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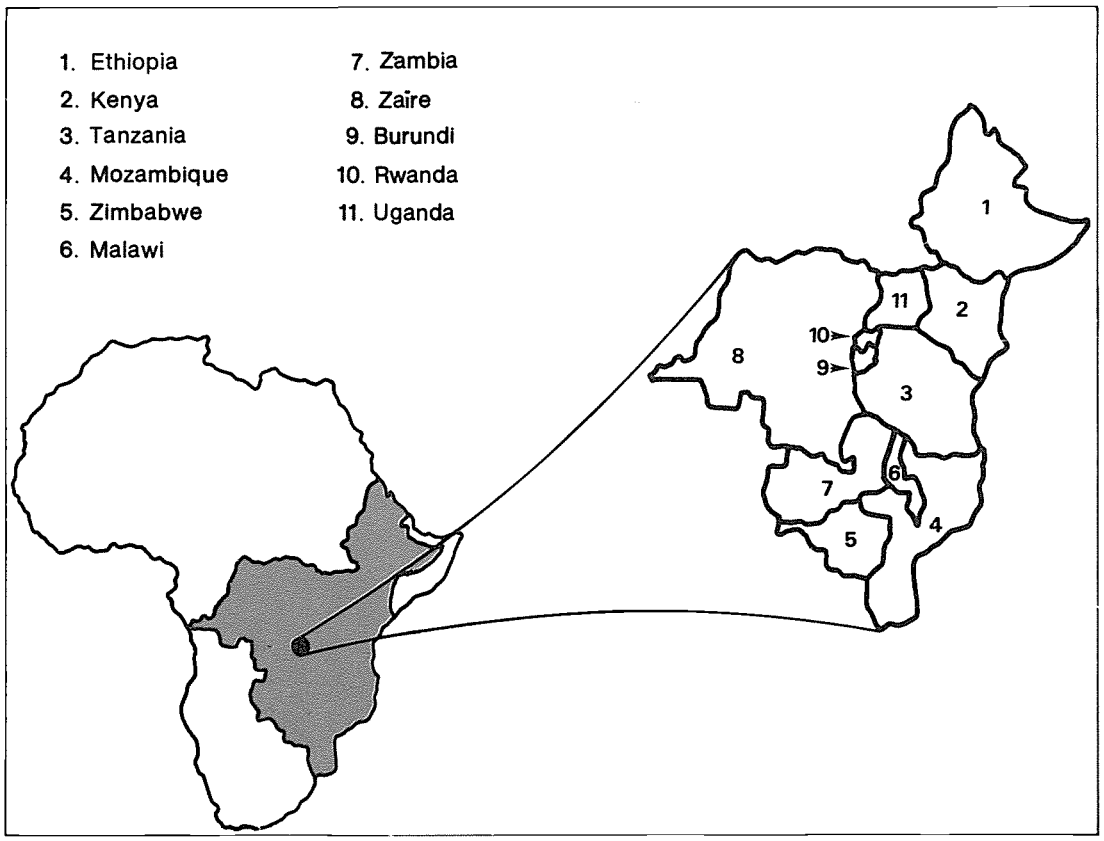
"Our Children Will Suffer": Present Status and Problems of Mweru-Luapula Fisheries and the Need for a Conservation and Management Action Plan



UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

UNDP/FAO Regional Project
for Inland Fisheries Planning
Development and Management in
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"Our Children Will Suffer": Present Status and Problems of Mweru-Luapula Fisheries and the Need for a Conservation and Management Action Plan

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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PREFACE

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

Eleven countries and three intergovernmental organisations are 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 Community (SADC).

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

The IFIP Project carried out a general assessment of the situation of the Lake Mweru-Luapula fisheries (Zambian side) in 1991 [see TD/28/91 in attached list of publications]. This mission reported on the severe management problems affecting the fisheries, the growing importance of the pelagic fishery, and the urgent need to conduct more systematic research and assessments. The present document reports on some of the work undertaken since then in the context of a project executed by the Department of Fisheries with the assistance of the Netherlands Development Organization (SNV/NDO). More specifically, this document provides for a rather comprehensive assessment of the fisheries' status, as seen by fisherfolk and extension personnel of the Fisheries Department. Problems addressed include; declining catches; decreasing fish size; rampant use of destructive and illegal fishing methods and gear; net theft. Solutions are proposed, and the role of emerging community organizations is discussed.

It is especially interesting to note the degree of awareness on the part of fisherfolk and their attempt to find solutions to some of the problems they face, as, for example, through the creation of Fishermen's Associations and their request for specific management measures. It is also important to note that in Zambia, like elsewhere in the project area, there is a growing recognition of the urgent need to adopt more effective fisheries management programmes and to fully involve fisherfolk communities and organizations in this endeavor. This stems from the severe over-exploitation of a growing number of major commercial stocks, and from the recognition that fisherfolk's participation is required for the effective management of small-scale fisheries. Malawi and Zimbabwe have recently started to establish such participatory management programmes for the Southern part of the Lake Malawi complex and for Lake Kariba respectively. This document is published by the project as an example of the kind of study and approach required for the elaboration of a participatory management framework and the subsequent implementation of a conservation and management action plan.

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 (50), the year of publication (93) and the language in which the document is issued: English (En) or French (Fr).

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ABSTRACT

A frame survey conducted in 1992 revealed that 9436 fishers[1] were operating at the time in the fisheries of the Lake Mweru-Luapula complex. These fishers use a wide variety of fishing gears such as gillnets (45781), *chisense*[2] nets (1402), traps (10583), baskets (1218), longlines (438) and hook and line (4177). Most fishing is conducted from plank boats (3955) or dugout canoes (3684).

The present status of Mweru-Luapula Fishery is quite alarming and characterized by the following problems: decline in catches, increasing use of destructive and illegal fishing methods and gear, and rampant thefts of nets. Conservation, management and enforcement efforts by the Department of Fisheries are hampered by lack of clarity in present and about future regulations, and lack of funds and staffing.

Present ecological and socio-economic problems of the Mweru-Luapula Fishery, as expressed by fishers through their complaints, actions and suggestions should persuade the Department of Fisheries to redirect its focus towards a sound fisheries conservation and management strategy allowing for greater local involvement. In order to restore and ensure the sustainability of the Mweru-Luapula Fishery, a Conservation and Management Action Plan (CAMAP) is proposed, in which both biological and socio-economic concerns are incorporated.

ACKNOWLEDGEMENTS

Many thanks go to our colleagues, the Fisheries Assistants who were involved in the Mweru-Luapula frame survey of 1992. The present paper could not have been written without their efforts in conducting the survey and in answering more qualitative questions based on this newly gained information and their own experience. The Provincial Fisheries Development Officer, Mr. J. Maluti, is thanked for his critical and fruitful comments. The Netherlands Development Organization (SNV/NDO) gave financial support to the 1992 frame survey. We are grateful to Dr. D. Gréboval of the IFIP/FAO project in Bujumbura for stimulating the revision of an early draft and for providing assistance in the editing and distribution of this report.

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[1] In accordance with McGoodwin (1990) we are using the term fisher instead of fisherman or fishermen since these latter terms do not include the women who fish or who own boats or fishing gear. We have defined a fisher as someone who owns fishing gear and/or a boat used for fishing. Gear is defined as all types of equipment used for fishing including those solely used for subsistence fishing (e.g. baskets, hook and line).

[2] Chisense is a complex of small sardine-like species

ABBREVIATIONS

CAMAP	Conservation And Management Action Plan
DOF	Department Of Fisheries
FAO	Food and Agriculture Organization of the United Nations
IFAD	International Fund for Agricultural Development
IFIP	Inland Fisheries Planning, Development and Management in Eastern/Central/Southern Africa
MMD	Movement for Multiparty Democracy
SNV/NDO	Netherlands Development Organization
UNDP	United Nations Development Program
UNIP	United Nation Independence Party
ZCF	ZCF Financing Service Limited.

GLOSSARY

chisense	a complex of small sardine-like species
chombo	a large vessel (>10 meter) used for transport or for fishing, also used in *leleke* fishing
chitumpu	illegal fishing practice (table III)
chosa	beach seine nets
dambo	swampy and grassy areas near river mouths, sometimes extending quite far inland
fibata	a Zairian illegal fishing method (table III)
kapopela	illegal fishing practice (table III)
kasenswa	illegal drift netting (table III)
kutumpula	illegal fishing practice (table III)
leleke	an emerging type of gillnet fishing using a *chombo* vessel which enables fishers to stay overnight on the lake
mealie meal	maize flour
mifimbo	name of a prohibited fishing area located in the southern part of Lake Mweru
mukwau	beach seine nets
mutumboko	annual ceremony for the Lunda senior chief Kazembe
nyamvu	seine nets made out of onion bags
shichide	illegal fishing practice (table III)
ububa	herbs used to poison fish.

1. INTRODUCTION

The title of this paper "Our Children Will Suffer" is a remark made by a concerned fisher who demanded the re-introduction of the seasonal closure of the lake and the river to allow for proper fish breeding, "because if the government does not do this our children will suffer a lot". The remark was recorded by one of the Fisheries Assistants of the Nchelenge Fisheries Department (DOF) who was involved in the 1992 Mweru-Luapula frame survey. Yet another frame survey recorder stressed the importance of the fishing industry for the Luapula people: "by seeing the number of people involved and how it provides employment and the cheapest protein a poor man can ever secure nutritionally".

