

The Contribution of Lake Victoria Fisheries to the Economy of Tanzania¹

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Abstract

This study focuses on the importance of Lake Victoria fisheries activities to the national economy in terms of employment generation, income generation, and government revenue. The economic linkage effect analytical framework has been used to trace and determine the interdependence among sectors as markets for inputs and outputs. Results from primary data collected indicate that Lake Victoria Nile Perch (NP) fisheries activities are an important economic activity at three levels namely; household level, private sector level and government level. The importance ranges from providing nutritious food to subsistence fishermen and population in general, income generation to small retail fish businesses, capture of considerable resource rents by fish traders and big fish processors and exporters of NP, also employment to a significant number of people both directly and indirectly. However, much needs to be done before small-scale fishers and the nation as a whole derives the optimal benefit from this industry.

Keywords: Economic linkages, income generation, employment creation, fishing effort, sustainability.

Introduction

Preamble

Fisheries are an important sector in the Tanzanian economy in terms of food supply and generation of foreign exchange through exports. Fisheries as an economic activity do not only generate incomes for the households but also creates employment to a significant proportion of people living around lakes and seashores. In short it provides a source of livelihood to a significant proportion of the population.

One such area is the Lake Victoria region. Lake Victoria is the second largest fresh Water Lake in the world covering about 68,800 km². The Lake is a shared resource among Tanzania, Uganda and Kenya. Of the total area Tanzania has 51% of the Total Lake area as its share while Uganda has 43% and Kenya the rest. Shared resources as is the lake, require an integrated management so as to avoid any abuse and degradation, thus facilitate a sustainable management of the Lake Victoria fishery.

Fisheries activity in this region have assumed an important dimension in recent years especially with the introduction of exports of fish fillets particularly Nile Perch fillets to mainly Europe. It has become a booming activity. Around 1988 most of the Nile Perch fishing took place between Kenyan waters and just west of Mwanza gulf (Reynolds and Greboval 1988). Between 1992 and 1993 a Nile Perch boom and the banning of whole and

¹ Regional Scientific Conference in Kisumu, Kenya from 12-16 November 2001. This paper has benefited from constructive comments and suggestions from various individuals. I would like to thank all of the people who contributed to the improvement of this work. I would however, like to particularly thank Dr A.V.Y. Mbelle and Dr A. Mkenda of the Department of Economics, University of Dar es Salaam, for reviewing the paper and for their useful comments and suggestions, which have greatly helped to improve the paper. However, the usual disclaimer applies.

semi-processed fish exports by Tanzania during this time, forced Kenyan investors to establish processing plants in Tanzania (Gibbon 1997) and hence stimulate the growth of the activity in the Tanzania side of the Lake². What then is the contribution and nature of importance of Lake Victoria fisheries to the National Economy?

Statement of the Problem

Fisheries resources are among natural resources that are known as renewable resources, i.e. those resources whose stocks can be continually replenished. However, these can also be exhaustible depending on how they are exploited! The decline in fish catch is a reality in the world of fisheries. The decline and collapse of a fishery is not only a concern for present generation but also for future generations. This is so because fisheries are not only an important source of protein but also provide major economic and business opportunities for a considerably large number of people the world over. The importance of fisheries activities in the Lake Victoria region is recognised by many who benefit from it in one way or the other. Some benefits are direct while others are indirect. The magnitude and nature of these benefits or contribution to the national economy is not actually and quantitatively known. It is therefore important to try and measure the level and extent of the contribution of Lake Victoria fisheries activities to the national economy in order to provide qualitative and where possible quantitative dimensions of this contribution.

Objective of Study

The main objective of this study is to examine the extent at which fishery activities in the Lake Victoria Region contribute to the national economy and the well-being of all involved in the fishery related chain of activities.

Specifically, the study has focused mainly on;

- Describing how the industry affects other micro-economic activities. In particular estimating employment creation by this industry.
- Describing the sector's contribution to macroeconomic aggregates namely: GDP, BOP, GDP/Capita and Government Revenue.

Study Limitations

This study has been confined to the area around Lake Victoria where the actual fishing and related activities take place. Other areas in the country have been included in the analysis as far as the macroeconomic linkage effects are concerned. Due to resource constraints, only a sample of areas was considered in the survey as a representative of the general area.

Data availability as expected posed some problems due to the existing weak database. Some important data were not readily available such as fish stock. Lack of such data imposes a constraint on modelling and hence alternative approaches had to be adopted in order to achieve the desired goal.

² In addition comparative cost advantages in Tanzania relative to Kenya helped lure investors to Tanzania. Investment incentives such as tax holidays, remission of import duties and sales tax on capital equipment, 100% foreign exchange retention among others. Gibbon (1997) also adds what he calls 'de facto deregulation' of Tanzania labour [and other] laws due growing Government incapacity.

Due to problems of data availability the study had to be focused towards a single- specie the Nile Perch for which data were relatively better organised and available. The proportions of the main species in the lake in 1995 are estimated to be 80%, 15%, 4% and 1% for Nile Perch, Sardines, Tilapia and other species respectively³

Methodology

Choice of Study Areas

This study has been carried out in regions bordering Lake Victoria on the Tanzania side, these are Mwanza, Mara and Kagera. With the help of regional fisheries officers, a total of eleven districts were selected and from these, 22 landing sites and their adjacent villages were sampled. However due to logistical problems 2 of the landing sites and their adjacent villages were not visited. The major determining factor for the choice of these areas was their importance as fishing activity areas on the lake where required data on fisheries and related activities could be obtained.

Data and Source

Primary and secondary data has been sought and obtained for the study. Secondary data has been obtained from the Ministry of Natural Resources and Tourism, Fishery Division; Bureau of Statistics, Planning Commission, Bank of Tanzania (BOT) among others. Data obtained include fishery related economic activities of industrial production, transportation, employment and income. Others include the number of fishery equipment and sizes such as boats; fish catch sources of supply (landings) and markets.

Primary data on fishery installations such as processing factories, landing bases, fishery authorities in selected survey areas of Mwanza, Mara and Kagera were collected. Socio-economic data were also gathered to supplement the analysis. Data collection has been done through interviewing respondents using an interview guide. This has been administered mainly to government department officials, NGO respondents, private sector operators and special informants.

Structured questionnaires have been used to collect household related data on socio-economic aspects of employment, gender, and income among others. A total of 536 out 570 planned households (94%) have been interviewed in 19 out of 22 (86%) planned villages near selected landing sites in all the eleven (11) districts around the lake (approximately 30 households in each village). This information has been used to get an in-depth insight and understanding of the benefits and costs of having or not having fishery activities in a particular locality.

Sample and Sampling Technique

Basically we have focused on three categories of interest to this inquiry. First unit of inquiry has been households whose main economic activity is fishery based which include fishermen and fishmongers. Second, we have focused on fish processing companies, transportation companies and private traders in fish products, suppliers of fishing gear and accessories

³ See FAO (1997), TANZANIA: Lake Victoria Fisheries; Study on Fish Quality Improvement and Related Investment Proposals.....

among others. The third category involved government officials working in institutions and government departments in facilitating and providing a conducive operating environment for the fishing industry to flourish. These have included district and regional natural resources officers particularly fishery department.

