

Socio-economics of the Lake Victoria Fisheries

**THE MACROECONOMY OF
THE EXPORT FISHING INDUSTRY IN LAKE VICTORIA (KENYA)**

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April 2000

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Lake Victoria is the second biggest freshwater lake in the world. with its 69,000 km², the lake has the same size as Ireland. The lake is shared between three countries; Tanzania (which possesses 49%), Uganda (45%) and Kenya (6%) of the lake.

The findings, interpretations and conclusions in this publication are those of the authors and do not necessarily reflect those of IUCN or the partner organisations in this project.

Newspaper Cutting: Excerpt of The East African, October 18 - 24, 1999

Design & Layout: IUCN EARO Communications Unit

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Acknowledgements

This report is prepared by Mr. Crispin Bokea (principal researcher) and Dr Moses Muriira Ikiara. Mr. Bokea, an economist, has for the last three years worked with the International Center for Economic Growth, Africa region office based in Nairobi as the Research Manager while Dr Ikiara is currently a lecturer at the School of Environmental Studies, Moi University, Eldoret, Kenya.

Preparation of this report was mainly based on review and synthesis of secondary data and information as well as visits to fishing beaches, markets and factories around Kisumu. The authors are grateful for the useful comments and general direction provided by Ms. Mine Pabari,

1. Introduction

Kenya is a coastal state with a marine coastline of 640 kms and a marine fishing industry. In spite of this, Lake Victoria dominates Kenya's fishing industry. In 1995, for instance, the lake accounted for 94% of the 193,789 tonnes of fish produced while marine fishing accounted for only 3% of this output. This is notwithstanding the fact that Kenya claims only 6% of Lake Victoria's total surface area, with 45% being owned by Uganda and 49% by Tanzania. Kenya's portion is the most heavily fished, commercialized and productive of the three countries, producing an estimated 33% of the lake's entire fish output in 1990.

In terms of contribution to the gross domestic product (GDP), Kenya's fishing industry is small but growing. Thus, while the industry accounted for an average of 0.2% of the country's annual GDP between 1971 and 1981, the contribution rose to 2% and 4.4% of the non-monetary and monetary GDP, respectively, by 1990 (Ikiara, 1999)³. This increase is largely attributable to the Nile perch export business that emerged in the mid-1980s and expanded significantly in the subsequent years. This lucrative external trade in Nile perch has engendered a notable transformation of the hitherto artisanal fishery, ushering in an unprecedented inflow of national and international capital and completely new set of players. Within a few years of the emergence of this lucrative export business, the fish processing capacity grew from nil in the early 1980s to 15 registered factories by 1998 with a current processing capacity far in excess of production capacity.

In the 1990s, moreover, a fishmeal-based animal feeds industry developed with considerable consequences. In less than a decade, a total of eight animal feeds factories have prospered, six using large amounts of *Rastrineobola argentea* as an input while another two use the Nile perch skeletons to produce fishmeal.

The increasingly worrisome implications of the expanding Nile perch export industry and the use of fish and fish products in the animal feeds

³ Kenya has limited capacity for regulation and data collection. For this reason, we believe that some of the contribution that the fishing industry makes, especially with regard to local incomes and subsistence, escapes recording and that the industry's contribution to GDP is much higher than reported.

2 Overview of Kenya's Lake Victoria

Economic Importance

Even though fishing constitutes only a small portion of Kenya's GDP, it is, nevertheless, an important source of livelihood for many Kenyans and has been so for many years. First and foremost, fish is an important source of animal protein, especially for most poor people living immediately around the lake. Panos (a London-based research institution) for example, estimates that fish provides about 19% of the total animal protein consumed by African people. In addition, sources cited in Myers (1997) estimate that seafood contributes 50% of all the animal protein consumed by human beings around the world, more than that supplied by beef and poultry combined. In Kenya, many ethnic communities, especially those in parts of Central and Eastern provinces, did not consume fish as recently as 1980, but fish has now become an important source of cheap protein in almost all parts of the country. Thus, per capita annual fish consumption has increased from 3kgs in 1980 to 7.5kgs barely 10 years later (Kenya Fisheries Department, various years). In a later section of the paper, a more accurate picture of per capita fish consumption in the country will be presented.

Many Kenyans engaged in fishing earn income from the activity. This income has been increasing over the years, although distribution is becoming increasingly more inequitable, with the export-oriented fish processing sector taking the lion's share. In 1995, fishermen earned an estimated Kshs 5.9 billion from fishing, less than 30% of the value of the retail trade (Ikiara, 1999). The rest went to the people engaged in processing and marketing and the government in taxes. In the same year, fish exports earned Kenya Kshs 1.5 billion in foreign currency. These foreign exchange earnings are, in fact, an under-estimate as earnings from sport fishing are not included. In addition, there is speculation that fish processing firms frequently under-report their export quantities for tax evasion purposes.

Employment is the second avenue through which fishing provides a livelihood not only to Kenyans but many other people in developing countries. The Food and Agriculture Organization of the United Nations (FAO) has

estimated that the livelihood of 100-200 million people, 95% of them living in developing countries, directly or indirectly depends on fisheries (Konstapel & Noort, 1995). In Kenya, the Fisheries Department recently estimated that a total of 798,000 people were directly or indirectly supported by the fishing industry compared to 720,000 in 1995. There were 34,000 fishermen, 238,000 dependants and 596,000 people engaged in the provision of support and ancillary services such as trade in fishing inputs, fish handling, processing and marketing⁴. A majority of these people live in the Lake Victoria region, an area in which alternative economic opportunities are limited largely due to low rainfall, poor soils and a shortage of paid jobs. In a country where the unemployment rate is estimated at between 25 and 30% and is in fact rising, fishing is clearly a very important economic preoccupation. In 1995, for instance, 560,000 people were estimated to have been employed in Kenya's fishing industry accounting for 25% of the country's total employment in the informal sector and 14.5% of the country's total employment.

Finally, the fishing sector supplies raw materials for other economic activities, notably manufacturing and agriculture. Thus, spoil fish, by-products of fish processing and some fish species such as *Rastrineobola argentea* and *Carodina nilotica* are increasingly finding use in the manufacture of animal feeds, important inputs in poultry, dairy and beef production.

Historical Overview

The changes that have occurred in the fisheries of Lake Victoria have taken place in this century. Before the arrival of colonial rule, the fishery resource existed in harmony with the resource users (Geheb, 1995). The fishing community had traditional and territorial rules and regulations which ensured that the fishery

⁴ The estimate for employment in support and ancillary activities suggests that for every job created in Kenya's fish harvesting sector, 15 others are created in support and ancillary activities. We find this hard to believe given international estimates. FAO estimates that every individual employed in developing country industrial fishing fleet creates 4 - 5 other jobs in support and ancillary activities while the ratio in artisanal fisheries is 1:1. Since Kenya's fishing industry is semi-industrial, we feel that a more realistic ratio is 1:3. This is the ratio we will use in this paper.

was exploited in a sustainable manner by limiting access to a specific group of people and to specified stock areas. The use of simple traditional technology such as traps and spears by artisanal fishermen, moreover, kept fishing intensity and pressure in check.

During the colonial period (1901-1962), the harmony existing between the resource users and the resource base started to crumble as a result of escalating fishing pressure (Geheb,

to basic food insecurity. Hence, the control of fishing technology and marketing has shifted from local fishers to large commercial entrants

with access to capital, and one result has been the erosion of responsible fishing behaviour.

