Tanzanian Economic Trends Vol. 19 No. 1, 2006:107-122

Resource Rent Capture in Lake Victoria Fisheries

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Abstract

Fisheries activities in Lake Victoria have grown tremendously in the 1990s largely due to the export of Nile Perch (NP) to mainly European markets. Exploitation of NP has been intensive to the extent of threatening the sustainability of the NP fisheries. Resource rent generation is an important element and driving force for overexploitation of a fishery. This study estimates resource rent capture by the government and appropriation by small-scale fishers to determine the level of rent obtained, and how much the government captures the resource rent. Findings reveal that resource rents generated by the small-scale fishers are significant but accrue mostly to vessel and fishing gear owners. In terms of resource rent capture, the government is shown to capture only about 4.3% of the rent; leaving the rest to fishers and owners of fishing vessels and gear. The study concludes that for the government to earn more revenue from the NP fishery, more investigation should be undertaken on resource rent generation by large-scale fishers and processors who are also exporters. Due to the poverty reduction drive, it may be wise to capture more resource rents at those levels than from the small-scale fishers. Also, the benefit sharing mechanism at the small-scale level should be improved to favour fisher workers.

1. Introduction

1.1 General overview

Fisheries activities in the Lake Victoria region have assumed an important dimension in recent years especially with the introduction of exports of fish fillets, particularly Nile perch fish fillets, to mainly Europe. It has become a booming activity with the characteristics of boom and burst elements. However, the Lake is clearly in a state of ecological stress. Fish harvests are declining, and pressures on the lake are increasing. The quest for a sustainable fisheries and utilisation for poverty reduction is important for fishing communities and non-fishing communities alike around and beyond the Lake Victoria regions. This study focuses on resource rents and capture by small-scale fishers and the government respectively within the Tanzania side of Lake Victoria, with a view that its findings may generate some lessons to be considered for future policies decisions.

1.2 Context

The importance of fisheries activities in the Lake Victoria region is recognised by many who benefit from it in one way or the other. Resource exploitation conflicts

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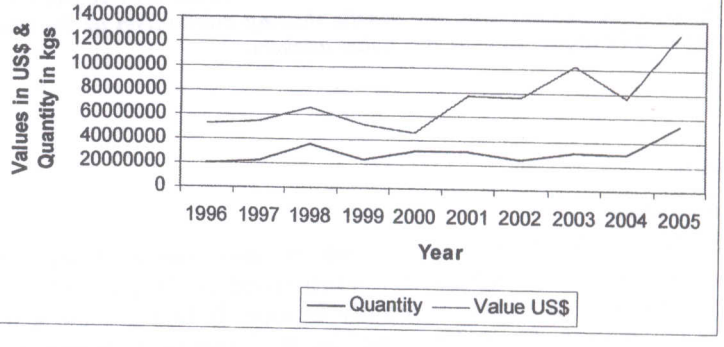
and overexploitation pose a danger to the sustainability of the fisheries resources of the lake, and also to social harmony and welfare of the fishing communities. Resource rents are key to exploitation and management of fisheries since, on the one hand, they are the driving force behind the widespread overexploitation of fisheries and, on the other, these determine the potential economic and social benefits that may be derived from well-managed fisheries.

Until recently, fishing communities around Lake Victoria have been engaged in fishing for subsistence for many years. It is reported that more than 30 million people around the Lake Victoria Basin depend on the Lake for their livelihood.

The importance of the Lake to the economy can be demonstrated by the amount of employment and income it generates for the country. For example, one can see the amount of earnings from Nile Perch exports between 1998–2005 as shown in Figure 1. With the exception of a decline of exports in 1999 (due to import ban to the EU countries), exports have on the average been increasing.

Figure 1: Trends of Nile Perch Exports (1996-2005)



The contribution of the fisheries sector to the national income between 1998 and 2005 was an average of 2.6%. The significance of Lake Victoria fisheries to total country fisheries is given by the proportion of fish exports from Lake Victoria, particularly NP, to total fish exports, which on the average represented 78% of total fish exports. The value of the same represented 79% of total fish export value, and 80% of total fish tax revenue.

