

SOCIO-ECONOMIC RESEARCH REPORT 3  
**LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT**

**SOCIAL AND ECONOMIC IMPLICATIONS OF  
THE FISHERY DISTRIBUTION PATTERNS ON  
LAKE VICTORIA, UGANDA**



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## **EXECUTIVE SUMMARY**

The fisheries of Lake Victoria have undergone a dramatic transformation during the last two decades. From being a locally based fishery with little intervention and capital investment from outside, the present fishery is dominated by national and international capital penetrating the industry. It is the explosion in the growth of Nile perch and the strong demand developed for this fish in the global markets, which have transformed the fisheries of Lake Victoria.

This report presents the results of a survey carried out between October 2001 and February 2002 about the fishery distribution patterns and their impacts on fisher communities of Lake Victoria. The fisheries distribution pattern of the lake is described as well as the flows and benefits from the fisheries resource and the resource constraints and sustainability options. A major part of the paper discusses some of the socio-economic impacts of the rapid changes that are responsible for the present fisheries. It particularly focuses on the effect of the Nile perch boom, its globalization and the development of the fish industry in Uganda, on food security and employment for the local population.

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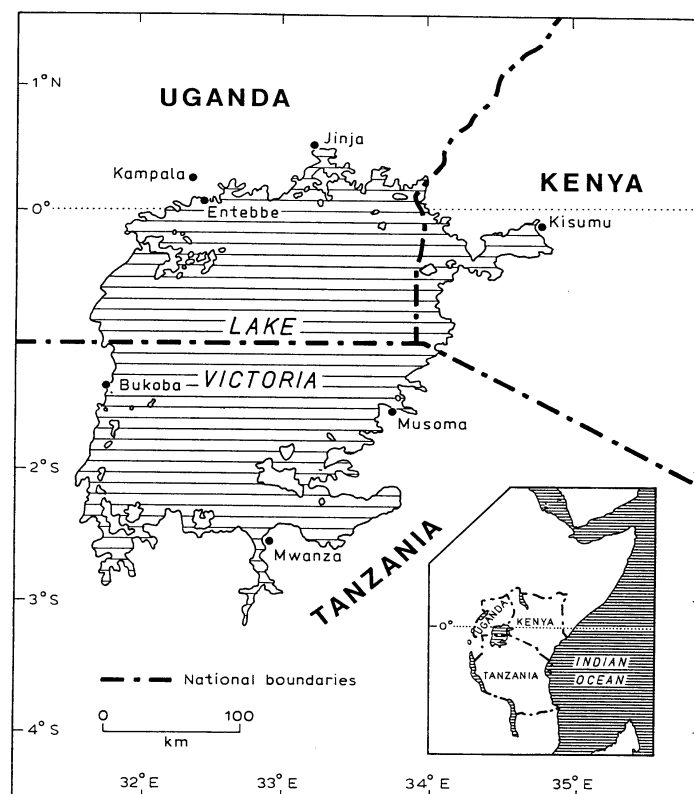
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## 1. INTRODUCTION

Lake Victoria is located in East Africa (Figure 1) and is bordered by three countries: Uganda to the northwest, Kenya to the northeast, and Tanzania to the south. It is the second largest lake in the world by surface area and the largest fresh water body in Africa covering about 69,000 sq km (Hecky and Guildford, 2001). Twenty million people live in the Lake Victoria watershed (Hecky and Guildford, 2001). The low relief of the land along the shores of Lake Victoria makes much of the area suitable for human habitation (Bootsma and Hecky, 1993). As a result, population densities along the lakeshore are very high (Bootsma and Hecky, 1993).

Lake Victoria accounts for more than 60 per cent of all the fish produced in Uganda every year and almost all of the country's fish exports, which earns the government US \$ 60-80 million annually and, contribute to income, nutrition and employment for about one million people.

**Figure 1.0: Map of Lake Victoria**



Source: LVFRP

## 1.1 An Overview of the Lake Victoria Fisheries

The world's second largest freshwater lake, has been slowly degraded and, its fish is being depleted by a combination of problems that include: the dumping of raw effluent into it, crude methods of fishing, the introduction of predatory species of fish, and the proliferation of alien water plants that destroy the plankton on which fish feed. The introduction of exotic species into the lake has been partly blamed for the near-extinction of some of the original species. The [exotic] Nile Perch has predated heavily on the primary grazers, contributing to an increase in algae, oxygen depletion in the deeper levels of the lake, fish kills and loss of biodiversity (Ogutu-Ohwayo, *et al.* 1997).

Lake Victoria once contained one of the most species-rich freshwater fish communities in the world, with over 300 fish species that were found only in Lake Victoria (Hecky *et al.*, 1994). These species were known collectively as *haplochromine* cichlids (Hecky *et al.*, 1994). In 1954, the Nile Perch (photo 1) was introduced into Lake Victoria in order to rejuvenate the fisheries industry (Hecky and Guildford, 2001). Its population remained in check until the 1980s, when it increased dramatically favoured by abundant food availability in the lake. Its predacious feeding behaviour did havoc to the haplochromine stocks and has affected the whole ecology of the lake.

Already there has been a drastic reduction in the lake's biodiversity. Important fish species have virtually disappeared. Within the last two decades the fishery has changed considerably. *Oreochromis esculentus*, previously a fish of the greatest commercial importance, has virtually disappeared as well from Lake Victoria though it is still found in the satellite lakes.

Government statistics in all the three riparian states (FRD, various years) have indicated that fish production rose over the years up until 1989 when it peaked and has since steadily declined or stagnated to the present. On the Ugandan side, the annual yield rose from about 10 000 tons in 1980 to more than 132 000 in 1989, Tanzania's yield fluctuated between 146 000 and 213 000 tons since 1988, while Kenya's catch rose to 180 000 tons by 1989 but has since not increased appreciably. Moreover, fish catches are said to have declined from an average of 39.82kgs per boat per day in 1993 to about 25kgs per boat per day today (Namisi, 2000) and, catch levels are stagnating in littoral areas of the lake.

The increased local and export demands for fish have most likely exceeded the sustainable yield of the lake's fish. In addition, the rapid build-up of fish-processing capacity along the lakeshores has given rise to the indiscriminate use of small fishing nets that continues to threaten the survival of both small and large fish species. Moreover, information from fisheries department, research workers and even fishers themselves indicate that undersize fish are being caught, threatening breeding patterns. The lack of a comprehensive law on fishing is also making it possible for illegal nets and poison to be used. The displacement of fishers and fish traders by large commercial traders and fish-processing plants, along with over-fishing in near-shore waters and under-fishing in offshore waters is probably the worst implications resulting from the changes in the fishery patterns of Lake Victoria. This study sought out to describe the fisheries distribution pattern of the lake, fish flow channels and benefits and; identify the resource constraints and possible sustainability options. A major part of the paper discusses some of the socio-economic impacts of the rapid changes that are responsible for the present fisheries.

## **2. OBJECTIVES**

The overall objective was to assess the social and economic implications of current fishery distribution patterns in view of the pertaining fisheries management issues on Lake Victoria, Uganda.

Specifically, the overall objective would be achieved by:

1. Establishing the current fisheries resources distribution patterns
2. Determining impacts on the communities: socially (domestic consumption of fish, fishing activity, social structure, culture and resource conservation) and economically (incomes, investments, trade and markets) by changes in fisheries distribution patterns.
3. Identifying major management constraints and soliciting sustainable management options.

### 3. METHODOLOGY

#### Description of Study Area and Sample Selection

In total 400 people including key informants were interviewed during two months of fieldwork in October 2001 and January 2002. The questionnaire is presented in Appendix 1. The Survey took place in all the regions of the Uganda sector of Lake Victoria. Involved in the study were over thirty landing sites from nine districts out of the eleven districts surrounding the lake including Islands (Table 2).

**Table 1. Data Collection Sites**

DISTRICT	SITE NAME	LOCATION/SIZE
Busia	Nalyoba Maduwa	Mainland/small
Bugiri	Bumeru A Bumeru B Busiuro Namatu Sidome	Mainland/big,  Small small
Mayuge	Ntokolo Buluba Masolya	Average Small Island/big
Mukono	Kamwanyi Kibanga Namusenyi Bulebi Nangoma Lubya Namiti Makalaga Kilewe	Mainland     Island/big
Kalangala	Kibanga Kakyanga Tubi Malabana/Kyagalan yi	Island/big
Rakai	Kyabasimba	Mainland/small
Wakiso	Kasenyi/Bugiri Dewe Lwena	Mainland/Big Mainland/Big Mainland/Big
Mpigi	Buvumbo Nabugabo Sanya	Mainland/big
Masaka	Kamuwunga Lambu	Mainland/small Mainland/Big

## **Research Design**

A survey to assess socio-economic impacts of current fisheries distribution patterns was conducted from October 2001 to February 2002 in the Lake Victoria region of Uganda. Data on current fisheries distribution patterns and the consequent socio-economic impacts on the Lake Victoria fisherfolk communities were collected. The sampling units were the landing sites mainly, with a fisher as main respondent respectively.

Data was collected using unit questionnaires, focus group discussions and direct observations. Unit questionnaires were administered to the members of the fishing community who were selected randomly. A total of 400 unit questionnaires including key informant questionnaires were enlisted. Key informant questionnaires and Focus group discussions were mainly composed of *Gabunga* and other beach community leaders. Developing the questionnaire in conjunction with relevant researchers at Fisheries Resources Research Institute (FIRRI) controlled internal and external validity of the questionnaire. A first outline of the socio-economic questionnaire was discussed with the staff of the above-mentioned institution during a preparatory mission for the execution of the survey. Following these discussions the questionnaire was modified and field-tested in October 2001. After the field test a final version was designed. The pre-test was also very helpful in establishing rapport with the study area. The socio-economic research team at FIRRI carried out interviews. Provision was made for community participation where community members played a role in guiding and mobilising fishers wherever there was need.

## **Limitations in Data and the Study**

### **a). Data**

This survey was conducted at a time when the sponsoring project (LVEMP) was having financial difficulties and it was not possible to get adequate finances in time to collect data in all areas as expected. Therefore, bad infrastructure as well as insufficient funds often restricted the accessibility of statistics and primary data available in Uganda. This is however, something encountered by every researcher embarking upon a research project in a developing country.

**b). The Study**

The study focusing on distribution patterns of fisheries and impacts on communities is a broad study touching almost all aspects of fisheries and it required enough time to exhaust all these aspects but time and resources available could not allow.