Table 1: Species Composition of Fish Landings in Lake Victoria (Kenya), (% of total weight landed)

1968 1970 1975 1980 1985 1990 1992 1994 1996

3 The Nile Perch Transformation of the Fishery

Desiring to enhance the fisheries of Lake Victoria the colonial government introduced several species of tilapia and Nile perch into the ecosystem between 1950 and 1962. These new species, especially the Nile perch, established themselves fully within only ten years. Two of these species, the Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*), now occupy a dominant position in the three-species commercial fishery that Lake Victoria has been transformed into. Without doubt, the non-indigenous species have served the fishery enhancement objective. Catches have expanded five-fold, and a lucrative export business based on Nile perch has taken root. Consequently, the price of Nile Perch increased in real terms, and the tilapia came to dominate the national fish market. Reynolds et al. (1992), report that the Lake Victoria fisheries produced a total value of US\$ 280million between 1975 and 1989. Employment, too, increased from 158,000 employees in fishing and ancillary activities in the entire lake to 422 000 by 1992 when Nile perch fishery was at the peak (Wilson, 1993). Fishery expansion has not been costless unfortunately. It is now widely acknowledged that the introduction of alien species into an ecosystem causes biodiversity loss (Konstapel and Noort, 1995). Studies in Scandinavian lakes and North America show that such introductions lead to irreversible changes in food webs (Ochumba et al., 1991).

Catch Expansion and Export Development

Following their introduction into Lake Victoria, catches of tilapia and Nile perch started appearing in the mid-1970s (Table 1). Initially, there were more catches of the tilapia relative to Nile perch as consumers and fishermen were already familiar with other closely related species and therefore targeted the tilapia. On the other hand, fishers and consumers in Kenya regarded Nile perch as fatty, smelly and unpleasant as there was no prior experience with it.⁴ It was not until the late 1970s that significant amounts of the perch started to be landed in the Kenyan waters of Lake Victoria For example, 1,000 tonnes were landed in 1978. This increased to nearly 23,000 tonnes in 1981, 50,000 in 1985 and reached a peak of 123,000 tonnes in 1991 (Abila and Jansen, 1997). There has since been a declining trend.

Thus, the dislike of Nile perch among the Kenyan fishing community around Lake Victoria was short-lived. This development, coupled with the popularity of perch in Uganda and Tanzania saw the East African market absorbing thrice as much fish in the mid-1980s as in previous years without corresponding changes in prices (Abila and Jansen, 1997). During the initial years of the Nile perch boom, therefore, Kenyans and East Africans in general benefited enormously from increased availability of fish at affordable prices. In fact, Reynolds et al. (1992) observe that the dollar prices of Nile perch in Lake Victoria as a whole fell over the 1975 - 1985 period and then began to rise as export demand grew. This observation is supported by the data, plotted in Fig. 3.

The Nile perch strengthened the dominance of Lake Victoria as Kenya's leading source of fish. The lake's share of total catch rose from 50% in 1970 to about 94% in 1995 (row 8 of Table 2). This dominance continues. Row 10 of table 2 demonstrates the dominance of Lake Victoria fisheries in the country's fish output from all freshwater sources while row 11 shows the role of fish farming or aquaculture in the country's fishing industry. It is worrisome that the performance of aquaculture is deteriorating instead of improving. The worry arises from the fact that aquaculture ought to serve as an alternative source of fish. The last row of Table 2 shows the size of Kenya's marine fishery over time. The serious decline in marine catch since 1965, is, to some extent, a reflection of the fact that the potential officially thought to exist in this sub-sector is largely illusory. The value of fish produced from Lake Victoria has also recorded phenomenal growth, in real terms, since 1980 (Fig. 1), that is, from Kshs 0.2 billion to about 2.2 billion in 1995.

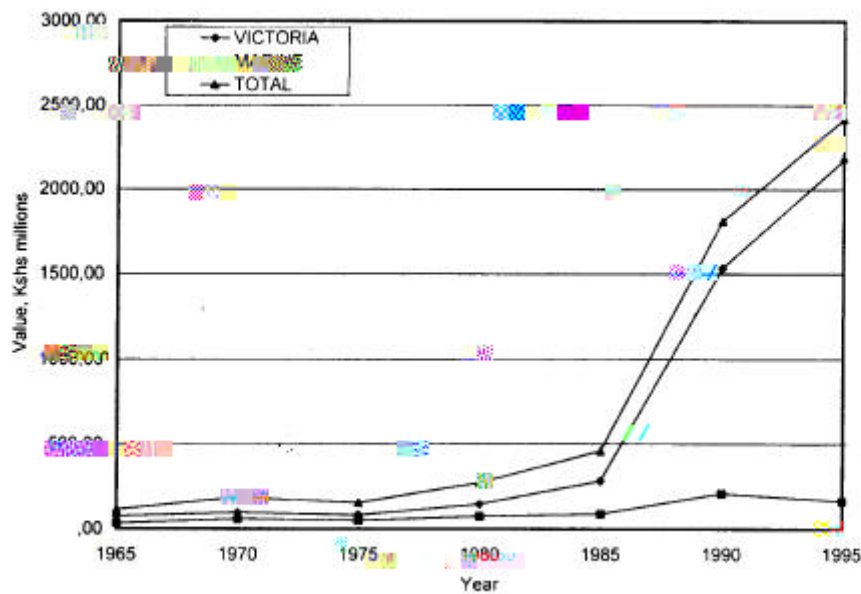
Table 2: Quantity of Fish (tonnes) Landed in Kenya: 1965-1998

SOURCE	1965	1970	1975	1980	1985	1990	1995	1998
1. L. Victoria	13,000	16,988	16,581	26,914	88,589	183,101	181,888	158,876
2. L. Turkana	1,095	4,854	4,236	12,384	7,460	3,180	2,232	4,268
3. Others*	3,050	4,003	1,993	2,988	2,630	2,552	2,591	3,709
4. Fish Farming	130	-	-	596	1,085	975	1,083	217
5. All Fresh Water	17,275	25,845	22,810	42,882	99,764	191,808	187,794	167,070
6. Marine Fish	5,725	-	4,531	5,336	6,209	9,007	5,995	5,522
7. TOTAL CATCH	23,000	33,755	27,341	48,218	105,973	201,815	193,789	172,592
1/7 (%)	56.52	50.33	60.65	55.82	83.60	91.73	93.86	92.05
1/5 (%)	75.25	65.73	72.69	62.76	88.80	96.50	96.86	95.10
4/7 (%)	0.57	-	-	1.24	1.02	0.48	0.56	0.13
6/7 (%)	24.89	23.43	16.57	11.07	5.86	4.94	3.09	3.20

* This category includes other fresh water sources of fish such as rivers and dams.

Source: Ikiara (1999). Updated from Republic of Kenya, Economic Survey 1999.

Fig 1: Real Value of Fish Produced Annually in Kenya



Source: Ikiara, (1999)

The initial low demand for Nile perch in the domestic market and large supply stimulated the growth of an export business that now earns the country about

Table 3: Kenya's External Trade in Fish and Fish Products, 1970-1997

YEAR	EXPORTS		IMPORTS	
	Volume, tonnes	Value, Kshs. millions	Volume, tonnes	Value, Kshs. millions
1970	1,369	-	5,274	-
1975	1,116	51.22	2,435	55.58
1980	784	18.32	3,537	49.75
1985	514	22.71	403	4.46
1987	4,677	183.16	155	1.20
1989	7,279	336.05	2,241	8.60
1992	11,762	506.86	409	1.56
1995	12,852	693.51	2,252	33.67
1996	14,412	963.62	1,000	0.06
1997	13,295	847.54	-	-

* Values are in constant 1990 prices. A GDP Deflator series (1990=100) for Kenya obtained from IMF's *International Financial Statistics Yearbook*, is used to calculate real values.

