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

# IFIP PROJECT

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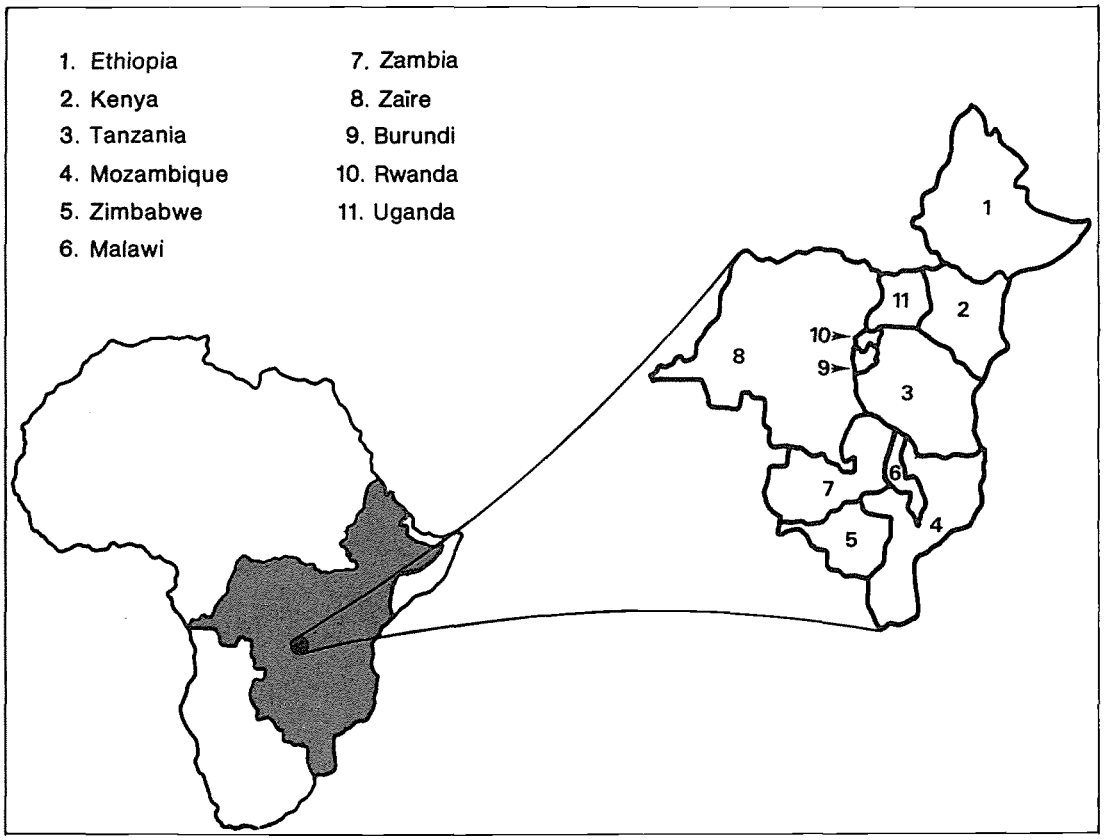
## Managing the New Fisheries of Lake Victoria:

## Major socio-economic issues




UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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

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# Managing the New Fisheries of Lake Victoria:

# Major socio-economic issues

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
UNITED NATIONS DEVELOPPEMENT PROGRAMME
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## PREFACE

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

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

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.

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The present document reviews the major socio-economic characteristics of the new fisheries of lake Victoria. The fisheries of the lake have indeed undergone rapid and drastic changes following the proliferation of Nile perch in the late 1970's . Major socio-economic issues related to their management are addressed and a management framework is proposed.

An earlier version of the document was presented by the author at the fifth session of the CIFA (Committee for Inland Fisheries in Africa) Sub-Commmittee for the Development and Management of the fisheries of Lake Victoria held in Mwanza, Tanzania, 12-14 September 1989.

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## IFIP PUBLICATIONS

Publications of the IFIP project are issued in two series:

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

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

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## 1. INTRODUCTION

The fisheries of Lake Victoria have undergone radical changes over the last decade owing essentially to the rapid proliferation of the Nile Perch (Lates niloticus) and its effect on the lake's ichthyomass. While the ecological disruptions brought about by this introduced predator draw worldwide attention, the fact that the fisheries of Lake Victoria were in the process of becoming the most important of Inland Africa remained mostly unnoticed outside of the three countries concerned.

Today, the single most important issue which these countries face is the urgent need to bring these fisheries under proper management in order to avoid expected resource over-exploitation and the rapid dissipation of the huge socio-economic benefits brought about by the new fisheries regime. The present paper addresses some of the main socio-economic issues related to the management of these new fisheries. Development aspects are only addressed here in relation to resource management. Therefore some important development issues related, for example, to the reduction of post-harvest losses and to increasing value added or export earnings, have purposely been left aside.

The fisheries of Lake Victoria presently represent for Kenya, Uganda and Tanzania a most valuable source of food and of much needed animal protein. The lake has become the main source of fish production in all three countries, with annual production estimates for the last three years ranging from 300,000 to 400,000 tonnes. Compared with the estimated average production of 100,000 t observed under the pre-Nile perch regime (Table 1), an average surplus production of about 150,000 per year was caught in the Lake over the last 10 years.

Other very important benefits were also derived in terms of employment, financial returns to the industry and reduced consumer prices for fisheries products within a wide area all around the lake. According to Reynolds and Gréboval (1988), the value of the catch in constant 1987 US$ increased from US$ 25 million in 1975 to US$ 72 million in 1987, reflecting the magnitude of the benefits derived from the new fisheries regime since the beginning of this decade. For the most part these benefits accrued to small- scale fisherfolk whether previously engaged in the fisheries sector or brought into the industry by its profitability. Indeed, with the exception of the Nile perch fisheries of Kenya where industrial processing and marketing companies play a significant role, the fisheries of the lake remain almost exclusively exploited by small-scale fisherfolk at all levels from harvesting to marketing. It is now estimated that over 350,000 fisherfolk derive their livelihood from these fisheries.

The major reason why such large benefits have been derived so far is that riparian fisherfolk and consumers did adjust very rapidly indeed to the changing composition of the fisheries resource base. It follows from relative consumer preference and relative exploitation cost that the present resources of Lake Victoria are far more valuable than the resources of the former regime. Indeed the latter was characterised by the predominance of Haplochromis species which constituted an estimated 80% of the lake's biomass (FAO 1973) and remained nearly unexploited due to very low demand for these species.