**Processing and Data Analysis**

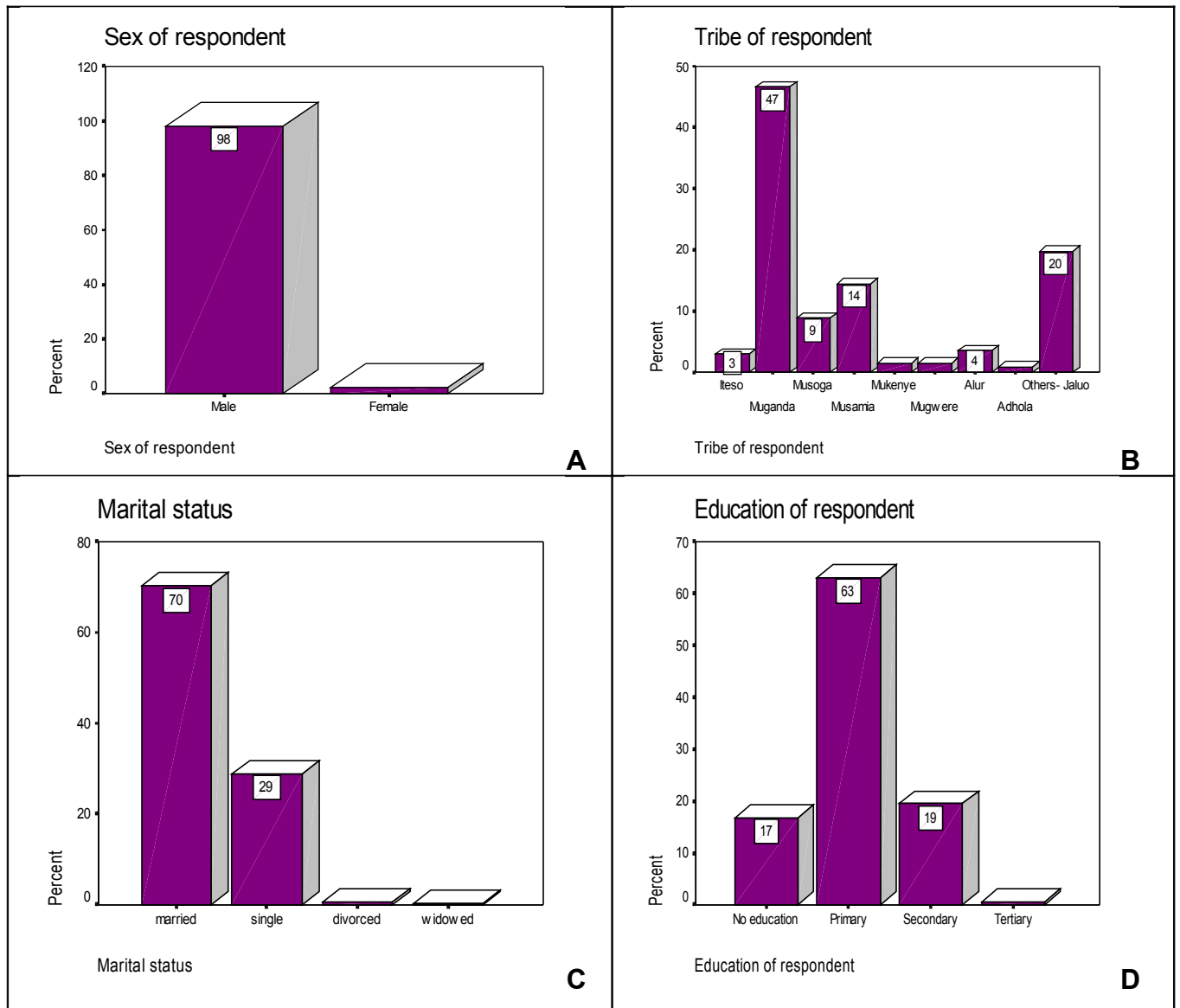
The data collected was both quantitative and qualitative, coming from a mixture of primary and secondary sources, which therefore demanded different analyses and presentations.

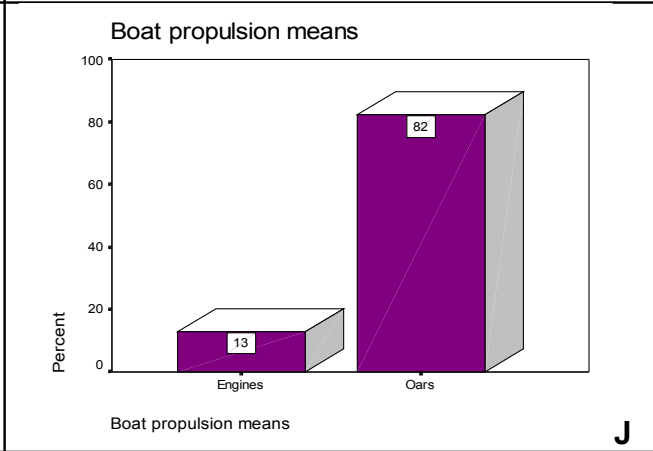
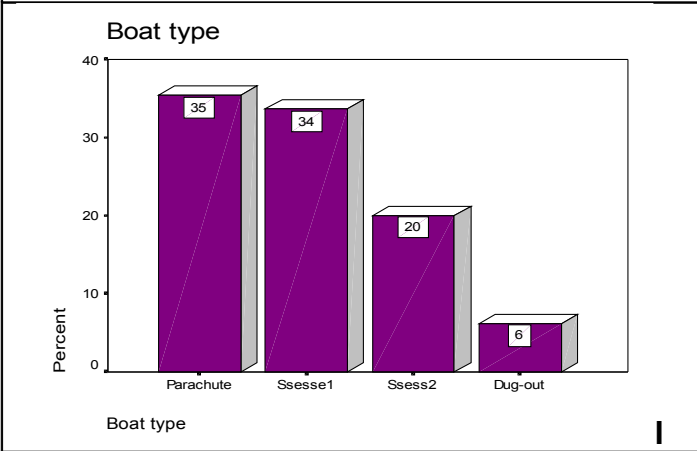
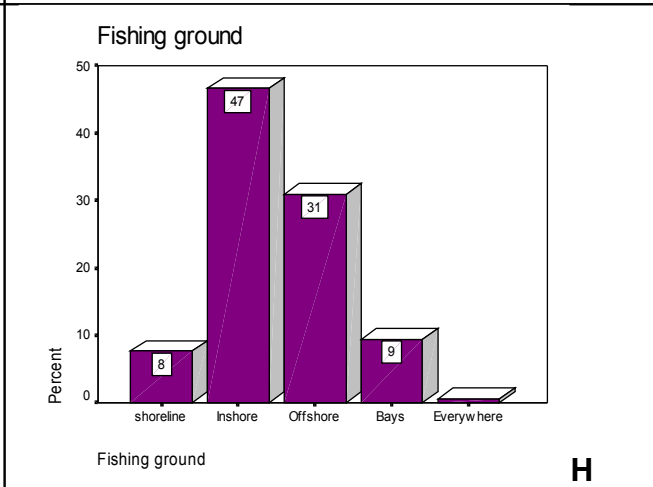
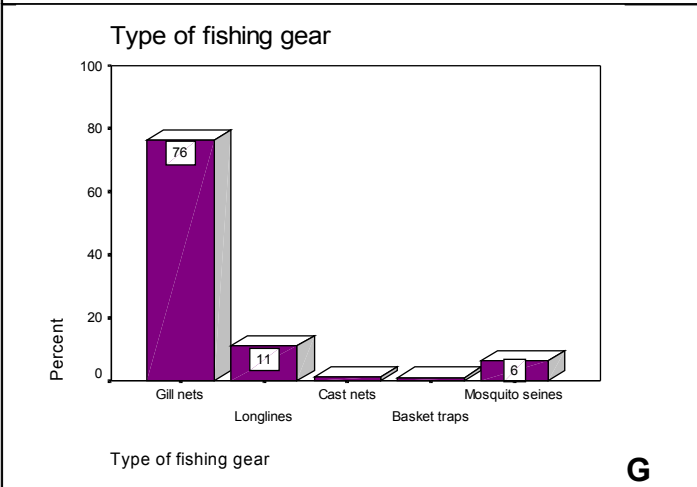
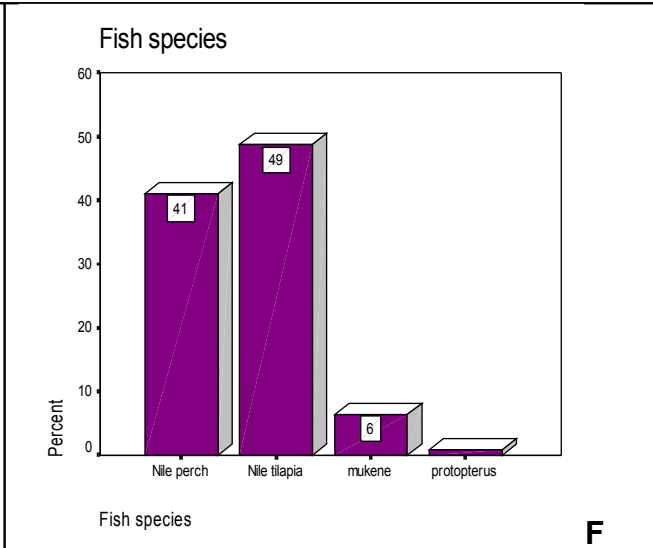
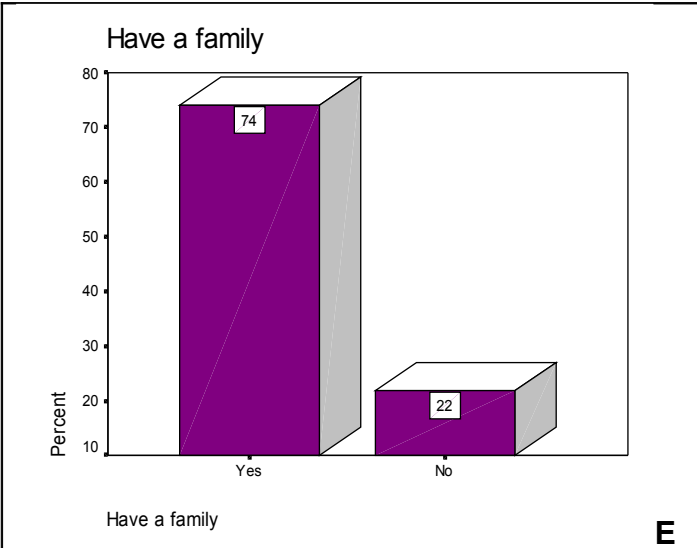
The information obtained was coded and entered in a database utilising the software package Dbase III plus files. The data were then converted into SPSS/PC+TM V.8.0 system files for processing and preliminary analysis. SPSS/PC+TM V.8.0 was used for this purpose. Graphs presented in this report were created with Harvard Graphics.

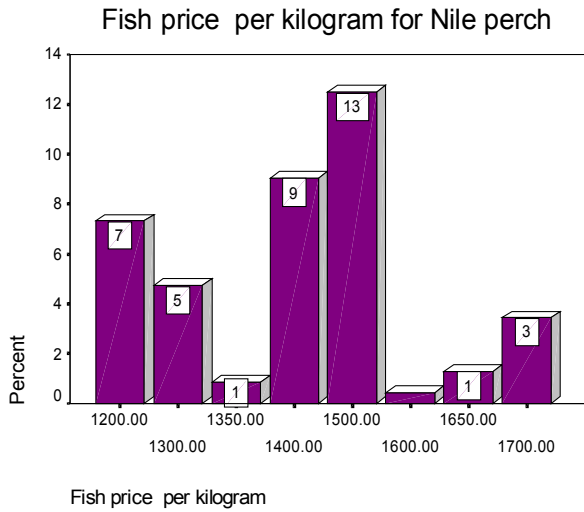
## 4. RESULTS AND DISCUSSIONS

This section constitutes findings on changes in the Lake Victoria fisheries with respect to its sustainability, fisheries resource distribution patterns, benefits from the fisheries, fish flows, markets and management issues. The chapter discusses the drastic changes and the pertinent problems experienced in fisheries and communities, which are identified as having been both internal and external to the lake. It finally highlights the need for interventions for sustainable management of the lake resources.