Source: Adapted from Ikiara (1999).

the value increased by 386% in nominal terms and by 106% in real terms over the same period.

The Nile perch export business is facing increasing and challenging obstacles which cast doubt over its temporal sustainability. Thus, the country's fish export performance has started to decline. From the peak export of 14,412 tonnes in 1996 that earned the country Kshs 963.6million in real terms, performance has declined to 13,295 tonnes in 1997 and further to 10,861 in 1998. The value has also declined by 12.0% in 1997. The most daunting of these challenges are the dwindling supplies of fish, and serious quality problems.

The quantity of Nile perch available for processing has been declining since 1991. From a peak of 123,000 tonnes landed from the Kenyan side of Lake Victoria that year, the perch catch dropped gradually to only 96,500 tonnes in 1996. This decline occurred in spite of a substantial increase in fishing pressure. Between 1993 and 1995, for instance, the number of fishers and boats increased by 15% and 7% respectively (Ikiara 1999). In addition to these increases, previously existing fishermen and fishing units increased their fishing efforts substantially to compensate for declining CPUE. Diminishing availability of fish has meant that installed fish processing capacity is not fully utilized. In a recent survey involving

the 12 fish processing firms in operation, Abila and Jansen (1997) estimated that only about 50% of the daily processing capacity of 380 tonnes was being realized. This is supported by a more recent survey which estimates fish processing capacity utilization of 49% in Kenya and 57% in the East African region (LVFRP/Tech/99/027 1999). This survey estimates that in the entire lake, 469 tonnes of Nile perch are processed daily out of an installed daily processing, capacity of 823 tonnes; twenty one out of the twenty three filleting firms surveyed by LVFRP/Tech/99/02 (1999) cited fish supply problems primarily attributed to low catches and high competition.

Factors responsible for this decline in catches include ecological consequences of overfishing, introduction of alien fish species, pollution and the water hyacinth infestation that has recently assumed alarming proportions. Overfishing, in turn, has been caused by excessive demand for fish in both local and external markets and improved fish prices. Other factors are excessive processing capacity, high rates of population growth, lack of alternative employment opportunities and open access to the fishery (Ikiara, 1999). Further discussion of these factors is beyond the scope of this paper.

Quality is the other major challenge to Kenya's fish export business. Even though most of the processing factories in Kenya generally meet

EU hygiene standards of design and construction, unscrupulous processing by unregistered and unhygienic factories occurs and the conditions at the landing beaches are generally poor (Goulding, 1997). Currently, Kenya's fish exports are going through a debilitating ban from the EU market, the largest market until last year. This comes only a short while after another ban, from the same market, of fresh fish imports from East Africa following a cholera outbreak which lasted from January to July 1998. Also, in March 1997, East African fish consignments to Spain and Italy were found to contain unacceptably high levels of bacterial contaminants, prompting stricter inspection procedures for subsequent consignments from the region (Ikiara, 1999).

These export bans have been accompanied by extremely heavy losses. The 1998 ban, for instance, led to a fall of 45-67% in the ex-vessel price of Nile perch in a period of only 3-4 months, reduction of the scale of operations by as much as 75% by some processing factories and laying off of workers (as many as 150 workers from only one factory), increased lack of confidence in East African fish even in markets outside the EU, and deteriorating confidence in other export commodities from the region. Others include the exit of some fishermen and their boats from the fishery, loss in tax income and incomes for people employed in the fishing industry and loss of business to airlines (as much as US\$ 0.5million per week for one airline), among other losses (Ikiara, 1999).

Other Fishery Developments

In the last decade a fishmeal-based animal feeds industry has developed and generated unprecedented demand for the second most important commercial fish species in Lake Victoria, *R. argentea* (or omena in the local language), and for Nile perch skeletons. The development of this industry has, in effect, subjected omena, like Nile perch, to regional and international commercialization.

In a 1997 survey, Abila and Jansen (1997) found that six animal feed manufacturing companies in Kenya were using about 70% of all the omena that was produced every year to manufacture fishmeal while another two companies were using 60% of the Nile perch

skeletons produced for the same purpose. It is noteworthy that up to the late 1980s, all the Nile perch skeletons (popularly known as

There were hardly any wholesalers. The fish processors and traders, moreover, exerted no pressure or control on fishers through credit relationships or any other mechanisms.

Since 1980, the situation has changed dramatically. The number of fishers grew by 200% between 1973 and 1995 to reach, 30,000 while that of vessels increased by about 95% over the same period to reach 8,000 (Ikiara, 1999; Table 4). This indicates that the number of fishers operating from the same boat increased from 2.5 to almost 4 during that period, ushering in an extremely intensive fishing regime. Current Fisheries Department statistics indicate that the number of fishers and boats has continued to increase, reaching 40,000 and 15,000 respectively, in 1998. This increase is, in fact, only a small proportion of the total increase in fishing effort, implying a

implementation will deny the local fisherfolk access to the landing beaches. This is, no doubt, a very significant development which must be critically examined by the regulatory authorities, if the objectives of the Fisheries Department have to be achieved in a balanced fashion.

Moreover, resulting primarily from the ecological disruption associated with the introduction of alien species and also from overfishing and pollution, the ecosystem balance of the lake has changed substantially. The Nile perch is now known to be a predator of most of the fish species found in the lake including its own juveniles. As already mentioned many of the endemic fish species have now disappeared from the catches and the originally multi-species fishery has been reduced to a three-species commercial fishery.

The processing and marketing sub-sectors have also experienced transformation. New technologies for processing Nile perch were developed. Small-scale traders and processors were edged out by capitalized operations. The by-product of Nile perch filleting, the skeleton formed the basis of a new processing and trading business to which displaced women turned. An aggressive use of *R. argentea* and the skeletons for animal feeds manufacture also emerged. Artisanal traders and processors, 84% and 56% of whom are women in Kenya and the East African region, respectively,

BOX 1:

MEMORANDUM

Following our various discussions about fish export trade relations with the European Union, this letter

4 The Macroeconomy of the Fishery

In this section, we trace the socio-economic and environmental effects of fishery transformation that has occurred since the explosion of the Nile perch fishery and the development of an animal feeds industry using local fishmeal. We compare the costs and benefits of this transformation. Specifically, the section tries to answer the following questions: Have the benefits of the transformation been large enough to cover the costs? What has been the official policy position with regard to the transformation? In light of the assessment of the benefits and costs of the fishery transformation, has the official policy been well informed or does it need re-formulation?. Environmental effects are treated as part of the macroeconomic

Even considering tax revenue, employment of Kenyans, sourcing of raw materials locally and the ownership structure of the fish processing firms, we believe that a high proportion of the officially reported forex receipts from fish exports is not retained in the country. Of the 12 processing firms operating in 1997, three were fully owned by Kenyan Africans, eight by Asians (some of whom were Kenyan nationals) either solely or in partnership with investors of other nationalities, and one by Israeli nationals (Abila and Jansen, 1997). Current information indicates that only ten fish processing companies are in operation, each of which has at least one Kenyan shareholder. Seemingly, as a rule, the fish processing firms employ influential Kenyan Africans as directors (Jansen, 1997). Since foreigners usually repatriate their forex, the ownership structure painted above suggests that most of the money earned from the export of fish may not be retained in the economy.

Even though the survey by Abila and Jansen (1997) indicated that some of the processing

To summarize the discussion of the foreign exchange benefit of Kenya's fish export business we argue that the Kshs 1.5 - 2.3 billion earned annually should not be taken at face value. The actual value could be 20-29% more than these reported figures. It is doubtful that this unreported revenue ever gets into the country. Assuming that up to 50% of the reported revenue is retained in the country (a reasonable assumption), the Kenyan economy benefits from almost

receives 0.5% of the market price for every kilogram of fillet exported, as export levy. This levy is collected by the Fisheries Department. In 1995, the export of 12,470 tonnes of Nile perch fillet ought to have generated a total of Kshs 10.5million.

