishermen mentioned lack of ice as a problem. Only a few fisherman mentioned the need for construction of an ice plant and/or cold storage facilities. They felt that this would provide the conditions for a stronger bargaining power vis-a-vis the traders.

---

[7] The significance of this problem can be illustrated by the fact that a number of beaches was encountered where the village population had pooled their capital and labour to construct or improve access roads large enough for trucks to pass.

e.) Understandably problems were also mentioned with respect to heavy weather, rough waters etc. and the related problems of loss of equipment and safety. Some mentioned loss of nets because of hippo's. More serious were the worries about the spread of the water hyacinth, locally referred to as 'floating islands' or 'Nile cabbage' which, among others, leads to regular losses of nets. Lack of timber for the construction of boats is also an increasing worry among fishermen. Increasing quantities of timber for boat construction have to be imported from Uganda. Although this wood is more expensive fishermen do claim that the quality of wood is by far superior to the local wood.

f.) Although not frequent a number of fishermen mentioned the existence of bilharzia as one of their problems.

g.) In the border areas problems were recorded related to the limited size of the fishing grounds and security.

h.) Some fishermen complained about regulations on mesh size imposed by the fisheries department. Others, however, were clearly aware of the need for this type of regulation. The need for training in processing techniques was also mentioned. A fair number of fishermen pointed at the lack of credit facilities. Although some fishermen mentioned the cost of licenses and taxes to be too high their number was limited. The need for 'Fisheries Department patrol boats' was also mentioned. Interestingly one beach was encountered where fishermen had organized themselves against gear theft by collectively operating two patrol boats.

References

Hoekstra T.M., A. Asila, C. Rabuor, O. Rambiri. Report on the census of
1991 fishing boats and gear in the Kenyan waters of Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/26/91 (En): 36p.

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.

Fisheries Department, Ministry of Regional Development/FAO Review of the
(in press) Fisheries of Kenya.

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.

Ogutu E.M., Artisanal Fisheries of Lake Victoria, Kenya. Social and Economic
1988 aspects of production and marketing. Paper presented at the regional workshop on the Fisheries of Lake Victoria, Kenya.

Prado J., R.J. Beare, J. Siwo Mbuga and L.E. Oluka. A catalogue of fishing
1991 methods and gear used in Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/19/91 (En):104p.

Reynolds J.E. and D.F. Gréboval, Socioeconomic effects of the evolution of
1988 the Nile perch fisheries in Lake Victoria: A review. CIFA Technical paper (17): 148p.

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

SOCIO-ECONOMIC SURVEY OF BOAT OWNERS, LAKE VICTORIA 1991 GOK/IFIP

A. IDENTIFICATION PARTICULARS Stratum [ ][ ] A1 [ ][ ]

1. Name of beach : [ ] A2 [ ][ ][ ]
2. Date : [ ]
3. Name of interviewer : [ ]
4. Boatowner code : [ ][ ][ ][ ] A3 [ ][ ][ ][ ]

B. BOATOWNER IDENTIFICATION

1. Is the respondent :

Full-time fisherman (> 10 days per month) 1 [ ] B1 [ ]

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

Occasional fisherman (< 5 days per month) 3 [ ]

Not fisherman 4 [ ]

└> If not a fisherman what is his main occupation? [ ]

2. To which tribe does he belong?

Luo 1 [ ] Luya 2 [ ] Kikuyu 3 [ ] Other (Specify) _____ B2 [ ]

3. What is his religion? [ ] B3 [ ]

4 a. What is his district of birth? [ ]

b. What is his Division of birth? [ ] B4 [ ][ ]

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

Yes 1 [ ] No 2 [ ] B6A [ ]

b. └> if yes, which occupation [ ] B6B [ ]

6. If fisherman how many years ago did he start fishing? [ ][ ] years

See Sect.I

B7 [ ][ ] B8 [ ] B9 [ ]

7. What is his age? [ ][ ] years (H1A) [ ][ ] Code to section J

C. RESIDENTIAL MOBILITY

1. Is the place of interview the place where he was born?

Yes 1 [ ] No 2 [ ]