The implication of this evolution is, however, that both high demand for table fish (especially if few immediate subsitutes are available) and low production costs are also the key factors leading to the systematic overexploitation of unmanaged fisheries. Indeed, following the rapid and sustained expansion of fishing effort since the the early 1980's, the two major fisheries based on Lates niloticus and Oreochromis niloticus are becoming heavily exploited. With effort still reported to be increasing in these two fisheries, they might very soon be entering a phase of progressive overexploitation. As this process unfolds, the rent - that is the value of production over and above what it costs to produce - will progressively be dissipated and the huge benefits derived from the new fisheries regime will have been only temporary gains to the riparian fisherfolk and consumers.

The way this process of overexploitation unfolds will depend of course on the bio-economic characteristics of each of the three major fisheries (Lates, O. niloticus and Rastrineobola argentea) and their interaction; and on whether or not the three States concerned can introduce and enforce management regulations which will, at best, bring the process to a halt or at least slow it down while further information is gathered for the elaboration of more effective management schemes.

## 2. RECENT EVOLUTION AND SOCIO-ECONOMIC CHARACTERISTICS OF THE FISHERIES

Indeed little information is currently available on the characteristics of the new fisheries of Lake Victoria and their interrelated dynamics. The need for further biological and stock assessment investigations has been pointed out in a number of instances, especially with respect to the three key species already mentioned. More recently, the need for socio-economic investigations has also been stressed (CIFA 1988; Reynolds and Gréboval 1988).

While numerous articles have been published on the recent evolution of the fisheries of Lake Victoria (see reviews in Reynolds and Gréboval 1988, and University of Leiden 1986), these have mostly focussed on the decline of Haplochromis stocks and have unfortunately been based more on secondary sources of information than direct observation. Nowadays, however, a clearer picture of what happened to the fisheries and the resources on which they are based is emerging. It allows for a sketchy comparison of the new and former fisheries regime of Lake Victoria.

### 2.1 The pre-Nile perch fisheries regime

Until the early 1970's, the resource base of Lake Victoria was characterised, as previously emphasized, by the predominance of Haplochromis stocks. These cichlids did constitute, according to the scientists involved, quite unique case material for the study of lacustrine ecology and evolutionary biology (e.g Greenwood 1984; Fryer 1984; Coulter et al. 1986). From a socio-economic point of view, however, this resource had very little value and remained a food of last resort all round the lake. In spite of various efforts undertaken in the 70's through marketing campaigns and the creation in Tanzania of a trawl fishery and related industrial processing which proved quite unprofitable, the fishery

remained characterized by a very low level of exploitation and poor marketability (Dhatemwa 1982, Nyholm and Whiting 1975). Furthermore, it is doubtful that haplochromines could have withstood heavier fishing pressure because of the trophic specialisation of the many species concerned (Goodswaard and Witte 1985). The fish biomass of Lake Victoria also consisted of more valuable species groups : Oreochromis/Tilapia, Bagrus, Synodontis, Clarias, Propoterus and Barbus.

Total catch during the late 1960's and 1970's was relatively stable as indicated in Table 1. Average production for the period 1968-1979 was about 100,000 t per year. The stability of the global figure does, however, obscure a progressive reduction of the real value of the catch resulting from overfishing. This phenomenon has been well documented starting with Graham (1929). Among the species especially affected over the last two decades are Labeo victorianus, Oreochromis esculentus, Schilbe mystus, Alestes jachsonii, Alestes sadleri and Barbus. The key factor in the gradual collapse of these fisheries has been the systematic overexploitation of most valued inshore stocks though the intensification of gillnet fishing and the progressive decrease in mesh size used (e.g Cadwalladr 1969; Mann 1970; Marten 1979). Concurrently, the catch of little valued Haplochromis and Rastrineobola argentea increased progressively to represent over half of total catch in the later part of the 1970's.

Given the general socio-economic characteristics of the fisheries, it is likely that this trend would have continued if the overall fisheries situation had not been dramatically transformed by the rapid expansion of the Nile perch stocks after 1978-1979. The socio-economic characteristics of these fisheries are not known in any detail as only a few investigations of the sort were ever conducted. However, past reports of the CIFA Sub-Committee for Lake Victoria do provide basic information. In this section only those characteristics of the fishery which bear some relation to its management are considered.

Until the creation of the Nyanza Fishing & Processing Company which started operating up to four trawlers in the mid 70's, the fisheries remained exploited solely by small scale fishermen. The basic fishing unit is composed of wooden canoes and simple gear which do not constitute a sizeable investment. Since the introduction of synthetic fibre nets in the early 1950's, only gradual changes have occurred in the technologies used in the harvesting sector. These involved mostly: the replacement of dugouts by planked canoes; a slowly increasing motorization rate which nevertheless remains marginal; a gradual decrease in mesh size and higher specialisation by target species in the gillnet fisheries; and a move away from traditional fishing techniques such as traps and weirs used to catch once relatively abundant anadromous species, and towards beach seines, mosquito-nets, scoop and ring nets used in the Haplochromis and R. argentea fisheries.

It is to be noted that this evolution implied higher investment and operational costs per fishing unit whereas gross benefits derived from the fishery were actually decreasing throughout most of the 60's and 70's. While the number of fishing units did increase during the 60's, it seems to have remained quite stable through the 70's and might even have decreased slightly. Butcher and Collaris (1973) reported the total number of fishing units to be 12,142 in 1972, while in the late 70's estimates range from 11,000 to 12,000 (CIFA 1981; CIFA 1983). According to the same sources, the

number of fishermen operating in the 1970's is estimated at 50,000. Roughly half of the boats are owner-operated, with 80% of the fishermen deriving their income primarily from fishing. A definite trend towards operating on a thoroughly commercial basis is thus to be noted, especially in Kenya. But subsistence fishing remains significant, especially in Tanzania where a large proportion of fishermen are engaged in complementary agricultural activities.

This evolution from an originally subsistence/part-time mode of exploitation is explained by three main factors, namely the scarcity of agricultural land and of alternative employment opportunities around the lake, and the specialization of some riparian ethnic groups in fishing activities. In such a context, one can expect fishermen to remain actively involved in fishing activities even if it becomes less and less productive and profitable (as mobility out of an economically overexploited fishery depends on opportunity costs of labor and capital (Panayoutou 1982), and since these appear limited in the case of Lake Victoria).

This is why the intensity of fishing effort remained especially important in Kenya as compared to the two other countries, leading to more intense overexploitation. Indeed the shortage of agricultural land and alternative employment has been higher in the Nyanza Gulf area than elsewhere around the lake and the Luo ethnic group is highly specialized.