Government receipts from this export levy reached an all-time high of Kshs 13million in 1996. Between 1991 and 1997, the government received a total of 42.4million from this source. Between 1991 and 1995, an additional Kshs 0.44million was received as export levy on Nile perch bladders. These benefits can be entirely attributed to fishery transformation as fish was not previously exported. However, Kenya could be exporting more fish than is reported in the official statistics. We have estimated, in a previous section of this paper, that perhaps 20-29% of the actual fish exports are not reported. This suggests that the Government of Kenya is losing tax income amounting to Kshs 2million per year.

The government receives other income from the fishing industry. First, it is estimated that the Fisheries Department collects US\$ 30,000 (Kshs 1.8million) annually from the registration of boats, issuance of fish trader licenses, court fines for violators of fishing regulations and other similar sources (World Bank, 1996). Since this figure has remained unchanged for about the last nine years, it is incorrect to attribute this entire benefit to the fishery transformation. Nevertheless, in this paper we attribute this entire benefit to the fishery transformation as we lack data to indicate the proportion that should be attributed to the transformation. This assumption is reasonable given that the fishery transformation started more than nine years ago. Secondly, the Ministry of Health issues an export certificate at Kshs 500 for every container of fish. Since each container weighs 8,000 kilograms, it means that, in 1997, when 12,470 tonnes of Nile perch fillets were exported, the Ministry of Health received Kshs 0.78million through the issuance of export certificates. Thirdly, the Kenya Bureau of Standards (KBS) charges Kshs 200,000 for each annually renewable license. KBS is thus able to collect a total of Kshs 2.8million annually from the fish processing and animal feeds firms that are based on Lake Victoria fisheries. The Kenya Chamber of

Commerce and Industry (KCCI) also receives some fee from these firms.

Finally, fishing co-operatives and local authorities receive a sizeable amount of revenue from fish trade. The co-operatives charge a commission of Kshs 0.2 for every kilogram of fish handled while the local authority of Busia district, for example, receives about Kshs 2 as levy for every kilogram of fish. It is estimated that all the local authorities and co-operatives in Kenya receive about US\$ 2million (Kshs 120million) annually (World Bank, 1996). However, because of mismanagement and other institutional problems, our survey revealed that this money does not benefit the local fishers through improved services or infrastructure.

and 1993, and increased between 1993 and 1995. If the data plotted are accurate, these trends suggest that prior to 1991, the markets of these three commercial species were largely independent but after 1991 the Nile perch and tilapia behaved as substitutes. As the price of one species increased, demand would be switched to the other, causing its price also to rise. The prices of the two substitutes would, thus, tend to follow the same trend. *R. argentea* on the other hand continued to operate in an independent market.

Higher prices are one of the important macroeconomic benefits of the Lake Victoria fishery transformation. High prices have translated into higher incomes for the fishers. It is estimated that fishers earned Kshs 5.2 billion in 1995, representing 26.7% of the value of the fish retail trade. Had the fishery transformation not taken place, ex-vessel fish prices would not have reached present levels and the earnings to fishers would have certainly been less in absolute terms. Increasing fish prices have socio-economic and environmental costs however. These are discussed in a later section of this paper.

Largely because the transformation has not affected Tilapia and *R. argentea* as it has Nile perch, real prices for these two species in the 1990s have remained lower than their 1970 levels, although the declining trend that was evident in the 1970s and early 1980s was somewhat slowed down in the late 1980s and the 1990s. In fact, we predict that as the commercialization of omena intensifies in the coming years, the real earnings for fishers will surpass the 1970 level. As Figure 3 shows, prices have been on an upward trend since 1985 except for the decline experienced between 1991 and 1993 due to unprecedented high rates of inflation in Kenya. The same is true for Nile tilapia. As fish processing firms turn to the processing of tilapia in an effort to increase capacity utilization and as the domestic demand for this species increases, competition is likely to push the price upwards.

Employment and Livelihood

Due to superior infrastructural capacity, the large scale processing and trading companies soon pushed aside the small-scale operators in the Nile perch business, which was generating a

substantial number of jobs. It has been estimated that a total of 180,000 new jobs were created in the harvesting, processing and distribution of sub-sectors of the Kenyan lake fisheries during the 1980s. During this time the lake community came to regard the Nile perch as 'the saviour' (Reynolds and Greboval, 1988; Greboval, 1989), and people who had been previously under-employed became fully employed as the fortunes associated with the Nile perch soared. Medard and Wilson (1996) suggest that for the whole lake the total employment in fishery (including that in ancillary activities), rose from 158,000 people before the Nile perch dominance to 422,000 people by 1992 when Nile perch fishing was at the peak. This suggests that the fishery transformation created 264,000 jobs.

The initial Lake Victoria fishery transformation contributed greatly to national food security and nutrition. Annual per capita fish consumption in Kenya increased from 2 kgs in 1963 to 8 kgs in 1992 (Kenya Fisheries Department). Even though the per capita consumption figures ignored the amounts of fish exported and used for animal feeds production, it is widely acknowledged that the initial years of the transformation wrought substantial food security and nutritional benefits. This initial beneficiary period of fishery was soon reversed, however. As large-scale capitalized processors and traders gradually took control of the harvesting, processing, distribution and marketing of Lake Victoria fish, jobs in the traditional sectors disappeared. These losses are described in detail in a later section, where it will be shown that the net employment effect of fishery transformation has been negative in the processing and trading sectors. Moreover, as fish prices increased, fish became increasingly inaccessible to the local fishing community and other poor Kenyans seriously threatened by food insecurity. This is also discussed in detail in later in this section.

In the harvesting sector, the transformation of Kenya's Lake Victoria fishery has had a positive impact on employment so far. As demand for fish at the ex-vessel market has expanded and prices risen, many people have been attracted to the fishery. This has been reinforced by credit relationships between the processing and harvesting sectors, whereas

previously there were capital constraints hindering the growth of harvesting. Of course the increase in the numbers of fishers and boats that has occurred following the growth of the Nile perch export business and the fishmeal-based animal feeds industry cannot be entirely attributed to these developments. Current levels of population growth and unemployment rates would have definitely caused some entry. Nevertheless, our opinion is that the fishery transformation has had a notable impact on employment in the harvesting sector.

Between 1979 and 1985, the number of fishers in Lake Victoria grew by 19.4% compared with 9.1% over the 1989- 1992 period. 25% over the 1992-95 period and 33.3% over the 1995-1998 period. From this, we conclude that the rate of growth in the number of fishermen in the pre-Nile perch days was about 86% of the rate of growth in the era of fishery transformation. We believe that this acceleration in the entry of fishermen is largely driven by the rise in ex-vessel fish prices. This employment is a considerable benefit given that not only the fishermen but also their many dependants obtain a source of livelihood.