2. Is the place of interview the place where he normally lives?

Yes 1 [ ] No 2 [ ]

3. └> If yes:

Since birth (enter age) [ ][ ] years or [ ][ ]

Lived somewhere else and came (back) [ ][ ] years ago [ ][ ]

4. a. If no (in Q 2), 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 [ ]

b. └> How many months [ ][ ][ ] months [ ][ ][ ]

D. BOAT INFORMATION

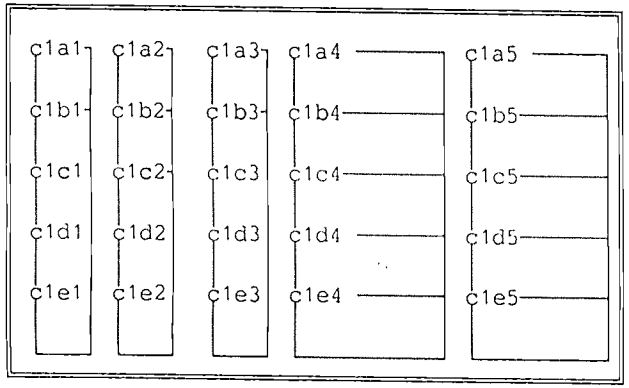
1. How many fishing boats does the respondent own? ☐ 2. How many transport boats does the respondent own? ☐

3. Give the following details with respect to the fishing boats:

*) Note: Type of boat: D for Dugout, KA for Karua, TA for Taruma, SE for Sesse, O for Other

BOAT NR	Type *)	Length (m)	Age (yr)	Replacement cost (Kshs)	Cost of maintenance per year	OWNERSHIP OF THE BOAT: Full 100%	Shared with (Enter number of co-owners): Crew	Family	Other Specify	CREDIT USED TO PURCHASE BOAT: NO	YES: Family	Friends	Fish processor	Other (specify)	MAIN PROPULSION OF THE BOAT: Oar/pole	Sail	Out-board
1																	
2																	
3																	
4																	
5																	
6																	

CODING FRAME BOATS



4. Does he hire the boat(s) out sometimes? Yes 1 ☐ No 2 ☐

Payment received in cash ☐ Kshs per month

or payment received in fish ☐ Kshs per month

Owns outboard engine? Yes 1 ☐ No 2 ☐

Rents outboard? Yes 1 ☐ No 2 ☐

At which cost? ☐ Kshs per month

Does he use it regularly? Yes 1 ☐ No 2 ☐

C2A ☐

C2B ☐

C2C ☐

C3A ☐

C3B ☐

C3C ☐

C3D ☐

E. ENGINE INFORMATION

1. If the boat(s) has an engine give the following details with respect to the engines.

						OWNERSHIP OF THE ENGINE							CREDIT USED TO PURCHASE THE ENGINE				
						FULL OWNERSHIP				SHARED WITH (enter number of coowners)			NO	YES			
	Brand	Horse power	Age (yr)	Replacement cost (Kshs)	Cost of maintenance per year	100% Self	100% Crew	100% Family	100% Other Specify	Crew	Family	Other Specify		Family	Friends	Fish processor	Other (specify)
B1																	
B2																	
B3																	
B4																	
B5																	

CODING FRAME

c4a1	c4a2	c4a3	c4a4	c4a5
c4b1	c4b2	c4b3	c4b4	c4b5
c4c1	c4c2	c4c3	c4c4	c4c5
c4d1	c4d2	c4d3	c4d4	c4d5
c4e1	c4e2	c4e3	c4e4	c4e5

2. Who is maintaining the engine(s)?

Himself 1 ☐ Family 2 ☐ Dealer 3 ☐ Other 4 ☐

CODE

C5 ☐

F. GEAR INFORMATION 1. Give the following details with respect to the gear on each of the boats.

	Gear Type *)	Length (m) or units	Depth (m)	Replacement cost (Kshs)	Age (yr)	OWNERSHIP OF THE GEAR: FULL OWNERSHIP 100% Self	100% Crew	100% Family	100% Other Specify	SHARED WITH (enter number of coowners) Crew	Fam-ily	Other Specify	CREDIT USED TO PURCHASE THE GEAR: NO	YES Family	Friends	Fish pro-ces-sor	Other (specify)
BO1																	
BO2																	
BO3																	
BO4																	
BO5																	