The process of overexploitation in an open-access fishery is characterised by the dissipation of all resource rent; that is any revenues over and above the cost of production, inclusive of minimal returns to both labor and capital. In such a situation, intramarginal rents can still be derived by those units which are more performant, i.e. those which are generally but not necessarily using more capital-intensive techniques.

The fishing on the lake in the 1970's is quite typical of this situation with most of the fishermen involved in the predominant gillnet fisheries having presumably become progressively impoverished, and with a few better equipped fishing units perhaps earning above-normal profits, especially in more recent fisheries such as light fishing for Rastrineobola argentea, or because of seasonal involvement in several fisheries. While the author is not aware of any comparative cost and earnings study having been conducted during this period, the impoverishment hypothesis explains the relative stagnation of fishing effort throughout the 1970's and the slow development of alternative but more capital intensive techniques such as light fishing.

As far as demand is concerned, one notes first that the price of 'table' fish[1] does not decrease with decreasing fish size. Actually, and as often noted in other African fisheries, a better price can be derived from fish size corresponding to an individual serving. This is one of the factors which did induce the progressive use of smaller mesh size in the gillnet fishery.

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[1] Fish served whole or in chunks rather than used as a (sauce) ingredient to a dish as is generally the case for small pelagics or juveniles.

Another demand-related factor is the lack of readily available substitutes for 'table' fish. First, meat is generally much more expensive than fish due to the fact that it is itself relatively scarce all around the lake. Then there is a high qualitative difference between 'table' fish and small-size species such as Haplochromis/Rastrineobola argentea which implies that these are not substitutes. Finally, the area of Lake Victoria is relatively isolated from other fish production centres, with the noticeable exception of the Ugandan shore between Masaka and Jinja. This explains why fishing pressure has always remained less in Uganda than in Kenya and Tanzania and why the exploitation of lesser-quality fish like Haplochromis and R. argentea has remained marginal in this country. Indeed the very large quantities of Nile perch and tilapia caught in Lake Kyoga were direct substitutes for Lake Victoria's higher quality fish and as such were largely marketed in the same markets.

On other markets around the lake, the relative price inelasticity resulting from the relative scarcity of close substitutes and growing demand related to population growth resulted in higher prices for decreasing quantities of quality fish. The characteristics of demand also explain the pernicious tendency of overexploiting major species through the use of small mesh gillnets. .Increased landings of less valued fish may have slowed down this process through its impact on total demand and price but the related and increasing use of beach seines and mosquito nets also had a detrimental impact on high valued fish stocks through the capture of juveniles from these species (e.g. Marten 1979).

## 2.2 The Evolution and Characteristics of Lake Victoria's Fishery in the late 1980's

It has already been over 10 years since the dramatic upsurge of the Nile perch stock. The evolution of Nile perch into a resource base supporting a major and thriving industry was not anticipated by those who have been so outspoken in their opposition to its introduction. But the development of the Nile perch fishery was extremely rapid, and not surprising given the socio-economic context.

Even in Kenya where Nile perch is less appreciated by the riparian population than elsewhere around the lake, Nile perch catches rose from around 1,000 t in 1978 to over 4,000 t in 1979-80, reaching nearly 23,000 t as early as 1981. In spite of this development, heavy predation by Nile perch greatly reduced the abundance of haplochromines while subsequently affecting more valuable species such as Clarias, Protopterus, Bagrus, Barbus, Synodontis and Schilbe.

Judging from catch records the impact of Nile perch on these species has been more drastic (so far) in Kenya than in Tanzania and to a lesser extent Uganda. This follows from the rapid proliferation of Nile perch having originated in Kenyan waters. The evolution of species composition over the period 1974-1987 is given in Table 2 for Kenya. It denotes an extremely rapid evolution of the fisheries towards what would eventually prevail with a lag of 3-4 years throughout the lake.

The evolution of the ichthyomass of Lake Victoria is closely following a pattern already observed for Lake Kyoga where Lates along with O. niloticus were introduced in the mid 1950's. Following the virtual

disappearance of haplochromines and numerous native species similar to these encountered in Lake Victoria, the fisheries of Lake Kyoga rapidly evolved into a three species fishery dominated by Lates, O. niloticus and R. argentea (Ogutu Ohwayo 1985). R. argentea became the main prey of Lates and so far remains virtually unexploited due to the lack of market for this species in Uganda.

A similar pattern is apparently occurring in Lake Victoria with Lates, O. niloticus and R.argentea having become rapidly predominant. Unlike in Lake Kyoga, however, Lates also prey heavily on the freshwater shrimp Caradina. As a result of species interaction, the abundance of Caradina has been shown to have increased dramatically in recent years (Wanink et al. 1988).

The evolution of species composition and their relative abundance is not only related to interspecies competition but to economic forces. Data presented in Table 3 and the general evolution of major fisheries since the late 1970's provide some insight into the market forces at play. Among these are :

(i) - The relative heterogeneity of consumer preferences around the lake

O. oreochromis can be viewed as the exception, being widely considered as prime quality fish all around the lake and fetching a higher price than other endogenous tilapiine species - even if compared to the once highly priced O. esculentus. Lates, at a high level of production, fetches a higher price in Uganda than in Tanzania and Kenya. This is easily understandable if one considers that Lates is found in other Uganda lakes and that large quantities coming from L. Kyoga have been marketed around the Lake Victoria shores of Uganda for decades. Among other major species, one notes, for example, that species such as Bagrus and Clarias are fetching a higher price in Uganda and Tanzania than in Kenya. A reverse situation is observed for Propterus and Haplochromis.

(ii) - The elasticity of demand at a low level of production

This implies that while the price of major species does rise as production decreases, it would either stabilize or decrease as marketed quantities are reduced to very low levels. This is a relatively surprising phenomenon which explains some of the data presented in Table 3. For example, Lates in Tanzania was fetching a relatively low price before significant quantities became available. For species like Bagrus, Barbus, Clarias or Protopterus prices appears to have risen relative to the price of other species when production initially decreased. But as production diminished to very low levels, the relative prices of these species decreased or remained stable. There are a number of explanations for this phenomenon, such as : the reluctance of wholesalers to deal with low volume products and the difficulty for retailers to find the few consumers who would be ready to pay higher prices for scarce products as marketing structures for such products do not exist. Risk aversion added to the fact that few people may be ready to buy these products at a premium price seem to be the key factors.