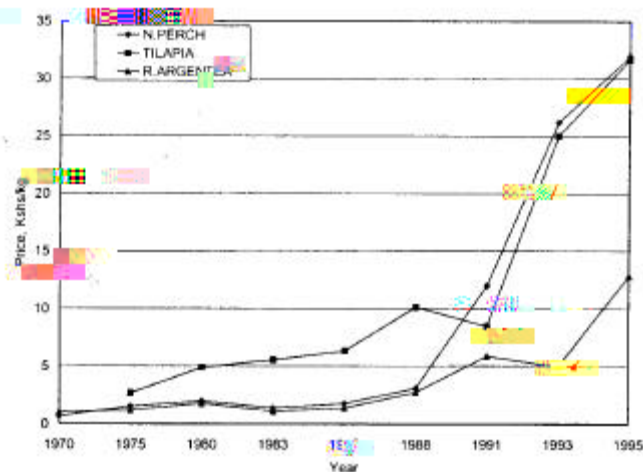
It is now estimated that there are about 40,000 registered fishers exploiting the Kenyan Lake Victoria fisheries (Fisheries Department). Given the high incidence of unregistered fishermen found during our random survey, we estimate that 80,000 Kenyans are employed as fishers in the lake. Our estimate is based on the fact that up to 20% of the boats were thought to be

unregistered in 1991 (Hoekstra et al., 1991), yet these are easier to monitor and register than fishers. It is possible, therefore, that up to 50% of the fishers who operate in the lake are not officially known.

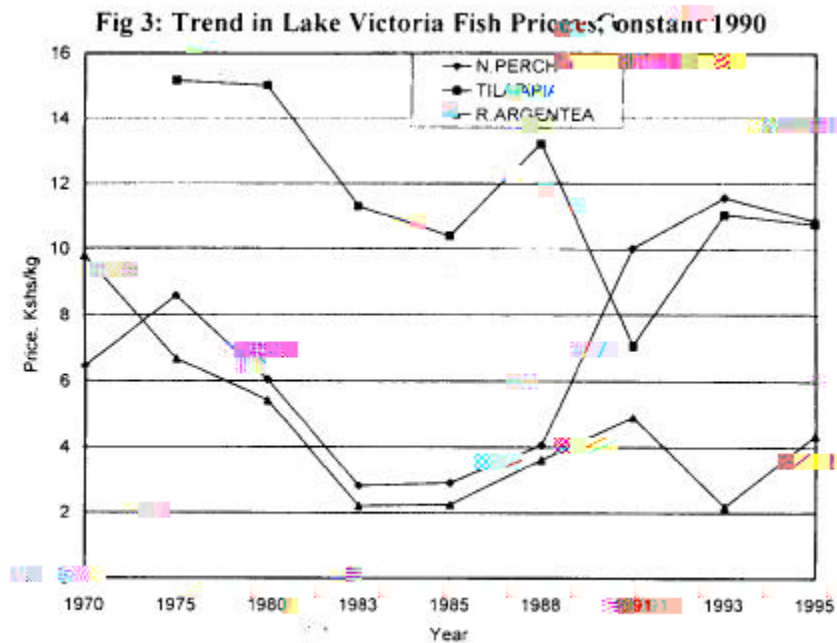
Total employment in the fishery can be estimated. Assuming that for every job created in the harvesting sector three others are created in support (boat building and repair, fishing gear manufacture and repair) and ancillary activities (processing, transport and marketing), we estimate that a total of 240,000 people are employed in the Kenyan fisheries of Lake Victoria. Of course even if commercialization had not taken place, employment would have grown but at a lower rate; Lake Victoria fishery would have remained largely artisanal. Going by the FAO estimates that every job created in the harvesting sector of artisanal fisheries in developing countries creates one other job in support and ancillary activities, employment in Lake Victoria fishery (had the transformation not taken place) would have been 80,000. The transformation, thus, could be credited with creating an additional 160,000 jobs so far. This is an enormous benefit for a country which has unemployment in excess of 25%.

The value of these jobs in monetary terms can be estimated. In his study, Ikiara (1999) found the average monthly income for boat owners to be Kshs 6,000. Fishing crew-members earn Kshs 1,000-2,000 per month. We believe that people employed in the fish-processing sector earn slightly more than fishing crews. Since the

Fig 2: Trend in Lake Victoria Fish Prices, Nominal Terms



Source: Ikiara, 1999.



Source: Ikiara, 1999

vessel owners are few in number, we assume an average monetary income of Kshs 3,000 per month for all categories of employment. This translates into a current annual amount of Kshs 5.8 billion.

Commercial Spin-off Activities

Processing and trade based on Nile perch skeletal by-products are the most important spin-off activities that have emerged from the modern processing industry. This by-product, which was a disposal nuisance for the processing factories in the early 1980s, has found a large market not only as food for human consumption but also as an input into the manufacture of animal feeds. There is, in fact, serious competition between the users of fish skeletons. An estimated 2000 workers, mostly women, were engaged in processing skeletons and sales in the early 1990s (Abila and Jansen, 1997). This commercial activity has served as a significant source of livelihood to these people and their dependants. This is a direct employment and income benefit of the fishery transformation. Assuming that the monetary value of each of these jobs is Kshs 3,000 per month, the annual income of this spin-off activity is Kshs 72million. This is, however, only part of the value estimated for employment in the entire fishery.

Commercialization of Lake Victoria fisheries has produced another important spin-off. The expansion of beaches along the lake-shore by more and more fish dealers setting up camp has attracted a significant amount of commercial and service activities. Most of the larger beaches are now dotted with cafes, bars and small hotels, among other business premises. Ikiara (1999) found that such business has been so good that more fishers are welcome now to join the beaches despite the negative externality bound to affect individual catch rates. To most, the benefits of this spin-off outweigh the negative externality. More research into this spin-off is needed in order to quantify the associated benefits.

The development of an animal feeds industry based on local fishmeal has yielded an additional benefit. Since fishmeal is rich in proteins, the quality of animal feeds which have some fishmeal is definitely high. This must have a positive effect on livestock production and, thus, the economy. Once again, we feel that research based on primary data is required to quantify the value of this spin-off.

Table 5: Annual benefits from Lake Victoria in Kenya

Benefit	Beneficiary	Annual amount, Kshs
Foreign exchange earnings	Kenyan economy	1 billion
Income to owners of fish processing and animal feeds factories	Investors, both Kenyan and foreign	1.12 billion + higher profits for owners and animal feeds factories
Tax Revenue: <ul style="list-style-type: none"> ◆ Export levy ◆ Registration of fishing operations ◆ Issuance of export certificate ◆ Kenya Bureau of Standards (KBS) charges ◆ Fisherman Co-operatives and local authorities 	Government of Kenya Local Authorities Fishing Cooperatives	<ul style="list-style-type: none"> ◆ 6.2 million ◆ 1.8 million ◆ 0.78 million ◆ 2.8 million ◆ 120 million
Income in fish sales and fishers income	Fishers	5.2 billion
Employment and livelihood	160,000 Kenyans employed since 1980	5.8 billion currently*
Spin-off commercial activities	2,000 Kenyans employed in commercial and service enterprises in the beaches in the last 10 or so years	7.2 million plus the unestimated but large value of enterprises
Total**		At least 7.1 billion

* This, of course includes income to fishers reported as Kshs 5.2 billion, and the value of spin-off commercial activities

** Care is needed in totaling to avoid double counting

Summing up the Benefits

It is evident that the fishery transformation associated with the development of a lucrative fish export business and an animal feeds industry based on local fishmeal has wrought substantial benefits. These benefits are

Costs of the Transformation

The transformation of Lake Victoria fishery that has been caused by the development of the fish export business and a local fishmeal-based animal feeds industry has had negative impacts too. These include an ecological upheaval, loss of control by the local community over most aspects of the fishing enterprise and displacement of people who were formerly employed in traditional fish processing and marketing sectors. In addition, there has been a skewed distribution of income and increasing food insecurity in the lake region and the entire country as fish has gradually become unaffordable and unavailable. These costs are briefly discussed in the remainder of this section.