*) Note: Type of gear: NG for Nile perch Gillnet, TG for Tilapia gillnet, LL for Longline, MS for Mosquito seine, BS for Beach seine, LI for lights, SN for Setnet

CODING FRAME GEAR

d1a1	d1a2	d1a3	d1a4	d1a5	d1a6 111111111111
d1b1	d1b2	d1b3	d1b4	d1b5	d1b6 111111111111
d1c1	d1c2	d1c3	d1c4	d1c5	d1c6 111111111111
d1d1	d1d2	d1d3	d1d4	d1d5	d1d6 111111111111
d1e1	d1e2	d1e3	d1e4	d1e5	d1e6 111111111111
d1f1	d1f2	d1f3	d1f4	d1f5	d1f6 111111111111
d1g1	d1g2	d1g3	d1g4	d1g5	d1g6 111111111111

SUMMARY CODING FRAME CREDIT AND OWNERSHIP

BOAT	d2a1	d2a2	d2a3	d2a4	d2a5	d2a6
BOAT	d2d1	d2d2	d2d3	d2d4	d2d5	d2d6
ENGINE	d2b1	d2b2	d2b3	d2b4	d2b5	d2b6
ENGINE	d2e1	d2e2	d2e3	d2e4	d2e5	d2e6
GEAR	d2c1	d2c2	d2c3	d2c4	d2c5	d2c6
GEAR	d2e1	d2e2	d2e3	d2e4	d2e5	d2e6

G. SHARING SYSTEM AND FISHING MOBILITY

1. Indicate the sharing system for each type of gear.

	Crew size	Wage per crewmember per day or month	Crew share (% of catch)	Share for *) boat and gear
Nile perch gillnet				
Tilapia gillnet				
Mosquito seine				
Beach seine				
Longline				
Setnet				
Traps				
Trolling line				
.....				
.....				

e1a1	e1a2	e1a3	e1a4
e1b1	e1b2	e1b3	e1b4
e1c1	e1c2	e1c3	e1c4
e1c1	e1c2	e1c3	e1c4
e1d1	e1d2	e1d3	e1d4
e1e1	e1e2	e1e3	e1e4
e1f1	e1f2	e1f3	e1f4
e1g1	e1g2	e1g3	e1g4
e1h1	e1h2	e1h3	e1h4
e1i1	e1i2	e1i3	e1i4

*) After deduction of operational cost.

2. a. Does the crew bring its own fishing gear?
(check with gear section F on gear ownership)

Yes, always 1 ☐ Yes, sometimes 2 ☐ No 3 ☐ e2a ☐

b. Which kind of gear ☐ e2b ☐

How is the catch shared in this case? e2c ☐

.....

3. Do the crewmembers change to other boats sometimes?

	Yes From day to day	Yes From week to week	Yes From month to month		
Boat 1	1 ☐	2 ☐	3 ☐	No 4 ☐	e3 ☐
Boat 2	1 ☐	2 ☐	3 ☐	No 4 ☐	
Boat 3	1 ☐	2 ☐	3 ☐	No 4 ☐	

4. If the boatowner is himself a fisherman does he land his catch in an other village sometimes?

Yes 1 ☐ No 2 ☐ e4a ☐

e4b
j f m a m j j a s o n d

If yes, During which period of the year? ☐☐☐☐☐☐☐☐☐☐☐☐

With which fishing gear? ☐

Where? ☐

Why? ☐

e4c ☐

e4d ☐☐☐

e4e ☐

5. Does he has to pay the village government to fish in this village?

Yes 1 ☐ No 2 ☐ e5a ☐

if he fishes in an other village Yes 1 ☐ No 2 ☐ e5b ☐

If yes, how much in cash ..... e5c ☐

in fish ..... e5d ☐

6. Does he have exclusive rights to fish from a certain beach

H. DESTINATION OF THE CATCH

1. If the boatowner is a fisherman himself to whom does he sell the catch?

(Tick all appropriate boxes)		Tick box of main outlet	
Women on the beach	1 ☐	1 ☐	F11 ☐
Bicycle traders	2 ☐	2 ☐	F12 ☐
Traders with a pickup/lorry	3 ☐	3 ☐	F13 ☐
Cooperative	4 ☐	4 ☐	F14 ☐
Local shopkeeper	5 ☐	5 ☐	F15 ☐
Other (specify)_____	6 ☐	6 ☐	F16 ☐
Other (specify)_____	7 ☐	7 ☐	F17 ☐ ☐