(iii) - The relative stability of Nile perch prices at high level of production

The rapid increase in abundance and landings of O. niloticus in the 1980's has more than compensated for the loss of other high price species. Meanwhile important and ever increasing quantities of Nile perch were being landed without greatly affecting its price relative to that of O. niloticus. It is not surprising that Nile perch found a ready market around the lake. This market already existed in Uganda and Lates was not completely foreign in other countries as small quantities were already being landed in the 70's from Lake Victoria and other lakes in the three countries. Furthermore, Lates has supported flourishing fisheries everywhere it is found in Africa including Lake Albert, Lake Tanganyika and Lake Turkana - even if the situation of Lake Turkana is significantly different as the lake region is populated by ethnical groups which traditionally do not eat fish.

What is surprising, however, is the rapidity with which the Nile perch market expanded. Indeed one would have expected Nile perch to find a ready market equivalent to the quantities of average to low-value species supplied under the previous regime. Allowing for population growth this could have represented a market of about 100,000 tons for the whole lake at prices between 75% and 50% of that of most highly priced species. But one could hardly have expected that the market could expand in a period of 3 to 4 years to absorb a supply 2 to 3 times higher without much effect on prices. Indeed while production more than doubled in Kenya between 1981 and 1986, relative prices only decreased by about 30%. In the other two countries where Nile perch is even more appreciated, relative prices decreased even less. This demonstrates the popularity of Nile perch in a wide area around the lake, the existence of a huge demand for medium priced table fish in the three countries, and a remarkable ability of fisherfolk and small entrepreneurs to adapt to new marketing situations, especially when large profits are to be made.

(iv) - The absence of market for small size fish in Uganda

Under the previous fisheries regime, Uganda was already singled out as the only riparian country where Haplochromis found only a very limited market, and R. argentea hardly any market at all. This follows from the basic unacceptability of these products in either fresh or sundried forms in most of the country (a limited market for R. argentea exists only in the West Nile region). While ample harvesting opportunities exist for the development of a R. argentea fishery of the type developed in Kenya and Tanzania, the primary market of the small quantities now being landed in Uganda is for animal feed.

The evolution of the fisheries at harvesting level appears to have been linked primarily to the rapid evolution of demand. Indeed few adjustments were required on the part of small-scale fisheries as Nile perch is best caught by gillnet, which was already the most common fishing method used. Even if smaller mesh gillnets were initially damaged by Lates, nets typically lasted no more than six months on Lake Victoria and were rapidly replaced by large mesh nets. The profits realized thereafter more than compensated for any losses incurred at the very initial stage of Lates proliferation. The intensification of fishing for O. niloticus and R. argentea also followed from previous involvement in these fisheries.

Similarly, the changes which occurred on the Lakes did not require significant adjustments in processing technologies as sun drying and fish smoking were and remain predominant. Actually it is at marketing level that major adjustments had to be made in order to distribute ever- increasing amounts of fish throughout a larger and larger area.

It has been shown that for the overall fisheries sector, these adjustments were made without any major displacement or adverse impact (Reynolds & Gréboval 1988). There is no doubt that consumers gained tremendously from the changes having affected the fisheries so far, with huge amounts of fish having been made available at more affordable prices throughout a large portion of the three countries concerned. As prices globally remained quite high due to extremely rapid market expansion, fisherfolk from the harvesting to the distribution sub-sectors also derived tremendous benefits from the new fisheries regime. So much so that fisherfolk have nicknamed the Nile perch 'the savior'. The fisheries were and remain almost exclusively operated by small-scale rural fisherfolk. Fisherfolk previously engaged in the fisheries appear to have gained as much if not more than newcomers who predominantly came from the lake shore as well. There is no evidence that investment cost increased at first, and the use of better equipped units generally reflects progressive reinvestment of profits made in the fisheries.

In the late 1970's, total fleet size was estimated at about 11,000 canoes involving about 50,000 fishermen/crews and perhaps three times as many people in the secondary sector (CIFA, 1983). In 1987, nominal effort has been roughly estimated to have risen to about 19,000 canoes (Reynolds & Gréboval 1988). Keeping the same figures for fishermen/crew per canoe and primary to secondary employment ratio, primary and secondary employment figures may have risen to 95,000 and 285,000 people respectively. Overall this would mean that 180,000 additional jobs have perhaps been created so far.

In this context little case can be made in our opinion, of commonly advanced arguments on the adverse socio-economic impact of Nile perch proliferation and the changes which it induced. It is nowadays common knowledge that the fish is widely accepted and highly priced all around the lake in spite of the huge quantities landed in recent years. As far as local displacement is concerned, far from destroying opportunities, Lates has created them, nearly doubling total employment in the fisheries. While a case has often been made of the deforestation resulting from increasing demand for fuel wood to smoke increasing amounts of fish, the main cause of deforestation in the area, as elsewhere in Africa remains the ever increasing demand for household use. The issue nevertheless warrants further and urgent attention because of its impact on the environment and on the cost of fish processing.

Displacement due to increasing industrial fishing and processing activities has remained marginal. As far as industrial fishing is concerned there are presently about twenty small trawlers fishing for Nile perch in Lake Victoria and nearly all are based in Tanzania. More will be said in the next section about the desirability of such investment. However the catch of these trawlers remains very marginal. As far as industrial processing activities are concerned these are all based in Kenya (Kisumu, Nairobi, Mombasa) where fourteen processing plants process Nile perch

fillets as a major or secondary activity. Production capacity was estimated in 1987 at about 25,000 tonnes annually, that is about 30% of the Nile perch production of Kenya for this year (Tettey 1988). The long-term desirability of having created such a capacity is an open question. Since the early 80's, however, it broadened the Nile perch market and did contribute to stabilize ex-vessel prices by removing excess supply from the shore area. Furthermore the largest part of this production is marketed in Kenya where Nile perch is now one of the cheapest sources of animal protein. In Nairobi and other large cities, Nile perch skeletons have even become quite a delicacy for people of lesser means.

Exports outside East Africa are limited to those of Kenya which represented 11,500 tonnes of Nile perch (wet weight) in 1987. This corresponds to less than 5% of the Lakes's production for that year. From observations reported in Reynolds and Gréboval (1988) it can be assumed that an additional 5% to 10% of the total catch of Lake Victoria is informally exported outside the three countries. This mostly involves exports of sundried R. argentea to Zaire, Zambia, Zimbabwe and Rwanda; as well as some exports of smoked Lates and O. niloticus.

For management purposes, major changes which occurred at the socio-economic level since the late 1970's concern:

(i) the profitability of fishing activities which remains very high in all aspects of the fisheries industry (Reynolds and Gréboval 1988);

(ii) the wide expansion of the market base which is no longer limited to riparian communities and nearby urban centres;

(iii) a continuation of the trend towards more commercially oriented exploitation even if subsistence fishing/processing/marketing activities are still significant;

(iv) a significant increase in fishing effort and in the number of fishermen, processors and traders involved in the fishery sector;

(v) the development of a small industrial fishing and processing capacity which may induce localized conflicts with the interest of small scale fisherfolk if catches are allowed to decrease very significantly.