Loss of Control of the Resource by Local Fishermen

The loss of control over the means of production as well as processing, pricing and marketing by local fishers to industrial investors has generated substantial costs. There is diminished access due to investments in such modern technologies as trawling and tembea. In the harvesting sector, newcomers have introduced trawlers and tembea boats, invested in many boats and a lot of fishing equipment and hired fishermen to do the fishing for them. The fishers in turn are controlled through credit relationships. The phenomenon of absentee fishers is now widespread. The local fishers have, thus, lost control of the means of production. Wilson et al. (undated), writing about the Tanzanian side of the lake, note that harvesting capacity is now concentrated in the hands of a smaller number of fishers and into a less diverse set of gears and techniques. In pricing, local fishers have no say because of lack of storage facilities, the perishability of fish and the pressure of credit relationships. In addition, each local fisher accounts for an insignificant portion of total fish supply and is therefore a price taker. In the processing and marketing sectors, large actors with a lot of capital have edged out traditional sellers and processors. Wilson et al. (undated) estimated that in the accessible, central landing beaches of Tanzania, 77% of all the Nile perch landed was sold to the processing factories, leaving little for other fishery participants. This has increased stratification within the industry and changed

production relations. Gibbon (1997) estimated that in 1996, 50% of all Nile perch landed in Tanzania went to filleting factories. In Kenya for the same year, Abila and Jansen (1997) estimated that about 48% of all the Nile perch was taken by the filleting factories.

Some traders and agents now literally control the fish landings of entire beaches. Entry into and operations within the fishery have taken on a "free-for-all" atmosphere. Geheb (1995) noted that the transformation of the once controlled access to fishing with proper management by the indigenous community into a "free-for-all" situation is mostly attributable to the commercial fishing of Nile perch. This is, thus, another cost of fishery transformation. It is a cost because the local fishers have lost control and access to the fishery and thus, no longer have even the slightest incentive to adopt responsible fishing behavior, a factor that has accentuated the open access attitude (Owino, 1999). This may prove to be an enormous cost to the integrity of the fishery resource in the foreseeable future, particularly in the context of overfishing and biodiversity.

Loss of Employment and Livelihood

The employment situation changed substantially when large-scale processing and fishmeal industries and trading agents gradually edged out the women who traditionally dominated the processing and marketing sectors. On the basis of their survey of the 12 fish processing firms in operation at the time, Abila and Jansen (1997) estimated that these firms created about 2,400 jobs but displaced about 15,000 other workers in the traditional processing and marketing sectors. The net effect of these large firms as far as employment is concerned has been a loss of jobs. In fact, three quarters of the jobs created by the fish processing factories are casual, temporary, low-paying and have no long-term benefits (Abila and Jansen, 1997). Furthermore, these jobs are given to urbanites who live near the factories and not the local fishing community. The large proportion of women going for animal feeds production represents loss of employment opportunities for the women who would have been involved in its processing and marketing.

Our estimate of the current level of employment in all sectors of fishery, suggests that 20,000

jobs have been lost since the 1980s when 180,000 jobs were estimated to have been created. The annual monetary value of this loss, using the assumptions made in the previous analysis, amounts to Kshs 0.72 billion.

The 2,000 jobs created in the processing and trade of Nile perch skeletons are also under threat as many of the skeletons are beginning to find their way into fishmeal production. Abila and Jansen (1997) estimate that 50-60% of these jobs have been lost and the remaining workers are underemployed. To take consideration of underemployment, we use the upper percentage

increase in price has been large enough to compensate for the fall in catch rates. The situation with the other two commercial fish species has been worse as the fall in catch rates and real prices continues to be below 1970 levels.

The upshot of this is that income distribution is increasingly skewed in favor of the owners of fish processing and animal feeds factories and against the fishers, factory employees and fish consumers. The latter are forced to purchase fish at higher prices. The cost of skewed income distribution is that fishers feel exploited and ignored by the government. Besides the obvious political cost of such feelings, there is also an environmental cost since fishermen no longer have the incentive to uphold responsible fishing behavior which assists sustainability of the fishery and biodiversity of the lake.

Commercialization of Lake Victoria fisheries has also exacerbated the inequality between vessel and gear owners and their crew members. Wilson et al (undated) identify various ways in which crew members have been adversely affected by the internationalization of the Lake Victoria fisheries. For example, fishing boats operating from central beaches allocate a higher percentage of the catch to boat owners and less to the crew. Secondly, share systems assign "maintenance and depreciation" payments prior to sharing of the catch. Since fishing units selling in international markets have investments that are five times higher than ordinary units, internationalization of the fisheries has steepened crew members' career path so there has been social disruption and moral decay in communities along the beaches. In sum, the effect on fishing has been economic and cultural alienation from both their employers and communities. Most feel a sense of loss of ownership or long-term commitment towards the fishing (Wilson et al., undated).

Food Insecurity and Nutrition

After ecological upheaval, rising food insecurity is perhaps the largest cost of the establishment of fish export and fishmeal manufacturing enterprises on the fisheries of Lake Victoria. Fish has been an important source of animal protein for many Kenyans largely because of its relatively low price. From the national average of 2.2 kgs per capita in 1963, fish consumption in Kenya increased to 8 kg in 1992. A large

part of this increase in fish consumption is attributed to improved catches of Nile perch. Consumption grew even in hitherto non-fish-eating areas of the country. For the fishing community around Lake Victoria, the availability of cheap animal protein was a godsend for this area of low agricultural potential and where people lacked purchasing power to acquire alternative sources of animal protein.

cheaper than alternatives. It adds flavour to the staple diet; is rich in essential fatty acids, vitamins and minerals; is easier to process than other sources of animal protein and it offers food security at the household level by providing a safety net during harvest failures (Ikiara, 1999).

The growth of the Nile perch export business and the increased use of fishmeal in animal feeds production are largely responsible for worsening food security, especially in the fishing communities. In Tanzania, Wilson (1993) showed that even though there has been an increase in fish consumption by households with at least one fisher member, there has been a definite drop in fish consumption by many households within the lake region in general since 1989. The highest levels of malnutrition in Kenya are now found within fishing communities because fisher-folk consume very little of what they harvest and yet they have no access to supplementary sources of protein (Ikiara, 1999). Thus, Kwale and South Nyanza had some of the highest levels of stunting among children, at 43.4% and 30.9%, respectively, in 1987, which had increased from 1982 levels. Kisumu, the seat of the fishing industry, has the highest prevalence of urban food poverty as well as absolute poverty, at 44% and 47.75%, respectively (Republic of Kenya, 1997a). The same source reports survey results showing that people living around the lake, especially children, suffer from protein deficiency. Yet daily access to 10 grams of protein would adequately address the iron, zinc, and vitamin A deficiency among children (Mwaniki, 1998). Since the poor households are unable to access alternative sources of animal protein, the cost they suffer as a result of reduced access to fish cannot be estimated from replacement cost but from the cost related to declining productivity, malnutrition and other ailments.

The Lake Victoria fishery transformation has compromised food security in several ways. First, close to 50% of all the Nile perch produced is exported, leaving only half for domestic consumption. Moreover, most of what remains is consumed by rich urbanites, leaving only immature perch and poor quality rejects for consumption by the fishing community. The fish processing factories now process fish

smaller than 1 kg in individual weight, leaving only juveniles and spoiled fish for the local market. In Tanzania, it has been estimated that about 30% of the Nile perch harvested is retained for local (that is lakeside) consumption (Wilson and Medard, 1999).

Secondly, Nile perch and tilapia became luxuries to the local fishing community a long time ago when demand for these fish species in the domestic and external markets pushed up prices to and made them unaffordable to Kenya's poor people. Even the fishers who harvested these fish could not afford to consume them as the opportunity cost was very high. Figure 2 shows the tremendous increase in ex-vessel fish prices, particularly since the mid-1980s. This increase in fish prices was not

export business based on this species might develop, with even more serious consequences.

