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EFFECTS OF FOOD SAFETY STANDARDS ON THE LIVELIHOODS OF ACTORS IN THE NILE PERCH VALUE CHAIN IN TANZANIA

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12. Ponte, S. (2007) 'Governance in the Value Chain for South African Wine', *TRALAC Working Paper* 9/2007'. Stellenbosch: Trade Law Centre for Southern Africa.

13. Kadigi, R.M.J. et al. (2007) 'Effects of Food Safety Standards on The Livelihoods of Actors in the Nile Perch Value Chain in Tanzania', *DIIS Working Paper* 2007:24 Copenhagen: Danish Institute for International Studies.

Contents

List of Tables

List of Figures

List of Boxes

List of Plates

Abstract

Exports of non-traditional products from developing to developed countries have increased rapidly over the past two decades. However, one of the major challenges facing developing countries in seeking to maintain and expand their share of global markets is stringent food-safety requirements in industrialized countries. The effects of compliance with these requirements and their distributional impacts among actors in developing countries are generally not well known. Based on this understanding, a study was conducted on the Tanzanian side of Lake Victoria (in Mwanza and Mara regions) to evaluate the effects of food-safety standards on the livelihoods of actors in the Nile perch value chain using the Livelihoods Analysis and Change in Net Income (CNI) approach. The effects of food-safety standards were imputed as the residual values between the "*with*" and "*without*" compliance scenarios for a specified actor category.

The results of the analysis showed that the livelihood platform and income portfolios for the "*with*"-compliance scenario was relatively more favourable than that in the alternative, "*without*"-compliance scenario. The difference in human capital and livestock holdings between fishers / crews in the two scenarios was however non-significant ($P<0.05$). The results of the analysis also showed that both the costs and benefits of compliance with food-safety standards were considerable. Actors in the Nile perch export supply chain (the "*with*"-compliance scenario) obtained the highest gross revenues and net returns, as well as incurring the highest operating costs. However, the profit margins, assets and income portfolios for most actors upstream of the fishery value chains were generally lower in both the "*with*" and "*without*" compliance scenarios than those of the actors in the subsequent stages. The overall analysis of issues in this paper suggests the need to ensure more effective and coherent planning in order to safeguard the future of the fishery sector, ensure an appropriate regulatory framework, strengthen the capacity of the stakeholders to manage the resource sustainably, develop safeguards for ensuring an equitable distribution of fishery benefits, and increase collaboration among the riparian states of Lake Victoria between them and development partners.

1.0 Introduction

Over the past two decades, the share of traditional tropical products in developing countries' exports has been declining, while that of non-traditional products has increased.[1] Within the non-traditional product group, for Tanzania export of Nile perch from Lake Victoria has increased the most.

This shift presents new possibilities for developing countries to increase export revenues from non-traditional food trade. Yet, it also poses new challenges upon these countries to comply with prevailing food-safety standards in international markets.[2] Consumers in developed countries have become more concerned about the food they consume. For the private sector, food safety has become a competitive variable in commercial strategies.

Past experiences with Bovine Spongiform Encephalopathy (BSE), Foot and Mouth Disease (FMD) and most recently, Avian Influenza, together with discussions of genetically modified foods and antibiotic use, have increased consumers' awareness of possible threats through food consumption. Consequently, governments in industrialized countries have laid down stringent food-safety standards to safeguard consumers.

In 1991, the EU laid down requirements for the hygienic handling of fresh and processed fishery products during production, storage and transport. Exporting countries were given the responsibility for ensuring compliance. Compliance had to take place at two levels, national and firm. At the national level, governments were expected to set up authorities to oversee and manage inspections, designate testing facilities, upgrade infrastructure and introduce proper handling

[1] Within the non-traditional product group, for Tanzania export of Nile perch from Lake Victoria has increased the most.

[2] For many higher-value foods, the challenges of international competitiveness have moved well beyond price and basic quality to food safety and agricultural health concerns (Jaffee and Henson, 2004). Previous studies suggest that exporters in a number of developing countries have experienced problems complying with these food-safety standards (see, for example, Henson *et al.*, 2000; Rahman, 2001; Musonda and Mbowe, 2001; UNEP, 2001a; 2001b; Zaramba, 2002; Reardon and Berdegue, 2002; Weatherspoon and Reardon, 2003).

throughout the "value chain".[3] Individual processing plants were to be certified only if they met the requirements, which included proper layout, improved processes and application of Hazard Analysis and Critical Control Point (HACCP).[4]

The proliferation and enhanced stringency of food-safety standards are generally a growing concern among many developing countries and those promoting their increased integration into the world trading system (Jaffee and Henson, 2004). There is also a concern that many developing countries lack the administrative, technical and scientific capacities to comply with the emerging food-safety requirements (*ibid.*). The combined effects of institutional weaknesses and rising compliance costs could contribute to the further marginalization of weaker economic players, including poor countries, small businesses and artisanal fishers and boat owners. This trend is likely to continue unabated in the future, with the result that, over time, food-safety standards will become increasingly demanding. This implies that access to food export markets for developing countries like Tanzania will depend more and more on their capacity to upgrade their levels of conformity with these standards. This is essential since trade in high-value foods represents one of the main possibilities for developing countries to trade their way out of poverty.