Where household data was concerned, stratified sampling was applied. This required villagers to be categorised into two main groups i.e. fisher folk and non-fisher folk such as farmers, business people and livestock keepers and also in terms of scale of operation. 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.

Data Processing and analysis

Primary Data collected has been organised and processed using SPSS. Simple averages have been used for analysis.

Discussion of results

Preamble

The importance of the Lake to the economy can be demonstrated by the amount of employment and income it generates for the country. For instance, taking the case of Nile Perch Exports between 1996-1998. (Appendix Table II) we see that the amount of revenue generated out of Nile Perch exports is quite significant.

According to the economic survey of 1999, the value of Nile Perch production in 1996, 1997 and 1998 were US \$ 1,108,800, US \$ 59,756,047 and US \$ 69,122,629 respectively. Government revenue accrued from the above transactions were respectively Tshs 35,153,400, Tshs 2,166,987,925 and Tshs 2,674,410, 164.7 for 1996, 1997 and 1998. This section presents various measures of Nile Perch fisheries importance to the economy.

Contribution to Gross Domestic Product

Gross Domestic Product (GDP) is a measure of how much the economy has produced or spent (depending on whether one has used the income or expenditure approach to. In computing GDP, we considered two levels. One is the GDP itself and the other is the income generated from fish activity in Lake Victoria. After obtaining our aggregate estimate of income generated from sale of fish from Lake Victoria, we simply take a ratio of the two to obtain the contribution of the fishery to the national economy. Thus

$$LVFC = FI/GDP$$

Where: LVFC = Lake Victoria Fishery Contribution
FI = Fishery Income
GDP = Gross Domestic Product

Using data from the Economic Survey on Gross Domestic Product, (GDP), data on fisheries in general and Nile Perch in particular, from the NBS and Fisheries Department (FD) of the Ministry of Natural Resources and Tourism (MNRT) for the years 1993-2000, we computed the fisheries contribution to GDP as per the above specification with some adjustments.

Instead of considering multi-species fishery contribution of Lake Victoria, single specie fishery Nile Perch, was used.

Thus the new specification reads:

$$LVFC_{NP} = FI_{NP} / GDP \times 100$$

Where: $LVFC_{NP}$ = Lake Victoria Fishery Contribution (Nile Perch)
 FI_{NP} = Nile Perch Fishery Income
 GDP = Gross Domestic Product.

The results show that Nile Perch Fishery contribution to GDP is quite significant (See Appendix I). It is shown that the contribution has grown from 0.4% in 1993 to 1.8% in 1998⁴.

Other measures, which show the importance of Nile Perch Fishery to the National Economy, include the proportion of Nile Perch value to total Fisheries Sector output, proportion of NP to Division of Fisheries Budget, Ministry of Natural Resources and Tourism Budget and National Budget.

The proportion of Nile Perch Value to the Fisheries sector output is shown in Appendix I to have risen from 14.8% in 1993 to 75.7% in 1998 before falling to 45.3% in 1999 due to the EU ban. Likewise the proportion of NP value to Division of Fisheries budget was 1769% in 1993 rising to 2882% in 1999 despite the fish import ban by EU. The comparison of NP value to the MNRT budget reveals that the NP value, if all was devoted to financing that budget would have met 56% in 1993 but surpass the budget almost thrice in 1999.

Contribution to BOP

The Balance of Payment is a measure aimed at gauging the performance of the economy in terms of foreign trade. The current account records trade transactions between the country and the rest of the world i.e. imports and exports of goods and services. If the economy imports more than it exports then we will register a negative balance and vice versa. In order to obtain the contribution of Lake Victoria Fishery to BOP we have to establish the proportion of total exports attributed to Lake Victoria fish exports and the amount of imports oriented to Lake Victoria fishery activity. Thus

$$LVBOPC = y/z$$

Where: $z = X - M$

$y = x - m$, and X = aggregate exports; M = Aggregate imports; x = Lake Victoria fish exports; m = Lake Victoria fishery related imports.

Computations using data obtained from the Bank of Tanzania (BOT) publications and data obtained from the fisheries department show that the proportion of Nile Perch export value to total exports also rose from 1.4% in 1993 to 12.7% of total exports in 1998 before dropping to 9.5% in 1999! (See Appendix I).

⁴ Computed as the f.o.b value of fillet exports plus 25% of total catch for local sales at Tshs 360/= /kg.

This is quite a significant proportion especially compared to the proportions represented by Gold exports to total exports. In 1993 Gold value proportion to total exports stood at 7.2% and went on to decline until 1997 when the proportion registered a 0.3%⁵! Comparing the 1999 figures for Nile Perch and Gold, you will see that the figure for Nile Perch is higher although Gold is also rising in the future, the trump card for Nile Perch is that the NP resource is renewable while Gold is not!

The contribution to Balance of Payment (BOP) as specified above could however not be undertaken due to the complexity in allocating import costs to Lake Victoria fisheries activity and Nile Perch in particular out of total imports.

Nevertheless, we feel that the relationship between total exports with Nile Perch exports serves to indicate the importance of Nile Perch business in our export trade.

Contribution to government revenue

Nile Perch tax contribution to Government revenue has been measured by simply taking the ratio between the amounts earned through tax collection from NP fish sales and total government tax collection.

This study found out a huge potential for improvement in tax revenue increase through three main avenues. First, the amount paid to local government as levy could increase if the amounts reported as purchases could be monitored so that cheating by the weighing scale could be contained. Secondly, innovative ways of levy collection as those already employed by some district councils could be adopted and implemented in a transparent and correct manner.

Thirdly, the declared prices by exporters could be adjusted upward to reflect the prices fetched in the world market or specific markets where the Nile Perch fillets are sold. Together with this, the differentiation between Frozen and Chilled (fresh) fillets should be made since this is no secret that chilled/fresh fillets fetch a higher price than frozen fillets.

Using data obtained from the Division of Fisheries on royalty and data from the National Bureau of Statistics publications on budgets, we obtain quite an interesting outcome. The results indicate that in 1993 the NP royalty could fund the Division of almost 12 times in 1998! (See Appendix I). The importance of the Lake to the economy can be demonstrated by the amount of income it generates for the country. For instance, taking the case of Nile Perch Exports between 1996-1998. (Appendix Table II) we see that the amount of revenue generated out of Nile Perch exports is quite significant.

According to the economic survey of 1999, the value of Nile Perch production in 1996, 1997 and 1998 were US \$ 1,108,800, US \$ 59,756,047 and US \$ 69,122,629 respectively. Government revenue accrued from the above transactions were respectively Tshs 35,153,400, Tshs 2,166,987,925 and Tshs 2,674,410, 164.7 for 1996, 1997 and 1998.

⁵ The figures for Gold should be taken with caution since the rate of smuggling in the years a reliable market was missing (1995-1998), smuggling was at its highest after the Bank of Tanzania stopped buying gold hence depriving the small-scale miners of a reliable legal market outlet.

The survey found out that there are significant leakage of revenue due to cheating on the part of local government levy collectors, buying agents and exporters of NP fillets.