The World Conservation Union (IUCN), Eastern Africa Regional Office and several scholars have done various studies on Lake Victoria fisheries. The studies include those by Jansen (1997), Jansen and Abila (1997), Okeyo-Owour (1999), Jansen et al (1999), and Mbuga et al (1998). However, one thing that can be noted from these studies is that none address the resource rent small-scale fishers—or even large-scale fishers—obtain; and how much the nation benefits from these rents through capture by the government. Thus, it is

important to conduct this type of study to have a clear understanding of the benefits both small-scale fishers and the government get from fisheries resources exploitation.

1.3 Objective of study

The main objective of this study is to estimate the resource rents generated by fishing activities in Lake Victoria, and the amount captured by the government to facilitate fisheries management for the sustainability of the fisheries resources in Lake Victoria. Specifically, the study focuses mainly on estimating resource rents by small-scale fishers[1], and the capture by the government for managing the fisheries resources.

The rest of this paper is organised as follows. Section two presents an overview of the size and relative importance of the fisheries sector in Tanzania. Section three deals with the methodology used, specifying theoretical discussion and empirical models. Section four analyses the empirical findings, before concluding in section five.

2. Size and relative importance of the Nile Perch fishery

In the past 15 years or so, fish production in Lake Victoria has been dominated by NP fishing. Lake Victoria contributes more than half of the country's fish production, of which 75% of the fish harvested (around 160,000 tonnes) was Nile Perch (URT, 2002). Between 1996 and 2005, NP exports from the Lake contributed an average of 80% of the total value of exported fish; and an average of about 77% of the export duties from fish. Furthermore, fishery supported the livelihoods of more than 70,000 fishers and their families in 2004, and creates significant forward and backward linkages in terms of providing market for fisheries activity inputs and outputs to fish markets, creating employment in the process.[2] All this shows how important NP fisheries are in the Tanzanian fishing sector.

The increase in the relative importance of the sector is mainly due to the increased trade in NP, particularly during the 1990s. In terms of the weight of total fish exported between 1998 and 2005, NP constituted around 84% of total fish exports, which accounted for 64% of the total value of fish exports. With respect to government revenue, between 1996 and 2005 Nile Perch exports contributed an average of 81% of all exported fish tax collections for the government (see Figures 2 to 6)..

In addition to the fisheries sector contributing significantly to foreign exchange generation and government revenue, it further provides the necessary employment needed to reduce poverty in the fishing communities.

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[1] Small-scale fishers are defied here as those who use boats or canoes without engine

[2] See Kulindwa (2006) for more discussion of backward and forward linkages to the fishing activity in Lake Victoria.

Figure 2: Relative importance of Nile Perch in Total Fish Exports from Tanzania in US$

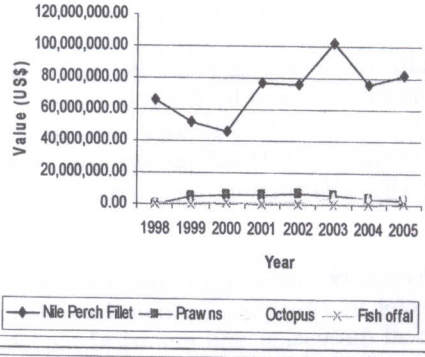


Figure 3: Relative Importance of Nile Perch in Total Fish Exports from Tanzania in terms of Weight (kgs)

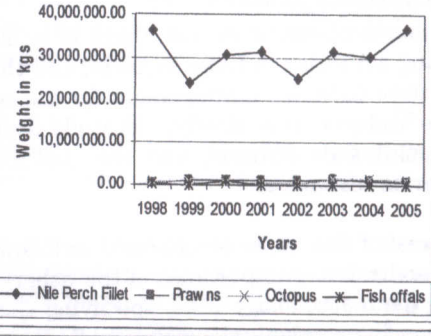


Figure 4: Relative Importance of Nile Perch in Total Fish Exports (1998-2005)