2. How much fish does he keep weekly for home consumption

☐ kg/week F2 ☐

3. a: Does he process fish himself? Yes 1 ☐ No 2 ☐ Not married 8 ☐ F3A ☐

b: Does his wife(ves) process fish? Yes 1 ☐ No 2 ☐ F3B ☐

└ If either of the two is yes is processing:

Permanent 1 ☐ Seasonal 2 ☐ Occasional 3 ☐ F4 ☐

4. What is the relationship with fishtraders?
(Tick all appropriate boxes)

only to sell fish	1 ☐	F41 ☐
they provide credit	2 ☐	F42 ☐
they provide fishing boat	3 ☐	F43 ☐
they provide fishing gear	4 ☐	F44 ☐

I. OCCUPATIONS

1. Which was his fathers main occupation?

Fisherman 1 ☐ Farmer 2 ☐ Trader 3 ☐

Animal producer 4 ☐ Hired worker 5 ☐ Other (specify) 6 ☐

2. Which was his grandfathers main occupation?

Fisherman 1 ☐ Farmer 2 ☐ Trader 3 ☐

Animal producer 4 ☐ Hired worker 5 ☐ Other (specify) 6 ☐

3. According to income generated, which is his main occupation?

Fisherman 1 ☐ Farmer 2 ☐ Trader 3 ☐

Animal producer 4 ☐ Hired worker 5 ☐ Other (specify) 6 ☐

4. According to income generated, which is his secondary occupation?

Fisherman 1 ☐ Farmer 2 ☐ Trader 3 ☐

Animal producer 4 ☐ Hired worker 5 ☐ Other (specify) 6 ☐

5. Are these occpations:

	Permanent	Seasonal	Casual	
Principal Occupation (Q3)	1 ☐	2 ☐	3 ☐	G3A ☐
Secondary Occupation (Q4)	1 ☐	2 ☐	3 ☐	G3B ☐

Codes to page 1

(B8) ☐

(B9) ☐

G1 ☐

G2 ☐

6. If the occupation is seasonal indicate during which month:

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
Principal (Q3) Occ.													G4A												
Secondary (Q4) Occ.													G4B												

7. According to time spent, which is his main occupation?

Fisherman 1 ☐ Farmer 2 ☐ Animal producer 3 ☐ G5 ☐

Hired worker 4 ☐ Other (specify) _____

8. According to time spent, which is his secondary occupation?

Fisherman 1 ☐ Farmer 2 ☐ Animal producer 3 ☐ G6 ☐

Hired worker 4 ☐ Other (specify) _____

9. Are these occpations:

	Permanent	Seasonal	Casual	
Principal Occupation (Q7)	1 ☐	2 ☐	3 ☐	G7A ☐
Secondary Occupation (Q8)	1 ☐	2 ☐	3 ☐	G7B ☐

11. If the occupation is seasonal indicate during which months:

	J	F	M	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D
Principal (Q7) Occ.													G8A												
Secondary (Q8) Occ.													G8B												

J. INFORMATION ABOUT BOATOWNERS FAMILY

Code see p.1

1. a. What is his marital status?