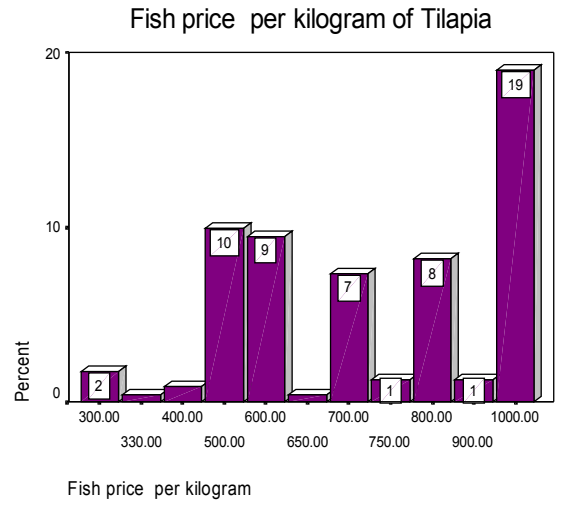
**Figure 2: Social and economic characteristics of fishers**



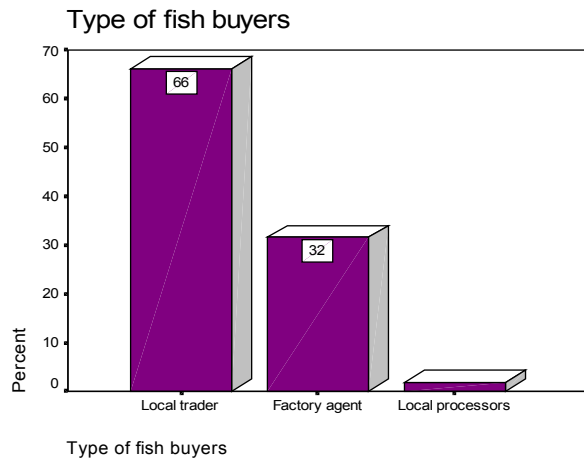




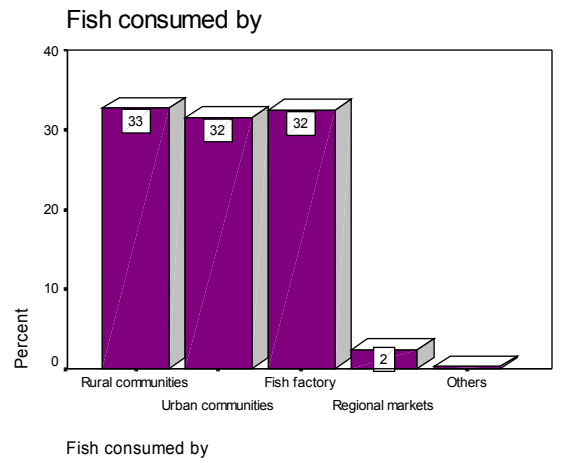
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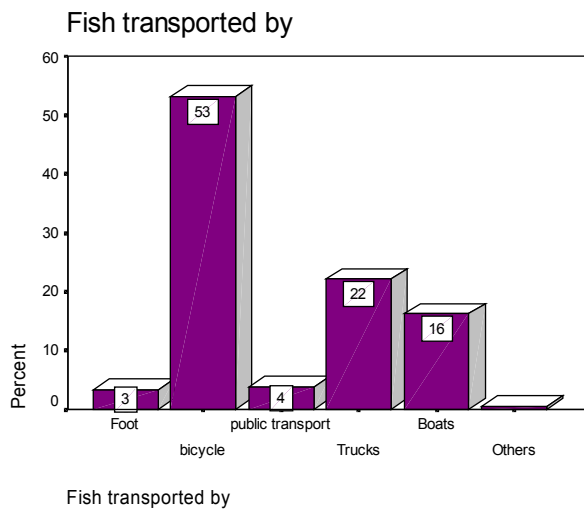
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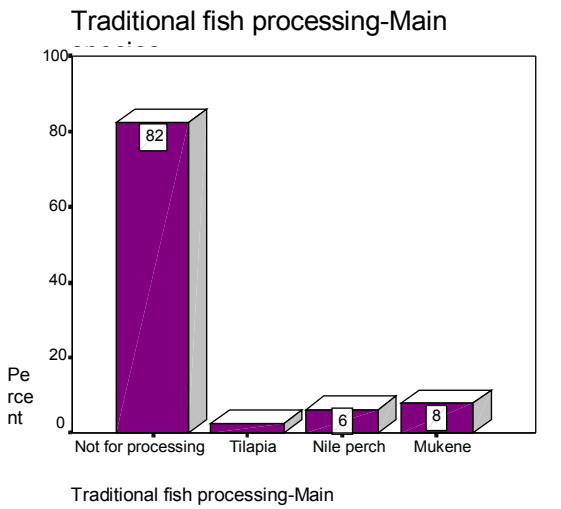
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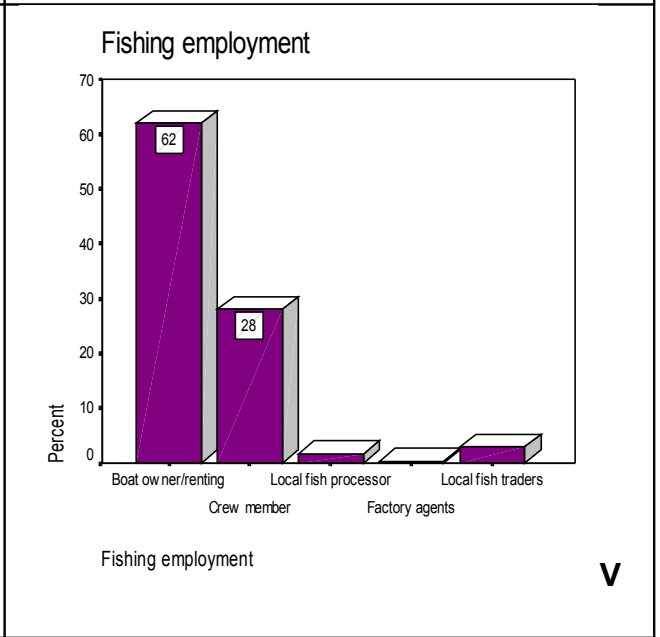
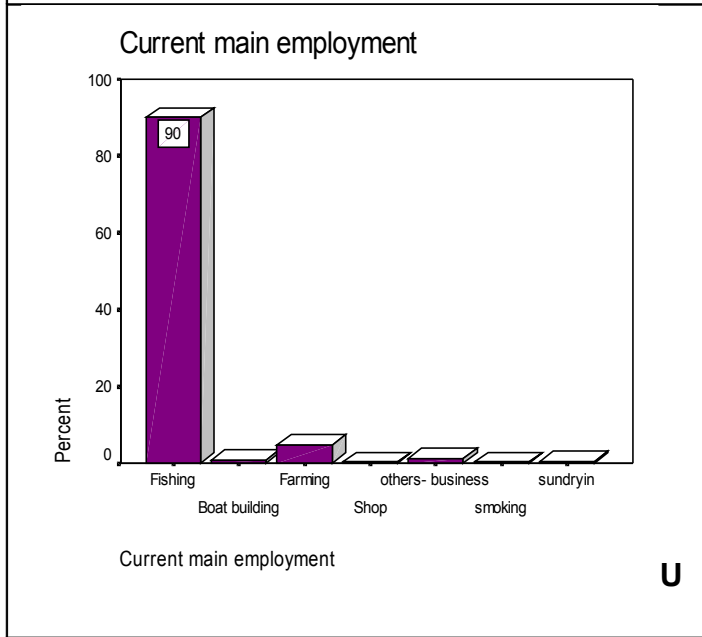
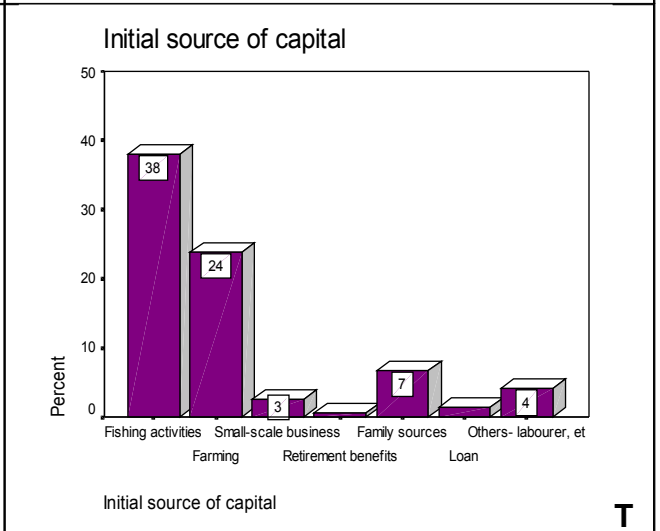
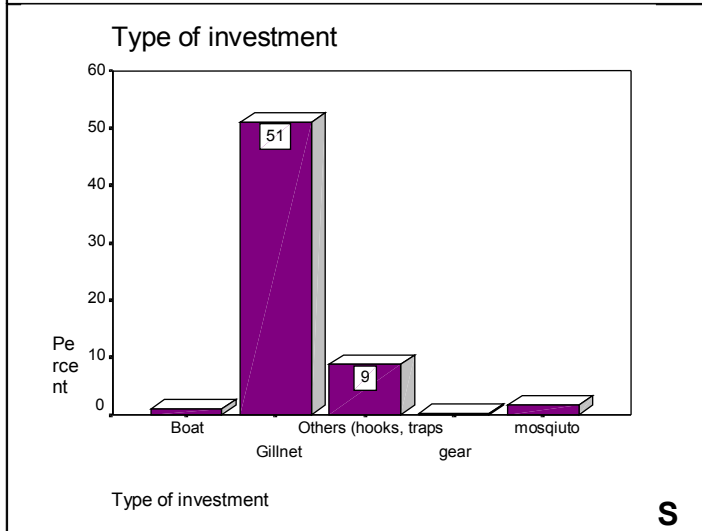
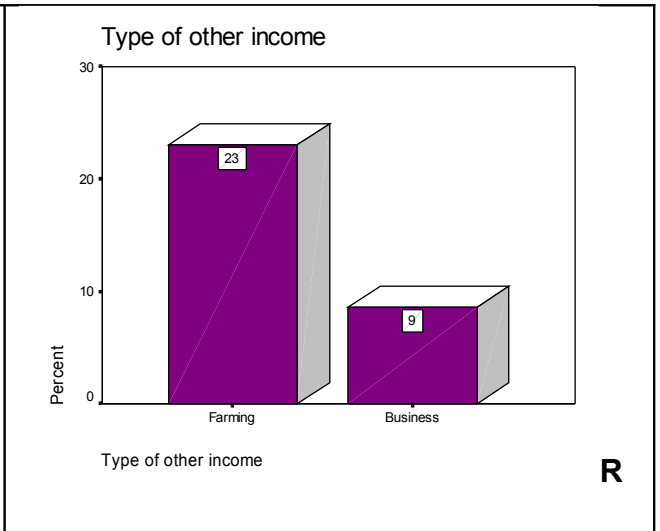
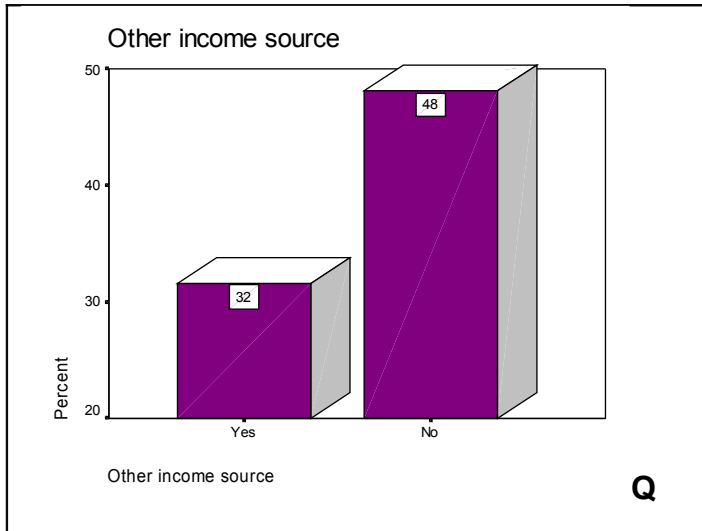
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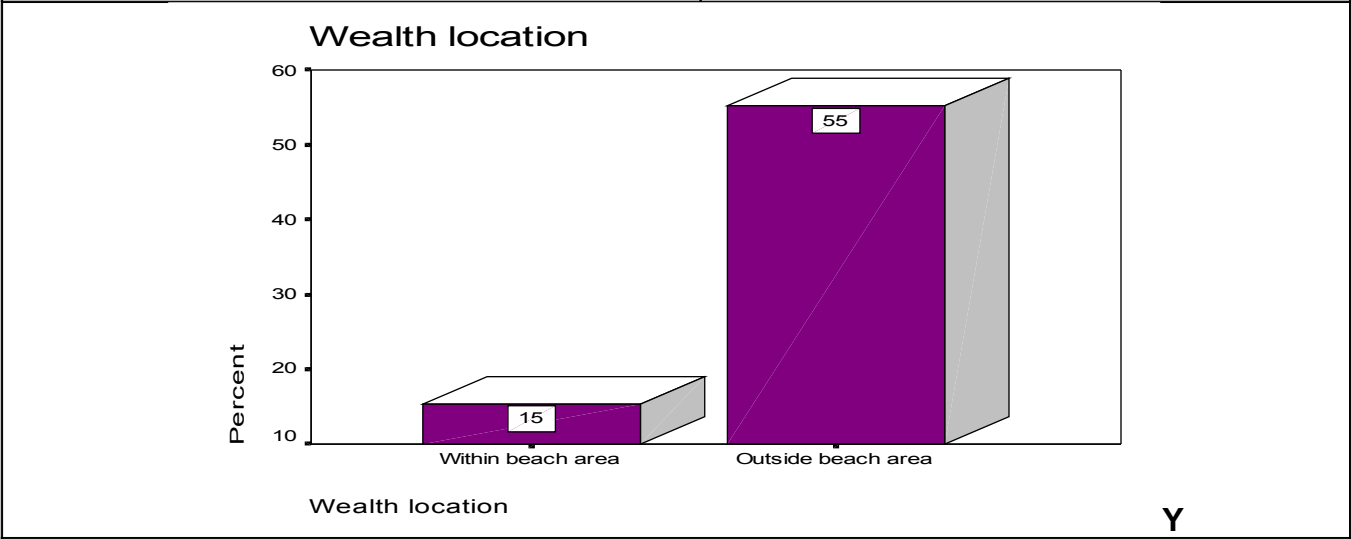
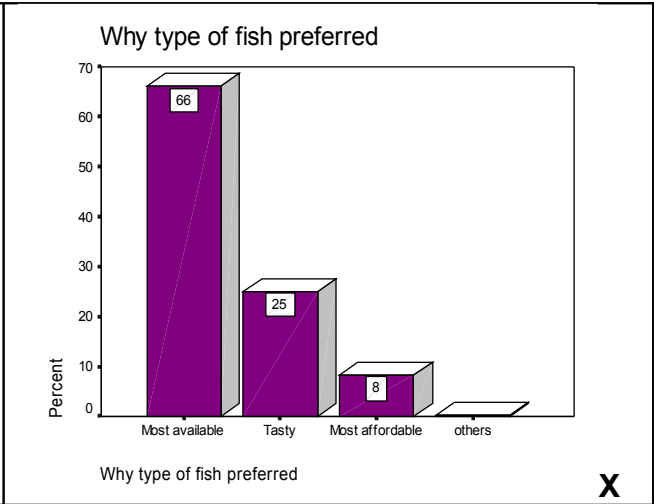
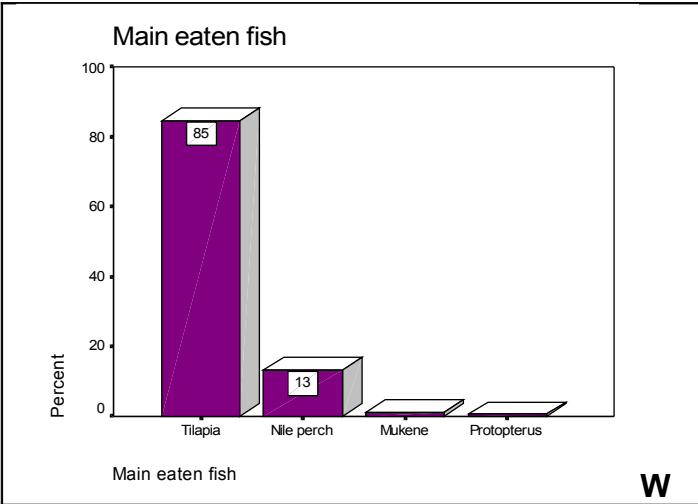