The aim of this paper is to give an impression of the present status and problems of the fishery as viewed by fishers and Fisheries Assistants. The following quote from a survey recorder indicates that the fishing community generally has a good understanding of the alarming trends emerging in the Mweru-Luapula Fishery:

> "All the way from Mambilima (Mulundu) to where we have ended the Chiefs and their people were asking the same question: could the DOF resume closing the river and lake every year to let fish breed? At the same time if the government will not assist in this, within a short period of time no fish will be caught in Luapula and Lake Mweru. They were pleading with us to take this information to higher authority".

Concerned with the status of the Mweru-Luapula Fisheries the authors conducted a preliminary analysis of the dynamics (socio-economic, demographic, political and environmental) which determine and affect the fisheries. The paper reflects suggestions by fishers and fisheries staff for a future conservation and management strategy. Furthermore the paper gives guidelines and recommendations for further research. In the concluding section the authors stress the need for a comprehensive Conservation And Management Action Plan (CAMAP) for the Mweru-Luapula Fisheries.

This paper is based on the following information:

1. quantitative data provided through the Mweru-Luapula frame survey conducted in the period June - August 1992. 11 Fisheries Assistants and 4 cartographers wer involved in this survey (Appendix I);

2. qualitative data collected by means of questionnaires (appendix V) and personal communication, by the Fisheries Assistants. Quotations used in the text are from survey recorders. Otherwise the source is mentioned separately;

3. a review paper by the Fisheries Research Officer in Nchelenge on fisheries management policy (Kapasa, 1992);

4. notes taken during a seminar on fishery management held for fishers and traditional Chiefs in Nchelenge (October 1992);

5. other information collected by the authors during field-visits or gathered from fishers or local leaders visiting the department of fisheries in Nchelenge.

The authors intend to use this document as a basis for discussion and for the further elaboration of recommendations for a Conservation and Management Action Plan aimed at ensuring the sustainability of the Mweru-Luapula Fisheries.

2. MAGNITUDE AND DIVERSITY OF MWERU-LUAPULA FISHERIES

The Mweru-Luapula Complex includes Lake Mweru, its islands and the Luapula river with its lagoons, swamps and flood plains from the Mambilima rapids northwards up to Lupiya on the Lunchinda River (appendix II). The two main affluents are the Luapula River in the south and the Kalungwishi River in the east. The Luvua River flows out of the lake. Both the riverine sector and Lake Mweru itself are shared almost equally between Zambia and Zaire, which complicates the management of these fisheries (Ngula, 1990). About 17 of the 100 fish species present are commercially important. The abundance of a number of fish species have declined to very low levels over the years. One species (Labeo altivelis) has been exploited to possible extinction.

Fishing is the basis of the rural commercial and subsistence economy in the Nchelenge district and in major parts of Kawambwa and Mwense districts (appendix IIb). A rough estimate of the number of people actively involved in fishing (gear and/or fishing boat owners and workers[3]) amounts to 25.000 to 30.000 people[4]. This estimation excludes the people who are engaged in fishery-related activities such as fish processing, fish trade, boat building, charcoal-burning and collection of fuel-wood. The frame survey results reveal a great diversity within what is generalized as the Mweru-Luapula fisheries. Table II shows some of the cruder differences between the river and swamp fisheries (Stratum III and IV) and the fisheries of the Lake area (Stratum I and II).

2.1 Stratum IV: subsistence fishery

Stratum IV is the long stretch of river, swamps and lagoons from the Mambilima rapids up to Muku Lagoon (± 120 km). About 45% of the total number of fishers were recorded to be operating mainly in this Stratum. Fishing is practiced essentially at subsistence level. About half of the fishers operate in the gillnet fishery, using dugout canoes (Fig.2) and only one or a few pieces of gillnet (Table 1). Other fishers use traps (about 20%), angling and longlines. Baskets are operated by women and young girls in the shallow waters of the lake and lagoons (about 20% of fishers; Fig. 1). Trade of fish seems to be limited to the area itself and the market of Kawambwa.

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[3] A worker is someone who is actively involved in fishing but does not own a boat and/or fishing gear.

[4] This estimate is based on the number of fishers counted in the Frame Survey taking into account that gillnet fishers on average operate with one worker, chisense fishers with four to six workers, basket fishing is usually done with about four women per basket. The number of chisense fishers is approximately 1220, women with baskets 1218, gillnet fishers about 6500 (Table I).

The frame survey recorders describe the southern fishery as follows:

> "A large percentage of fishers own gear of which sizes vary between 37 and 76 mm. Catches are small, mostly depending on rainy season (November to March). Incomes are low, although most people fish for the pot only".
>
> "Stratum IV is over-fished by illegal fishers using small mesh-sizes (25-63 mm) and beach seining with meshless material i.e. mealie meal bags. Fishers catch small fish. Catches are very poor and fish is very scarce and expensive. People who are not able to get their living from fishing go to farming".
>
> "In some places like Kashiba, Mulundu and Lukwesa people have started to buy fish from Kashikishi and Kanyembo for their consumption".

2.2 Stratum III: transition fishery between swamps and lake

Stratum III encompasses the lagoons near the mouth of the Luapula River, the islands in the swamps (Chisenga, Fyulu) and, at the southern edge of Lake Mweru (Isokwe, Kanakashi), Kilwa Island and the Mifimbo[5] area. The latter is one of the most important breeding areas for the green headed bream (Oreochromis macrochir) and is closed for fishing throughout the year (appendix III). Stratum III can be described as a transition area between the swamps and the Lake: traps (about 8% of the fishers), baskets (13 %) and hook and lines are widely used in the swamps, while the mouth of the river harbors one of the biggest *chisense* (small pelagics) fishing camps in the area (Kashilu). Most gillnet fishers operating in the swamps use only a few nets, while Kilwa Island harbors some of the biggest gillnets of Lake Mweru.

2.3 Stratum I & II: small-scale gillnet and chisense fishing

Small-scale[6] gillnet fishing takes place from the larger fishing camps located in Stratum I and II. Here fishers operate mostly from plankboats and, in average, own 8.8 (Stratum I) to 10.3 (Stratum II) gillnets (Table 1). A minority of fishers own up to 100 nets. As indicated in Figure 1, other important gear used elsewhere (traps, hook and lines, baskets) are much less used in Stratum II - virtually limited to the areas around the mouths of the Mwatishi and Kalungwishi Rivers - and hardly at all in Stratum I.

The larger fishing camps in Stratum II - Kashikishi, Ntoto, Kabuta, Mukwakwa and Kafulwe - have relatively good access to means of transport to the Copperbelt. North of Kafulwe (Stratum I) access to road transport is much more limited. A major part of the trade of fish on the Northern edge of the lake is done via transport vessels from Zaire.

The more capital intensive *chisense* fishery is concentrated on the

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[5] Mifimbo is a prohibited fishing area throughout the year (see appendix III).

[6] With the term small-scale fishing we cover the group of fishers whose individual capital commitments and levels of production are relatively small-scale but higher than those of subsistence fishers.

Northern shore of the lake. Here 6.2 % of all type of gear are *chisense* nets, compared to only 0.3 % in Stratum IV (Fig.1).

Generally a *chisense* fisher owns one net, one or two plankboats and a number of tilley lamps (minimum 4). A *chisense* 'company' comprises the owner of the gear and boat and usually 4 to 6 workers per *chisense* seine net. The impact of *chisense* fishing on employment is quite high: a rough estimate, made from the frame survey results and based on personal observation, implies that the Mweru-Luapula *chisense* fishery offers direct employment to about 7000 people (1220 gear-owners and 5807 workers) - compared to about 15.000 in the gillnet fishery - and income for both local and outside traders (copperbelt and Zaire). "*Chisense* fishers make a lot of money especially from August to April".

2.4 Nets, Sails and Engines

The supply of nets and netting material is a major problem in both the gillnet and the *chisense* fishery. It is estimated that most (up to 75%) of the gillnets are imported from Zaire. These nets are preferred to those available in Zambia because of lower plynumber and smaller mesh sizes. In the short term, this means higher catchability rates and relatively lower price. On the other hand these nets are damaged much more easily. Nets from Zaire are available in some shops in Kashikishi. Although it is reported in some instances, specific data on whether nets are exchanged for fish are not available. In recent years the supply of nets from Nkwazi Manufacturers has been far below Zambian demand due to production and distribution problems (Melander and Nilsson, 1991). At present, nets are available but prices are prohibitive.

The supply of nets through the Lima Bank in Nchelenge is poor: in 1991 less than 1% of the applicants to the Lima Bank obtained loans for gillnets and less than 1% of the nets applied for were effectively supplied (Munalula, 1991). From April to October 1992 the Lima Bank received 243 applications for fishing loans but due to financial problems[7] not a single loan had been approved by November 1992.

The situation in the growing *chisense* fishery is not much better:

> "Ninety percent of the *chisense* fishers use meshless material. The major problem is where to get the right material (of 6mm and above)". Supply from Nkwazi Manufacturers is far below demand. Netting material is sometimes imported from Burundi, but by far the majority of the *chisense* fishers use meshless materials for the construction of their nets (Kapasa and van Zwieten, 1992).

Most fishing is done from plank boats or canoes propelled by paddling. In Stratum II sails are quite common in addition to paddling. Engines are rarely used in the whole fishery, mainly because of the poor supply of petrol, two-stroke oil, spare parts and mechanical services.