Married 1 ☐ Single 2 ☐ Widower 3 ☐ Divorced 4 ☐ H1A ☐

b. If married, how many wives ☐ H1B ☐

2. What is the highest level of education he reached? ☐ H1C ☐

3. How many children does he have? ☐ H1D ☐

4. How many of them are (still) dependent on him? ☐ H2A1 ☐

5. Are there any children working as fisherman?

Yes 1 ☐ No 2 ☐

If yes, how many? ☐ H2D1 ☐

6. Are there any children working in fishprocessing or marketing?

Yes 1 ☐ No 2 ☐

If yes, how many? male ☐ female ☐ h2d1 ☐ h2d2 ☐

7. Is he himself head of the household in which he lives?

Yes 1 ☐ No 2 ☐ —— Who is head of the household? ☐ ☐

_____

K. FARMING AND BREEDING ACTIVITIES

1. How many fields does he and/or his wife(ves) hold? ☐ fields — I1A ☐

2. What is the total surface of the fields? ☐ acres — I1B ☐

3. How did he acquire these fields?
(Tick all appropriate boxes) — I1C1 I1C2

Allocated by village headman 1 ☐ Inherited 2 ☐

I1C3 I1C4 I1C5

Rented 3 ☐ Bought 4 ☐ Other (specify) ☐

4. Indicate his three main cultures: — I2A I2B I2C

a. ☐ b. ☐ c. ☐

5. Production in kilograms (during the past year) of:

Culture a. ☐ kg — I3A ☐

Culture b. ☐ kg — I3B ☐

Culture c. ☐ kg — I3C ☐

Note: If no production confirm that land is left idle!

6. How many of the following animals does he and/or his wife(ves) keep? — I4A I4B I4C

a. Cattle ☐ b. Goat ☐ c. Lamb ☐

I4D I4E I4F

d. Pig ☐ e. Poultry ☐ Other (specify) _____

L. ATTITUDES AND OPINIONS REGARDING FISHERY

1. If he had other employment possibilities he would: — J1A ☐

- stay in fisheries 1 ☐
- change profession 2 ☐
- doesn't know 3 ☐

Explain why _____

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

Yes 1 ☐ No 2 ☐ No opinion 3 ☐ — J2 ☐

Why not, explain _____

3. If he would earn more money (with fishing) how would he use it:
(List various answers in order op priority)

a. _____ J3A ☐

b. _____ J3B ☐

c. _____ J3C ☐

d. _____ J3D ☐

e. _____ J3E ☐

f. _____ J3F ☐

g. _____ J3G ☐

4. If he would be able to get a loan in what would he invest? — J4A J4B J4C J4D

Farming 1 ☐ Animals 2 ☐ Fishing 3 ☐ Other 4 ☐ ☐ ☐ ☐ ☐

Other (specify) _____

5. What are his main problems with respect to the fishing activities. (List them in order of priority)

a. _____ J5A ☐

b. _____ J5B ☐

c. _____ J5C ☐

d. _____ J5D ☐

e. _____ J5E ☐

f. _____ J5F ☐

g. _____ J5G ☐

h. _____ J5I ☐

i. _____ J5J ☐

j. _____ J5K ☐

k. _____ J5A ☐

6. Some people say that the introduction of the nileperch in the Lake has not been a good development for the people in the fishing communities. What is your opinion? Explain!

_____

_____

_____

_____

_____

post coding ☐

7. Some people say that because the lorries buy all the fish being ded there is not enough fish available for the local people! What is your opinion? Explain!

_____

_____

_____

_____

_____

post coding ☐

Annex 2 List of sampled villages and number of respondents

Beach name	Beach code	Number of boats	Sample intended	Sample size	Stra-tum	Beach size above/ below average
Rudacho	8	91	24	18	1	A
Uhanya	27	132	0	9	1	A
Wichlum	49	82	22	22	1	A
Osindo	53	49	13	13	1	A
Misori B	54	89	24	24	1	A
SUBTOTAL			83	86		
Bumbe	1	10	7	7	1	B
Nambo	22	28	0	8	1	B
Uharia	34	17	11	7	1	B
Oele	36	36	0	15	1	B
Lwanda Konyimbo	41	18	12	11	1	B
Ludhi	50	18	12	4	1	B
SUBTOTAL			42	52		
Dunga	82	69	0	4	2	A
Tako	83	25	15	11	2	A
Nyamware	84	35	0	14	2	A
Obaria	110	36	22	18	2	A
Ngega	124	24	0	12	2	A
Gode Ariyo	135	28	17	0	2	A
Uyoga	143	35	21	21	2	A
SUBTOTAL			75	80		