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**P**





**Table 2. Statistics**

		Age Of Respondent	Family Number	Years At Landing	Gear Size	Fishing Gear Quantity	Boat Length	AvgQty-kg/Day	Effort-Trips/Week	Gross Returns Per Trip	/DayAmount Spent On Food	Number Of Times Per Year	Expense Re-Investment	Extra Labourers	Times Fish Eaten/ Week	Kgms Of Fish Eaten Per Day	Items Total Value
<b>N</b>	Valid	339	339	339	318	312	318	220	253	217	268	218	207	212	338	333	264
<b>Mean</b>		30	7	9	5.5	60	20	22	5	8259	2304	1893	422366	2	5	2	895992
<b>Std. Error of Mean</b>		.5056	.3823	.5258	6.970E-02	7.4943	.2894	1.8367	9.868E-02	831.2209	117.0654	1835.0147	56012.6164	.1134	.1015	7.639E-02	112768.8842
<b>Median</b>		29	5	5	5	18	18	15	5	<b>3963</b>	<b>1896</b>	<b>3</b>	154286	2	5	2	<b>224500</b>
<b>Mode</b>		30.00	<b>1.00</b>	<b>1.00</b>	5.00	<b>10.00</b>	18.00	<b>20.00</b>	7.00	<b>3000.0</b>	<b>1000.0</b>	<b>3.00</b>	<b>300000.</b>	1.00	7.00	1.00	<b>35000.00</b>
<b>Std. Deviation</b>		9.3087	7.0384	9.6812	1.2429	132.3766	5.1610	27.2429	1.5695	12244.6482	1916.4434	27093.6676	805881.2148	1.6509	1.8654	1.3939	1832277.4921
<b>Variance</b>		86.6513	49.5394	93.7250	1.5448	17523.5587	26.6355	742.1751	2.4634	14993.14092589	36727.552141	73406.68252415	6494445.323997180	2.723479655	3.4796	1.9429	3357240807927.1810
<b>Skewness</b>		1.180	2.778	1.797	1.021	4.816	.264	3.883	-.296	3.395	3.059	14.755	3.625	2.461	-.181	2.071	4.694
<b>Range</b>		<b>52.00</b>	<b>54.00</b>	<b>49.90</b>	<b>6.50</b>	<b>999.00</b>	<b>25.00</b>	<b>200.00</b>	<b>7.00</b>	<b>80000.00</b>	<b>15000.00</b>	<b>40000.00</b>	<b>4999998.00</b>	<b>12.00</b>	<b>6.00</b>	<b>9.80</b>	<b>17304000.00</b>
<b>Minimum</b>		<b>16.00</b>	<b>.00</b>	<b>.10</b>	<b>3.50</b>	<b>1.00</b>	<b>7.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>2.00</b>	<b>.00</b>	<b>1.00</b>	<b>.20</b>	<b>6000.00</b>
<b>Maximum</b>		<b>68.00</b>	<b>54.00</b>	<b>50.00</b>	<b>10.00</b>	<b>1000.00</b>	<b>32.00</b>	<b>200.00</b>	<b>7.00</b>	<b>80000.00</b>	<b>15000.00</b>	<b>40000.00</b>	<b>5000000.00</b>	<b>12.00</b>	<b>7.00</b>	<b>10.00</b>	<b>17310000.00</b>
<b>Sum</b>		10015.00	2349.00	3009.20	1765.00	<b>18633.00</b>	6205.00	4819.50	1331.00	<b>17922.07.00</b>	61757.00	41275.70	<b>8742996.3.00</b>	410.00	1666.50	640.65	<b>236542000.00</b>

- 1 Calculated from grouped data.
- 2 Multiple modes exist. The smallest value is shown

## 4.1 The Lake Victoria Fisherfolk Communities

### Socio-demographics

Males dominate in the fisheries (98 %). The mean age of fishers is 29 years with 30 years age dominating (Figure 3a). The majority of the fishers are married (70%) and, have families (74%) consisting of mainly 4 members, although an overall mean of 9 was recorded with the maximum number being 54 (Figure 3c,e & Table 3).

The mean for the period most fishers have stayed at landing sites is 9 years; although most fishers have been at landing site for only 1 year.

A maximum of 50 years was noted (Table 3).

The fishers on Lake Victoria part of Uganda constitute a wide range of ethnic tribes with Baganda (47%) dominating followed by Samia (14%), Basoga (9%), Alur, Iteso Bakenye, Bagwere and Adhola respectively. Among others the Jalu and Banyala from Kenya constitute a big portion of the other twenty percent, the rest of the small groups include Banyankole, Nyarwanda and Bagisu from Uganda (Figure 3b).

According to key informants, youthful men do the fishing while women are involved in *mukene* drying, traditional processing of fish and cookery. People who do not go fishing themselves but hire to catch fish own most fishing units. The involvement of family is less. The other groups involved in fishing are fish traders, boat owners and fish smokers. Women are involved in fish smoking and food service business, men do fishing and trade. In the *mukene* fishery labour constitutes hired men (crew) as majority but in some cases the family members are involved in fishing. Boats, mosquito seine and light (bait) are the main inputs used for fishing.

Several studies have examined Uganda's fishing communities over the last decade (Reynolds & Greboval 1988, Kitakule 1991, FCSEP 1997, LVFRP 1999, LVEMP 2000) and noted that one of the main interest groups in the fisheries of Lake Victoria is constituted by the vast fishing communities that have exploited the resource for generations. Made up of little scattered settlements at the edge of the villages and on the islands, the fishing communities consist primarily of large numbers of male youths who provide labour to a few boat and gear owners for a share of about a third

of the catch. In addition, there are also a few fish processors, mostly operating traditional and improved smoking kilns. Considerable numbers of fish traders, coming mainly by bicycle and also by truck, get to the beaches early in the morning and depart for their market destinations on securing their supplies. Many of other traders, dealing in provisions and supplies are also to be seen at the beaches, their activities depending equally on the level of catch.

Changes in the fisheries of Lake Victoria over the last two decades have resulted in development in the fishing communities in response to the situations and opportunities created by the changes. There has been expansion in size of fishing communities, resulting from rise in population growth rate, estimated at 2.5% per annum (MFEP 1999). There has been greater diversity in the ethnic composition, from the local traditionally fishing ethnic groups of the Baganda, Basoga, Bakenye and Samia to include other tribes, namely the Banyankole, Bagisu, Japadhola and Lugbara. The fisheries have seen the entry of new comers, bringing with them not only improved harvesting skills but also greater capital. These changes have represented a threat towards excessive effort on the lake.

## **4.2 Fish Handling and Social Factors**

Fish handling is still poor with fish caught just placed in open boats with no box containers or ice in the boats. The fish are transported to inland beach markets where they are offloaded and placed on racks for selling as bundles (tilapia) or weighed (N/perch). Apart from ice containers that transport fish for factory processing the rest of the transport are in poor hygienic state (see Photo2)

There is only a limited use of ice by fishers. Conditions at beach landing sites are poor, lacking portable water supply, clean auction areas and toilets. However, there is now a trend to improved control of the distribution chain with some of the main buyers operating collection vessels to receive and ice fish directly on the lake. The fish are landed at numerous small landing sites on the shore or off-lying islands, where they are bought by traders or directly by processors for onward road transport to the factory or market. Only the best quality fish are selected for export processing. The fish are transported to inland beaches where they are offloaded and placed on

racks for selling as bundles (tilapia) or weighed (Nile perch). Fish caught is stored in baskets (Busero) and sold to local traders, who use bicycle, motorcycles and pickups to transport the fish to local village markets and urban markets. Selling is by auction and mutual agreement for Tilapia, although in terms of kilograms it ranges from Ushs 500-1,000 per kg and varies from beach to beach and in different regions of the lake. Nile perch is particularly weighed at racks direct from boats and placed into truck containers, iced and transported to fish processing factories. Nile perch is sold in kilograms using weighing scales and a kilogram ranges from Ushs 1,200/- to 1,700/- and even more on Nkome Islands. The rate of reject due to spoilage, however, has gone down probably due to good timings and increased demand.