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[7] According the Officer In Charge of the Lima Bank in Nchelenge its financial problems are caused by a bad rate of return and high overhead costs (huge area to cover). Net-thefts and poor catches are reasons given by fishers for not being able to repay loans.

It was also noted that:

> "Most *chisense* fishers in stratum I do not use engines since the chiefs or headmen are against it thinking that the engines scare the fish as well as (to avoid) *chisense* (fishers) to go far from the shore line" (words in between brackets added).

3. SOCIO-ECONOMIC AND POLITICAL DIMENSION OF THE FISHERY

One of the recorders gave the following impression of the socio-economic context of the fishery in stratum III and IV:

> "It seems that people get their living through fish and just a bit through agriculture, although now most of them have turned into farming because of net-thefts, low catches and because the mesh-size they want to use is illegal. They do not make enough money these days, they try to use and concentrate on mesh-sizes 50# to 76#, dugout canoes, *kutumpula* (Table III), few gillnets and more seine nets. They use relatives as workers".

According to the fishers the Mweru-Luapula fishery is confronted with three major problems: 1. decline of catches; 2. growing cases of net-theft; 3. increasing use of illegal fishing gear and methods (Table III). Other problems are: inadequate supply of fishing nets, high prices of material for fishing gear, inflation, inadequate marketing and credit facilities, and the influx of Zairians into the Zambian sector.

According to the frame survey recorders the high incidence of net thefts - combined with increasing cost of living - somehow force the fishers to engage more and more in active (=illegal) fishing: "Many fishers have resorted to active fishing because of rampant stealing"; "Fishers use illegal gear to make ends meet" while at the same time they realize that this kind of illegal destructive fishing "will lead to laying off more people from this industry than already is the case".

3.1 Decline of catches

Catch per unit of effort for the stationary gillnets has decreased from 10 kg per net per night between 1955-1975 to the present value of 2-4 kg per net per night for Mweru-Luapula fishery (Kapasa, 1992). The majority of the fishers complain about this decline in catches and about small fish sizes for which they give the following reasons[8]:

1. use of illegal fishing methods e.g. "Zairian *fibata*", *kutumpula*, beach seining, *kasenswa*, etc. (Table III);

2. use of illegal fishing gear;

3. low rainfall during last few years;

4. fishing in breeding grounds (Mifimbo, mouth of Kalungwishi River) and while fish are migrating to their spawning grounds;

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[8] These were collected by the recorders of the Frame Survey 1992.

5. influx of people in the fishery and thus more gear in use;

6. lifting of the seasonal closure;

7. Department of Fisheries does not function properly i.e. general lack of conservation patrols and lack of education of fishers, improper control of Mifimbo, non-capture of culprits, lack of fisheries stations along the Luapula river;

8. unchecked Zairian fishing effort: e.g. no restriction on mesh-size and seine nets used by Zairians; unauthorized fishing in Zambian waters;

9. lights used in night fishing by *chisense* fishers.

3.2 Impact of net-thefts

The occurrence of net-thefts seems to have an impact on the fishery in terms of the type of fishing gear and fishing methods used, as well as in terms of the organisation of fishers themselves. According to the survey recorders, the problem of increasing net-thefts is related to the ever growing practice of illegal fishing (virtually all active fishing methods): "One subsistence fisher stated that although he does not like using a beach seine net, he is just forced to do so by the present situation of net thefts". Others refer to people in Stratum III and IV "who have lost interest in fishing because of thefts and now have switched to farming or other types of work" or to fishers losing interest in buying nets for fear their gear might get stolen.

One of the recorders stated that in Stratum I and II fishers complain less about illegal fishing methods than in Stratum III and IV. But complaints about theft cases do come up as well. Fishermen Associations try to safeguard the gear of their members (section 4). Some fishers are organising themselves in *leleke* fishing i.e. they stay overnight with their nets on a permanently anchored large vessel (*chombo*). This requires organisation among fishers to make collective use of these boats while relieving each other in guarding nets. Presently these larger type (10+ meters) boats are being built at several places along the northern part of the lake and on the islands.

3.3 Illegal fishing methods and gears : "bad harvesters"

According to rough estimates made by recorders, more than half the fishers operating in Stratum III and IV use destructive fishing methods, especially beach seining with small meshed nets and *kutumpula* with both small and big mesh sizes (Table III). Illegal fishing methods are practiced especially along the Luapula "beaches". *Shichide* nets (25mm gear) seem to catch very small Tilapia and Bream, especially at the Luapula mouth and in Kamibombo Lagoon. Women from Mulundu who fish with baskets use *ububa* (herbs) to poison fish in *dambo's*[9].

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[9] Dambo's near Lake Mweru are swampy and grassy areas near river mouths, sometimes extending quite far inland.

The use of illegal fishing methods and gear is on the increase as the following anecdote of an aged man[10] reveals:

> "I quite remember 1938-1945 when I was quite a boy I only saw one method of catching fish being used: bigger fishermen were using large meshes in their nets and young fishermen were using nets with 2,5 to 3 inch meshes. In this way fish could grow to reasonable sizes. Nowadays, because of nasty fishing methods fish is declining and will continue to decline until there is nothing left". "Chosa, chibata, mutabi and kapopela should be completely forbidden because the destruction caused by these methods of fishing is so bad that in some lagoons not a single fish is to be seen".

The frame survey recorders reported that most fishers are against the use of seine nets. According to them, fishers term seine nets as "bad harvesters", for it crops even the young fish.

> "Beach seining seems to be the outcry throughout the whole fishery. A lot of people, both old and young, are against beach-seiners. There are other fishers who are also against the use of nets below 50mm".

Yet, a reliable figure on the prevalence of beach seine nets could not be derived from the frame survey data[11] as fishers are "hiding their gear" and "are feeling uncomfortable when they notice the presence of fisheries staff, thinking they have come to confiscate their nets". To quote another survey recorder:

> "Most of the fishers along the Luapula river were careful and never told us the truth about owning illegal gear and about practicing illegal fishing (...). This I can tell because during our stay at Kashiba, the residents started complaining about a shortage of fresh fish due to our presence".

3.4 Local conflicts

Increasing use of illegal fishing gear and methods cause locally organized actions (e.g. by chiefs or by political youth groups) against illegal fishers. This creates complex conflicts and challenges traditional lines of authority. The following anecdote is a vivid example of such conflicts:

> The local MMD youth after confiscating illegal nets from a group of fishers in return were beaten up by the same illegal fishers who claimed to fish for the village chief. The Officer in Charge of the Department of Fisheries in Nchelenge was asked to arbitrate at the local dispute between the chief, his workers, their wives, MMD officials and some other villagers. The MMD officials condemned the use of illegal fishing methods. The chief referred to the cultural tradition of chiefs of paying tribute (=fish) to the Mutumboko ceremonies. The Officer in Charge took the illegal fishing gear that had been used to Nchelenge pending further investigations.

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[10] The man participated in a seminar held for fishers and traditional chiefs in October 1992.

[11] The Frame Survey counted a total number of beach-seine nets of 414 only. For Kilwa Island fishing camps the recorded number is 11, but the recorders were personally informed by Chief Nshimba that there were in fact about 200 (!) beach seine nets.

Local conflicts also arose in the area between Kashiba and Kazembe because of fishers using *Nyamvu* nets made out of onion bags. "The owners of this very destructive type of gear are hated by the local community who already appealed to the Department to stop this". Other conflicts are related to the influx of Zairians. They settle in Zambian fishing camps and take up membership of fishermen associations but reject paying tribute to the Chief.

4. FISHERMEN ASSOCIATIONS

In the Mweru-Luapula Fisheries, especially along the northern part of the lake, Fishermen Associations have emerged since 1985 based on local initiatives.

> "From Kafulwe up to Ifuna, fishers have formed associations that look after the theft of their gear. Gears are recorded and counted by type and mesh-size. Each new fisher has to be entered into the register of the village before he starts operating".

According to the constitution[12] of the Fishermen Associations, their main objectives are:

1. the safeguard of gear (nets, boats, lamps) for members;
2. to preserve the "old culture heritage in fishing"[13]
3. to help each other in difficult times e.g. to provide payments for funerals and pay for expenses related to retrieving stolen gear.

In achieving their safeguarding objectives the associations undertake the following activities: to register different type of gear (in some cases the information is arranged in mesh-sizes and lengths), boats and tilley lamps per fisher; to inspect and register additional gear; to produce transfer letters for fishers moving to other camps. Before leaving a fishing camp all gear should match with the records. Some associations are reported "to operate nicely, such that now even thefts of nets has reduced at least".

Fishermen Associations are hierarchically organized in sections, branches and wards. However, information about the associations is scattered, and their magnitude unknown to the Department of Fisheries.

4.1 Associations seeking for empowerment

Well organized associations are ensuring safety, especially in those fishing camps which are located far away from the nearest police station. "The associations want to form one big association (union), which will be registered at the registrar of societies by Act of Parliament, for protection of nets from being stolen".

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[12] Constitution as compiled by the Chipungu Ward Fishing Main Committee, 1990 (appendix IV).

[13] It would be very interesting in terms of future conservation and management to find out what the associations mean by the "old culture heritage in fishing".

They ask for more room for manoeuvre in handling cases of net-thefts and illegal fishing:

> "In Nyamfwa we met a ward chairman who asked for power to arrest fishers who practice *chosa* (Table III) because the fish they catch is very small and in this way the fishery gets spoiled".