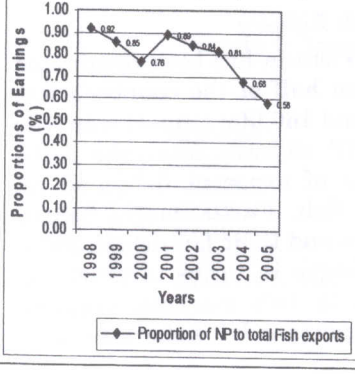


Figure 5: Nile Perch Proportion to Total Fish Exports

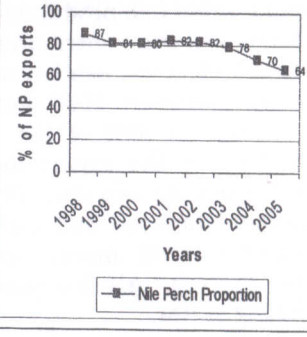
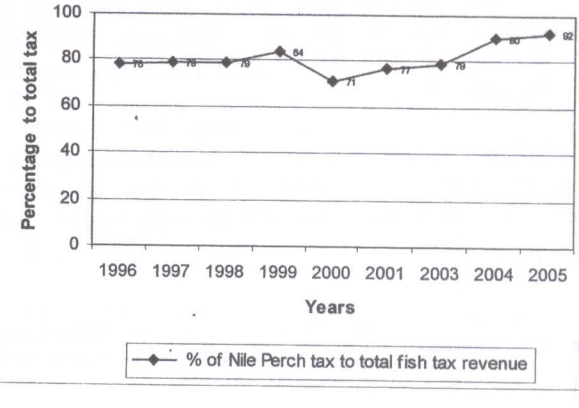


Figure 6: Importance of Nile Perch to Total Fish Tax Revenue



In the year 2004, for instance, the Lake Victoria fishery provided employment to an estimated 91,662 people, mostly in the backward linkage aspects to the fishing industry (84%) like making boats, sales and distribution of fish gear, and the fishing activity itself.[3] Fish processing and transportation comprise the major forward linkage activities where the fisheries sector facilitates employment generation. The employment generation of the NP fishery in 2004 translated to 60% of the total employees in the manufacturing industry in that year. Given that small-scale fishers are still dominant and the state of technology used has not changed much since 2004, and while the Nile Perch fish exports are increasing (see Figure 3), employment creation in the Lake Victoria fisheries should be higher at present.

2.1 Potential of the fisheries sector

The potential of expanding marine fish production is great given that most of the fisheries exploited and probably over-fished are areas close to shores. This is due to inferior vessels most small-scale fishermen use. With improved and better vessels and fishing gear, fishermen will be able to go further and hence have more options. Iversen *et al* (1984) presented results of a survey by a Norwegian research by Dr. Fridtiof Nansen conducted in 1982/83, showing fish biomass in the surveyed marine waters was estimated at 100,000 to 175,000 tons.

However, with the amount of fishing pressure exerted in Lake Victoria, we would probably see less increase of NP production compared to other marine fisheries. In 2002, the Lake Victoria Fisheries Research Project in Jinja estimated NP maximum sustainable yield to stand at 212,000 tonnes per annum for the Lake Victoria (Tanzania). If that is the case, then the fishing activity had already exceeded the amount that could be fished without affecting the fishery's capacity to replenish itself as early as the year 2000. This estimate is yet to be accepted as a true representation of the situation on the ground. Meanwhile, given the fact that technology is the limiting factor to most small-scale fishers to venture in deeper and far-off fishing grounds, the decline in catch per unit (CPU) is representative of traditional fishing grounds, and do not include the pristine grounds.

3. Methodology

3.1 Choice of study areas

This study was conducted in areas around Lake Victoria on the Tanzania side. Specifically the study was carried out in ten villages. These included Bukima, Nyarusurya, Suguti, Bwai Kumsoma, Bwai Kwitururu, and Maneke in Musoma district, Mara region; and Semba and Igombe in Mwanza district in Mwanza region. Others were Lugezi, and Nyamkazi villages in Bukoba district, Kagera region.

3.2 Data and source

Primary and secondary data was sought for the study. Secondary data was obtained from the Ministry of Natural Resources and Tourism, Fishery Division.

[3] See Kulindwa, 2006.