Beach name	Beach code	Number of boats	Sample intended	Sample size	Stra-tum	Beach size above/ below average
Wikwang	57	18	13	12	2	B
Obange	86	16	12	1	2	B
Kendu Bay	108	24	0	5	2	A/B
Balarawi	116	22	17	16	2	B
Lela-Homa Bay	125	10	8	0	2	B
SUBTOTAL			50	34		
Kiumba	162	55	19	19	3	A
Lwanda Konyango	196	47	17	17	3	A
Got Kachola	200	57	20	21	3	A
Nyangwina	204	60	0	6	3	A
Ngore	205	57	19	13	3	A
SUBTOTAL			75	76		
Nyachebe	145	15	0	2	3	B
Tabla	146	23	12	12	3	B
Gingo	147	28	0	11	3	B
Siyenga/Sienga	165	30	16	12	3	B
Rasira	188	23	12	11	3	B
Mukuyu	189	19	10	0	3	B
SUBTOTAL			50	48		
TOTAL		1326	375	376	28.4 %	
NOTE						
Stratum 1 = North		A = Above avg				
Stratum 2 = Gulf		B = Below avg				
Stratum 3 = South						

LIST OF IFIP REPORTS - LISTE DES RAPPORTS PPEC

I. 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 SADCC/FAO Training Workshop on Fisheries Planning, Victoria Falls, Zimbabwe, 15-24 Novembre 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
1990 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
1990 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
1990 Fisheries. A Symposium organized by the IFIP Project under the framework of the CIFA Sub-comittee 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
1990 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
1990 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
1990 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
1990 Fisheries Development and Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/13/90 (En)**: 115p.

Report of the Workshop on Fisheries Statistics and Information Systems for
1990 Lake Victoria, 26-29 June 1990, Kampala, Uganda, 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
1990 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
1990 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
1990 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.

Machena C. and V. Kanondo, A Review of the Fisheries of Lake Kariba and
1991 their Management. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-**TD/17/91 (En)**: 58p.

Rapport de la deuxième réunion du Comité consultatif du projet régional
1991 pour la planification des pêches continentales. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC).

RAF/87/099-TD/18/91 (Fr): 25p.

Report of the Second Meeting of the Advisory Committee of the Regional 1991 Project for Inland Fisheries Planning. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-**TD/18/91 (En)**: 23p.

Prado J., Beare R.J., Siwo Mbuga J., Oluka L.E. A catalogue of fishing 1991 methods and gear used in Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-**TD/19/91 (En)**: 104p.

Biribonwoha A.R. A Review of Fisheries Inputs in Kenya, Tanzania and 1991 Uganda. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-**TD/20/91 (En)**: 65p.

Rapport de la deuxième Consultation technique sur l'aménagement des 1991 pêcheries des lacs Edouard et Mobutu Sese Seko. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**TD/21/91 (Fr)**: 27p.

Report of the Second Technical Consultation on the Management of the 1991 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.

Leendertse K. and B. Horemans. Socio Economic Characteristics of 1991 the Artisanal Fishery in Kigoma region, Tanzania. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/22/91 (En)**: 104p.

Hanek G, K. Leendertse and B. Farhani. Socio-Economic Investigations of 1991 Lake Kivu Fisheries. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/23/91 (En)**: 55p.

Report on the Regional Training Course on Fish Stock Assessment, 21 January 1991 - 15 February 1991, Kariba, Zimbabwe. Denmark funds-in-trust FI: GCP/INT/392/DEN-Act. Rep. No 29 and UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/24/91 (En)**: 29p.

Bellemans M., Structural characteristics of the Burundi Fisheries in 1990 1991 and Historical Review. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/25/91 (En)**: 26p.

Hoekstra T.M., A. Asila, C. Rabuor, O. Rambiri. Report on the census of 1991 fishing boats and gear in the Kenyan waters of Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/26/91 (En)**: 36p.

Ssentongo G.W. and J.D. Nfamara. Report of a National Seminar on the 1991 Development and Management of the Kenyan Fisheries of Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**TD/27/91 (En)**: 124p.

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.