At a seminar held in October 1992 for fishers and traditional Chiefs, a representative of the Fishermen Associations reported on the lack of cooperation from some Chiefs: "some of them do not understand the aims and the work of the association, some suspect that the association may overtake their traditional power". Perhaps this is due to Chiefs not knowing about the existence of the constitution.

4.2 Relation with Department of Fisheries

The cooperation between Fishermen Associations and the Department of Fisheries appears to be minimal, mostly because these associations started on their own. The Department of Fisheries has only recently become aware of their existance and importance.

> "The few representatives I met were complaining about the lack of support from the Department of Fisheries as well as from the government. Their complaint was that ever since the associations were formed they had just been fending for themselves".

According to the chairman of Chipamba Association, in the past, fisheries assistants based in outstations used to cooperate in confiscating illegal gear. However, nets were regularly illegally resold or handed over to fishers against payments. Other critical comments about the Department of Fisheries were collected such as:

> "Fishermen Associations in the north and in part of the south complain about the Department's failure to patrol all areas in the fishery and about the lack of extension visits and training whereby views between fishers and the DOF could be exchanged".

In July 1992 a delegation of Fishermen Associations' representatives came to the Department of Fisheries in Nchelenge to highlight their concern about the future of the fishery:

> A delegation from different branches of the Fishermen Associations came to the Department in Nchelenge demanding action to be taken against the use of illegal fishing methods and small mesh-sizes. At the same time the delegation made a strong plea on behalf of the fishers for re-introduction of the seasonal closure from 1st of December up to 1st of March. "Fish needs time to breed". According to them the ban needs to include the chisense fishery as well because of the fake fishing i.e. fishers setting gillnets while pretending to go out for chisense fishing.
>
> In asking them why they want a closed season they referred to the various meetings they had with the fishers who were found to be very concerned about rapidly declining fish stocks. The second reason the representatives mentioned is to promote the alternative of farming during the closed season. The third reason for a closed season aims to decrease death by accidents on the lake due to bad weather and heavy rainfall from December to March.

The delegation recommended the following for proper conservation and management:
1. the early and timely distribution to the associations of written circulars on policy matters concerning the fishery;
2. to regularly call fishers for meetings on the importance of fish conservation;
3. to control illegal fishing methods by confiscating nets and burning nets on the spot;
4. to temporarily employ people in enforcement activities.

When asked, representatives indicated that they did not meet any hostile reaction due to their enforcement activities. Instead they stressed the point that they represent the majority of fishers who agree on their proposal, "we do not worry about the few who do not". The delegation, after making their views clear to the Department of Fisheries, proceeded to do the same at the office of the District Council Secretary, the District Council and the Nchelenge Police.

5. CONSERVATION AND MANAGEMENT: DILEMMAS AND STRATEGIES

With the current lack of staffing and funding, the Department of Fisheries cannot fulfil their conservation and enforcement duties adequately. Conservation is limited to enforcement covering a small part of the whole fishery: the Mifimbo area, Isokwe and Kanakashi. No funds are available at all for training and extension (Ngula, 1990).

According to the frame survey recorders, enforcement is hampered by people who have settled near Mifimbo: "Fishers at Kanakashi, Kashilu and Fyulu must be taken away from the nearby fishing area". The plea for resettling people from Kanakashi and Kashilu also came from Chief Muyembe from Chisenga island. According to him the "political" school[14] built in Kanakashi should be removed to Isokwe. On the other hand "the Kanakashi people are against their removal from the breeding area where they have settled".

5.1 Attitude of fishers towards the Department and other officials

Some fishers have a negative attitude towards the Fisheries Department or other officials due to the confiscation of nets, a seasonal or spatial closure of the fishery, the establishment or increase in levies on fish marketing, boats and nets. "Many women complained about governmental plans to tax fishing baskets" although such plans are not known by the Department of Fisheries. Obscure incidents like the following reported by a traders' organisation from Kafutuma aggravates fishers' negative and reluctant attitude towards officials: here some people who pretended to be working for the district council collected levies from *chisense* fishers neither identifying themselves nor giving out receipts.

Despite negative feelings towards officials there is a general concern about the fisheries and it is generally felt that the Department should take action.

"Some fishers are on the side of the Department by being very

[14] According to Chief Muyembe the school at Kanakashi has been built by UNIP short before the 1991 elections.

willing to work with us, by having the idea that the Department of Fisheries is their own department, by wanting to help in better fishing methods and by giving some information which others were hiding from us".

Fishers hope and expect that the Department will close the fishery, some were even pleading for an extension of the closure with a few months. "More than half of the fishers are very concerned about the catches of small fish sizes. They want small meshed nets and seine nets to be banned completely". But at the same time fishers accuse the Department of not taking the law very seriously when it comes to people using illegal fishing methods. They are wondering why the Department is "relaxing in deploying preventive measures" and why "the penalty is not a strong one, it should be more than 4 or 5 years of imprisonment".

5.2 Actions and suggestions of fishers

According to the survey recorders, fishers represent people with different characters "some with destructive and emotional ideas whereas others would be very helpful in the future development of the fishing industry". Most fishers were complaining that there is nothing they can do: on the one hand gillnets are in danger of being stolen at night, on the other hand if they use seine nets the fisheries officers might come to confiscate them. Other fishers leave gillnet fishery and engage in *chisense* fishing. Another emerging trend is the *leleke* fishing (see 3.2).

Fishers of course try to get around the restrictive fishery regulations. Apart from the different types of illegal fishing methods and gears (Table III), there are fishers who engage in "fake fishing" i.e. who during the closed season set out gillnets at night while pretending to go fishing for *chisense*. Another example involves beach seiners using Luapula beaches on the Zairian side where patrols of the Department cannot reach them.

On the other hand there are numerous fishers who are concerned about the future of the fishery. In summary the fishers had the following suggestions for future conservation and management:

- reintroducing the closed season. Some fishers suggest starting the closure around the 15th of January instead of the 1st of December;
- increased monitoring of closed season;
- banning seine nets;
- adoption of a law against the use of gears with mesh size ranging from 25 and 63 mm;
- illegal gear should be burnt on the spot and the owner should be duly arrested and prosecuted;
- strengthening of regulations and tougher penalties inclusive of imprisonment;
- police force should help with enforcement;
- the government should take action against net thefts;
- the formation of local (security) fishing committees - responsible for monitoring fishing activities and for prevention of thefts and illegal fishing - assisted by the Department of Fisheries;
- the Department of Fisheries should work hand in hand with local leaders in educating the fishing community (including the Chiefs)

about conservation and the danger of stock depletion to allow for constant awareness. This is viewed as more effective than imposing minor punishment on offenders contravening fishing regulations;
- local authorities must join forces with the Department if fish conservation and management is to be effective;
- to improve on extension activities with the fishing community;
- removal of fishers who have settled in restricted areas such as Mifimbo, Kanakashi, Kalungwishi/Kasungwa to either mainland or other areas;
- stop fishers erecting barriers along Kalungwishi River during breeding months;
- the government should shut the company making small meshed nets and recommend appropriate sizes to be manufactured;
- reintroduce fisheries stations along the lake and the river.

Another issue related to conservation is the fishers' complaint about Zairian beach seiners "who get into Zambian waters while fishers fishing from the Zambian side are denied the right to fish like their counterparts to the other side. This problem is shouldered by the Department to combat this situation as it is the same fishing ground".

5.3 Local initiatives and conservation strategies

Village headmen and chiefs sometimes have their own ways of regulating the fisheries. Chief Puta has put a ban on the use of engines for fishing purposes. According to his belief engines chase away the fish. The ban is also for the protection of fishers fishing from non-motorized boats during the night. Fishermen Associations in his area follow up on his order. At Kafulwe survey recorders came across a conservation committee comprised of fishers and party cadres.

An MMD chairman from a town situated in Stratum I has listed all fishers with illegal nets and wants the Department of Fisheries to allow him to start confiscating illegal nets. In certain places Fishermen Associations and local youth groups are trying to impose some measures on fish conservation: "The whole thing is experimental because not all fishers understand their interpretation. As a result of this, associations and fishers appealed to the Department of Fisheries to meet once in a while to discuss problems affecting both the Department and fishers".

5.4 Suggestions by fisheries assistants

Suggestions by Fisheries Assistants for future conservation and management reveal that almost all of them want to link up more with the fishing community in order to improve contacts between fishers and the Department. According to them, this is needed both in terms of explaining fisheries regulations and conservation, and of assisting fishers in how to apply for and use existing services e.g. fishing loan facilities. "It is only through cooperation, communication and training that we can do something. Together we stand, divided we fall".

The Fisheries Assistants suggest to work hand in hand with the Fishermen Associations on conservation. "Chiefs, village headmen and local politicians have to be educated and be told to work with the staff of DOF". They further suggested the establishment of "local fishing group committees

to help fishers with the implementation of the fisheries regulations". A recorder assigns a security component to these committees, with particular reference to fighting net-thefts. Another recorder suggests the establishment of local fish conservation committees whose role "should be mainly educative, advising the people in their own areas to refrain from doing illegal fishing. At the same time it would be the contact group for the DOF".

Educational programs are suggested, involving the Department, local authorities and the fishers. This is based on the feeling that "many fishers are ignorant about the importance of fish conservation. They need to be told why some of the gear and methods are prohibited". Yet, according to another survey recorder, fishers know quite well what is happening but still need to be controlled: "Fishers are aware of conservation, but need continuous reminding".