Here we obtained general information on fishing activity in Lake Victoria, including frame survey documents. Data obtained here include fishery related economic activities of industrial production, transportation, fishing efforts (i.e., fishing gears, vessels etc.), fish landings, fisher conflicts, employment, and income. Also, from here we obtained information on the sources of supply (landings) and market. The Bureau of Statistics provided data documents on regional profiles for Mwanza, Mara, and Kagera; while BoT provided information on treasury bills for the calculation of return on capital.

Primary data on fishery installations such as processing factories, landing bases, fishery authorities in the selected survey areas of Mwanza, Mara and Kagera was sought. This, together with socio-economic data to supplement the analysis was collected through interview guides. This applied mainly to government department officials, NGO respondents, private sector operators and special informants. Structured questionnaires were used to collect household related data on socio-economic aspects of employment/occupation, production gender, and income, among others. This has been used to get an in-depth insight and understanding of the fishing practice, risks, benefits and costs of carrying out the fishery activity in particular locality.

3.3 Sample and sampling technique

Basically we have three categories of interest to this inquiry. First, were households whose main economic activity is based on fishery. Second, we focused on fish processing companies, transportation companies, private traders in fish products, and suppliers of fishing gear and accessories. This gave us an insight into the market conditions small-scale fishers face because these were the major buyers and suppliers of fishing gear. The third category involved government officials working in institutions and government departments facilitating and providing the necessary conducive environment for the fishing industry to flourish. These included district and regional natural resources officers, particularly in the fishery department. Since the work of management of fishery resources and enforcement of rules and regulations fall squarely on their shoulders, we obtained valuable information on the general conduct of fishing activity achievements, and constraints from these government departments. Also, we consulted NGOs which are instrumental in capacity building and awareness creation.

Where household data is concerned stratified sampling was applied. This required villagers to be categorised into two main groups, i.e. small-scale fishers (low income and high income). Random sampling guided the choice of respondents within the stratified groups. A representative sample was sought through proportional representation of various groups in a locality. A total of 88 households were sampled and responded to the questionnaires.

3.4 Resource rent estimation

Resource rent is an important concept in fisheries exploitation and management since it is the driving force behind over-exploitation of fisheries, and at the same time it determines the potential economic and social benefits that may be derived

from well-managed fisheries. If fisheries are not well-managed, as long as resource rent could be obtained, people will always increase effort until such rent is eventually dissipated. As Gordon (1954) concluded, unregulated fishery with free access will tend towards a level of exploitation where the entire resource rent is lost as it results into excess fishing capacity, leading to over-exploitation in both economic and biological terms. This happens especially in open access conditions. Lake Victoria is a regulated fishery, but control is lacking such that open access conditions exist.

The pay-off for fishers' efforts translates into the amount of resource rent they are able to capture and retain. The main target for the government authorities is to capture as much rent from these fishers to facilitate sustainable management of fisheries. Since this is a national resource, capture of resource rents also acts as means of sharing the benefits these resources bring on behalf of the owners of the resources, i.e., the citizens.

The SEEA (2003) provides three possible ways of estimating resource rent: (i) estimations based on actual transactions, i.e., appropriation method, (ii) perpetual inventory method (PIM), and (iii) capital services flow method. The appropriation method is premised on the fact that governments are the owners of the natural resources and, therefore, they collect the entire rent derived from extraction of these resources through taxes, fees, and royalties levied on companies that carry out extraction (UN/IMF/OECD/WB, 2003). However, this approach normally understates resource rent due to the inability to capture the full value of resource rents generated. Among the reasons for this is the existence of cheating on the part of extractors through various means of tax aversion.[4] Resource rent calculation is based on the determination of capital stock through the PIM rely on the consumption of fixed capital. This consumption of fixed capital is deducted from the gross operating surplus, which is the total revenue less compensation of labour, together with the return to capital to obtain the resource rent. The capital services flow method is similar to the PIM approach in that it provides the same result. The capital services flow calculations of resource rent consider the resource rent as an outcome of gross operating surplus minus the capital services flows, which comprise the consumption of fixed capital and return to capital. This study follows the residual approach between revenues and costs (both operating plus capital) to calculate resource rent.

The fixed capital component was determined by taking it to be the average value of the cost of a canoe and gear. The formulae for calculating resource rent are:

$$RR = TR - (CE + CFC + NP) \quad (1)$$

$$NP = r \times K$$

[4] These include overstating depreciation, understating revenues.