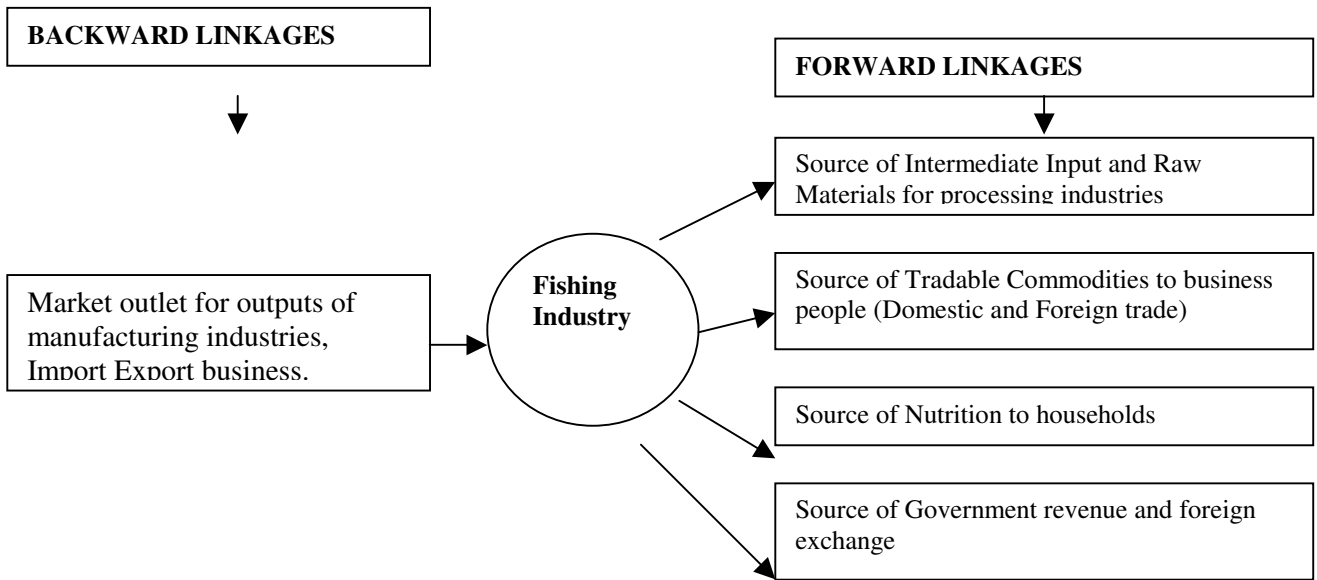
Other Important Indicators of Nile Perch Importance to the National Economy

To be able to gauge and put into context the implication and meaning of the value figures for Nile Perch contribution to the economy, we further do a comparative analysis of royalty from Nile Perch fillet exports (frozen and chilled). Royalty on Nile Perch exports which was previously 5% then 6% and now a fixed US \$ 0.15 per kg (since September 2000) as a percentage of the National Budget was 0.04 in 1993 but consistently rose to 0.34% in 1998 before declining to 0.23% in 1999 due to EU ban. As a percentage of the Ministry of Natural Resources and Tourism (MNRT) the royalty was 1.7% and rose to 37.6% in 1998 before falling to 14.4% in 1999 (See Appendix I).

The economic linkage definition adopted in this study follows the definition used by Skarstein and Wangwe (1986) and Bangens (1998) which shows the relationship between economic units and agents in related activities. The economic linkages are essentially concerned with market exchange of goods and services in terms of inputs and outputs, the sort of interdependence, which was propagated in the late seventies in the wake of import substitution industrialisation. The rationale lies in the creation of an integrated self-reliant economy, which provides domestic markets for primary produce. In classical economics Adam Smith proposed division of labour in order to increase returns captured by firms through specialisation. Through specialising, efficiency in processes is gained and hence higher returns. For Adam Smith, division of labour was internal (i.e. within the same firm). However Young (1928) noted that specialisation between firms was also important in increasing return and enhancing economic progress. These propositions do work under the assumption that these different units do inter-depend either through the market or through deliberate vertical or horizontal integration of process activities or products. In the case of the fishing industry being the catalyst of several economic activities depending on its existence, we see that its importance is evident in figure 2.1. The backward linkages to the fishing industry are those economic activities, which look upon the industry as a market for their outputs. So that, as the fishing industry expands, the producers and traders get a chance to expand their production and trade with it since their products will be in high demand and vice versa if the fishing industry is contracting. The output from this industry will in turn stimulate economic activity through forward linkages as shown in Fig.3.1.

The growth of the Lake Victoria fisheries especially the Nile Perch fisheries in the 1990s has seen a stimulation of economic activities in the regions of Mara, Mwanza and Kagera regions. During our survey we could see how small fishing camps turned into a hive of activity and urban centres.

FIGURE 3.1: Analytical Framework for the Economic Linkage Effect of Fisheries Activity on Other Sectors of the Economy



Mud and stick and grass thatched houses have to a large extent turned into well-built brick, roofed with corrugated iron roofed. In areas where there was previously no transport, there are frequent and established transport arrangements. In some places satellite dishes could be seen and TV antennas are abundant. Gibbon (1997) reports of “matajiri” or wealthy fishermen and traders emerging. The largest of the wealthy fishermen own more than 20 fishing boats/canoes. One man in 1996 owned 90 fishing boats, which had a total of 7,000 nets including 4-collector boats etc. However, many wealthy fishermen we encountered in the field owned up to 35 fishing boats each with 50-100 gillnets. Most of these would have been given on credit by the processing industries.

It was easy to see the effect of fisheries contribution in the lake region during the EU ban in 1999. Reduced production of fish by fishermen and processing industries meant less employment and hence less purchasing power around. This effect was seen in the market where from food vendors in the streets to goods in shops, purchases were slow and low. The reduced levy collections in districts and royalties to central government meant that government business was affected. Which means, in terms of government facilitation in various sectors, financial resources reduction impinged on their operations.

Looking at the analytical framework, the backward linkages, which look upon the fishing industry as a market for other output and services e.g. the distributors of fishing gear and equipment, boat builders, fishing net producers and fishing workers, are growing as indicated by employment increase in these areas (See Appendix Table II).

Transport services for collecting fresh whole fish from landing sites by road and sea account for a considerable income generation to the economy. Looking at the distances travelled and frequency of travel by road hauliers and transport vessels, we may arrive at a large quantity of fuel being used for that purpose. Needless to point out the income generated by oil companies, jobs that this activity helps to maintain more spillover effects do exist. The businesses supporting this activity would benefit or suffer with it. These include, tyre production and sale, vehicle and boat engine spare part shops, mechanical engineering workshops and their employees. Others are boat engine and accessories specialised shops the likes of Hunasa, Nile Fishnet Motors Co. Ltd in Mwanza, boat builders like the numerous small scale boat builders and large scale ones such as the Songoro Marine Transport Ltd. (previously Pasiansi Boatyard).