In terms of adequate enforcement, the Fisheries Assistants suggest stronger punishments, funds and staff to be sent to fishing camps and sensitive fishing grounds for patrol. One of them refers to the situation in Western Province where DOF cooperates with the police, as well as chiefs and village headmen. Another Fisheries Assistant presents the idea of giving traditional rulers more power to punish culprits. Yet, other Assistants propose a special wing for enforcement in order to prevent conflicting roles "because fisheries officers cannot confiscate nets one day and then another day come and camp in the same village to do some other work with the fishers".

The suggestions made by the Fisheries Assistants do require a serious redirection of activities from the side of the Department of Fisheries:

> "DOF has a big role to play, esp. requesting and advising the Government on the need to organise the fishery so that it comes back to juvenile status" (...). There is a great need for DOF to plan properly, to identify its priorities first then to make follow ups, step by step. Planning should be tailor-made to the needs of each specific fishery".

According to the Fisheries Assistants the already existing conservation and enforcement programs must be strengthened, extended and diversified. They suggest the reintroduction of the seasonal closure (with different provisions for gill-netting and *chisense* fishing); stricter fisheries regulations and penalties, the identification and protection of more breeding grounds; and the registration of fishers who use illegal gears and methods.

However, it is felt that the Department of Fisheries is unable to carry out conservation and enforcement without increased governmental support and consideration:

> "The Department should make the people and the Government understand the need for conservation. DOF should stand up and make matters very clear to the parties involved. Others who are in favor of the closure and have bright ideas on this issue should be encouraged to educate others to make them understand the need for conservation".

6. DISCUSSION

"Freedom in a commons brings ruin for all". The Lake Mweru Luapula Fisheries can be described in terms of the 'tragedy-of-the-commons' model expressed in this phrase (Hardin, quoted from McCay and Anderson, 1987). Individual fishers of Mweru-Luapula can derive high short-term personal gain by increasing all components of fishing effort, whereas losses through subsequent over-fishing are shared by all and more specifically by future generations of fishers. Concerned fishers face the dilemma that reducing their own effort will have no effect unless all other fishers do the same. Richards (1939) refers to this dilemma in her economic study of the Bemba tribe. She questioned fishers about their wish to trap fish that are full of eggs or young fish that are under-sized. Answers were formulated in terms of: "Well, it is no use leaving the fish for someone else to catch, is it?".

It is within this context that we would like to describe the present status and ecological, socio-economic and political problems of the Mweru-Luapula Fisheries and try to formulate a way out of the potential deadlock posed by the dilemma. Compromises are required between goals of protection (i.e. preservation of the ecological basis of the fishery) and production (i.e. increased food production and income).

6.1 Over-exploitation

Let us first try to delineate what is happening with the commons of Lake Mweru-Luapula. Commonly held notions are that 'fish is the backbone of the Luapula economy', and that 'fish is the main source of animal protein in people's diet'. However, present developments in the area may already be such that the fisheries will not be able to meet future economic and nutritional demands. Demographic and migratory developments call for more employment opportunities, food and income. Yet, alarming malnutrition figures were recorded for the area[15] under consideration.

It can be said safely that for Mweru-Luapula Fisheries over-exploitation of some of the (commercially important) fish species has already taken place to the extent of near extinction and that other stocks are overexploited or are in danger of being so. It is possible that the *chisense* stocks can support further expansion, but even if pelagics are quite resiliant, there is little doubt that these stocks could be overexploited as well if no controlling measures are taken.

According to the fishers themselves, net thefts, a steady decline in catches and illegal fishing practices are the main problems within the fishery. It is the opinion of the authors that the high occurrence of net theft and the prevalent decline in catches only cause fishermen to engage more and more in illegal fishing. This is a trend which is damaging and destructive to the fisheries as expressed by a former Fisheries Development Officer:

"Over-fishing in fact breeds the known and always preached

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[15] For example in the Luapula valley it is found that more than 60% of the children under the age of 6 years show signs of long term malnutrition attributed to inadequate intake of energy foods (Mwandu, 1992).

> against illegal fishing methods which nearly all our fishermen are using or are attempting to (...). We cannot (...) hope to stop the use of illegal destructive fishing methods if we cannot assure him (fisher) a good economical catch year after year" (Ngula, 1989).

Further investigations are needed on how these problems exactly intertwine, why and what groups of fishers resort to illegal fishing practices, what groups of fishers fish from breeding areas, and what are the magnitude and reasons behind net thefts. The purchase of new nets of appropriate mesh size is not presently an alternative for fishers. These nets are scarcely available in Zambia and more expansive. The chance that newly acquired nets may get stolen seems to be another impediment in the decision to buy new and more appropriate nets. Loans are not an attractive option as declining catches do not promise good recovery rates.

6.2 Freedom in the commons: history and present

The waters of Lake Mweru seem to be open to everyone who wants to start fishing. At present available data are insufficient to assess whether open access has historically been the rule, although it is known that within the area of Senior Chief Kazembe - comprising most of the lakes and swamps along the Luapula River - there have been measures to stop fishing activities during certain periods of the year. In his paper 'History of the Luapula', Cunnison reports on certain fishing regulations posted by the colonial government in all the chiefdoms "which lead to great embarrassment on the part of chiefs and fish guards". (Cunnison, 1951). In 1959 the same author writes about 'owners of the land' being responsible for the fertility of fish and game in their lands and about annual ceremonies of prayer to the ancestors taking place usually at the opening of the best seasons for the various activities. "But the most important ceremony of this type that is recalled, and the only one still practiced is 'unlocking the fish'" (Cunnison, 1959).

In the 1950's, the native authority (lowest rank of colonial administration) posted fish guards in the Luapula valley to assist the fishing councillor in the regulation of the fishing industry. Bates writes about these fishguards who "policed the river and lakes, making sure that the fishermen used nets of sufficient gauge, that they stayed clear of the breeding grounds of the fishery, and that they refrained from fishing during the spawning season" (Bates, 1976). According to Bates, in the late 1950s and early 1960's, fishers were strongly committed to short-term gains as a result of bad economic circumstances, and as a result as well as because of other circumstances "fishermen turned against the native authority and resisted the fish guards and messengers with force and violence".

Immediately after independence (1964) the seasonal closure was abandoned. What happened since was recalled by a fisher from Ntoto at the fisheries seminar held in October 1992 held in Nchelenge:

> "this rule (seasonal closure) was called off in the first Republic (1964-1972) by the selfish and uneducated people. They used to say that fish does not finish in the lake. But what happened was that all bad methods of fishing were practiced in Luapula and Mweru Fishery. During the second Republic (1972-

> 1991) every fisherman had seen that the fish we had in Luapula Mweru Fishery had finished (...). We saw companies like Lake Fisheries coming down together with the incomes of fishermen and fishermen's employees unemployed".

He then referred to his participation in a seminar on the preservation of fish organized by the Department of Fisheries in 1980: "The Fisheries Department as the father and the fishermen came to the conclusion of reintroducing of closing the Luapula Mweru Fishery". The UNIP government imposed a seasonal closure of the Mweru-Luapula fisheries from 1986 onwards. After the elections of October 1991 the closure was uplifted and since then not reinstalled.

Presently and apart from the current fishing regulations which include the prohibited fishing area of 'Mifimbo' (appendix III), some steps are being taken to restrict open access. Chiefs in the swamp area are asserting their rights to chase away fishers from outside their domain of power. The regulations of chief Puta and of the Fishermen Associations are also making access more difficult to outsiders or at least to offenders, through fishers registration and some form of control on fishing inputs.

6.3 Diversity in fisheries and response of fishers

There is enormous diversity in the Lake Mweru-Luapula fishery. We have shown some of the cruder differences between the river & swamp fisheries and the fisheries of the lake area, and the diversity in methods and gear used. But there is also a great diversity in responses towards the present situation of over-exploitation and other fishery related problems.

Not all fishers are equal. Some might only be interested in quick money no matter the methods or gear used. Some live up to a commonly held notion that "fishers after returning with their catch, immediately spend their income on beer and the next day the same thing happens again". Others seemingly are really concerned about the future but are somehow forced to resort to illegal fishing. Switching to *chisense* fishing is only an alternative for people who have enough starting capital. Again, others demand regulations, organise themselves in associations or start fishing companies such as *leleke* fishing (see section 3.2). Some try to improve fish processing technology in order to produce a better quality product and increase their income (Aarnink, 1992). There are also fishers who start looking for alternative sources of income such as seasonal fishing in Kafue, farming, trading, rice cultivation or trading wood.

6.4 Cooperation among fishers and potential for conservation

Certain forms of cooperation exist among fishers of the northern part of the lake exist which aim at safeguarding their mutual interests, such as: the emerging Fishermen Associations, traders organizations, fishers' consumer cooperatives, *leleke* fishing and some kind of price-fixing system applied within lake-side village communities.

In the southern area there are fewer signs of cooperation at this level: fishing involves a large number of fishers but fishing effort per individual is quite low. Traders approach fishers individually and price-fixing systems like in the northern camps do not seem to exist. In this

area peak fishing occur during the period when stocks are most vulnerable, i.e. from November to April when fish migrate to reproduce upriver and into the swamps.

However, the potential for cooperation between fishers on the subject of conservation seems to be frail and much seems to depend on how the Department of Fisheries and the Government respond. Apart from suggestions to empower associations or to stimulate cooperation and communication between local committees and the Fisheries Department, most other suggestions from fishers more or less reflect a dependence on enforcement measures to be taken by the Department. Fisheries Assistants stress the need for continuous exposure on conservational aspects: older fishers asked the department to do so, as young fishers do not seem to be as aware of the need for conservation.