In spite of these changes, the sector remains fundamentally characterized by small-scale exploitation taking place in a relatively similar socio-economic framework, with little fundamental change in technologies, techniques and practices compared to the former regime.

## 3. MAJOR MANAGEMENT ISSUES

### 3.1 The stakes

The benefits derived from the fisheries of Lake Victoria have reached unprecedented levels over the last decade. But without proper management, further potential rent could be dissipated within the next decade as the Nile perch stock is already believed to be overexploited, with definite signs of overexploitation for highly fished areas like the Nyanza Gulf (FAO, 1988).

The stakes are extremely high. The ex-vessel and market values of total catch were estimated respectively at 72 million US$ and 180 million US$ in 1985 when circa 260,000 tonnes were landed (Reynolds and Gréboval, 1988). Now that total catch is reported to have reached about 400,000 tonnes, it is probable that the average for the period 1979-1991 may be about 260,000 tonnes.

If this is the case, it follows that over an expansion period of about 12 years the value of the catch may be estimated at over 2 billion US$. Compared to the average yearly production of about 100,000 tonnes prevailing under the previous fisheries regime, the value of the net increase in catch over the same period could be estimated at 1.25 billion US$. This would have constituted extremely important benefits, even if additional benefits are progressively dissipated in the absence of adequate management. However, without proper management, the downfall of the fishery may follow a similar but reverse pattern with catches stabilizing at their pre-Nile perch level in 10 to 15 years.

If the 1985 level of production in weight and value is sustainable, the stakes of proper management may be the additional yearly production of up to 150,000 tonnes of fish valued at around 100 million US$ together with over 100,000 jobs.

Now the central question is whether the present resource base can sustain high yields. As noted earlier the abundance of O. niloticus has increased tremendously in recent years and fish size remains quite large in spite of heavy fishing pressure. Because of marked difference in habitat preference, the predation pressure from Lates on O. niloticus has been and should remain very low. As in Lake Kyoga, the proliferation of Nile perch has led to the equally important development of R. argentea whose abundance is reported to be still increasing[2]. A similar development has been noted for Caradina (Wanink et al 1988; Ligtvoet 1989 which together with R argentea and insect larvae constitute the main source of food for Lates. With increasing prey stocks at very high levels of predator abundance, the prospect of medium-term sustainability from a predator-prey point of view seems very likely. Even if the ecosystem has still not stabilized, it is therefore likely that it can sustain a fairly large stock of Lates.

The parallel already drawn with the evolution of Lake Kyoga's fisheries can serve as a basis for estimating very indicatively what the MSY of Lake Victoria could be. As shown in Table 4, Lake Kyoga was able to sustain over the period 1961-1982 an average yield of 82,000 tonnes composed essentially and about equally of Lates and O.niloticus. The catch of Lates has significantly decreased since the mid 1980's due to heavy fishing pressure and diminishing water level, but catch and catch rates are reported by the Ugandan Fisheries Department to be increasing again since 1988.

Taking a conservative MSY estimate of 50,000 tonnes or yield of 18.5

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[2] Wanink (1989) estimated the 1982 biomass of R. argentea at 187,400 t and reports a four-fold increase in biomass between 1982 and 1987 in surveyed areas. Extrapolation to the whole lake gives an estimated biomass of 750,000 t for 1987.

t/km squared (9.25 t/km square for each species) for Lake Kyoga, and applying it to the very near shore area of Lake Victoria,[3] Reynolds and Gréboval (1988) estmated quite conservatively that an annual production of 120,000 tonnes[4] for Lates and 60,000 for O. niloticus could be sustainable. Together with R. argentea whose MSY is likely to be very high, especially if Lates predation is reduced, total MSY may be roughly estimated to be in the range of 200,000 to 300,000 tonnes. This represents an average lake-wide yield of 3.6 t/km squared which is not particularly high for a relatively shallow lake of this type and only about half the yield of Lake Tanganyika which supports a similar predator-prey fishery. Higher MSY figures could mean that the stakes are even higher than previously indicated.

Within the next few years, it is likely that Nile perch catch will start falling and lead to the use of mesh size smaller than the 7-9 inch (177-228 mm) mesh now commonly used all around the lake. If this occurs one would also expect a certain proportion of effort to be rapidly transferred to the O. niloticus fishery. As the two fisheries are predominantly exploited by gillnets, and as these fish are relatively good substitutes, it is likely that any overexploitation process will affect both fisheries simultaneously. But it is difficult to know which one will be most affected. Significant transfer of fishing effort on R. argentea is likely to occur only at a later stage. Even if this fishery is undergoing a very rapid expansion in Kenya and Tanzania - a trend which is likely to persist as the fishery remains largely underexploited and as additional effort is therefore unlikely to significantly affect the profitability of already operating units for some time - a transfer into this fishery implies a significant change in equipment and may not necessarily be as profitable as remaining in an overexploited fishery if prices for Lates and O. niloticus do increase significantly.

Judging from the little information that exists on fish markets around the lake, it is likely that Lates and O. niloticus prices would increase significantly and jointly if the production of Lates or both species falls significantly. Indeed even if purchasing power is limited, these two species have few immediate substitutes and the price of Nile perch is likely to be driven up by the forces of the nowadays numerous and diversified markets on which it is sold. Market prices are therefore likely to reinforce the overexploitation process as higher prices would to a certain extent compensate for lesser catch rates.

While the whole process of rent dissipation might take well over a decade - period during which large benefits will continue to accrue - the fisheries under relatively open-access would eventually stabilize at a presumably much lower level of production which may be close to the level

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[3] It is assumed that the major productive waters and /or fishing grounds are confined to the 20 m or less depth zone for Nile perch (an area of some 12,700 km squared or 18% of the lake) and to half this area (6350 km squared) for O. niloticus.

[4] In comparison, Ligtvoet (1989) estimated the standing stock of Lates in 1987 at about 480,000 tonnes for the whole lake.

observed in the 60's and early 70's. But such an evolution can hopefully be avoided through the introduction of proper management measures.