One could argue that since fishmeal is used in livestock production (another source of animal protein), the use of omena and Nile perch skeletons for the manufacture of fishmeal does not constitute a real threat to food security. However, as Ikiara (1999) correctly observes, such use of fish other than for direct human consumption constitutes a "redistribution of nutrients or welfare from the have-nots' to the 'haves' since the livestock sources of protein are largely inaccessible to the poor."

Declining food security is a major macroeconomic cost of the increasing export of fish and use of fish and fish products for fishmeal manufacture, and this cannot be overemphasized. Abila and Jansen (1997) estimated that had Kenya not exported any fish and not used any for fishmeal production in 1996, the country's per capita annual fish consumption would have doubled to 6 kgs. This would have substantially improved health, productivity and economic growth. Medical outlays made to treat malnutrition would have, additionally, been saved and used elsewhere. A more detailed welfare survey in the direction suggested here would lead to useful estimates of the food security and nutrition cost associated with the fishery transformation. No data exist currently to aid in such estimation.

Ecological Upheaval

BOX 2.

WISHING-AWAY THE FOOD SECURITY CONCERN?

A Review of Findings of a European Union supported Marketing Study titled "Lake Victoria Fisheries Research Project Phase II" (LVFRP/Tech/99/02, 1999)

Another way in which Nile perch processing firms have responded to declining fish numbers is adoption of strategies such as sourcing from their other factories in Uganda and Tanzania for enhanced procurement of raw fish. Some offer fishers credit in exchange for exclusive fish supplies. Others invest in modern harvesting technology including trawlers, tembea, large nets and motorized boats. Some processing factories have resorted to processing of tilapia

The second manifestation of the fishery decline is falling productivity. Total fish landings from the Kenyan portion of Lake Victoria entered into a declining phase in the 1990s in spite of increasing fishing effort. This downward trend has continued as CPUE also continues to fall. For instance, daily boat catch rates have fallen from about 400-500 kgs in 1981 to 100-150 kgs in 1996 (O'Riordan, 1996). In addition, from an average catch of 25 tilapia per net from Nyanza gulf at the turn of the century, there was a dramatic decline to only seven fish per net by 1920 and to two per net by 1940 (Geheb, 1995).

The cost of declining productivity is large. Not only are foreign exchange receipts reduced but the welfare of fishers is threatened. There is an adverse effect associated with a general switch to nets of small mesh size and other destructive technology in response to falling catch rates. These technologies are a serious threat to the sustainability of the resource.

These adverse effects on the environment in general, and resource sustainability in particular, have been largely caused by excessive exploitation emanating from high demand for fish in the domestic and external markets (Ikiara, 1999). This demand has attracted excessive capacity into the harvesting and processing sectors. Fish processing firms have now invested in efficient but destructive harvesting technology, such as trawling and tembea, and assisted fishers to expand their harvesting capacity by switching to efficient but environmentally costly technologies such as beach seines and mosquito seine nets which catch smaller immature fish. The latter, coupled with the increasing tendency of people displaced from the *R. argentea* and Nile perch sectors to turn to juvenile fish for survival (Abila and Jansen, 1997; Wilson et al., undated), have effectively commercialized immature fish, again with devastating effects to the integrity of the fishery resource. This has led to high prices for immature fish, particularly "table" fish, initiating another strong force to accelerate the switch to inappropriate technology.

Table 6: Summary of the costs (annual) associated with the transformation of Lake Victoria (Kenyan Portion)

Cost	Who suffers	Annual amounts, Kshs
Loss of control of locals means of production, pricing, marketing and processing	- The local people - The lake ecosystem	Substantial
Loss of employment and livelihood	- Local people	763 million, plus
More inequitable income distribution	- Local people -	

Desperate to increase processing capacity, some fish processing firms in Kenya have opened branches in Uganda and Tanzania to collect perch and carry out preliminary processing. In addition, many traders now have motorized boats which travel to the Ugandan and Tanzanian sides to collect fish for the Kenyan factories. The excess processing capacity existing on the Kenyan side is therefore gradually encompassing the entire lake.

Declining real prices, particularly for tilapia and *R. argentea*, have also increased exploitation pressure as fishermen struggle to increase their fishing effort in a bid to sustain or improve their real income levels (Ikiara, 1999). The high poverty levels that exist among the fishing community also contribute to high fishing pressure. Even with rising real prices, poor fishers strive to increase their fishing intake as much as possible.

In our estimation, the cost of ecological upheaval or threatened resource sustainability is the largest of all the costs associated with the fishery transformation. There are various reasons for this conclusion. Lake Victoria fishery is currently worth at least Kshs 20 billion to Kenya every year. We say "at least" because the fishery has non-market value besides the market value. In the case of most resources, the non-market value could be much higher than the market value. At the current rate of exploitation, the fishery cannot be sustained into the future. Within 20 years, under the current regime, the fishery could easily collapse. The country would have gained only about Kshs 300 billion (not discounted) within that period. However, suppose that the fishery is further transformed by way of rationalizing export levels and the use of fish for animal feeds production and by way of better management. Under such a regime, the annual market value could be reduced, say halved. The non-market value would, however, increase. Abstracting from the non-market value for clarity, the new market value, at the point where the fishery is being exploited optimally, would be received in perpetuity. It is obvious that the optimal management regime would yield much larger benefits to the country. To demonstrate this, consider a lifetime of 70 years only. Within that lifetime, total benefits from the fishery would amount to Kshs 525 billion.

The cost of investment, in terms of rationalized harvest and processing rates, would be recouped in less than a lifetime. It is on the basis of such reasoning that we take the position that no amount of forex earnings, or indeed any other production targets, should justify pushing the fishery to collapse.

This paper has not been able to put actual quantities on most of the costs associated with the transformation of the Lake Victoria fisheries (Kenyan side) due to data unavailability. Research based on primary data is urgently required to facilitate the quantification of these

What does the current fisheries management say about the issues raised in this paper? Specifically, what is the official policy regarding the export of fish, the use of fish in the animal feeds industry and human consumption of fish? What management strategies are currently being used to address

these issues? Are there enough efforts or does something more need to be done? What alternatives exist to ensure that the fishery resource is sustainably exploited? These are some of the questions we attempt to answer in the concluding section of this paper.

FAO releases Sh20.6m to boost fish quality in EAC

FOOD and Agriculture Organisation (FAO) has given over Sh20.6 million to help East African countries address fish quality standards for export to the European market.

The Common Market for Eastern and Southern Africa (Comesa) Secretary-General, Erastus J. Mwencha, said the organisation had also received US\$2.5 million from the European Union (EU) to enhance its Standards Quality Metrology and Testing (SQMT) project.

He said funds from FAO would be used by the organisation to upgrade quality and safety of fishery products in Kenya, Uganda and Tanzania in order to bring to an end persistent wrangles with the EU over quality of fish exports.

Mwencha made the remarks at the opening ceremony of the seventh meeting of the Intergovernmental committee at the Kenyatta International Conference Centre.

At the same time appealed to Comesa members to meet the challenges of complying in full with the rules and

by John Oyuke

provisions of the treaty which gave rise to the organisation.

"Over the last six months we have witnessed the taking of unilateral decisions to protect industries that face competition, or for revenue purposes, by raising duties, or not reducing tariffs at all," Mwencha said.

He said that the dispute provisions in the treaty had provisions for the protection of infant industries, and included safeguard measures in the event of serious disturbances in the economy of a member state.

"Let us not, when we are so far down the road, with our destination in sight, be faint-hearted. Let us finish the task we have set ourselves. It shows the rest of the world that Africa is capable of helping in the globalisation of trade by fully following rules," he said. The organisation has set October 2000 as the date to achieve its aim of turning the region into a free trade area.