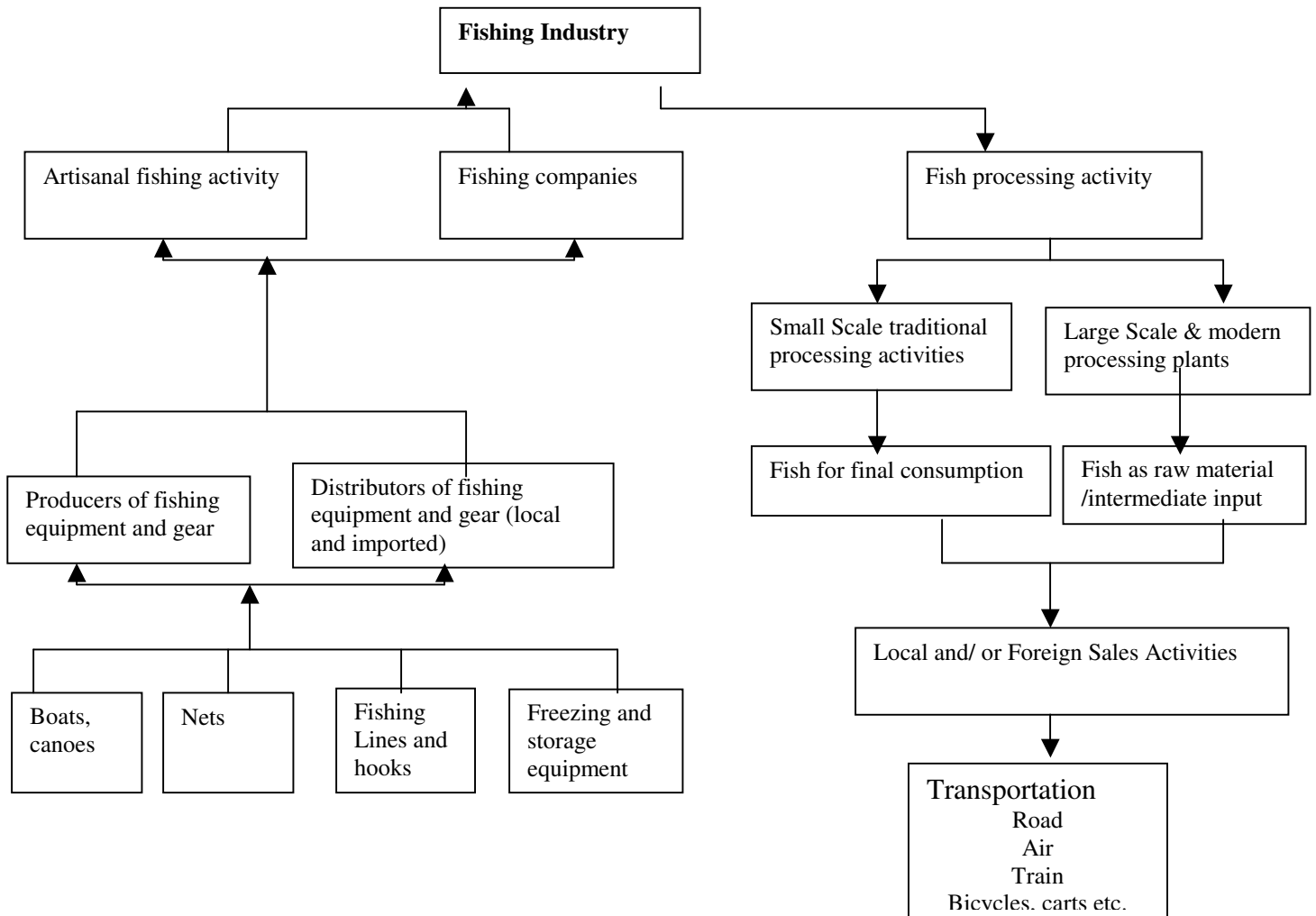
The Songoro Marine Transport for instance, has the capability of constructing boats and vessels and approximately 50 meters in length and maximum width of 10 meters and a carrying capacity of up to 300 tons. The boatyard has so far involved itself in construction of transport vessels and 14 floating jetty facilities and fish landing barges for TAFIRI and Division of Fisheries respectively.

The benefits of the existence of the Lake Victoria fisheries go beyond the direct links between the fishery industry and other activities as pointed out previously. The business creation ability and employment creation aspects do have their multiplier effects on other activities in the economy. If one considers the average number of members of households in the country and in the lake region in particular, then we may assert that income generated by one job created by lake Victoria fisheries will be multiplied to 5 people using the national average or 6.4 people per household for the Mwanza region, 6.7 for Mara and 4.9 for Kagera. In addition and at a general level, the lake fisheries make available an important and significant source of protein to the lake basin inhabitants on the Tanzanian side who number almost 6 million (Mwanza, Kagera and Mara) and the rest of the country where the lake' s fish is marketed. Going by the estimates of NP annual catches and the amount that is consumed domestically, more than 63,000 tonnes of fish are consumed per annum or about 2kg/per capita fish consumption from lake Victoria fisheries.⁶ If we had to import all this fish in the case they are not domestically available, we would need a considerable sum of foreign exchange, more than US\$157.5 million (using US\$ 2.50/ kg for NP as a rough estimate of buying price for all types of fish.). So, there are considerable savings in foreign exchange due to the existence of Lake Victoria fisheries.

Apart from domestic or local economic linkage effect, external economic linkages are also enhanced. Most of the machinery and accessories are imports but also the fish fillets and other product exports generate a significant amount of foreign exchange the country needs for its foreign purchases.

⁶ (i.e. 25%, (see Appendix II on annual NP catch which was estimated to be 80% of total fish catch of all species in 1995, where 15% of the catch were sardines (75% exported), 4% Tilapia (domestically consumed) and others 1% (domestically consumed))

FIGURE 3.2: Lake Victoria Fisheries Activity, Linkage Effect to Employment Creation



As discussed in the economic linkage effect of fishing activity to the rest of the economy above, there are two possible scenarios given the linkage effect model. In good times and sustainably managed fishery, the economic activity linked to fishing industry will be stable and healthy and hence provide stable and reliable employment to many people. However, if the fishing activity is not carried out in a sustainable manner, the opposite is likely to happen. The above analytical framework for employment creation through the linkage effect of the fishing activity shows how interdependent economic activities are and therefore how they can easily enhance the chances for employment creation in the various economic sectors related to the fishing industry. The primary activity of fishing industry triggers a chain reaction of economic activities throughout the economy. As employment is created in various related activities, incomes are increasingly enriched and benefiting a larger group of people and hence creating a larger market for various commodities locally produced and even

imported. The larger the fishing industry the bigger is the impact on the rest of the economy if enabling conditions for expansion exist.

As incomes are generated in all categories, effective demand for non-fishing industrial goods, such as basic needs and incentive goods increases. A further spill-over effect of fishing activity occurs in all the categories outlined above. Employment is being created and facilitated through the linkage and multiplier effects throughout the economy.

Estimation of some aspects of employment has been made. Data have been hard to come by for some aspects such as the backward linkage aspects of producers/imports and distributors of freezing equipment. Among the backward linkage activities, which we have been able to estimate employment creation include the fishing activity, distributors of fishing equipment, boats/canoes building/maintenance and net menders.