Where:

RR = Resource rent
TR = Total revenue
CE = Compensation of employees
CFC = Consumption of fixed capital
NP = Normal profit
r = the opportunity cost of capital (which is 4% on the average)
K = the value of fixed capital stock invested in the industry by the small-scale fisher.

The above equation considers the current unit resource rent generated by the small-scale fisher based on average value of fixed capital (fishing vessel only).[5] The total revenue was obtained by multiplying the average catch by households in both good and bad seasons by the market price, which was taken to be constant over time. Compensation of employees was calculated as 33% of the 'disposable income' after payment of landing fees and fish levy, which are paid daily on the spot after landing. In most of the agreements between fish workers and fishery owners, two trips will be for the owner and the third will be for workers. In addition to this compensation, fish workers get a daily supply of fish for home consumption amounting to about 4 kilograms. In total therefore, fishers' compensation includes the two benefits above. The consumption of fixed capital has been calculated basing on a straight line depreciation method for canoes and nets whose lifetime is four years. These values have been brought down to monthly levels. Normal profit has been determined through consideration of the opportunity cost of fixed capital, which is the expected return foregone by bypassing other potential investment opportunities for a given capital.[6] It is a rate of return that investors could earn in financial markets. In this study we use the treasury bills rate for 35 days, which was a weighted average rate for 2002.

The resource rent capture rate by the government and or local authorities is thus the amount of tax and other levy to the total resource rent accrued:

$$\text{Resource Rent Capture Rate} = \Sigma \text{Taxes} / RR \quad \ldots\ldots(2)$$

The above equation will show us how much the government, as the custodians of the public wealth, is able to capture from resource rent accrued to fishers from fishing for the benefit of the society's welfare. The levies and fees considered in this study are fish levy, landing fees, boat registration, fishing license, and vessel fees.

4. Analysis of empirical findings

Table 1 presents descriptive statistics of data collected from sample of small-scale fishers in the study areas, and provides a general picture of the levels of reliability of the data.

[5] In calculating resource rent in this study, we do not go beyond the small-scale fishers. We have left out large-scale fishers (those with outboard engines and large number of fishing gears), and also processing industries.
[6] The average total fixed capital invested includes canoe and fishing gear (nets).

Table 1: Descriptive Statistics

	N	Mean	Std. Deviation	Std Error	90% Confidence	95% Confidence	Median
Household size	88	8.6	4.6	0.49	0.81	1.0	8
How many family members	58	2.7	0.6	0.08	0.13	0.2	3
Amount caught (kg) per day in good season	65	62.5	50.6	6.28	10.3	12.3	50
Amount caught (kg) per day in bad season	46	16.9	14.3	2.11	3.47	4.1	13
How many Horsepower	12	15.2	4.3	1.23	2.03	2.4	15
Fish Hooks: Number	32	950.4	734.1	129	212.2	252.8	900
Fish Hooks: Size in inches	31	9.1	1.6	0.28	0.46	0.5	9
Fish Nets: Number	52	52.9	63.7	8.84	14.53	17.3	40
Fish Nets :Size in inches	51	5.0	0.8	0.11	0.18	0.2	5
How long have you engaged in fishing: years	84	7.3	3.1	0.34	0.56	0.7	7

The standard errors for most of the variables above are low enough for the results to be used as representing the population of fishers in the sample areas, and hence can be used for further detailed analysis. However, for some variables such as fish catch and number of fish hooks, the standard errors are high, making them less reliable as representatives of the population distribution. The median of the variables further emphasises this disparity by being very different from the mean, implying that there might be some outliers outweighing the normal distribution of the variable values. The 90% and 95% confidence interval for the population mean is reasonable as shown in Table 1 except for the number of fishing hooks.

We can conclude that accuracy of the sample mean in representing the fishing hooks and fish nets cannot be relied upon due to some outlier problems, hence we use medians. Since we have two fishing seasons (bad and good), the mean amount of fish caught in good season is added to the mean amount caught in bad season by weighting them with the length of season per year to get an average for the two seasons, i.e., 48 kilograms a day. On the average, the number of fishnets a fishing gear owner has is 53, with each net costing Tsh12,500. The number of hooks a canoe has been found to vary significantly with very high standard errors, making this figure unreliable as a representative of the situation on the ground. We have thus left it out of the resource rent computation.