In the traditional Bantu society, the lake: its swamps and islands are associated with numerous myths and customary activities responding to these beliefs. It is not surprising therefore, that there have been strong cultural considerations affecting fishing practices, use of sanitary facilities at the landings and fish consumption.

The traditional practice of prohibiting fishing during periods of crop harvest has been a positive resource management practice, as it took off fishing effort pressure on the resource during certain periods. Similarly, non-use of boat-based fishing practices by women in many societies, although it denied opportunities to the women, helped to keep the fishing pressure low.

On the negative side, the perception that the use of latrines leads to inability of women to bear children, or of men to realize good catch, has serious implications for pollution of the lake, on fish quality and on the health of the lake side communities.

### **Skills, knowledge and innovations**

At least 83 percent of the fishers are literate, that is, they have at least had primary (63 %), Secondary (19 %) and tertiary (1 %) education (Figure 3d).

Even if a large number of fishers have attained some formal primary education, generally the fishing communities operate on the basis of indigenous knowledge (IK). Some of IK has been handed down from the previous generations but there have been considerable local innovations in response to the needs of the changing fisheries. Most fishers have expressed satisfaction with their knowledge and skills

based on IK (LVEMP data). Government, through the fisheries management and research institutions, had previously been unable to provide the lead in sustainable technology generation and dissemination, due to institutional constraints though efforts are being made of recent by institutions like FIRRI. In the process, new designs of gear as well as new fishing methods have appeared on the lake, some of which are not compatible with sustainable exploitation of the fisheries. The IK, much of which is on fish production, has proved deficient with respect to fish handling and processing. In a recent survey, the most common method of fish preservation practiced by fishers was “covering the fish with leaves and keeping it in the shade” (LVFRP, 1999). This deficiency represents wastage of the fish resource.

While this technological development based on IK has taken place, however, the level of entrepreneurship among fishers has remained low. Records on operations have remained at best sketchy, due to lack of interest as well as inability among fishers to write books of accounts (LVEMP data). Personal savings continue to be the main source of capital within the community and very few operators have taken advantage of formal credit, mainly from the Poverty Alleviation Project, Micro Finance Schemes, *Erandikwa* (a political credit fund) and private individuals in that order (LVEMP data). The main problems resulting in poor repayment of the loans taken are reported to include high interest rates, short repayment periods, and occurrence of calamity during the loan period, e.g. theft of gear. Despite all the steps taken to improve the condition of fishfolk, migration in search for better catch or market has remained a common practice. This hinders their access to the various credit schemes.

The effect of all this has been a lack of efficiency in the fisheries, resulting in wasteful utilization of the resources.

### **4.3 Fishery Resource Distribution**

#### **The fishery of Lake Victoria**

The common commercial fish species by exploitation are Nile Tilapia (49 %), Nile perch (41 %), and *Rastrineobola argentea* (6 %) and *protopterus* (Figure 3f). However, *Haplochromines*, *clarias*, *Bagrus*, *Barbus*, *Mormyrus*, *Labeo*, catches

feature commonly in some areas of the lake according to key informants and they supplement the fishers' diet mainly.

The most commonly used gear is the gillnet (76 %) of size 5 inches (41 %), 6 inches (22 %) and 7 inches (12 %) though 3.5, 4, 4.5 are also in use to a large extent. In addition, long line (11%) of size 7, 8, 9 and 10 hooks, Mosquito net (6 %), cast nets and basket traps respectively are widely in use as well (Figure 3g & Table 3).

Most fishers have 10 pieces of nets and mainly fish in the inshore (47 %) and offshore (31 %) areas of the lake while some do fish in the bays and shorelines (Figure 3h).

The commonly used boat types are parachute (*bawotatu*, has a flat base) (35 %), Ssesse1 (keeled boats with pointed ends mainly propelled by oars and a sail) (34 %), Ssesse2 (keeled and pointed at one end with an outboard engine provision on one end) (20 %) and Dugout canoes (6 %) respectively. The oars (82 %) and engines (13%) are the main propulsion means for the boats (Figure 2 i, j).

Key informants revealed that most fishing is done within the grounds less than 3 kilometres from the beaches/shoreline, because the waters there are shallower and richer in fish-supporting food. Fishing for Tilapia and *Mukene* is done in the inshore by fishers who claim that they cannot afford offshore waters, which require strong boats and engines for propulsion. This was confirmed by findings indicating a great number of fishers (82%) who use oars/paddles and small boats for fishing (Figure 2i, j). Fishers desire to fish offshore/open water but are limited by small boats and expensive gears (engines).

### **Nile perch and Nile tilapia fisheries**

These fisheries are so important because they support the local and export markets and their demand is ever increasing. Nile perch fishers mostly catch from the offshore/deeper waters where there are good catches, unlike tilapia, which is exploited in shallow inshore waters mainly.

Methods used for catching include; gill nets for tilapia and; gill nets and long line using hooks for Nile perch. Gillnets of mesh sizes: 3" 4", 5", 6", and 7" are used to

catch tilapia as well as Nile perch. Long-line that uses hooks of various sizes from number 1-12 are used, however, 7-8 and 10-12 are commonly used depending on bait type and the targeted fish. Long line is known to be most destructive because they catch indiscriminately all sizes. Gill nets of 3.5 inches and lesser inches are rampant on most Islands, like Lolwe, Buvuma, etc where the Banyala from Kenya and Jaluos are well known for these practices.

### **Mukene fishery**

Alongside the Nile perch and Tilapia fisheries, the Mukene fishery has tremendously developed with an impressive market. Mukene fishery is mainly exploited for fishmeal industries in Uganda though some locals prefer it for food especially regionally. Easy of entry due to limited initial investment capital, ready market, readily available fish and its pelagic nature makes exploitation easier in mid waters. However, it is relatively more labour intensive requiring at least 4 people per boat. The main inputs used include mosquito nets and lamps to provide light as an attractant. The Jaluos from Kenya are very experienced in the exploitation of this fish and are said to dominate the business as main fishers in Uganda. They also enjoy *mukene* so much, on average, most fishers taking home to eat about 1 kg/day.

Handling is simple, involving pouring in boats and use of basins to measure and sell at 2000 to 6000/- per basin to traditional processors who do the drying. Drying is done on bear rocky grounds after which they are packed in sacks weighing between 60-70 kgs. Boat traders/ factory agents buy from fishers/driers and then transport fish to fish meal factories in Jinja where they sell at 2000/- to 3500/- per kg (Fig.2b). Some fish is transported by boats to land beach markets like Wakawaka and Bugoto from where it is sold to Busia traders/fishmongers for sale in inland markets. A 6 kg tin costs Ushs 2,500/-. Losses incurred are with respect to value resulting from processing—humidity from rain causes deterioration with 40 % of product output lost usually. By-catch of immature Nile perch is the main problem associated with this fishery.

## 4.4 Fish Stocks and Fisheries of Lake Victoria

### Changes in fish stocks.

Key informant findings revealed that changes in fish stocks were greatly influenced by the boom of the introduced fish species like Nile perch (*Lates niloticus*) that is predacious in its feeding ecology. The increase in Nile perch, has been associated with the simultaneous decline in most of the other stocks especially *Haplochromines*, which formed its main diet in its boom times. Currently, with the disappearance of *haplochromines* the feeding ecology of Nile perch has even changed constituting *mukene*, *caridina* and juveniles of its own mainly in its diet (Ogutu-Ohwayo *et al*, 1997).

Intensive traditional fishing methods and increased use of illegal gear may have also contributed to the decline of certain species especially Tilapiines (*Oreochromis esculentus*). Tilapiines (*Oreochromis niloticus*) are being over-fished due to increasing use of smaller mesh sizes. In addition illegal fishing gears like beach seines (non-selective) have also played a role in reducing fish stocks. Besides Nile perch (*Lates*) and *Rastrineobola argentea*, only the tilapiine *Oreochromis niloticus* is important to fisheries at present. Other species like *Bagrus* and *Clarias* are too low to support a fishery.

### Landing sites on Lake Victoria

Observations from the survey show that landing sites are normally determined by proximity to fishing grounds and local markets potential. The latter is influenced by population density and accessibility.

The number of boats landing at a given site is used to categorise landing sites into three groups (small, medium and large)

**Table 3. Landing site characteristics**

Characteristic	Small Landing	Medium Landing	Large Landing
No. Of boats	5	5-15	>15
Propulsion of boats	Paddles.	Paddles mostly at times sails.	Paddles or engines. Majority sails.
Target fish species.	No specific species.	Nile perch, Tilapia, <i>Protopterus</i> and Mukene.	Catches dominated by Nile perch.
Post harvest activities.	Fish for home consumption.	Local consumers or fishmongers and transport the fish to inland markets by bicycles. -Few young men are found doing the gutting, scaling and chopping of Nile perch. Food service businesses by women.	Same as medium but the activities are more intensive. -fish landing. -fish processing. -fish marketing. Traders transport fish to other far markets by car. -Some secondary businesses at the landing sites like selling cloth or merchandise. Food service businesses done by women.
Distribution.	Any where along the shorelines of Lake Victoria.	Located near populated areas.	Near towns or village centres with high population densities or with settlement.

## 4.5 Fish Flows and Market Mechanisms

### Fish trade and its role as a major cash income

Nile perch has the highest price per kilogram compared to other fish species. The highest beach price or, on-water price for Nile perch is 1700/- and the lowest is 1200/- per kg with 1500/- being the common price for most areas. Nile tilapia, the second important commercial fish has a maximum beach price of 1000/- per kg and the lowest of 300/- per kg, even so, the price varies greatly between 500/- to 1000/- per kg (Fig. 3 k & l).

Information gathered from key informants indicated that prices vary from place to place at landing sites/on water with distances from landing sites to consumer/processor influencing the prices significantly.

Local traders (66%) are the main buyers of fish from fishers. These include men and women who use bicycle and motorbikes (53%), pickup cars and public transport (4%)

and foot (3%), to transport fish to consumers in rural (33%) and urban markets (32%) mainly.

Factory agents/middlemen (32%) are the second largest but most powerful group of traders who use trucks (22%) and boats (16%) mainly to transport the fish to fish factories located in urban areas (Kampala, Jinja, Entebbe and Masaka). The last group constitutes local fish processors (2%) who mainly process *mukene* (8%) for fishmeal factories and rural markets consumers. Nile perch (6%) and tilapia, usually the rejects or the juveniles are processed for urban poor and rural markets.

The level of traditional fish processing is very low with most fishers (82%) indicating that they are neither involved nor do they sell fish for traditional processing (Fig. 3 m, n, o & p). Most fishers (48%) do not have any extra source of income but for those who have another source of income (32%), they either practice farming (23%) or do business (9%) respectively (Fig. 3 q & r).

Soft ware fishing inputs like gillnets (51%), hooks and mosquito nets are the most frequently invested in due to the short lifetime of these inputs, loss due to storms and occasional thefts whereas, boats and engines are rarely invested in (Fig. 3 s).

Fishing is the main employment (90%) for fishers interviewed though others include farming, small-scale businesses, traditional fish processing, boat building and retail shop ownership. Most of the initial capital was sourced from fishing (38%), farming (24%), family sources (7%), labouring (4%), small-scale businesses (3%) and retirement benefits. Sixty-two percent of respondents were boat owners or hirers, while 28 % were crew members/labourers and the rest were local fish traders, local fish processors and factory agents (Fig. 3 t, u & v). Most fishers are reluctant to declare returns per trip, a mode of 3000/- per day with a mean of 8260/-, a median of about 4000/- and the maximum of 80,000/- was noted (Table 3).

### **Market systems and fish distribution.**

The importance of the marketing is evident when considering that selling fish to middlemen and traders is a major source of cash income for many poor fishers, particularly in remote fishing villages. The trading network allows for a ready market

for high value fish, such as Nile perch, which otherwise would have been difficult to find a buyer for.