According to the 3 frame surveys conducted by the Fisheries Division in 1995, 1998 and 2000 we were able to obtain the number of fisher folk involved in fishing activity. For those years where the survey was not done, an average between the years has been computed (See Appendix II). Employment in fisheries increased from 34,832 in 1995 to 56,258 in 2000, a 61% increase.

Distribution of fishing equipment and gear has been considered on the basis of the number of establishments or businesses, which we were able to identify in the three regions. Since these are few, the employment they create directly in terms of workers in these establishments is similarly small but showing an increasing trend as demand for more modern gear and equipment increases with the expansion of the industry. Employment created by distributors of fishing gear outside the lake region was not considered since it was difficult to link their activity directly with the lake Victoria fishery activity. Employment created by distributors of fishing nets, hooks and lines, outboard engines and their accessories among others, grew from around 50 people in 1993 to 93 in 2000, a 84% increase. Total backward linkage activity employment creation has grown from around 30851 in 1993 to 73704 in 2000, an increase of about 139% in seven years.

For the forward linkage activities employment creation is not as high compared to the backward linkage ones. Nevertheless, significant employment creation has been achieved. The main employers in this area are the processing industries for Nile Perch, traditional and small-scale fish processors (dried fish) and fish traders. The small scale/traditional processors is the category, which dominates. It includes smoke drying and salt drying small-scale processors. Gibbon (1997) in his extensive survey of artisan fish processing and trading estimated 3300 people employed in this activity. This could also be varying with the volume of exports and local consumption.

This estimate also does not account for all the artisan processors there are. Gibbon concentrated his effort in and around Mwanza region and did not visit Kagera and Mara. The total employment in fish processing industries was estimated to be 1016 in 1993 and grew to 8,324 people in 2000. These include white-collar workers, which are the minority and blue collar employees who are the majority. They comprise of workers at the receiving bay where fresh whole fish is received, graded and forwarded to processing halls and onwards. Others

include gutters, cleaners and filleters who are the majority. Using data from the new plant in Musoma where about 1,500 direct employees are expected to be hired in a plant whose capacity is 125 tons of fish a day to produce 50 tons of fillets at full capacity (which gives a recovery rate of 0.40 kg of fillet out of 1 kg of whole fish), the number of employees in these processing industries has been estimated using the amount of fish processed and exported per annum.

Transportation has been treated separately because it cuts across backward and forward linkage activities. Moreover, the convenience of treating transport of all sorts together has prompted this treatment. Here we looked at Road transport for collecting fish and for moving the processed products to markets. Boat transport was considered for collecting fish from fish landing sites. Air transport has been considered for international freight. Since transportation be it by road (to markets) and by Air is not exclusively dealing with transporting fish all year round, we have again worked the employment based on the amount exported by air. To get that amount we consider the chilled/fresh fillet exports which were 1/3 prior to 1998 and 2/3 during 1998 and after. So the number of employment created full time all year round is seen to be low because we worked out full time employment (i.e. on daily basis).

Direct employment, which has been created by Nile Perch fishery and other types of fish, is shown to have increased since 1993 where there were 35,291 people to 87,821 in 2000. To put this in context and show the importance of NP and other Lake Victoria fisheries in employment creation, some relationships and proportions are calculated.

Comparing the direct employment created by Lake Victoria fisheries to industrial sector employment, we find the fishery employment has been between 40% to 58% of industrial sector employment in 1993 and 2000 respectively.

Using data from the Economic Survey for total available workforce in the country, we also find, Lake Victoria employment accounted for about 0.4% in 1995 and 0.5% in 2000 while the same relation for the industrial sector shows 0.9% throughout 1995 to 2000. Comparing direct employment created by Lake Victoria fisheries to available Lake region workforce for the year 1998 we find that the fisheries activities did account for about 2% of the total.

Analysis of sustainable fishing

Fish Catch

According to the fish catch estimates in Appendix II, fish catch has been increasing since 1993 to 1998 with the exception of 1999 the year of the EV fish import ban. Fish catch estimation in Lake Victoria and other lakes within the country and even marine waters, is difficult due to the open access nature of fisheries. The method of estimating fish landings suffers from lack of capacity in the Division of fisheries and the changing nature of selected representative landing sites. Furthermore, the existence of fishing vessels which are not registered and not licensed to fish and in addition to fishermen who fish for subsistence, quite a significant amount of fish escapes the statistics collected. However, despite these setbacks total fish catch for Lake Victoria is estimated to have been 49,914 tons of fish in 1993 and

263,606 tonnes in 2000. For the same period effort increased from 7953 vessels in 1995 to 15,491 vessels in 2000, an increase of about 95% in half a decade!

Fishing Effort

Apart from the increase in the two main components of effort, another equally important indicator is the number of fishing gear such as nets, long lines and similar tools. According to the frame survey report of 2000, small mesh gillnets of between 3" to 5" increased tremendously, while large gillnets (7"-10") declined considerably.

The implication of such an outcome is to point out to the type and size of fish being caught at present. Due to the decline of larger size Nile perch, fisher folk are increasingly targeting the smaller size hence the demand for small size mesh gillnets. The minimum size which fisher folk are allowed to use is the 5" mesh size gillnets!

The perceptions of respondents on fish availability paint a picture of declining catches. Catch Per Unit Effort (CPUE) calculations also indicate the index declining after 1998 mainly due to export ban but also for 2000 due to increased effort (vessels). (See Appendix II). The increase in effort and catch is mainly accounted by market availability. Through establishment of fish processing plants and export market for NP fishnets.

Emerging issues and recommendations

Monitoring and Enforcement

Monitoring enforcement of fisheries is complicated by water boundaries, which translate into areas of jurisdiction for the regional authorities. Fisheries officials assert that once the culprits run into a different regional territory, police officials and even fisheries officials cannot pursue them without trespassing and contravening the law. The best solution for this kind of problem is to organize national patrol efforts, which will avoid all the territorial impediments. It is important that monitoring of fishing activity with the view of enforcing regulations be strengthened. There are several ways of achieving this, which are found within the realms of command and control (C&C), community participation and market approaches.

The community participation approach could use the Beach Management Units (BMUs) in conjunction with the C&C approach so as to minimize the cost of monitoring and maximize compliance. The approach to establishing BMUs must be closely and carefully designed and implemented so as to inculcate the sense of ownership and control and hence responsible behavior on the part of BMU members and others.

To achieve effective participation, education and training about appropriate ways and methods of fishing and related activity such as processing (drying, salting, hygiene, environmental impact etc) should be provided. Information accompanying this sensitization and awareness building on the conduct of the business locally and internationally should be provided. Market information is of vital importance for fisher folk and traders alike. If they are made aware of the marketing chain of fish trade, some of the complaints might cease but also excessive cheating may be put under control.

The increased piracy in the lake for whatever reason increases the cost and risk of fishing in Lake Victoria. It is thus important for the government to facilitate the restoration of safety and tranquility in Lake Victoria so that the industry should prosper in a conducive manner. Piracy is a disincentive to this prosperity.