Suggestions of the Fisheries Assistants on future conservation and management strategies focus more on local participation and communication between fishers and the Fisheries Department. In their and our view this definitely implies that patrol and enforcement need to be carried out by a separate unit in order to prevent the Fisheries Assistants from having to perform conflicting duties.

7. CONCLUSION: A CONSERVATION AND MANAGEMENT ACTION PLAN (CAMAP)

In Zambia, the Luapula Province is famous for its fish. Fishing has traditionally constituted the major activity in the Province, generating the larger part of available cash income, providing the greatest number of jobs in the commercial sector, and further providing the protein foundation of local diets (Gould, 1989).

The overall objective of the Department of Fisheries is the promotion of sustained fish production, increased food availability and employment opportunities based on sound exploitation, management and conservation of fish stocks. In this context, the urgency of the present ecological and socio-economic problems (decline in catches, net-thefts, illegal fishing practices and local conflicts) observed in the Mweru-Luapula Fisheries calls for an adequate fishery conservation and management policy.

First of all the department should continue to carry out stock assessment research, catch assessment surveys and frame surveys which are very important in assessing both the capacity of the stocks and the pressure exerted on the fishery. However, a complete assessment of the fisheries and their management framework does require complementary socio-economic research. Indeed the formulation of a sound fishery conservation and management policy "depends as much, or more so, on an understanding of the socio-economic ramifications of the fisheries as it does on biological knowledge of the resources and capture characteristics of the fishery" (Kapetsky cited in Scudder and Conelly, 1985).

In order to restore and ensure the sustainability of the Mweru Luapula Fishery, it is proposed that a Conservation and Management Action Plan (CAMAP) be established. Such a plan should address both biological and socio-economic dimensions of the problem and should allow for local involvement. The contents of a CAMAP and the conditions required for its elaboration and application are discussed below.

7.1 Contents of a CAMAP

The main immediate objective of a Conservation and Management Action Plan (CAMAP) is to protect the primary resource of the area, the fish stocks, so as to achieve 'maximum' production. This could indeed be subject to other secondary considerations and the formulation of such a plan requires full consideration and recognition of socio-economic, cultural and political issues. One would need to consider the diversity which characterizes the fishery itself and its environment, e.g. in terms of agro-ecological and economic potential. The plan should address issues such as: research, closures and other fishing restrictions, enforcement, local participation and the strengthening of Fishermen Associations, training and education of fisheries staff and fishing communities, and the provision of inputs and services.

Besides being concerned with sustaining adequate stocks through research, monitoring, and enforcement, emphasis should be placed on the fishers themselves. Consequently socio-economic studies should be carried out on both production and post-harvest sectors in relation to major fisheries (Kapasa and Aarnink, 1993). More in-depth studies are needed, e.g. on the existing Fishermen Associations, the growing *chisense* and emerging *leleke* fishery, motives of fishers resorting to illegal fishing, the magnitude of and reasons behind net thefts, motives of fishers turning to farming and opportunities for alternative sources of income.

Knowledge of the economic, socio-cultural and political organisation of fishing communities and the establishment of a dialogue with these communities will provide important information for the formulation of a CAMAP based on local involvement. A recent study carried out in some fishing camps stresses this point: "It is of crucial importance to come to a dialogue with the population. They are the ones who have to manage the resource and who can indicate their experiences and ideas" (Kiewied, 1992). The existing and seemingly well-organised Fishermen Associations will be the first organisational level to consult and to cooperate with. Their role in future conservation and co-management strategies might be indispensable.

To make sure a CAMAP will receive sufficient support from the fishers themselves, it should be based on and reflect variations among fishers in terms of the specific fishery in which they operate, level of dependency on fisheries-related activities, organisational and cooperative potentials, and their aspirations and preferences for economic diversification. This consequently calls for a differentiated Action Plan.

The authors believe that the implementation of a CAMAP with the characteristics described above, will, in the long-term, lead to a better balance between protection and production: greater protection of the resource, increase in catches, and consequently more benefits for the fishing community and future generations.

7.2 Conditions for a CAMAP

First of all, more time and interdisciplinary data are required in order to develop and formulate an adequate fishery conservation and management policy. The diversity observed in the fishery needs to be

captured in terms of collecting area-specific (riverine, lake, islands), group specific (fishers, traders, processors) and fishery specific (e.g. *leleke*, *chisense*, gillnetting, basket) data. Gender specific data are needed as well, for women seem to be involved in all production and distribution components of the fishery especially in buying, bartering, processing and trading of fish. Apart from those who directly harvest fish with baskets, women seem to be indirectly involved in other harvesting activities, through financing of fishing operations and hiring of male labour to operate their own boats and gear. Information on seasonality, migration patterns and tribal affiliation should also be emphasized. Socio-economic problems which are directly related to the fishery sector need to be further analysed, such as the impact of the decline in catches on people's economic activities or the correlation between the increase in net thefts and the increase of illegal fishing practices.

A second condition for developing a CAMAP is the establishment of a 'conservation dialogue' with fishers, their organisations, local authorities and various district departments and rural services. Local concepts and views on conservation need to be collected and discussed.

Not only are the presently available data insufficient, but other conditions for implementing and monitoring a CAMAP are not yet met. The Department is confronted with a severe lack of staffing, funding and equipment. Presently the Department is receiving technical and financial assistance from SNV/NDO and IFAD/ZCF for activities on Lake Mweru. The Action Plan can be successful only if it gets full support from the Government in terms of funding, staffing and promotion opportunities. There are reasons to believe that the lack of personnel will not be solved as no fisheries officers and far too few fisheries assistants are being trained at this moment. Furthermore an attractive promotion ladder for the employed fisheries personnel is lacking. The policy of the Government to aim at a small but efficient and highly motivated work can be successful only when such conditions are met.

But maybe what is needed most and first of all is governmental support in terms of clear-cut fisheries laws and regulations which are timely adopted to allow the Department of Fisheries to make plans and work accordingly. In addition to the present fisheries regulations concerning the restriction of illegal methods, gears and mesh-sizes (appendix III), a seasonal closure of the whole fisheries is a must and is demanded by the majority of the fishers. Clear and timely announcement of regulations allows the fishing community (fishers, workers, fish processors and traders) to prepare themselves[16] and look for alternative sources of income and food during seasonal closures of the fishery. The government should aim for harmonisation of fisheries regulations with Zaire.

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[16] In November 1992 a fishers' cooperative asked the Department whether there would be a closure or not. They needed this information in order to decide upon taking a collective ZCF loan for buying nets. The Department was not able to answer their question.

APPENDIX I:

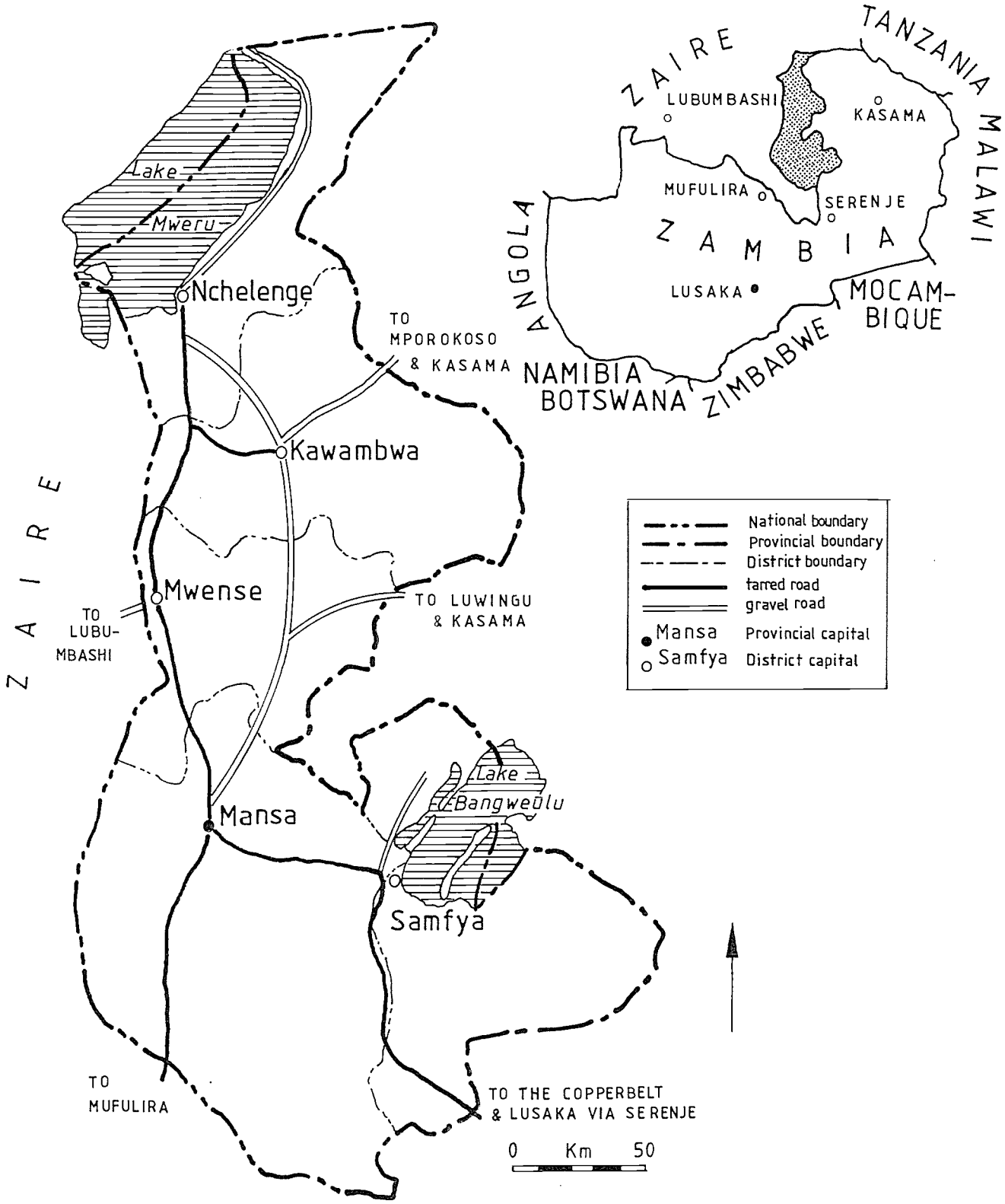
LIST OF THE RECORDERS INVOLVED IN MWERU-LUAPULA FRAME SURVEY 1992.