5 Concluding Remarks: Policy Implications

The Government of Kenya policy for the fisheries sector has the broad objective of managing fisheries sustainably in order to obtain the maximum yield while protecting the environment and securing benefits for future generations (Republic of Kenya, 1997b). In more recent policy statements, "maximum sustainable yield" has been replaced with the more realistic concept of "optimum sustainable yield" but without accompanying indications of an actual change of regime. The development objectives of fisheries management include:

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economic realities of the fishing communities, lack of incentives for compliance such as secure and well defined property rights, weak database and inconsistent fishery policy (Ikiara, 1999). In particular, fishery policies, statutes and institutional structures have failed to respond to developments such as ecosystem perturbation, structural adjustment programmes (SAPs) and the effects of trade liberalisation on the fishing industry. The law relating to fisheries in Kenya has retained colonial elements, despite a number of revisions, and has failed to respond to challenges associated with population increases and their effects and to develop an incentive structure that would facilitate self-regulation among fishery participants. Fishery policy and management have failed to respond or intervene as more and more fish gets diverted from domestic human consumption to export markets and the manufacture of animal feeds. The management and policy-making institutions appear to have been caught unprepared by the transformation in the fishery.

Economic incentives are powerful and cost effective means of achieving efficient fishing. For instance, the allocation of well-defined and secure property rights to the fishing community, has the potential to create requisite incentives for responsible fishing behaviour. Compared to CAC instruments, market-based instruments are less costly, easier to enforce, and generate revenues. In spite of their attractiveness and potential, economic instruments have not been used in the management of Kenya's Lake Victoria fisheries. Ikiara (1999) found that economic incentives could work in the management of these fisheries as fishers effort supply behaviour is responsive to economic variables. The most effective and efficient market-based instruments are landings taxes or ITQs. None of these is being used in the management of Lake Victoria fisheries and, despite their attractiveness and potential, we doubt that they could serve as an alternative management strategy under the present circumstances. In particular, the fact that the government is unable to effectively and efficiently collect the currently existing licensing fees suggests that these management tools would not stand a better chance of success. Besides this administrative weakness, poor database, difficulties inherent in the identification of genuine fishers, and lack of

alternative employment for those contemplating leaving fishery, and other obstacles stand in the way of using economic instruments in the management of Lake Victoria fisheries.

Fishery Policy and Development Objectives

The development objectives for Kenya's fishery sector are clear and reflect the country's development needs. However, it is doubtful whether they were deliberated upon adequately before being adopted. This is because the forex objective continues to receive top priority over the other three development objectives yet these are also important macroeconomic concerns of the Kenyan government. Even after the FAO warned about the negative impacts of the fish export industry on food security and employment, the government has not acted in any way to address these concerns.

In general, the development objectives of

to fulfil all the other objectives set for the fishing industry, including foreign exchange earnings, improved living standards for fisherfolk, employment generation and increased fish consumption.

Despite the recognition of domestic consumption shortfalls, nothing has been done to improve supply. The government erroneously believes that fish production can still be expanded from all the country's fish sources. Note, however, that fish production has been declining since the beginning of the 1990s in spite of increased fishing effort. Unlike food crops, no effort has been made to control the

ensure that the exclusive use rights of the fisher community are enforced, controlled and protected (Ikiara, 1999).

Whatever the management regime adopted, it should be noted that fishers in Lake Victoria are more supportive of restrictions on gears and destructive technologies than they are of restrictions on access. In Kenya, Ikiara (1999) found that 68% of fishermen support entry of new fishers while in Tanzania, Wilson et al. (undated) report that 72% of the fishermen do not support restriction of the number of people allowed to fish. This indicates that the management strategy adopted should not target

References

- Abila, R.O. and E. G. Jansen (1997) "From Local to Global Markets - The Fish Exporting and Fishmeal Industries of Lake Victoria: Structure, Strategies and Socio-economic Impacts in Kenya". Socio-economics of the Lake Victoria Fisheries (Report No. 2). IUCN Eastern Africa Programme. Nairobi.
- Achieng. A. P. (1991) "Management Issues, Options and Strategies for Lake Victoria Fisheries". Appendix 3-4 In Ssentongo. G.W. and Dampha. N.J. (eds.), "Report of a National Seminar on the Management of the Kenyan Fisheries of Lake Victoria" (UNDI/FAO IFIP Project). Kisumu. Julv 22-24. 1995. pp 48-50.
- Barel. G.D.N. (1986) "The Decline of Lake Victoria's Cichlid Species Stock". University of Leiden, Zoologisch.
- FAO (1973) "Lake Victoria Fisheries Research Regional, Kenya, Tanzania. Uganda Interim Report". FAO/UNDP, Rome. FI: DP/RAF/65/049:449.
- Geheb. K. (1995) "Exploring people-environment relationships: the changing nature of the small-scale fishery in the Kenyan sector of Lake Victoria". In Binns. T. (ed.), People and Environment in Africa. New York: John Wiley & Sons, pp. 91-101.
- Graham, M. (1929) "The Victoria Nyanza and Its Fisheries. A report on the fishery survey of Lake Victoria, 1927-1928". Crown Agents, London.
- Gibbon. P. (1997) "Of Saviours and Punks: the political economy of the Nile perch marketing drain in Tanzania" Copenhagen: CDR, draft memo
- Goldschmidt. T. (1992) "Reproductive strategies, subtrophic niche differentiation and the role of competition for food in Haplochromide cichlids (Pisces) from Lake Victoria. Tanzania". Annales-Musee Royal de l'Afrique Centrale, Sciences Zoologues (Belgium), No. 257. pp. 119-131.
- Goulding. I. (1997) "Perch on a Precipice". Sea Food International, April 1997.
- Greboval, D. (1989) "Managing the New Fisheries of Lake Victoria: Major socio-economic issues". FAO. Rome. IFIP Tech. Doc., UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/04/89 (En).
- Greboval, D. and P. Mannini (1992) "The Fisheries of Lake Victoria: review of basic data". UNDP/FAO Regional Project for Inland Fisheries Planning (Development and Management in Eastern/Central/Southern Africa (IFIP), Bujumbura. FAO, Rome, Raf/87/099-WP/16/92.
- Hoekstra, T M., A. Asila, C. Raburu and O. Rambiri (1991) "Report on a census of fishing boats and gear in the Kenyan waters of Lake Victoria". FAO, Rome. IFIP Tech. Doc., UNDP/FAO Regional Project for Inland Fisheries Planning (IFIP). RAF/87/099-TD/26/91.
- Ikiara. M. (1999) "Sustainability, Livelihoods, Production and Effort Supply in a Declining Fishery: The case of Kenya's Lake Victoria fisheries". Thela Thesis: Amsterdam. 1999.
- International Bank for Reconstruction and Development (IBRD) (1996) "Operational Strategy of the Global Environment Facility", Washington: The World Bank.
- International Monetary Fund (IMF) (Various years) International Financial Statistics Yearbook.

Jansen. E.G. (1997) "Rich Fisheries - Poor Fisherfolk: Some Preliminary Observations about the effects of Trade and Aid in the Lake Victoria Fisheries". IUCN Eastern Africa Programme

Reynolds, J.E. and D.F. Greboval (1988) "Socio-economic Effects of the Evolution of Nile perch Fisheries in Lake Victoria: A Review", Committee for the Inland Fisheries of Africa (CIFA) Technical Paper No.17, FAO. Rome

Reynolds, J., E.D. Greboval and P. Manning (1995) "Thirty years on: Observation on the Development of the Nile