Statistical and other relevant ecological data of catch and the lakes ecological status are vital. Therefore it is of utmost importance that statistics be collected and made available on a systematic and regular basis.

Vertical Integration of Lake Victoria Nile Perch Fisheries

This situation is taking place and continuing to build up at a fast rate. The processing plant owners are at the center of this process through the control of production, transporting, processing, and marketing of Nile Perch in the Tanzania side of Lake Victoria. This arrangement in turn enables the processors to control price making and dictating terms of trade through monopolizing the business.

Fish production/fishing

The question of processing companies indulging in fishing activity is a legal question. Both the industrialists and the members of the fisheries division say that there is no law prohibiting fishing by foreign industrialists only directives issued by regional authorities prohibiting industrial processors to also fish. The argument is that by industrialists indulging in fishing they deprive the small-scale fisher folk of their livelihood.

Fish processors engage in fishing indirectly through fishermen given loans where these people are bound and committed to sell to the lending factory all the fish they catch at an agreed price, which includes a repayment clause until they finish off the debt. This assures the factory of getting a steady supply of fish at cheap prices. Fishing camps belonging to processing factories are established in mainly fishing islands and are creating havoc and causing fatalities to individual small-scale fishermen.

Transportation

The collection and transportation of NP is also under either the direct control of processors or indirectly through credit. Most processing plants do have their own fleet of collection vehicles, which go around fish landing sites (where passable) to collect Nile Perch for the processing plants. Others do use collection agents whom they have provided credit to acquire the transportation facilities, which include boats, outboard/inboard engines, ice etc. This is an arrangement, which helps the processing plants with reliable supplies of fish since there is not enough reliable private transport in the market.

The lack of capital from the market seems to hinder individual efforts towards investment in the area of fish transport overland and by water. This gives the processors a good chance to influence the market to their advantage through extending credit.

Fish processing

The other major component of the integration is the processing especially of NP fillets. The majority of NP is processed into fresh or frozen fillets. Some of it is salted and sun dried while a small proportion is smoked. Exported fillets account for about 75% of all fish exports from Lake Victoria. This type of processing is capital intensive and needs modern facilities

with strict adherence to international hygienic standards, which only specialists in this field and serious investors can undertake. Since this kind of expertise and experience was lacking, it was necessary for foreign investors to be encouraged to invest in this area so as to bring with them the capital both financial and technological and also their experience. For collective bargaining, these processors are organized under their Association of fish processors, which serves to promote their interests through a collective voice in dialogue with the government with respect to pricing and taxation issues among others. This Association may also work as a vehicle for collusion among the processors and hence prevent the benefits of competition to local fish market scene.

Marketing

This aspect is crucial to the fish industry development. As the experts at the new fish processing plant in Musoma told us, a processing plant cannot be built without the assurance of a reliable market for fish! This may seem to be the normal practice in most economic undertakings. However, this commodity has a relatively shorter shelf life compared to other industrial goods. Hence, prior orders of fish are really what the investors want in order to be assured before they commit their money to the business. Since they have invested large sums of money of their own or loans, investors have to make sure that their investment pays. In doing so, they may not care very much for the welfare of their other players in the business signs that were observed during fieldwork in terms of ridiculously low prices per kg and cheating through weighing and under reporting of export prices. It is therefore crucial that rules of the game, which take into consideration the interests of all players and consumers are carefully put in place. Without such measures, conditions and opportunities for benefit of just a handful of players may be created at the expense of the majority today and in the future. The unequal distribution of benefits from the fish industry needs to be addressed.

Diversification of Export Markets for Nile Perch

Our survey observed 3 major market outlets for Nile Perch. The first and most reliable though not the largest is the local market (both around the lake region and up country including Dar es Salaam, Mtwara, Tanga, Morogoro, Shinyanga) for NP, Tilapia and Sardines. The second is the export market of salted and dried NP (Kayabo) to neighboring countries of Rwanda, Democratic Republic of Congo (DRC) and Rwanda, Burundi and Zambia for Sardines. The third and largest but sensitive market is the NP fillet exports to Europe, USA Australia and Japan. This is the most lucrative market where most of the fishery activity and particularly investment has been directed in the past decade. The fish processors who have created this market and stimulated local market of whole NP fish mostly control this market.

During the EU ban, other markets began to receive more attention by our exporters such as the USA and Australia. That is why even during the ban, NP fillets continued to be exported although at a much lower scale. The EU market is the most lucrative of all the existing markets given their transport cost advantages and higher prices compared to USA, Australia and Japan. However, diversification of export markets for our exporters may in the long run prove to be beneficial to the economy by avoiding the kind of economic shocks the likes of 1999 EU ban.

For small-scale fisher folk, diversification of markets involves selling to local agents who process the fish by salting and drying. According to the fish traders interviewed during our 2000 survey, salted and dried Nile Perch go through Rwanda's capital, Kigali and is not actually consumed there in any significant way. The largest market is in Bukavu in DRC where the fish is sold to consumers but also traders who re-export the fish to Central African Republic (CAR) and onwards as far as Chad!

With a more diversified fish market small-scale fisher folk stand to gain in various ways. First, price stability would be enhanced through breaking the monopoly of agent buyers for fish processing plants. Employment will be enhanced through stabilizing the activity for most of the year due to the existence of a reliable market.

Under-collection of Levy

There is ample opportunity for improving tax collection from the fish industry by local and central governments. On the local government revenue collection we established in a couple of cases, revenue collected was far below the amount expected and collectable. The system used to collect levies is not reliable and the amounts collected are too low. While the deficiency is obviously clear, it is difficult to point out the source of the problem without spending some time studying the situation. One thing that can be said is that foul play is suspect.

Levy collecting agents by tender is by far the best market oriented approach designed to produce best results through competition. However, in some instances the procedure used to select the tenders prevents the best result to be obtained. The lack of transparency and objectivity gives way to personal interest and nepotism. Where proper procedures are followed, the tendering system has been relatively successfully used.

At the central government level, royalty collection has been shown to be quite significant. However, proper monitoring and supervision of export trade will help eliminate the incidence of under-reporting of export prices, which is the basis for royalty calculation. Starting late 2000, royalty calculation has ceased to follow the proportionate royalty determination method (i.e. 6% of export price per kilogram). The present method is simply a flat rate of US \$ 0.15 per kilogram, which culminates into the same 6% of the export price per kilogram of fillet using a price of US \$ 2.50 per kilogram of fillet. In the event of a revised declared price, the government will be missing out on the incremental value of fish. Royalties of fish exports should therefore be based on the 6-percentage rate and not a flat rate so that the revenue collection is pegged on export quantities and prices.

For dried fish (Kayabo), packaging and weight should be carefully set. The present packaging and weight reporting is based on guesswork and leaves a loophole for revenue leakage and understatement of exports.

Cheating through Weighing Scales

Throughout the three regions, complaints were heard about buying agents cheating fishermen by fiddling with the weighing scales to the extent that a 3-kg fish records only half of the weight. We were able to check out these stories in Nyamkazi, Bukoba urban and Ukerewe.