#### 4.6 Market Structure for Nile perch, Nile Tilapia and Mukene

Figure 3a. Marketing structure for Nile Perch

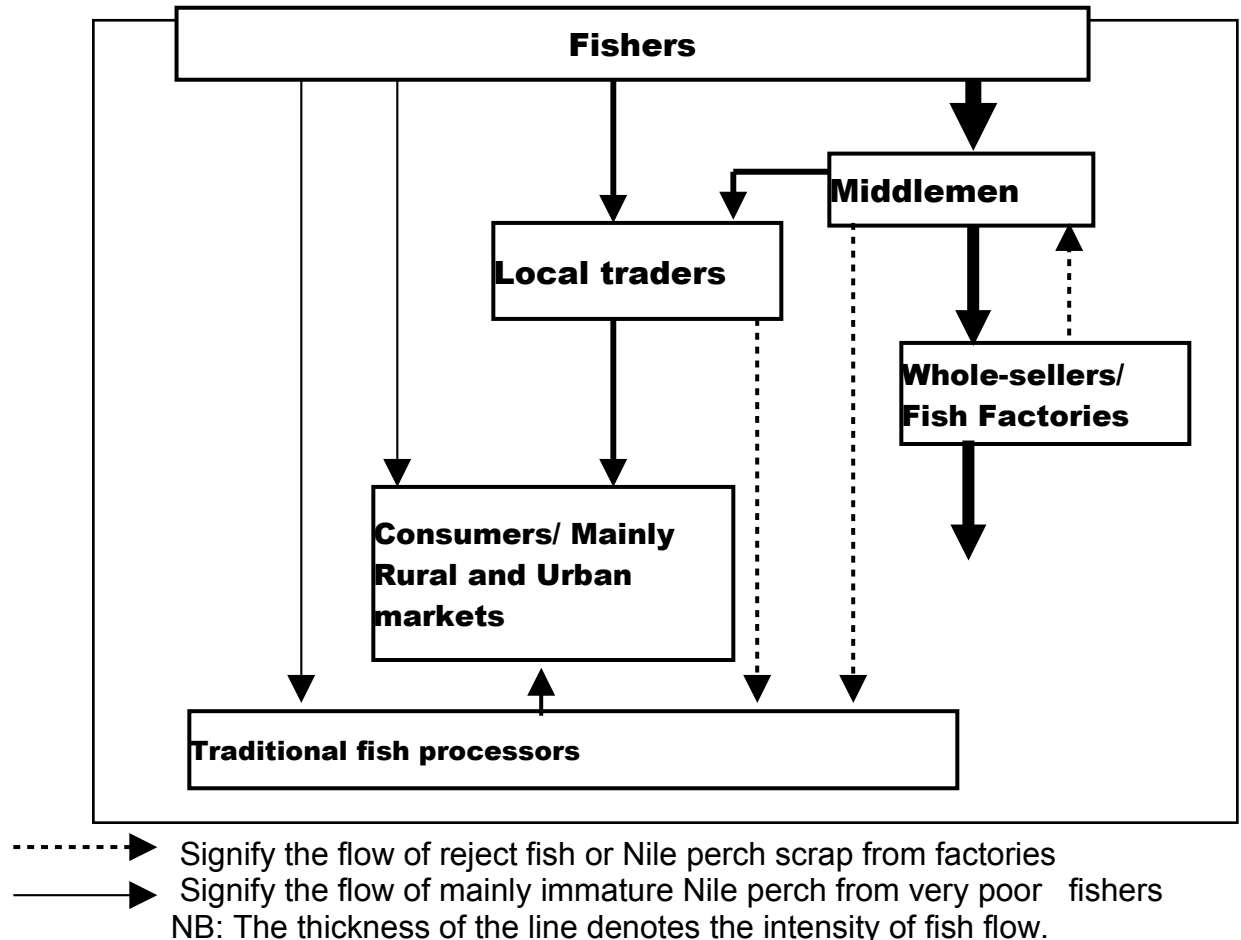


Figure 3b. Marketing structure for *Mukene*

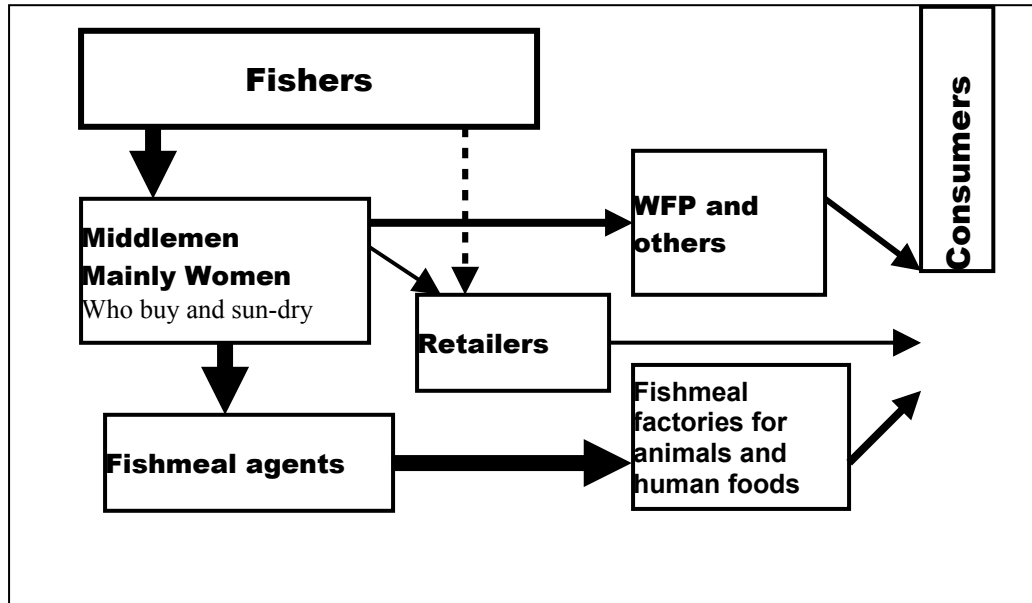
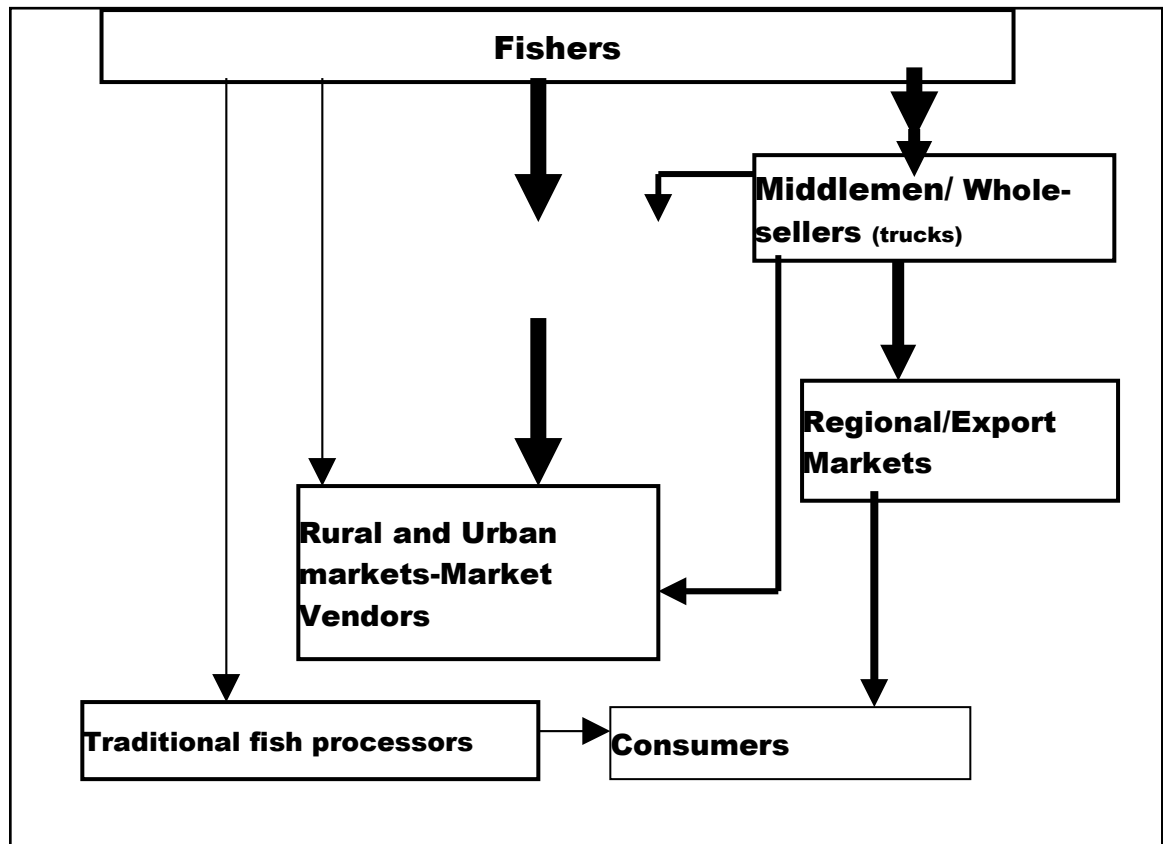


Figure 3c. Marketing structure for Nile Tilapia



- > Signify the flow of reject fish
- > Signify the flow of mainly immature Nile Tilapia from very poor fishers

The survey shows that there is a well-developed market for fish products in the region with the trading network stretching out to the villages. Generally there are three layers starting with fishers as the producers, selling to a middleman who sells to whole-sellers/factories and traders. The traders market the fish locally and the factories process and market the fish at distant markets (exports). Though this is the overall characteristic of the system it is not always adhered to as some fishers sell directly as retail, middlemen may sell to traders and traders may buy from fishers, see Figures 3 a, b, c. The sophistication of the network suggests that substantial amounts of fish are being marketed. Artisanal fisheries catches are marketed fresh or processed in line with consumer taste, storage conditions and supply and demand. The lack of a highly developed cold storage and marketing network makes fresh and frozen fish distribution to the inland population in Uganda difficult. In Uganda, more than 80% of the fish is sold fresh, about 10% is salted/dried and 8% smoked. In general, there is an increasing tendency to sell the fish captured by Artisanal fisheries in fresh form due to an increased availability of ice, together with better infrastructures that make an enhanced distribution towards hinterland possible. There is also a growing trade among neighbouring countries due to the same reasons together with improved co-operation between countries.

From this survey, it was noted that three main commercial fishery have emerged with characteristic distribution channels (Figures 3a, b, c). The main outlets being Fish factories, Urban markets, semi-urban and rural communities, fishmeal factories, Hotels and restaurants within the country and, regional and international export markets. Globalisation and increasing international trade in fish commodities and fishery products lead developments in one market to have rapid repercussions in other markets. In addition, long-term global trends in supply and demand, including developments in consumption have broad implications for the domestic industry and for consumers.

#### **4.7 Benefits from the Fisheries**

Findings from this study indicate that the demand for fish is ever increasing with all fish caught normally sold off according to fishers. The fish distribution has greatly

improved with increased channels. These include middle agents/boat traders that supply to fish factories, fish traders that supply to rural and urban markets, and factory agents that supply factories. The demand for fish for factory processing for both Nile perch and *mukene* is likely to be affecting fish distribution to other up country rural markets which used to feed local people. Some fish is sold to Kenyan buyers. Already there is growing exploitation of juveniles by fishers to meet the demand for local consumers especially the poor who cannot now afford big size fish. Most fishers note that they would rather sell Nile perch to factory agents at a good price and then use the money to buy small fish for home use. The quantity supplied home of course must have gone down with the increasing value of fish for cash.

This study established that Nile tilapia is the most preferred (85%) fish for eating because it is the most available (66%), tasty (25%) and most affordable (8%) according to fishers and, Nile perch (13%), *mukene* and *protopterus* are some of the others that are consumed (Figures 3 w & x). Most fishers eat fish daily although on average it is 5 times per week and they eat 1-2 kg per day and, spend 1000/- on food daily though the average is about 2000/- with a maximum of 15,000/- (Table 3). Tilapia, Nile perch and *Nkejje* are commonly eaten because they are tasty, affordable and available. Taboos limit consumption of some fish like *protopterus* among the Baganda.