3.2 The Management Framework

There are presently very few management-related regulations controlling fishing effort on Lake Victoria and the few that exist are seldom enforced. According to van Densen (1989) these concern essentially :

- minimum fish size for Lates (48cm) and tilapia (28 cm) in Uganda ;
- minimum mesh size in the tilapia fishery of 10.2 cm in Kenya and 7.6 cm (in bays) for Tanzania ;
- the prohibition of night fishing (mostly for security reasons) and of beach seining in Uganda ;
- a closed season from 21/3 to 1/8 for beach seines and mosquito seines in Kenya ;
- and closed areas such as for trawling in bays in Tanzania and for seining in Kisumu Bay in Kenya.

In practice, few of these regulations are strictly enforced but notable exceptions are the ban on beach seining in Uganda and to a lesser extent, seining restrictions in Kenya. It is to be noted that all these restrictions would affect gear use and other qualitative components of effort and not nominal effort per se. It reflects the generally accepted conclusion that it is indeed the gear used and the fishing practices that have led to severe overexploitation under the previous fisheries regime (Marten 1979). As effort has significantly increased over the last decade, this may no longer be entirely true. Even if overexploitation will eventually take the form of decreasing mesh size in the gillnet fisheries, it is doubtful that further investment into these fisheries is at all required. For other socio-economic reasons as well, this also concerns trawling and the expansion of industrial processing.

It is therefore likely that regulations should be introduced to control both the quantitative and qualitative dimensions of fishing effort. Among the range of regulations which one may consider, priority should be given to those which are more readily acceptable and in a related way more easily enforceable. But both acceptability and enforceability depend greatly on how committed the three governments are to avoiding severe overexploitation. Whereas the stakes are a lot higher than they have been for Lake Victoria, imposing generally unpopular regulations is politically a difficult task and requires enforcement means far in excess of those presently available. However, the governments concerned should bear in mind that it is a lot easier to introduce and enforce regulations in a climate of profitability and relative prosperity than it would be in a few years when the fisheries become overexploited.

Also to be noted is the fact that while the actual effectiveness of any regulation depends on acceptability and enforceability, these two factors are in the final analysis greatly influenced by the government's own dedication to fisheries management. Some regulations can be made more readily acceptable through proper popularization and consultation with

concerned communities. Similarly, more appropriate but less enforceable regulations should not necessarily be put aside by assuming that present enforcement capabilities may not be strengthened.

In further determining the framework of management, a major issue is whether or not managers can effectively control the very forces leading to overexploitation, especially in the case of gillnet fisheries for which mesh size reduction may eventually become the key factor. The engine of effort expansion is profitability. Obviously, the higher the profitability, the higher the incéntive to enter, especially if entry cost is limited in terms of investment cost or otherwise. In the expansion phase of a fishery, one could therefore limit effort expansion either by controlling effort directly or by controlling profitability. It is actually best to control both simultaneously. Indeed the more profitable a fishery is, the more difficult it is to control effort directly as the pressure for entry is high and more difficult to resist.

Because effort/profitability control schemes are difficult to enforce, effort is likely to continue to expand under such management schemes, but at a much reduced rate as compared to free entry. Furthermore as long as profits remain slightly above normal, the incentive to reduce mesh size is not as strong and mesh size regulations can be more easily enforced. Mesh size regulations should actually be introduced early in the process, i.e. well before mesh size becomes a constraint to 'normal' profitability.

In this way governments would also slow down the pauperisation which generally goes hand in hand with overexploitation. The logic is that whatever the government takes when profits are high, it can slowly give back when the profits fall to low levels and when pressure to ignore key regulations builds up. But the strict control of effort would nevertheless remain the only way to guarantee high returns to fishermen on a sustained basis.

Mesh size regulations would be required in any case, but applied by themselves, these are bound to be far less effective. Indeed as effort is allowed to expand more rapidly at higher levels, a faster post-peak reduction in catch rates and profits can be expected, leading to a faster and less easily controllable process of mesh size reduction. This evolution is likely to be reinforced in small-scale fisheries like those of L. Victoria as mobility in and out of the sector is thought to be quite asymmetric. Furthermore, mesh size regulations become constraining at very low levels of profitability and thus more difficult to enforce because of the social pressure. This situation very much prevailed under the former fisheries regime, making mesh size regulations ineffective or politically unenforceable. The result has been the systematic overexploitation of the gillnet fisheries.

To avoid a similar evolution, the three governments concerned should act promptly and preferably in a concerted way to introduce simultaneous controls of all three components: nominal effect, profitability and mesh size. Short of acting promptly on all three fronts with much increased enforcement means and ample concertation with the communities concerned, it is believed that the downturn of the gillnet fisheries would lead to a fast and similarly uncontrollable process of overexploitation.

While greater benefits could have been derived by acting earlier, it can be argued that it is still timely to control entry into the gillnet fisheries. Indeed, even if the fisheries are more or less at peak-production, profits are still very high and will continue to be so for some years, attracting additional effort.

### 3.3 Suggested Immediate Management Regulations

An attempt is made below at defining an indicative set of regulations and measures for immediate consideration. It contains key elements of a short-term strategy aimed at simultaneously controlling nominal effort and selected qualitative components of effort in a direct or indirect manner.

Introducing too many regulations and measures may lead to difficulties with respect to both enforceability and acceptability. It is believed, however, that the same means of enforcement can be applied to enforcing several regulations and that the socio-political factors which generally limit enforcement effectiveness may partially be overcome by a multidimensional set of regulations and constraints.

- Mesh Size Regulations:

Minimum mesh size should be introduced for both the Lates and O. niloticus fisheries. While a number of factors would have to be considered in defining these minima, it is recommended that they be set provisionally at the lower level of the mesh sizes commonly used nowadays, i.e. 6 inches (152mm) for Lates 4 inches (101mm) for O. oreochromis. This way the regulation is not likely to become constraining in the short-term, giving time to the fisheries departments of the countries concerned to popularize the regulation and to strengthen their enforcement capabilities.

Restrictions on the sale of gear of illegal mesh sizes around the lake can only be contemplated if gill netting for other species is marginal. It is now, but some species will recover as the abundance of Nile perch decreases, as has already been noted for Nyanza Gulf. (Siwo, 1988).

- Licencing of All Fishing Units by Main Fishery:

Owners should be required to obtain a licence for each fishing unit/boat which they own and for each main fishery in which the unit operates. Canoes should carry official markings and operators should be required to carry proof of proper licencing at all times. While some requirements of the sort exist in all three countries, the system should be strengthened and fully operationalized so as to enable effective monitoring of effort in each major fishery (immediate priority) and eventually to control entry (medium-term priority). It is further suggested that gillnetting licences be given for only one target fishery. In the present context, this is a key element to enforcing mesh size regulation and will allow for control of mesh size independently of whether a unit has been fishing or not.