NAME	POSITION	SECTION	LOCATION
A.C. Mubanga	Fish. ass.	Extension	Nchelenge
V. Maangwe	Fish. ass.	Research	Nchelenge
R. Lubilo	Fish. ass.	Research	Nchelenge
F. Lubasi	Fish. ass.	Research	Nchelenge
G. Chilufya	Fish. ass.	Training	Nchelenge
R. Nkhata	Fish. ass.	Extension	Nchelenge
W. Siluyele	Fish. ass.	Extension	Chipita
W. Chabinga	Fish. ass.	Extension	Kashikishi
E.D. Mwaba	Fish. ass.	Extension	Nchelenge
I.M. Ngoma	Fish. ass.	Extension	Nchelenge
P. Kaunda	Fish. ass.	Extension	Nchelenge
R. Kandama	Cartographer		Chilanga
C. Samende	Cartographer		Chilanga
M. Nyirenda	Cartographer		Chilanga
C. Munyakasa	Cartographer		Chilanga

Fish. ass. = Fisheries assistant

APPENDIX II MAP OF MWERU - LUAPULA FISHERIES

APPENDIX IIb LUAPULA PROVINCE, ADMINISTRATIVE BOUNDARIES



Source: Gould, 1989

APPENDIX III:

CURRENT FISHERIES REGULATIONS (MARCH 1992)

The current fisheries regulations for the Mweru-Luapula Commercial Fishing Area are based on The Fisheries (Amendment) Regulations 1986 attached to The Fisheries Act (Cap. 314), Statutory Instrument no. 198 of 1986.

Gear restrictions:

Specified Nets	Extent of restrictions	Examples of methods and gears
Seine/draw nets of any mesh-size	throughout the area	kapopela
Gillnet of mesh-size < 51mm	" "	kutumpula, kapopela, shichide, kasenswa, fibata
Mono filament nets of mesh-size < 120mm	" "	
Seine nets except those used for *chisense* (Poecilio-thrisa m.)	" "	chosa

Prohibited Fishing Area (throughout the year): Mifimbo

> "That portion of water of Mweru bounded by a straight line drawn from the northern tip of Nkolo point in a northerly direction to the southern most tip of Kwila (sic!) Island; thence in a south-easterly direction to the bank of the Chota Channel; thence following the shores of Lake Mweru to the right bend of Luapula River; thence up this River for a distance approximately 5 kilometers; thence to the nearest boundary between Zaire and Zambia opposite; thence in a northerly direction along this boundary to the point of starting. The rest of that area".

APPENDIX IV:

CONSTITUTIONAL AIMS OF THE LAKE MWERU FISHING ASSOCIATION OF ZAMBIA RELEASED BY THE CHIPUNGU WARD FISHING MAIN COMMITTEE (1990)

Aims of the association:

i. to prosecute (sic!) rampant theft of fishing nets, boats, *chisense* fishing nets, tilley and other fishing material.

ii. to preserve the old culture heritage in fishing.

iii. to help each other in times of difficulties and sorrow eg. deaths, sickness, loss of fishing materials and many other numerous problems encumbering fishing.

APPENDIX V:

QUESTIONNAIRE FOR 1992 FRAME SURVEY RECORDERS

The questionnaire came in two sets. The first set of questions were answered after the recorders had covered the southern fisheries (Stratum III and IV), the second set after the entire frame survey was completed. Three categories of questions were formulated:

a. impressions of the present status of the fishery, observations and discussions held with fishers and other members of the fishing community about problems within the fishery, suggestions for improvement of future conservation and management
b. personal ideas of recorders on present conservation and management and suggestions for the future
c. evaluation of the contents and organization of the frame survey

For the specified questions of the questionnaires we refer to the summary report of the survey (including methodology) by Aarnink, Kapasa and van Zwieten (1993, in prep.)

TABLE 1. Structure of the Fishery of Lake Mweru Luapula:
(based on summary data collected during the Frame Survey June-August 1992)

A. Number of fishers(a), boats and villages

STRATUM	Fishers' ownership of Boat	Gear	Boat+Gear	TOTAL FISHERS	BOAT TYPE Dugout	Plank	Fiber & Others	TOTAL BOATS	BOATS/ FISHER(b)	Permanent Village	Temporary Camp
I	18	329	1177	1524	16	1525	1	1542	1.01	77	7
II	30	680	1114	1824	99	1426	32	1557	0.85	86	0
III	18	531	1247	1796	744	700	9	1453	0.81	89	5
IV	18	1433	2841	4292	2825	304	26	3155	0.74	141	23
Totals	84	2973	6379	9436	3684	3955	67	7707	0.82	393	35

B. Number of Gillnets (commercial and subsistence) and Chisense Nets (commercial fishing).

STRATUM	Gillnets mesh<51mm(c)	mesh>50mm	TOTAL GILLNETS	GILLNETS/ FISHER(b)	Chisense meshless(d)	Chisense mesh 6mm	TOTAL CHISENSE	Beach Seines(c)
I	1271	12169	13440	8.82	826	88	914(e)	65
II	985	17767	18752	10.28	272	87	359(e)	95
III	307	8098	8405	4.68	69	6	75(e)	19
IV	1414	3770	5184	1.21	42	12	54(e)	86
Totals	3977	41804	45781	4.85	1209	193	1402	365

TABLE 1 (continued). Structure of the Fishery of Lake Mweru Luapula:
(based on summary data collected during the Frame Survey June-August 1992)

C. Number of Longlines, Traps (subsistence and commercial), Baskets and Hook and Lines (subsistence)

STRATUM	Longlines	LONGLINE/ FISHER(b)	Traps	TRAPS/ FISHER(b)	Baskets(f)	BASKETS/ FISHER(b)	Hook and Line(f)	HOOKLINE/ FISHER(b)
I	69	0.05	42	0.03	7	0.00	127	0.08
II	69	0.05	486(g)	0.27	73	0.04	585	0.33
III	82	0.04	1487	0.84	244	0.14	529	0.30
IV	218	0.05	8568	2.00	894	0.21	2936	0.69
Totals	438	0.05	10583	1.13	1218	0.13	4177	0.45

(a) a fisher is defined as the owner of a gear and/or fishing boat. Gear encompasse all types of equipment used for fishing including those solely used for subsistence fishing (baskets, hook and line)

(b) averages are over all counted fishers

(c) figures on the number of gillnets <51 mm have to be considered minimum figures as many fishers know these meshsizes to be illegal. Figures on beach seines are quite unreliable as there is an active confiscation policy on these nets. Furthermore beach seining is strongly condemned by a large number of fishers in certain areas (see text).

(d) chisense nets are made of a patchwork of different 'meshless' materials: mosquito netting, curtain material, mealie meal bags, nylon shading material, as well as knotless 6 mm mesh nylon nets. A net is called meshless if at least 3/4 of the net is made out of meshless materials.

(e) due to the high mobility of chisense fishers figures per stratum should be considered indicative (P. van Zwieten, C.K. Kapasa in prep.)

(f) both the number of baskets and hook & lines must be considered minimum figures. Survey recorders showed a clear bias to adult male fishers with nets or other 'commercial' gear, particularly during the first few weeks of the survey (stratum IV). Baskets are used exclusively by women, children were not interviewed during the survey (hooks and lines).

(g) virtually all found along the Kalungwishi River from Mununga up to the mouth.

TABLE II:

DIVERSITY WITHIN MWERU-LUAPULA FISHERIES
(ACCORDING TO OBSERVATIONS OF 1992 FRAME SURVEY RECORDERS)

	NORTH (Str. I & II)	SOUTH (Str. III & IV)
TYPE FISHERY	small scale (some semi-industrial), more gears, boats and engines per fisher, high number of workers	subsistence (for pot)
TRADE	Copperbelt/Lubumbashi	mostly local markets up to Kawambwa, trading directly on water
TRADERS	from copperbelt and Zaire (esp. *chisense*)	copperbelt, few from Zaire
UNIT OF SALE	per kg (use of scale)	per heap of fish
PRICES	fixed pricing within different fishing camps	no fixed pricing
TOT. FISHERS	2348 (frame survey 92)	6088 (frame survey 92)
TYPE BOATS	plank boats	dug out canoes
ENGINES	some	very few
SAILING POWER	yes	no
GILLNETS	esp 63, 76 mm nr per fisher = 8 - 10	esp 63 mm and lower sizes nr per fisher= 1 or 2
CHISENSE	yes (90% meshless nets)	very few
ILLEGAL FISHING	less common	very common
KUTUMPULA	here and there	yes
BEACH SEINING	less	yes, esp along Luapula and islands
TRAPS	no	yes
BASKETS	no	yes
NET THEFTS	less but increasing	rampant
ASSOCIATIONS	yes, common	no
COOPERATIVES	yes (2)	no
ZAIRIAN INFLUX	high	low

TABLE III:

LIST OF ILLEGAL FISHING METHODS AND GEARS

Kapopela :
A draw net operated in deep water by two or more fishers who pull each end to a circle until the circular shape is small. Then one fisher jumps into the water splashing water thereby scaring fish into the net. It is operated like a beach seine.