4.1 Sample characteristics

Here, we present a discussion of results from the empirical evidence and analysis. First, we present the results related to sample characteristics, where a sample of 88 representative households are discussed; and secondly we discuss the results with respect to sustainable use and benefit from the fisheries resources in the lake.

4.1.1 Age

The surveyed sample comprised both old and young fishermen (there were no fisherwomen seen in the surveyed areas). Respondents aged between 19 to 64 years constituted 57% of the sample; and 43% of respondents were aged more than 64 years. Some of these older generation respondents had stopped fishing, but owned canoes and nets, which they used for fishing through hiring of labour. These had the added advantage to the study due to their long experience in fishing, cutting across pre-independence to the present time.

4.1.2 Education

Educational achievement is not high for the fishermen surveyed as 25% of the respondents did not have any formal education. All fishers obtained fishing skills through apprenticeship. The majority (72% of the sample) of the fishermen had completed primary school. Only 3% had attained ordinary level secondary school education. This makes their occupational options to be limited to fishing and agriculture, with most of them being highly dependent on fishing. This finding is in line with other previous studies (Kulindwa, 2001; 2006; URT, 2001).

4.1.3 Migration

This is an interesting phenomenon, showing how the population in the lake region grew over the years other than by birth. The trend shows that in-migration into the Lake region started as early as 1940s and earlier (see Table 2).

Table 2 shows how people moved into the region from 1940 to-date. The 1970s decade is shown to have the highest rate of in-migration before the current period. This high movement of people into the villages in the lake region was mainly a result of villagisation program in the middle of that decade.

Table 2: Migration into the lake region

SN	Year of In-migration	Rate of migration per decade %	Rate of annual migration (%)
1	1940 – 1949	13	1.3
2	1950 – 1959	10	1.0
3	1960 – 1969	16	1.6
4	1970 – 1979	29	2.9
5	1980 – 1989	10	1.0
6	1990 – 1999	16	1.6
7	2000 - 2002	6	2.0

Source: Field study survey 2002

The program aimed at collectivising people so as to provide them easy access to education, health, and other social services; and also to enable them pool their resources for a communal good. After this period, the influx rate dropped to an average 1% per annum. The rate began rising again during the 1990s into the 21st century. The years of 2000 and 2001 have the highest in-migration rates. These can be explained by the emergence of NP as a major commercial fish specie

providing for a timely alternative employment activity to people around the region. During the 1990s agriculture failed the lake region people, particularly cotton and coffee farmers. The two main cash crops were experiencing falling prices and market problems. As a result more and more farmers in Mwanza, Mara and Kagera —and as far as Shinyanga region—switched occupation and moved into fishing. Food cultivation, which is mainly performed by women, however continues hand in hand with fishing.

4.1.4 Household size and occupation

The median household size is eight (8) members. Fishing is a full-time activity for 59% of the respondents, while 41% engage also in other occupations such as farming and trading. Of all respondents, 68% reported that 2 to 3 members of their families also engaged in fishing, apart from themselves. It was also found that not all in-migrants came to the region to fish. However, most of the in-migrants were engaged in fishing compared to the locally born fishermen: 68% of in-migrants were engaged in fishing, compared to 53% of the locally born fishermen.

A further analysis of the respondents revealed that 76% of those that owned a fishing boat were themselves engaged in fishing, while 15% of those that owned a boat were not themselves engaged in fishing. These findings contradict previous results that have shown that majority of the sampled vessels were not owner operated (see, for example, Lokina, 2005). However, Lokina's findings could be true for large-scale fisher vessels.

4.1.5 Technology

The main fishing gears used by small-scale fishers in the Lake include gillnets of various sizes, and hooks (long-line). Boats and canoes are used for transporting fishers to fishing grounds. Most of these vessels are not motorized, save for a few large-scale fishers.