The scale in Ukerewe shaved off 15% of the weight while that in Bukoba took off 25% of a kilogram. Furthermore, fisheries officers attested to the prevalence of such malpractice. The practice is facilitated by the fact that buyers use their own weighing scales and do not want to use scales provided at the landing in some cases.

If weighing scale were to measure correctly the weight of fish bought, obviously more kilograms will be reported and since the fish levy is based on weight, then we should expect more money to be collected and fishermen to get paid more even without a price increase!

Price Under- declaration

The third avenue of levy/royalty leakage is through exporters under-declaring of export prices. Officially exporters are known to report F.O.B prices of US \$ 2.50/kgm of both frozen and chilled fillet exports without exception! Going through the green export documents, we have found out that even the US \$2.50/kgm is high compared to the average price actually declared! If one divides the declared invoice value with the net weight of NP exported, one will get the result ranging from US \$ 1.75 for the Netherlands, Germany, Spain and Japan among others for Frozen and Chilled, US \$ 2.2 for chilled fillets to the Netherlands⁷.

Comparing the declared prices with cost of procurement of fresh fish for processing, processing costs and also the reported market prices in International media publications. It is easy to see that the prices are not correct⁸!

Insecurity in the Lake (Piracy)

Fishing is a risky activity in the Tanzania side of Lake Victoria. Numerous cases of robberies in deep waters have been reported sometimes involving the loss of lives. Due to this, there are fisher folk who have already moved away from this business because of mainly 2 reasons. The first reason is the fear of loss of life or injuries. The second is the fact that piracy in the Lake has deprived them of the only fishing gear they had and now they can no longer fish. Fishing nets and outboard engines are often the target of bandits. It is believed that the prices for these items are quite high hence the high theft rates due to high demand in the market where they are sold cheaply.

The fisheries division and its regional and district offices are working on the problem. However, capacity to monitor and enforce regulation is inadequate. Moreover, legal aspects of enforcement do minimize efforts made.

Unsustainable and Illegal Fishing Practices

These include the use of beach seine (kokoro), fishing without licenses and using undersize mesh. These practices have decreased in some areas while in some they have virtually stopped altogether. In those areas where use of the beach seines still continues, corrupt leaders are themselves accomplices. Lack of funds for purchasing the right kind of fishing

⁷ TRA export documents for September 2000.

⁸ See Kulindwa, K (2001) for elaborate calculations.

gear. For those areas where beach seines are still rampant, the situation should be closely studied and if possible, a buy back approach be instituted. This is a recommendation, which needs the Fisheries Division to gauge the benefits of not using beach seines to the cost of buying back the beach seines being used. A fish trust fund could be established in each district to cater for financing the exercise and fisheries development.

Negative Political Influence

In the absence of a mechanism to curb misconduct and monitor actions, especially where vested interests by politicians that go against technical and policy guidelines are involved, sustainable resource use is jeopardized. The continuation of use of illegal fishing gear such as beach seines is a case in point. Empty promises and misleading political meddling in technical fisheries matters abound. We think that since politicians have a great opportunity to influence the thinking and actions of their constituencies, it is better that influence is not used to mislead the people by misinformation and going against technical and policy decisions of which they have been involved in making!

Fisher folk Associations

Co-operation among small-scale fisher-folk has failed due to selfish behavior and mistrust. Intervention by fish processors through credit has further separated the big fishermen who in turn do not want anything to do with small fisher folk. The inability to associate by small-scale fishermen robs them of the bargaining power to influence prices and control selling procedures for fish. Fisher folk should however be encouraged and assisted in forming associations to cater for their collective interests.

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APPENDIX 1:MACROECONOMIC AND MICROECONOMIC STATISTICAL INDICATORS

SELECTED RELATIONSHIPS SHOWING THE IMPORTANCE OF THE NILE PERCH FISHERIES									
Item	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total GDP	989594	1275917	1607763	2125324	2794266	3452558	4281600	5125311	5986085
Total Fishing ⁹	29920	35120	41802	56038	65803	82166	103199	129245	157698
Fish/Total GDP	3.02	2.75	2.60	2.64	2.35	2.38	2.41	2.52	2.63
Real Fisheries Value (/NCPI)	690.67	648.57	622.05	616.68	568.39	586.61	634.60	704.52	823.49
Fisheries value (/USD)	136.52	117.97	103.15	109.96	114.49	141.67	168.59	193.84	197.12
Real GDP	22843.8	23562.64	23925.04	23388.62	24136.35	24648.80	26328.86	27938.46	
Mining	8840	13503	19062	26170	35190	38511	53515	74386	85792
Mining contr. to GDP	0.89	1.06	1.19	1.23	1.26	1.12	1.25	1.45	1.43
Gold exports(mTshs)			13037	13087	1879	1600	1217.9	2220.122	29295.1
Fisheries contribution	3.02	2.75	2.60	2.64	2.35	2.38	2.41	2.52	2.63
NP export value ¹⁰ (millions Tshs)			4439	6729	13133	26179	44284	62214	46710
NP Value \$			10.95	13.20	22.85	45.14	72.35	93.31	58.39
NP Royalty			134.308	470.693	485.606	1196.817	2172.152	2972.362	2315.86
NP Contr. to GDP			0.45	0.53	0.82	1.23	1.58	1.80	1.09
NP contribution to Fisheries			14.8	19.2	31.4	46.7	67.3	75.7	45.3
NP Production tonnes (0.4 recovery rate)			16936.15	23959.07	43768.94	57116.61	76028.27	119694.9	69510.83
NP Production tonnes (0.38			16044.75	22675.46	33741.46	54078.90	61706.76	102639.4	65719.07

⁹ (Economic Survey for 1999:5)

¹⁰ NP Value includes royalties + local govt levy of Tshs 10/-/kgm of landed fish.

10% of catch is own consumption + local sales escaping records as per field data and field observation

recovery rate)									
Total Exports(million Tshs)	75981.3	123966	181147.6	265176.8	390778.8	455419	459549	391804.6	407118.1
Non Traditional Exports(mTshs)			183.1	182.52	299.37	327.45	317.23	232.24	262.1
NP Export value (mTshs)			2513.78	4007.468	9083.752	19689.36	36879.172	49897.545	38823.83
Proportion of NP to total exports			1.4	1.5	2.3	4.3	8.0	12.7	9.5
Proportion of Gold to total exports			7.2	4.9	0.5	0.4	0.3	0.6	7.2
Percentage of NP to MNRT Budget			56.2	85.2	166.3	331.5	560.7	787.7	291.0
Percentage of NP to Division of Fisheries Budget			1769	2681	5232	10430	17643	24695	2882
Percentage of NP to National Budget			1.31	1.64	2.90	5.23	6.22	7.18	4.63
NP Royalty as a percentage of National Budget			0.04	0.11	0.11	0.24	0.31	0.34	0.23
NP Royalty as a percentage of MNRT Budget			1.70	5.96	6.15	15.15	27.50	37.63	14.43
NP Royalty as a percentage of FD Budget			53.51	187.53	193.47	476.82	865.40	1179.83	142.88
Contribution of Gold to GDP Government recurrent revenue (Tshs million)			0.81	0.62	0.07	0.05	0.03	0.04	0.49
NP Royalty as a percentage of Gov. Revenue			164100	242400	331200	448400	572000	627500	689300
Cotton production (million tonnes)	149.14	26.87	303.96	145.22	251.17	253.3	208.2	106.7	100
Average cotton real producer prices	94.64	129.27	89.29	88.04	103.65	142.79	103.31	109.02	107.05