Kutumpula / Chitumpu:
Chasing fish into stationary gillnets by hitting the water surface with knobbed sticks (*kaoma*).

Shichide:
A net is set in a shape of the figure '8' and fish is driven in it as the fisher beats the water with a stick (*kaoma*).

Kasenswa:
Drift netting in the Luapula River and at the mouth of the Kalungwishi River.

Fibata:
A Zairian fishing method with nets ranging from 50 mm to 127 mm mesh-size, 200 to 400 meter long and 6 to 10 meter deep. A fishing team is composed of 4 nets and 4 fishers with a canoe each. The nets are set in a square or circular way then pulled together at either end and reduced to a small circle. When this is achieved, a long stick is pushed into the water, then beaten by a paddle to make vibrant noise which scares the fish into the nets. The nets then are separated and taken home for fish removal by the owners. Each operation takes at least two hours.

Nyamvu:
seine nets made out of onion bags

Mukwau / Chosa:
beach seine nets made out of mealie meal bags

Fig.1 % Distribution of gear on Lake-Mweru Luapula (Frame Survey 1992)

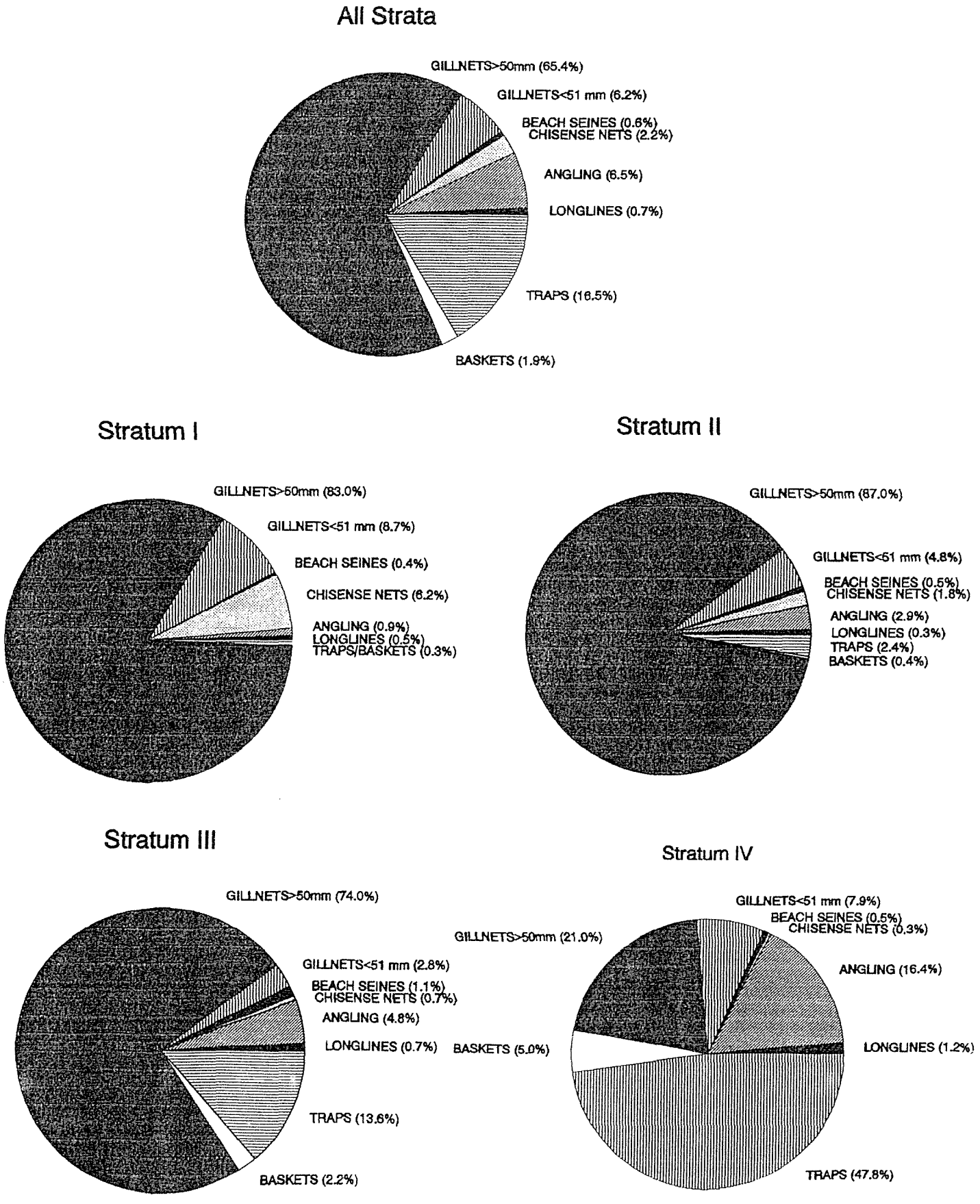
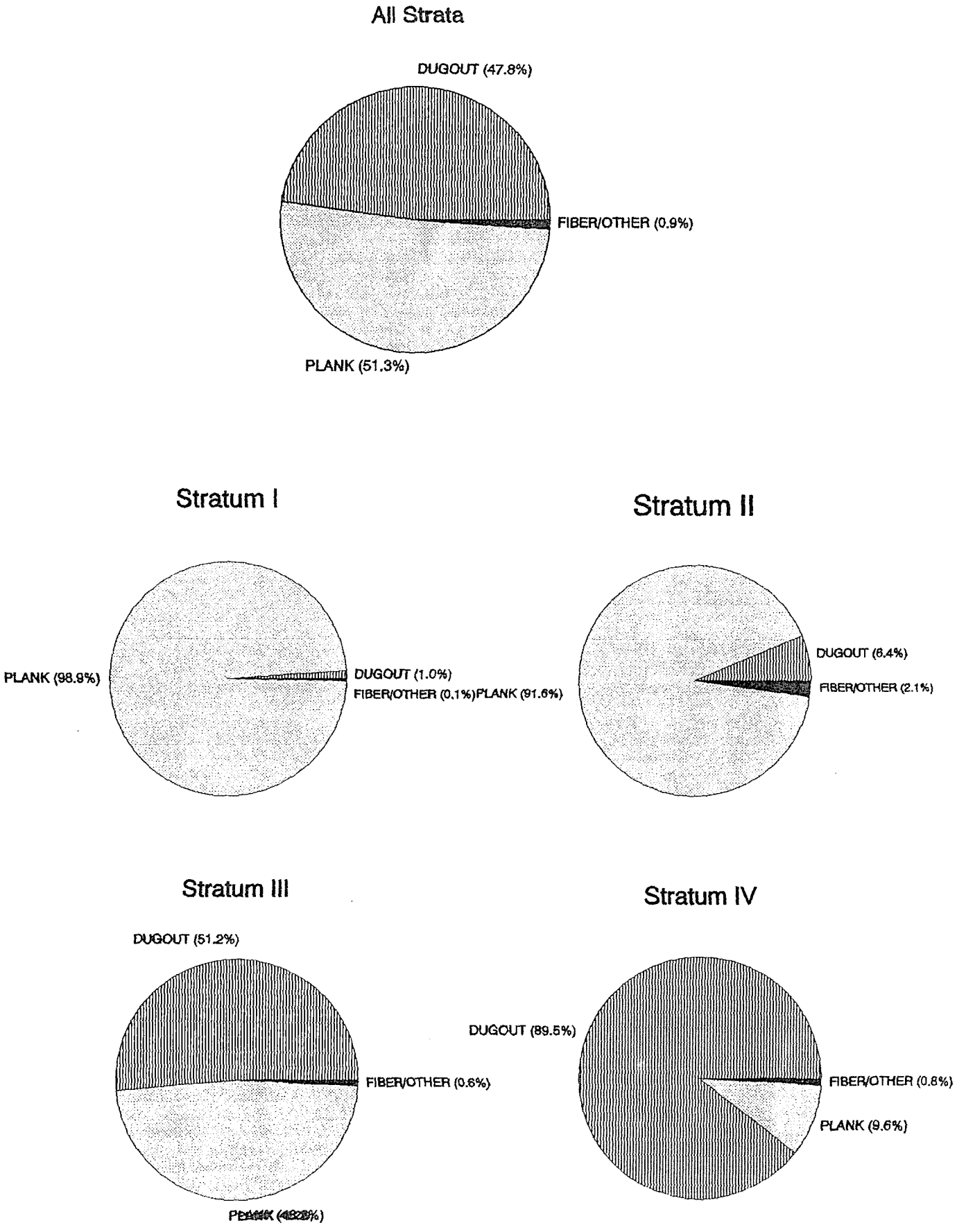


Fig.2. % Distribution of boats by type on Lake Mweru-Luapula (Frame Survey 1992)



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