In the survey, 98.6% of all respondents used fishing vessels (boats/canoes), implying that the age-old tradition of line fishing from the shore still exists, albeit at a minimum rate of 1.4%. From the sample analysis, 82% of the vessels used were not motorized, and these were the sample we have used for small-scale fishers.

Long lines are also in use, where 36% of the fishers interviewed use them. Various sizes of nets are in use. These include both the prohibited and legal sizes. Of all fishers, 66% use nets, 6.5% of which are below the legal size of 5". Most of the nets owned and used are 5" nets; with 18% of all nets used being of illegal size, i.e., below 5". Of all nets used, 12% were 6", and only 3% use were of sizes above 6". All the nets are personal property. Of the 88 respondents, 52% own a median of 40 nets. However, 88.5% of all respondents own a range of between 3-60 nets.

The prohibition of nets with undersized mesh was prompted by the need to protect immature NP, and hence provide for future breeders and sustainability of the NP fishery. The frame survey of 2000 for the Tanzania side of the Lake Victoria

clearly shows the increase in intensity of fishing in recent years particularly between 1995 and 1998. Hand in hand with the increased fishing was the increase in the use of illegal gears such as 'illegal' mesh sizes and beach series (*kokoro*). The 2000 frame survey shows 18% of all gillnets used were below legal mesh size of 5".

4.1.6 Type of fish and fish catch

The Lake Victoria biodiversity may be the third largest in the country after Lake Tanganyika and Nyasa. This is not to minimize the importance of the lake in terms of biodiversity. The lakes biomass used to boast of a large number of fish species. In all there were more than 20 genera of cichlid and non-cichlid fishes. These included *tilapiine* and *haplochromine cichlids, (furu) Bagrus (hongwe), clarias (mumi)*, lung fish (*kamongo*), *labeo (ningu)* sardine like fish (*Rastrineobola argentea*) or *dagaa* in Swahili. Others are *Alestes, Protopterus* (URT, 2002).

This richness of fish species in the lake could be found until the 1970s. Signs of over-fishing in the then multi-species fishery were reported in the late 1970s when catch rates for the native *tilapiine* fish (*Oreochromis esculentus* and *Oreochromis variabilis*) that were the backbone of the commercial fishery, were found to decline (URT, 2002).

The introduction of four other *tilapiines* during the 1950s (*Oreochromis niloticus, lates niloticus, O.levcostictus* and *Tilapia rendalli*) contributed to the decline of *haplochromines (cichlids)*. This decline was also partly a result of predation by the NP (LVFO, 2001: 6). Presently, Lake Victoria fishery is dominated by three species of fish, namely: Nile Perch, *Oreochromis esculentas* (tilapia), and *Rastrineobola argentea* (pellegrin) (Kulindwa, 2001; URT, 2002; Gibbon, 1997). Fish catches around the lake constitute of NP (75%), *Rastrineobola argentae* (12.2%), and *Oreochromis esculentas* (11.4%) (URT, 2002). The field survey has shown a wide disparity between the good fishing season of months between November to June, and the bad fishing season of July up to October. During the good season, fishers get up to an average of 63kg a day compared to only 17kg during bad fishing season. The weighted average is calculated using the total number of months for the season to get 48kg per day.[7]

4.1.7 Fishing experience

The fishing experience of the Lake Victoria shows an unfavourable trend to the sustainability of the lake fisheries. First, people have been using under-sized nets, which pick very small fish and damages the population progression. Second, the use of chemical agents for fishing (although now contained), was rampant in the recent past, threatening not only the sustainability of the lake fisheries but also the health of consumers.

Fishing effort has been consistently increasing for two reasons: for subsistence, and for commercial objectives. As mentioned earlier, the failure of agriculture

[7] 8/12 x 63 = 42kgs for good season; and 4/12 x 17kgs = 5.7kgs for bad season.

(particularly cotton and coffee) in the lake region resulted into the influx of people into the now commercialised fishery for NP to earn a living through in artisanal fishing as workers or owner/workers, or simply as owners for both subsistence and profit motives. With the available access to the EU markets, and a well-developed fish processing industry, indications of over-fishing have started to show.