APPENDIX II: EMPLOYMENT CREATION AND OTHER INDICATORS

	# of Respondents	Mean/Median	1995	1996	1997	1998	1999	2000
Average daily sales	332	35	91578.8	91578.8	89650.0	87721.3	66727.2	178378.9
Average daily home consumption(kgs)	327	6	15699.2	15699.2	15368.6	15037.9	22808.6	30579.2
Average number of nets(median)	277	40	318120	318120	311420	304720	462180	619640
Fishing effort: Number of vessels	.		7953	7953	7785.5	7618	11554.5	15491
Number of Vessels ¹¹	.		7953	7953	7785.5	7618	11554.5	15491
Number of fishermen ¹²	25000	30000	35014	34832	33617.5	32403	44330.5	56258
Number of fishermen per vessel			4	4	4	4	4	4
Weight of fish(tonnes) 0.38 recovery rate	16044	22246	33741	54079	61707	102639	65719	131438
NP Export value (mTshs)			19689	36879	43388	49898	44361	38824
Total Annual NP Fish Catch ¹³	.		108862	108862	106603	104343	91120	210542
Total Annual NP Fish Catch ¹⁴	39931	49119	66149	96279	107579	168220	113523	210885
NP Fish Export/Catch ratio			0.31	0.50	0.58	0.98	0.72	0.62
Unit catch per fisherman(tonnes)	.	Unit catch per fisherman(tonnes)	1.89	2.8	3.2	5.2	2.6	3.7
Fishermen trend index		Effort trend index(fishers)	100.0	99.5	96.0	92.5	126.6	160.7
Effort(Number of vessels) trend index	.	Effort trend index(vessels)	100.0	100.0	97.9	95.8	145.3	194.8
Fish catch trend index	.	Fish catch trend index	100.0	145.5	162.6	254.3	171.6	318.8
Unit fish catch index (fishermen)	.	CPUE(fishers)	100.0	146.2	169.3	274.7	135.5	198.3
Unit fish catch index (effort)		CPUE(vessels)	100.0	145.5	166.1	265.5	118.1	163.7

¹¹ [0](from frame survey reports 1995, 1998 &2000 + extrapolation

¹² [0](from frame survey report 1998&2000 + extrapolation

¹³ [0](daily sales + consumption est. tonnes

¹⁴ (exports/0.75 est. tonnes)/.9

Total annual fish catch ¹⁵	49914	61398	82686	120348	134474	210275	141904	263606
Annual catch growth rates		0.23	0.35	0.46	0.12	0.56	-0.33	0.86
Year	993	1994	1995	1996	1997	1998	1999	2000
Backward Linkages								
Fishing activity fisher folk	5000	30000	34832	34832	33617.5	32403	44330.5	56258
Distributors of fishing equipment ¹⁶	1	57	63	69	75	81	87	93
Boats and canoes maintenance ¹⁷	00	800	956	956	936	916	1389	1862
Nets menders(one for each vessel)	000	6000	7953	7953	7786	7618	11555	15491
Freezing equipment								
Total Backward linkage employment	0851	36857	43804	43810	42414	41018	57361	73704
Forward Linkages								
Dried Fish collect ¹⁸ ors			2133	2133	2133	2133	2133	2133
Small scale/traditional processing ¹⁹	300	3300	3300	3300	3300	3300	3300	3300
Large scale/modern processing ²⁰	08	704	1068	1712	1954	3250	2081	4162

¹⁵ (all species)Annual NP catch/.80 proportion of NP to total fisheries(includes 10% unrecorded subsistence and smuggled fish)

¹⁶ (base 15+2yearly shop increasex3workers@

¹⁷ Page: 138
(vesselsx3fundisx10hours work a dayx30 days per boat/312days in a year/24hrs a day)

¹⁸Page: 138
(Amount transported 20 ten ton lorries x 2 a month x 12 months divided by amount collected by each collector per month 500 pieces x12 months) x 2 people(i.e. one person working with the collector at any one time(local trade is highly under reported, Peter Gibbon found it to be around 3000tonnes in 1995/96)

¹⁹ Page: 138
(Peter Gibbon 1996)

²⁰ Page: 138
(fillet quantity tonnes/0.38recovery rate/20kg per person per day/300days)

Fish processors/drying or salting ²¹			267	267	267	267	267	267	267
Fishmeal processing ²²					126	91	207	200	
Fish oil processing ²³	0	10	10	10	10	10	10	10	
Total Forward linkage employment²⁴	818	4014	6778	7422	7790	9051	7998	10072	
Transportation									
Road ²⁵	44	144	144	144	144	144	144	144	144
Road ²⁶	01	278	422	676	771	1283	821	1643	
Boat ²⁷	67	371	562	901	1028	1711	1095	2191	
Air (international freight ²⁸)	.	3	4	7	11	23	14	29	

²¹ Page: 139

(process 2 persons per 100kg per day)

²² Page: 139

(cost of labour 5% of total revenue/minimum wage 30,000)

²³ Page: 139

(10 individuals self employed whole year round)

²⁴ Page: 139

(excluding transport)

²⁵ Page: 139

(local-transport from Kirumba to Dar at least 40, 10ton lorry a month x 12 times 3 employees + 3 loading labourers divide by 300 days/year 1995/96 estimate)

²⁶ Page: 139

(local-transport from collecting centres to Mwanza = amount processed at .38 recovery rate divide by 2 i.e. half of the fish is transported by road divide by 10 tons per each vehicle divide by 12 months days times 3 people per vehicle)

²⁷ Page: 139

(boat-transport from collecting centres to Mwanza = amount processed at .38 recovery rate divide by 2 i.e. half of the fish is transported by boat divide by 5 tons per each boat divide by 12x2 (2trips a month) times 4 people per boat)

²⁸ Page: 139

A amount exported by air (proportion of fillets chilled) divided by 40 tonnes per cargo plane divided by 52 weeks divided by 5 working days a week times 14 people for loading and other related activities per plane

Road transport ²⁹	8	11	16	26	23	30	19	38
Total Transport	621.65	806.38	1148.65	1754.24	1977.60	3190.15	2094.42	4044.85
Total Lake Victoria fish business employment (mostly NP)	35291	41678	51731	52987	52181	53259	67454	87821
Available Workforce				14631768	15120629	15584248	16006178	16438345
Total industrial sector employment			130554	129250	131831	137013	144531	152462
Percentage of NP fish business employment to Available workforce	.			0.4	0.3	0.3	0.4	0.5
Percentage of industrial sector employment to Available workforce	.			0.9	0.9	0.9	0.9	0.9

²⁹ Page: 140

(through Sirari)exported fillets x proportion frozen divided by 20 ton truck load divide by 52 weeks divide by 5working days x 10workers per truck load