Maes M., G. Ntakimazi et J. Ruremesha. Situation générale des lacs Cohoha
1991 et Rweru et propositions d'aménagement. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/29/91 (Fr): 61p.

Rapport de la deuxième Consultation technique portant sur l'aménagement des
1991 pêcheries des lacs Cohoha et Rweru. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/30/91 (Fr): 47p.

Ssentongo G.W. and F.L. Orach-Meza (eds.), Report of a National Seminar on
1992 the Development and Management of Ugandan fisheries of Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/31/92 (En): 137p.

Gréboval D. et M. Maes, Caractéristiques et évolution des pêcheries des
1991 lacs partagés d'Afrique centrale. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-TD/32/91 (Fr) : 35p.

Ssentongo G.W. and N. Dampha (eds), Report of the Technical Consultation
1992 between Malawi and Mozambique on Lakes Malawi, Chilwa and Chiuta. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/33/92 (En): 84p.

Leendertse K. et M. Bellemans, Caractéristiques socio-économiques des
1991 patrons de pêche artisanale et coutumière dans la partie burundaise du lac Tanganyika. Projet Régional PNUD/FAO pour la planification des pêches continentales (PPEC). RAF/87/099-TD/34/91 (Fr): 87p.

Ssentongo G.W. (ed.), Report on the National Seminar on the Development and
1992 Management of the Tanzanian Fisheries of Lake Victoria. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/35/92 (En): 86p.

Horemans B. and M. Hoekstra, Economic appraisal of the pelagic fishery of
1992 Lake Kariba. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-TD/36/92 (En): 37p.

Leendertse K. et Mambona Wa Bazolana, Caractéristiques socio-économiques de
1992 la pêche zairoise de la partie nord du lac Tanganyika. Projet régional PNUD/FAO pour la planification des pêches continentales (PPEC). RAF/87/099-TD/37/92: 76p.

Mannini P. (ed.), The Lake Victoria Dagaa (Rastrineobola argentea). Report of
1992 the First Meeting of the Working Group on Lake Victoria Rastrineobola argentea, 9-11 December 1991, Kisumu, Kenya. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP) RAF/87/099-TD/38/92 (En): 84p.

Hoekstra T.M., The Artisanal Capture Fisheries of Lake Victoria, Kenya: major
1992 socioeconomic characteristics of its fishermen and their fishing units. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099 - TD/39/92 (En): 78p.

II. WORKING PAPERS / DOCUMENTS DE TRAVAIL

Bean C.E., 1989 Selected abstracts of basic references and current literature in fisheries economics. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/01/89** (En): 51p.

Ssentongo G. W., 1990 Fish and fisheries of shared lakes of Eastern/Central/ Southern Africa. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/02/90** (En): 19p.

Nfamara J.D., 1990 Recent observations on the fisheries of lake Tanganyika. UNDP /FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/03/90** (En): 16p.

Proceedings 1990 of the Symposium on Socio-economic aspects of Lake Victoria Fisheries. Volume 1 (unedited papers 1-7). UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/05/90** (En): 114p.

Nfamara J.D., 1990 Improved method for smoking fish in the Kigoma region of Lake Tanganyika, Tanzania. UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/06/90** (En): 23p.

Proceedings 1991 of the Symposium on Socio-economic aspects of Lake Victoria Fisheries. Volume 2 (unedited papers 8-12). UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP), RAF/87/099-**WP/07/91** (En): 88p.

Gréboval D. et Diquelou J., 1991 Expérimentation de la senne tournante et coulissante dans les eaux burundaises du lac Tanganyika: Etude de pré-faisabilité. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**WP/08/91** (Fr): 20p.

Maes M., Leendertse K. et Mambona Wa Bazolana, 1991 Recensement des unités de pêche zaïroise dans la partie nord du lac Tanganyika. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**WP/09/91** (Fr): 61p.

Maes M. (ed.), 1991 Recueil de documents présentés à la Consultation technique des lacs Edouard et Mobutu partagés entre le Zaïre et l'Ouganda. Projet Régional PNUD/FAO pour la Planification des Pêches Continentales (PPEC). RAF/87/099-**WP/10/91** (Fr): 112p.