4.1.8 Resource rent generation and capture

The estimation of resource rent in Lake Victoria reveals some interesting results. As indicated in Table 3, resource rent calculations for small-scale fishers is shown to be significant at Tsh287,453, while its capture by the government is about 4.3% through levies and fees. However, the high benefit accrues to owners of vessels and fishing gear at the expense of fisher workers. The average amount of money each fisher worker gets per month amounts to Tsh62,690, while fisher owners pockets Tsh376,122.

Table 3: Cost and Value of Nile Perch Fishing Activity

SN	Item	Small-scale (boat/canoe without engine)		
		Amount	Unit price/Cost (Tsh)	Monthly revenue / cost (Tsh)
1	Fish Sales/month	1,152	500	576,000
2	Canoe/Boat (depreciation/month)	1	200,000	4,167
3	Nets (wear & tear/month)	53	12,500	13,802
4	Levies and Fees			
4.1	Fish Levy (Tsh 10/kg)	1,152	10	11,520
4.2	Landing Fees (Tsh 10/boat)	1	10	240
4.3	Boat Registration[a]	1	1000	21
4.4	Fishing licence	1	6000	500
4.5	Vessel fee	1	1000	83
5	Total Levies and Fees/month			12,364
6	Disposable income (Revenue less fish levy &landing fees)			564,240
7	Crews share (33.3%)	3		188,078
8	Crews' daily fish consumption (about 4 kg)	4	500	48,000
8	Owners share			376,122
11	Return to fixed capital (vessel + nets)			34,500
13	Return to fixed capital (4% opportunity cost of capital)			4%
15	Resource Rent = TR – (CE + CFC + NP)			287,453
16	Unit Resource Rent = (TR – (CE + CFC + NP))/Y			250
17	Resource rent capture rate= (Taxes/(TR – (CE + CFC + NP))*100[b]			4.3%

Notes: a. Registration is done once for each vessel. The average lifespan for a vessel is 4 years
b. Taxes = total of all levies and fees/Resource Rent (i.e. 4.1 to 4.5 items in the table)
c. Number of fishing days 24, fishnets has lifespan of 4 years.

Source: Field study survey 2002

Small-scale fishing is labour-intensive compared to large-scale fishing that is capital intensive. This aspect results into a lower capital services flow for small-scale fishers, and minimum intermediate input cost. This implies, therefore, that a higher return to labour ought to be given. Due to the poverty situation and employment opportunities, fisher workers find themselves at the mercy of the vessel and gear owners; and a low remuneration is given and accepted instead.

The amount of resource rent however, could be lower than shown if other costs such as maintenance costs were included in the calculation, and a different sharing mechanism could have been employed.[8] The low rate of resource rent capture indicates that there is room for more rent to be captured by the government to obtain more funds for management of the resource. It will be interesting to get and compare the amount of large-scale resource rent generation and capture. Also, rent capture by industrial processors and traders could shed further light on the amount of resource rent generated and captured; and could provide opportunities for improvement.

5. Conclusions and recommendations

Resource rents exist in small-scale fishing activities for NP fishery. The benefits, however, accrue more to owners of vessels and gear than to fisher workers. In terms of government revenue, the resource rent capture has been found to be very low due to inadequate taxation of small-scale fishers. However, more investigation should be undertaken on the other aspects of fish business such as large-scale fishers, industrial processors and exporters to ascertain how much resource rent is being generated and captured by the government. The distributive effect of small-scale fishers promotes poverty reduction in the fishing communities around the lake. The amount of income a fisher worker earns goes to support many people in a household.

Acknowledgements

The author would like to acknowledge the financial assistance extended by the Resource Accounting Network for Eastern and Southern Africa (RANESA), which enabled this study to be carried out. This study has also benefited from constructive contributions from various individuals. In particular I would like to thank Professor Glenn-Marie Lange of the Earth Institute, Columbia University-New York; Dr Eric Mungatana, of CEEPA, University of Pretoria; and Dr Razack Lokina of the Department of Economics, University of Dar es Salaam for their critical and constructive inputs. In addition, I am grateful to two anonymous referees for their constructive comments. However, the usual disclaimer applies.

[8] In some cases the income sharing formulae between workers/crew and the owner is based on equal sharing i.e. 50% workers and the other half for owner of the vessel and gears.

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