Factories mainly exploit Nile perch for export - so great volumes of Nile perch are feeding the out side market earning government a large foreign exchange. Many fishers and people involved in the distribution together with factory owners have greatly benefited from the Nile perch fishery.

The economic benefits occurring from the 3 main fisheries have attracted many actors into the business. This survey established a very conservative estimate of some fishers who indicated that they have some assets or wealth based mainly off the landing site worth at least Ushs 2 003 000/- on average with Ushs 35,000/- being the common figure and, ranging from Ushs 6000/- worth to Ushs 17million worth (Table 3) out of the money sourced largely from fishing activities.

Recent figures have put the total employment at between 700,000 and one million (East African Newspaper, 1999). Government assessment, however, puts the figure at about 440,000 persons comprising: full-time and part-time fishers at 140,000; fish processors/distributors at 150,000 and fisheries related activities at about 150,000 on Lake Victoria alone. Fishing effort has increased from about 3200 fishing canoes in 1972 to over 10,000 canoes presently for Lake Victoria. The numbers of nets and other gears have also equally increased boosting trade and enhancing employment incomes in these areas as well.

The number of projects and researchers related to the fisheries has greatly increased since early 90s creating employment and enhancing incomes for Ugandans.

#### **4.8 Uganda's Fish Factories and Fish Exports**

There are 12 Nile perch processing factories operating in the Ugandan part of Lake Victoria and, Non-indigenous Ugandans own most of them. The industry is well integrated horizontally and vertically, which extends to other factories in Tanzania and Kenya. Much of the investments in the industry have been financed by funds from both international and local financial institutions.

Government statistics sourced from twelve factories licensed to process and export frozen, chilled fish fillets and fish maws have indicated that in the month of Dec. 2001 alone Uganda, exported 2590.6 metric tons of fish worth \$7.8m (UFRD, 2001). The exports have been consistently rising in the past years only to register a drop in Dec. compared to the previous month of November when it registered 2832.8 mt fetching the country \$8.5m in foreign currency (New Vision, Monday, Jan 28, 2002, pg50). On the average, however, fish factories in Uganda export about 2500 metric tons of Nile perch per month, which is only 50% of the existing capacity. The excess capacity is mainly due to the difficulty factories face in getting adequate fish supplies, although some of them also have constraints related to marketing, fish quality and under-financing. Besides fillet, many of the by-products of processing are also utilised. The swim-bladders (maws) are sun-dried and find ready export markets in the Far East. The fillet and maws are marketed for different reasons and the products packaged in

different small packages to suit different export markets in several countries overseas. Belly flaps (with their high oil content) and visceral fat can be rendered to produce high quality fish oil. In the last five years, a small tanning industry has developed in Uganda and Kenya, producing high quality leather goods from the skins. Fillet frames are sold on the local market, where they are fried and sold for consumption by street traders. There is also some artisanal processing of Nile perch employing smoke drying over wood fires to confer a degree of preservation for distribution to interior markets. Most of the fish frames produced by factories are also now going for fishmeal. Similarly about three quarters of the catch of a small sardine-like fish, *mukene*, goes for fishmeal. The demand for both products in the local market for human consumption is high and unsatisfied. Therefore Nile perch frames and *mukene* going for fishmeal is directly in conflict with food security requirements for local people. Because of the strong demand for fishmeal, the price of fish frames and *mukene* has risen beyond what most consumers can afford. The industries also draw away fish and fish products from the traditional processing sectors, thus causing unemployment, which outweigh the new employment opportunities created in the modern sectors. Eventually, industrialization of the Lake Victoria fisheries is leading to negative impacts on the conservation of fisheries resources.

### **Fish Processing**

Artisanal fisheries catches are marketed fresh or processed in line with consumer taste, storage conditions and supply and demand. The lack of a highly developed cold storage and marketing network makes fresh and frozen fish distribution to the inland population in the country difficult. In Uganda, cold-storage systems are lacking/inadequate and fish not sold the same day is either dried or smoked. In any case, more than 80% of the fish is sold fresh, about 10% is salted/dried and 8% smoked. In general, there is an increasing tendency to sell the fish captured by Artisanal fisheries in fresh form due to an increased availability of ice, together with increased demand from fish factories. There is also a growing trade among neighbouring countries due to the same reasons together with improved co-operation between countries. The main trade flows are: Kenya, DRC, Rwanda.

According to the key informants, the processing methods used are mainly traditional ones dominated by women, although improved technologies are being introduced and gradually adopted. Different techniques of smoking fish exist and are based on tradition, preferred tastes and market preferences. The quality of smoked fish is different according to the smoking methods, species used to the wood used in the smoking process, which can give a different taste to the final smoked product. In general there are two main different smoking techniques: hot-smoked and dried-smoked. The first is considered of superior quality than the second and has a better market acceptance but, as it contains some water, it has a reduced conservation time compared to the dried-smoked fish. The main products processed and traded include dried *mukene*, smoked catfish and smoked tilapia and Nile perch. Other traditional forms of processing are sun-dried, dried-salted and fried. On most Islands like Lolwe, women normally buy fish especially, that is most likely rejected by buyers/juvenile and smokes it. The Oil is also extracted from Nile perch, processed and sold to Kenya. Women also deal in refreshments, bars, crafts like ropes and to some extent engage in prostitution on some Islands.

Fish trading varies, the sale of a consignment of catch to a commissioned agent, fish auctioning and purchasing fish in bulk for sale in the fresh state. Elsewhere, direct bargaining between producer and trader remains the most popular trade process.

Although Namisi (2000) indicated that the size of Nile perch processed by fish factories, had improved with most factories processing fish of more than 2 kg, this study established that all factory agents buy Nile perch starting from 1.5 kg and above. This has come about due to the increasing demand for Nile perch for export following the lifting of the ban on fish and its products.

The factories have established relationships with fishermen, either directly or via agents, by supplying gear or credit. This makes fishermen dependent on factories or their agents, effectively reducing their choices in the market.

### **Fish agents / Middlemen**

Fish agents act on behalf of the fish processing factories by buying the fish from fishermen and then supplying the same to the factories. Most of these fish agents are

influential and powerful. Many own outboard engine boats and vehicles for fish transportation, while some own canoes and nets and employ fishers. Many times the fish is bought in the lake and brought directly to the factory. Fish agents from Kenya and Kampala are known to transact fishing inputs with fishers. Fishers give them fish in exchange for inputs such as outboard engines, nets, fuel and ice.

Fishers, however, have become disillusioned with the fish agents who act as middlemen, between the fishers and fish processing factories because of exploiting them. For example, instead of buying fish at the agreed price (agreed between the agent and the fish processors), upon reaching the beach, the agent normally sets his own buying prices, which in most cases are lower than the agreed prices and he retains the balance. Arrangements are sometimes made between individual agents/factories and fishers in which the agents either employ the fishers or provide them with fishing equipment on credit and in return, the fishers supply fish to him and, in the process pay back his loan. This strong patron-client relationship is geared towards serving the interests of the factories and middlemen. By establishing tight control of the fishers who, in many cases are forced to supply them with fish, many fish agents have undermined the role of the fishers organization. They have become constraints for community participation in the marketing of the fisheries.

## **4.9 Management Issues and Possible Interventions**

### **Management issues**

Results from key informants indicated that low catches; low fish prices, high taxation, lack of clean water and poor health and lack of schools are some of the daunting problems facing the lake's fisheries.

Fishers used to get more earnings with uncontrolled gear sizes but with serious restrictions on illegal gears most fishers cannot afford the legal gears and have called it quits and resorted to farming.

Theft of fishing gear (nets and hooks) is serious and ever increasing for the same reason discouraging many fishers from the business and disrupting or distorting the beach management institutions.

Landing sites in Mayuge have very poor infrastructure mainly no schools and health centres, sanitary conditions are very shoddy. Some landing sites like in Busia, Madwa however, have good infrastructure with a primary school, hospital and toilets available or accessible. The road network has improved greatly to number of fishers and fish traders.

Bugiri (Bumeru B) has a good infrastructure with pre- and primary schools but had poor sanitation (lack latrines and bathrooms), poor medical facility, poor transport and poor management institutions.

Buluba (Mayuge) has schools and health services nearby but has poor local management institutions.

### **Increased fishing effort and illegal gears**

The gears have increased in quality and quantities. Ten percent of the boats are motorised Ssesse type; owned mainly by the affluent fishers, of which the Baganda are majority and they mainly target Nile perch. The majority constitute a typical traditional fishery employing simple boat types commonly known as parachute and used by the less affluent fishers including the two tribes from Kenya, Jalu and Banyala.

Dug out canoes are found in isolated places but they are indeed few. These mainly target Nile tilapia and they use the traditional method of cast nets. The main method of propulsion is by Oars.

Competition for money, poverty and increased fishing effort has forced most fishers to resort to use of illegal/destructive fishing methods such as gill nets with very small mesh size and fishing in shallow breeding grounds for fish. They reason that big fish is scarce and they have to adjust size of nets to get some fish. The small size nets can be locally made and are relatively cheaper.

Illegal fishing methods such as beach seines, monofilament, small mesh gill nets/cast nets and tycooning, increasing effort, weak enforcement due to corrupt government officials, high fish demand and feeding behaviours of Nile perch are some of the reasons why some fish (*Cynodontis*, *Barbus*, *labeo*, *momyrus*) have disappeared

and, why tilapia and Nile perch are declining. Some fishers who resort to bad fishing methods do it for their survival since they are poor, unemployed and cannot afford the legal gears, engines and fuel, which are too expensive for them. Fishers feel they need financial help to enable them acquire proper gears or the prices of the gears should be lowered. The lake communities have resorted to cheap but destructive methods because fishing gear is too expensive.

To get good returns, one needs hooks, nets, a boat and an engine, all valued at around Ush 5,468, 750 (\$3,125). Those who do not use motorised boats need close to Ush 800,000 (\$460), far beyond the reach of many in a country whose GDP per capita is \$150.

In contrast, those who poison fish need only Ush 5000 (\$3) or less to catch Ush400, 000 (\$234) worth of fish per day. Those using legal methods earn an average of Ush100, 000 (\$60) a day. Many fishermen can't afford that kind of money mentioned above, so they resort to methods which the government does not want."

Pressure from middlemen who control the industry and lack of incentives for fisherfolk to use appropriate methods was responsible for the rise in fish poisoning. The practice, which led to ban on fish imports from Lake Victoria by the European Union and jeopardised the country's Ush 105 billion (US \$60 millions) annual trade in fish. In any case, fishers have already lost control over the destiny of their resource to the rich and the influx of migrants into the sector has also had a negative impact.

Kenyans coming to fish and for fish in Ugandan waters have increased in recent years. The recent ban to restrict fish smuggling to Kenya (New Vision, 2001) has not helped much because during this study we learnt that a lot of fish still goes unaccounted for to Kenya after the culprits buying their way out from some Uganda Revenue Authority (URA) personnel manning these areas. The money given in bribe is Ushs 50,000/- per boat (personnal communication at Kirewe Islands). Moreover, the illegal immigrants (mainly Banyala and Jalu from Kenya) are seen as people importing destructive fishing methods to Uganda since the same methods have depleted fish in their country. In particular, long line fishery is associated with these people.

The situation is made worse by complete lack of government fisheries officials in these Islands. For example, Kirewe, Namiti, Luby, Laboro and Makalaga Islands have only one provisional fisheries assistant personnel who confessed that he takes sometimes two months to get to some Islands to see what is happening (personal communication by Jjugu). While fisheries officials blame fishers for using illegal methods, fishing communities accuse fisheries officials of corruption.

Fish scouts who are supposed to monitor fishing activities in the lake have become ineffective because they accept bribes from the offenders. The institution mandated to manage, regulate and monitor the fishing industry in Uganda is poorly funded, corrupt and politically marginalized."