- Banning of Gear:

Uganda should continue to strictly enforce the prohibition of beach seining as it is targeted primarily on juvenile Lates and O. niloticus in the country. In Tanzania, and even more so in Kenya, beach seines (and mosquito nets) are also used in the R. argentea fishery. Imposing more restrictions on the use of this gear in these two countries warrants further immediate investigation taking into account that open-water gear such as ring nets and scoop nets are not only less destructive but reportedly more efficient and increasingly used in Tanzania (Ligtvoet 1989).

Further investigations may lead to recommending other regulations which will complement the above and existing ones. The recommended set of regulations should be relatively effective in achieving their purpose if penalties are swift, involving both confiscation and legal pursuit. As far as acceptability is concerned, licencing would be readily accepted if licence fees remain reasonable relative to profitability. Mesh size restrictions are generally well understood by fishermen, but would only be readily accepted if thoroughly applied. Gear prohibition can be made more readily acceptable by giving fishermen time to fully depreciate their gear and by providing incentives to switch to other gear. It is also more readily enforceable than most other regulations. Mesh size regulations and licencing are about equally difficult to enforce, necessitating regular on-shore and on-water control over extensive areas and for a large number of fishing units. It is believed, however, that these can be effective even if strict enforcement is limited to key landing areas where effort is concentrated.

## 3.4 Suggested Complementary Management Measures

These measures are based on socio-economic considerations and concern economic incentives or disincentives which can influence effort allocation. In the short-term, these should aim at discouraging a further and economically wasteful expansion of fishing effort in the gillnet fisheries by reducing the profitability of these fisheries in general, and relative to others.

- Avoiding further government support to gillnetting

This can take the form of governments discouraging new development projects that would directly or indirectly result in effort expansion in the Lates and O. niloticus fisheries. Especially concerned are projects which require direct government approval. New entry into these fisheries at the small- scale level can also be discouraged by limiting cheap credit for gillnetting and avoiding the subsidized importation of gillnets through projects of other government programmes.

- Providing incentives to the transfer of effort away from gillnetting

Through development projects and financial incentives, such as lower

taxation, transfer grants or special credit schemes, the government may induce transfer away from gillnetting into long lining and open-water pelagic fishing. The introduction of lift nets by some Lake Tanganyika fishermen in the southern part of Lake Victoria may provide further scope for the development of the pelagic fishery.

- Raising Taxes

A variety of taxes and fees are levied in all three countries: from registration fees, landing and marketing taxes to the taxation of inputs. As noted by Reynolds and Gréboval (1988), these do not amount to a significant portion of total revenues, especially at harvesting level. Raising taxes at this level is not only unpopular but would affect statistical recording if applied to landings and increase 'parallel' trade in any inputs it is applied to, which is not desirable. If taxes are to be raised, it should rather be done by progressively raising registration/licence fees at both harvesting and marketing levels. It should further be noted that these fees are now set at very low levels and that the fisheries administrations have direct control over them, whereas other taxes are generally levied at decentralized levels.

- A ban on further development of the trawler fleet

Although trawler catch remains very marginal, the number of trawlers operating in the fishery has increased significantly in recent years. In Tanzania, 13 trawlers are now operating compared to 3 to 5 during the 1970's; 5 trawlers operate in Kenya, and in Uganda a new Sino-Ugandan joint venture is soon to start operating 2 pair trawlers. It was shown by Reynolds and Gréboval (1988) and in FAO (1988) that trawling does not make sense as it provides far fewer socio-economic benefits than canoe-based operations. This is especially the case as trawlers and canoes exploit the same stock of Nile perch. Even if the catch by trawlers remains marginal, their operations will increasingly conflict with those of small-scale fishermen, as catch rates decrease.

- Discouraging further investment in Industrial Processing

This should be considered on a country by country basis. In Kenya, where industrial processing has developed rapidly, it is believed that the proportion of Nile perch catch going to existing factories is already very high. As the catch decreases, this proportion is likely to increase almost proportionally with significant adverse effects on local processors, distributors and consumers. In the longer term only long-established companies may continue to be profitable (their investment being fully depreciated). However, more recent and any additional investment into this activity is likely to be unprofitable. In other countries, there may be room for the development of a small industrial capacity if it can be shown that this would remain profitable at higher ex-vessel prices and if it does not compete directly with small-scale processors and distributors on their own market.

## 3.5 Other Management Issues

The management of Lake Victoria's fisheries will require on the part of the three countries a determination to act promptly and in a concerted way. An issue which may be raised is whether or not more in-depth studies are required before determining a management plan. Taking into account that the information base is sufficient to qualitatively assess the dynamics of the system and its likely reaction to management measures, it is felt that an interim management plan could be prepared on the basis of a thorough analysis of existing information. Complementary research priorities could be determined concurrently as a basis for fine-tuning the plan at a later stage.

Enforcement is a key issue to the elaboration and implementation of such a plan. Without additional enforcement means it is doubtful that the fisheries of the lake could be effectively managed. The strengthening of enforcement capabilities would require additional staff and logistical support as well as complementary training at field and managerial levels.

It is to be noted, however, that the approach to enforcement is as important as the means themselves. Concertation is the key word, and fisherfolk should not only be made to know and to understand the regulations but should also be progressively involved in their elaboration and implementation. For example, each country could establish a management council which, on a consultative basis, would associate fisherfolk representatives and local leaders in the elaboration and implementation of management measures. Local management committees could also be established to monitor the implementation of management measures and to ensure the fair and thorough application of the regulations.

The elaboration and implementation of a management plan of the sort described in this document is a fairly complex task. The three countries concerned may take advantage of the experience acquired elsewhere and seek external assistance to strengthen their management planning and enforcement capabilities. However, experience has shown the key constraint to fisheries management to be of a political nature as the introduction of restrictive regulations is bound to be initially unpopular. For this reason, a key priority should be for the relevant fisheries institutions to organize the concertation and lobby for the political support required to enact and implement appropriate management measures.