Fisheries guards in the field say that much as they may try to enforce regulations, lack of guarantees for their security limits their capacity.

Some fishers in Bugiri admit that due to declining harvests they sometimes resort to destructive techniques in order to earn sufficient income.

### **Fisheries management by Government**

The management of Lake Victoria fisheries has been transformed during the last two decades, from traditional to central management systems. Traditional management systems, based on the clan institutions, provided a sound management for Lake Victoria fisheries. The management framework was based on the territorial user rights, with enforceable clear rules and regulations on who could fish where, when and how.

The Government has played a role in fisheries development since colonial times. However, it is mainly since the 1970s Nile perch boom that the government activities have affected the development of the fisheries and undermined the traditional management system. The rules and regulations for the fisheries and the development plans made by the government are well articulated in the Act. However, the key informants presented a rather negative picture of the way in which the regulations and the development plans are being implemented at the local level. Almost all people interviewed emphasised that the behaviour of the Government

officials in the field has changed for the worse during the last decades. Instead of managing the fisheries resources sustainably, they have focussed on exploiting the fishers for their (officials') economic advantage. This has thrown Lake Victoria fisheries into a management crisis hence compromising the resource base and, by extension, the living standards of the fishing community.

In response to these frustrations, and given the importance of Lake Victoria fisheries in terms of employment generation, income and food security, the fishers are coming up with their own institutions, the self help groups, which they would like to operate without any intervention from the government.

#### **4.10 Organisation of Fishing Communities**

The overall authority at fish landings lies with the LCs, the state organ at the grass root level. It ensures law and order among fishing communities and the implementation of government programs within the communities. Traditionally, fishing communities have operated under the leadership of a head fisherman (*Gabungu*), with his committee. In other situations, there are elected chairmen, also with their committees, serving unspecified periods of office. These organs are essentially to resolve conflicts and maintain harmony at the beaches. They have power to set up and enforce byelaws, often regarding hours to go fishing in order to control theft of gear. They have, however, not played significant roles in resource management due to the legal policy implications involved and lack of incentives.

Recently, following the increased use of fish poisoning, the District authorities ordered the establishment of Fisheries Task Forces at the Sub-counties, initially to curb the use of fish poisoning. The Task Force has been responsible for registering fishermen at the beaches, inspecting and issuing certificates for fish consignments and setting up bye-laws governing hours to go in and out of the lake. Having largely achieved its objective, the organ's mandate has been extended to cover the control of other types of fishing malpractices. They have, however, had much less success in this role.

The existence of different organs at the beaches has often created conflict among the organs themselves, resulting for unclear definition of powers. Conflicts have also

been experienced with other local leaders, due to divergence of interests over resource management. There are no clear mechanisms for resolving these conflicts.

At the higher level, there exist fishers' NGOs working to co-ordinate and represent the interests of the communities. Notable are the Uganda Fisheries and Fish Conservation Association and the Uganda Fisheries Development Union. Government development projects have been working with these NGOs to involve fishers in formulation and implementation of management and development programs on the lake but the success of this is still to be realized.

Fishers' participation in resource management has been hindered by the open access regime on the lake. A recent study (Namisi, 2000; LVFRP, 1999) revealed that there was considerable awareness among fishers on the danger of illegal fishing methods and practices causing fish decline. Fishers also have the basic knowledge on fishery regulations in place. However, the open access nature of the fishery regime is a disincentive to fishers not only to enforce the regulations but also to comply themselves.

## CONCLUSIONS

1. The demand for fish is ever increasing. Almost all fish caught (mainly Nile perch, tilapia and *mukene* respectively) is utilised in one way or the other according to fishers. The fish distribution has greatly improved with increased channels. These include - middle agents/boat traders that supply to fish factories for regional and export markets, fish traders that supply to rural, urban and regional markets, factory agents that supply factories and, boat traders who smuggle fish to Kenya. The demand for fish for factory processing for both Nile perch and *mukene* is likely to be affecting fish distribution to other up country rural markets which used to feed local people.
2. Factories mainly exploit Nile perch for export - so great volumes of Nile perch are feeding the out side market earning government a large foreign exchange. Many fishers and people involved in the distribution together with factory owners have greatly benefited from the Nile perch fishery. Nile tilapia mainly serves the domestic fish requirements.
3. There have been tremendous structural changes at major landing sites, increased infrastructure, including businesses indicating improved incomes and standards of living.
4. Mostly semi permanent ethnic groups have become diverse: —Baganda, Basoga, Baziba, Jalu, Bagungu, Adholas, Bagwere, Itesots, Alur, Nyankole, Nyarwanda, Bagisu, Bakenyi, Banyala, etc., indicating high rates of migration in recent years.
5. Illegal fishing methods such as beach seines, monofilament, small mesh gill nets/cast nets and tycoonig, increasing effort, weak enforcement due to corrupt government officials, high fish demand and feeding behaviours of Nile perch are some of the reasons why some fish have disappeared. Some fishers who resort to bad fishing methods do it for their survival since they are poor, unemployed and cannot afford the legal gears, which are too expensive for them.

6. Unemployment, poverty, lack of capital and laxity in enforcing existing regulations has compounded the use of destructive fishing methods in Lake Victoria.

## **RECOMMENDATIONS**

1. There is need for a clear fisheries policy regarding food security and fish exports in view of the available fish stocks and all fisheries stakeholders should understand this.
2. At the mean time, the government ought to institute measures such as taxing the fish processing and animal feed firms and using the revenue back to improve the fisheries sector and the welfare of fisherfolk.
3. A gradual transfer of ownership of the fisheries to the fishing community to reduce open access to the lake and provide incentives for adoption of appropriate technology is the best way forward. This can be done through sensitisation and empowerment of the local community to manage the resource.

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## Appendix: DATA INSTRUMENT USED

Socio-Economic Sub-Component  
**Lake Victoria Environment Management Project**  
Fisheries Resources Research Institute

### **A STUDY TO EXAMINE THE CURRENT FISHERIES DISTRIBUTION PATTERN AND THE SOCIO-ECONOMIC IMPLICATIONS.**

Name of Interviewer: \_\_\_\_\_

Date: \_\_\_\_\_

District: \_\_\_\_\_

#### **A. Personal Data:**

1. Name of Respondent \_\_\_\_\_
2. Age \_\_\_\_\_ years
3. Sex [1] Male  
[2] Female
4. Tribe [1] Iteso  
[2] Muganda  
[3] Musoga  
[4] Musamia  
[5] Mukenye  
[6] Mugwere  
[7] Alur  
[8] Adhola  
[9] Others (Specify) \_\_\_\_\_
5. Marital Status  
[1] Married  
[2] Single  
[3] Divorced  
[4] Widowed  
[5] Others (Specify) \_\_\_\_\_
6. What is your level of education? (Tick one)  
[1] No schooling  
[2] Primary  
[3] Secondary  
[4] Tertiary  
[5] University  
[6] Others (Specify) \_\_\_\_\_
7. Do you have a family?  
[1] Yes [2] No
8. If yes, how many people are in the family?

Children \_\_\_\_\_

Dependants \_\_\_\_\_

Wives \_\_\_\_\_

9. How long have you been at this landing? \_\_\_\_\_ Years

**B. Fisheries Distribution Pattern  
Fish Production**

10. What fish species do you most commonly catch? (Rank)

- [1] Nile perch
- [2] Nile Tilapia
- [3] Mukene
- [4] Others (specify) \_\_\_\_\_

11. What type of fishing gear do you use?

- [1] Gill nets
- [2] Longlines
- [3] Cast nets
- [4] Basket traps
- [5] Mosquito seines
- [6] Beach seines
- [7] Others (Specify) \_\_\_\_\_

12. What gear size/ number do you use?

- [1] Size \_\_\_\_\_
- [2] Number \_\_\_\_\_

13. In what fishing ground do you operate?

- [1] Shoreline
- [2] Inshore
- [3] Offshore
- [4] Bays
- [5] Others (Specify) \_\_\_\_\_

14. What boat type/ length/ means of propulsion do you use to fish?

Boat type	Means of propulsion	Boat length
[1] Parachute	[1] Engines	
[2] Ssesse 1	[2] Oars	
[3] Ssesse 2	[3] Sails	
[4] Dug-out	[4] Others (Specify)	
[5] Others (Specify)		

**Fish Marketing**

10. To what type of traders do you sell your fish?

Type of trader	Means of transport	Market
[1] Local trader	[1] By food	[1] Rural
[2] Bicycle trader	[2] Bicycle	[2] Urban
[3] Factor agent	[3] Public transport	[3] Fish processing factories
[4] Truck trader	[4] Truck	[4] Regional markets
[5] Local processors	[5] Boat	[5] Others (Specify)
[6] Others (Specify)	[6] Others (Specify)	

**Fish Processing**

10. Is there any traditional fish processing done?  
 [1] Yes [2] No
11. If yes, what fish species is most commonly processed?  
 [1] Tilapia  
 [2] Nile perch  
 [3] Mukene
12. What method of processing do you use?  
 [1] Smoking  
 [2] Salting  
 [3] Sun drying  
 [4] Others. (Specify) \_\_\_\_\_

**C. Socio-Economic Status**

**Income**

13. Boat owner

Fish Species	Quantities				
	Yesterday	Today	Good day	Bad day	Price
Nile perch					
Tilapia					
Mukene					
Protopterus					
Clarias					
Other (Specify)					

**Fish Labourer**

20. How many fishing trips do you make in a week? \_\_\_\_\_
21. How much do you make on each fish trip? Shs. \_\_\_\_\_
22. Do you have any other sources of income?  
 [1] Yes [2] No
23. If yes, which ones?  
 [1] Farming [2] Business [3] Others (Specify) \_\_\_\_\_
24. How much do you spend on food per day? Shs \_\_\_\_\_

**Investment**

25. Do you re-invest some of the money you earn in fishing assets?  
 [1] Yes  
 [2] No
26. If you reinvest, what fishing asset do you mainly buy?  
 [1] Boat  
 [2] Gillnets  
 [3] Boat engine

- [4] Oars.  
 [5] Others (Specify) \_\_\_\_\_

27. How often do you re-invest in fishing assets in year?

Asset	Rate
Boat	
Gear ( )	
Boat engine	
Oar	
Other (Specify)	

28. How much of your income is re-invested on the following assets?

Assets	Amount
Boat	
Gear ( )	
Boat engine	
Oar	
Other (Specify)	

29. What was the source of your starting capital?

- [1] Fishing activities      [2] Farming      [3] Small-scale business  
 [4] Retirement benefits      [5] Family sources      [6] Loan  
 [7] Others (Specify) \_\_\_\_\_

**Employment**

30. What is your main occupation?

- [1] Fishing      [2] Boat building      [3] Farming      [4] Shop  
 [5] Food and refreshment      [6] None      [7] Others (Specify)

31. If fishing, what is your

(a) Type of employment

- [1] Boat owner  
 [2] Crew member  
 [3] Local processor  
 [4] Factory agent  
 [5] Middlemen  
 [6] Local fish trader  
 [7] Others (Specify) \_\_\_\_\_

(b) How many people do you employ? \_\_\_\_\_

**Fish Consumption**

32. What type of fish do you most commonly eat?

- [1] Tilapia  
 [2] Nile Perch  
 [3] Mukene  
 [4] Others (Specify) \_\_\_\_\_

33. Why do you mainly eat this type of fish?

- [1] Available  
 [2] Tasty

- [3] Affordable
- [4] Others (Specify) \_\_\_\_\_

34. How often do you eat fish in a week? \_\_\_\_\_

35. How much fish (kilogrammes) do you eat per day? \_\_\_\_\_

**Wealth**

36. What wealth items do you own?

<b>Item</b>	<b>No.</b>	<b>Unit value</b>	<b>Landing/ Off-landing</b>
[1] Permanent house			
[2] Semi-permanent house			
[3] Vehicle			
[4] Bicycle			
[5] Cattle			
[6] Goats			
[7] Radio			
[8] Others (Specify)			

Thank you for your time