TABLE 1

L. VICTORIA - TOTAL NOMINAL CATCHES OF THE ARTISANAL FISHERIES BY COUNTRY, 1968-1979

| Country | Years | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Kenya | 16.400 | 17.400 | 16.400 | 14.900 | 16.000 | 16.800 | 17.200 | 16.300 | 18.700 | 19.300 | 23.900 | 30.600 |
| Tanzanie | 59.400 | 53.900 | 48.300 | 42.600 | 40.900 | 49.600 | 41.700 | 46.600 | 50.600 | 65.400 | 46.500 | 55.100 |
| Uganda (*) | 40.500 | 41.200 | 34.800 | 38.100 | 33.900 | 32.500 | 30.000 | 30.000 | 30.000 | 30.000 | 30.000 | 30.000 |
| Total | 116.300 | 112.500 | 99.500 | 95.600 | 90.800 | 98.900 | 88.900 | 92.900 | 99.300 | 114.700 | 100.400 | 115.700 |

* Uganda's total annual catch assumed to be less than the 1973 magnitude, following the deterioration of the fishing industry during tha abnormal economic period 1973-79

Source: CIFA (1982)

TABLE 2

KENYA - LAKE VICTORIA WATERS, ANNUAL CATCHES (m.t.) BY SPECIES, 1974-1985*

| SPECIES | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O. esculentus | 57 | 28 | 49 | 42 | 180 | 94 | 90 | 139 | 399 | 108 | 99 | 42 | - | 3 |
| O. niloticus | 411 | 202 | 421 | 465 | 972 | 962 | 1184 | 1858 | 2581 | 2516 | 6136 | 7573 | 7853 | 9024 |
| Other tilapia | 488 | 412 | 537 | 928 | 1454 | 1683 | 3739 | 1900 | 1495 | 1658 | 1243 | 1827 | 1311 | 1326 |
| Alestes | 1 | 14 | 2 | - | 35 | 23 | - | 4 | 2 | 4 | 1 | - | - | - |
| Bagrus | 1103 | 1389 | 1025 | 1141 | 1396 | 1769 | 642 | 430 | 2532 | 1243 | 88 | 61 | 61 | 40 |
| Latus | 136 | 51 | 97 | 203 | 1066 | 4286 | 4310 | 22834 | 3334 | 52337 | 41319 | 50029 | 56975 | 68545 |
| Protopterus | 2179 | 1469 | 935 | 773 | 612 | 472 | 370 | 187 | 239 | 108 | 81 | 150 | 150 | 58 |
| Haplochromis | 6013 | 4620 | 6368 | 5378 | 6621 | 6599 | 3636 | 916 | 2546 | 612 | 41 | 6 | 3 | 183 |
| Clarias | 2211 | 2584 | 2507 | 1755 | 1729 | 3029 | 1223 | 1003 | 2062 | 895 | 780 | 547 | 762 | 345 |
| Barbus | 127 | 283 | 182 | 183 | 199 | 417 | 421 | 292 | 692 | 100 | 53 | 113 | 248 | 125 |
| Synodontis | 196 | 126 | 191 | 310 | 155 | 482 | 388 | 127 | 232 | 47 | 75 | - | 1 | - |
| Mormyrus | 89 | 58 | 89 | 102 | 102 | 359 | 333 | 208 | 2678 | 218 | 89 | 49 | 59 | 12 |
| Labeo | 59 | 108 | 123 | 936 | 148 | 443 | 482 | 112 | 918 | 81 | 58 | - | 161 | 477 |
| Schilbe | 31 | 54 | 57 | 129 | 120 | 320 | 117 | 49 | 78 | 22 | 3 | 5 | 25 | 4 |
| Rastrineobola | 3742 | 4548 | 5652 | 6704 | 8710 | 9321 | 9443 | 7635 | 10419 | 16444 | 19437 | 25866 | 34518 | 33145 |
| Oth. sm. mixed | 332 | 635 | 445 | 280 | 327 | 333 | 536 | 483 | 961 | 894 | 2321 | 2351 | 1013 | 165 |
| TOTAL | 17175 | 16581 | 18680 | 19332 | 23856 | 30592 | 26914 | 38179 | 60958 | 77327 | 71854 | 88589 | 104968 | 113452 |

* Source : Statistical Bulletins, Department of Fisheries Kenya.

Table 3

COMPARATIVE EX-VESSEL PRICE INDEXES IN KENYA, TANZANIA AND UGANDA

| | KENYA (1) | | | | TANZANIE (2) | | | UGANDA (3) | |
|---|---|---|---|---|---|---|---|---|---|
| | 1976 | 1981 | 1986 | 1987 | 1978 | 1983 | 1986 | 1972 | 1987 |
| O. niloticus (base) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Lates | 52 | 40 | 27 | 34 | 25 | 60 | 53 | NA | 75 |
| Protopterus | 65 | 60 | 68 | 69 | 45 | 30 | 78 | 45 | 40 |
| Bagrus | 36 | 43 | 39 | 48 | 76 | 73 | 78 | 109 | 110 |
| Clarias | 52 | 51 | 43 | 51 | 50 | 67 | 63 | 106 | 110 |
| Haplochromis | 38 | 34 | 35 | 20 | 31 | 30 | 20 | NA | 11 |
| Rastrineobola (4) | 28 | 40 | 18 | 19 | NA | 43 | 40 | NA | NA |

(1) Source : Actual prices from Department of Fishery, Kenya. Statistical Bulletins.
(2) Source : Annual reports, Regional Fisheries Office, Mwanza and Mara Regions. Prices from Mara Region (1978) and Mwanza Region (1981 - 1986).
(3) Source : Kanyike (1972) for 1972 date reflection consumes preferences in the Entebbe region; 1987 data collected by the author.
(4) Price includes other miscellaneous species for Tanzania.

Table 4

LAKE KYOGA : TOTAL ANNUAL CATCHES (m.t.)
1961 - 1982 ( All species )*

| Year | Total catch (m.t.)** | |
|---|---|---|
| 1961 | 12 900 | |
| 1962 | 13 200 | |
| 1963 | 17 000 | |
| 1964 | 18 500 | |
| 1965 | 18 400 | |
| 1966 | 19 900 | |
| 1967 | 26 300 | |
| 1968 | 52 300 | |
| 1969 | 48 900 | |
| 1970 | 62 000 | |
| 1971 | 89 700 | |
| 1972 | 95 100 | |
| 1973 | 100 500 | |
| 1974 | 105 000 | |
| 1975 | 118 700 | Mean 1961-75 : 53 226 t |
| 1976 | 145 800 | |
| 1977 | 167 000 | |
| 1978 | 167 000 | |
| 1979 | 133 000 | |
| 1980 | 131 000 | |
| 1981 | 130 000 | |
| 1982 | 138 000 | Mean 1961-82 : 82 245 t |

* SOURCE : Uganda Fisheries Department

** Rounded to nearest 100. As noted in the text, there has been drop in the Lake Kyoga Nile perch catches since 1983. Recent observations indicate that the most likely cause of this decline has been overfishing, using small-mesh seine nets and that the Nile perch stock is now recovering (Pers.Comm. by Uganda Fisheries Department; draft terminal report of IFAD/World Bank Lake Kyoga Project)

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