In general, the specific food-safety requirements and associated conformity-assessment procedures in importing countries are diverse, but as Henson and Mitullah (2004) argue there are also a number of common elements to the food-safety control systems applied in industrialized

[3] The term "value chain" is defined differently by different authors. Kaplinksy and Morris (2000) define it as the "full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use." Other authors, like Steven and Pirog (2006), define the term 'value chain' from a food supply chain's perspective (i.e. value added) or viewpoint of a food product which has been converted from raw product, through processing resulting in a different product form and hence incremental value in the market place. Generically, the word 'value' (or 'values' in plural) is used to characterize the nature of business relationships among interacting food business enterprises, these value-based relationships then being called value chains (see the Asian Development Bank, 2006; Mudimigh *et al.*, 2004; Das and Teng, 2000; Mulani and Lee, 2002; Hildebrand, 1998 for a detailed discussion of the concept of "value chain").

[4] See Mortimore and Wallace (2000) for a detailed discussion of HACCP.

countries. Efforts to comply with food-safety requirements in one market (for example, the EU) are therefore likely to go a long way in meeting the requirements of another (the US or Australia).[5]

Non-compliance with food safety standards may be associated with lost export opportunities, as happened in the case of the Nile perch (*Lates niloticus*) exports to the EU from the riparian states of Lake Victoria in the period 1998–1999. This may have significant negative impacts at both the macro and micro levels (see Henson, *et al.*, 2000; Delgado *et al.*, 2003a; 2003b; Henson and Mitullah, 2004; Thorpe and Bennett, 2004 and Willems *et al.*, 2005 for detailed discussions of these impacts).[6] At the macro level, a decline in Nile perch exports may lead to falls in foreign exchange and government revenues.[7] At the micro level, the decline in export demand may lead to a reduction in landed price to fishermen and boat-owners, as well as a fall in income for the actors in the beginning and intermediate stages of the fish export value chain,[8] including local fishing communities and other people who depend on Nile perch for their livelihoods.

However, two important aspects are worth noting. First, there is a recognition that upgrading standard-conformity levels involves non-trivial costs, including those of upgrading production systems, processing and storage equipment, and quality control. Compliance with food-safety standards requires big investments, technological skills and a well-functioning institutional framework. In general, developing countries can incur significant "costs of compliance" whenever changes are made to international standards or to those of their trading partners, which in turn

[5] Examples include the required implementation of HACCP (or an equivalent system of food-safety control) and inspection of processing facilities by a third party (whether government or a private certification agency) as a means of assessing compliance.

[6] A more general literature exists on the impact of food safety and other sanitary and phytosanitary (SPS) measures on developing country exports of agricultural and food products (see, for example, in FAO, 1999; Henson *et al.*, 1999; Bankole *et al.*, 2000; Jha, 2002).

[7] According to Revenga *et al.*, (2000) and Bwathondi *et al.*, (2001) the three countries bordering Lake Victoria (Uganda, Tanzania and Kenya) were extracting an estimated 220,000 metric tonnes of Nile perch worth between US$ 280 and 400 million annually in export revenues by the year 2000. In 2004 and 2005, Tanzania's total value of exports of Nile perch to the global markets amounted to 194 billion shillings (161.6 million dollars) and 183 billion shillings (152.5 million dollars) respectively, these being revenues accrued from the exportation of about 72,000 and 63,000 tons in 2004 and 2005 respectively (Xinhua, 2006).

[8] The fish supply chain is defined as a set of interdependent agents (fishers, processors, and distributors) that work together, consciously or unconsciously, to convey a fish-derived product to the eventual consumer (Thorpe and Bennett, 2004).

can result in diminishing competitiveness (Jaffee and Henson, 2004). Secondly, there is the possibility that food-safety standards may also work as a catalyst for modernization and contribute to the creation of competitive advantages, resulting in increases of both export volume and unit value, as well as improvements in the livelihoods of those involved in the value chain (*ibid.*).

Compliance to food-safety standards therefore has profound effects on the livelihoods of the actors in the Nile perch value chain in Tanzania. It involves costs and benefits, but empirical analyses of these effects are relatively few and largely qualitative. Little is known about their magnitude and distributional impacts, particularly on the livelihoods of economic actors in Tanzania. On this basis, a study was conducted in Mwanza and Mara regions (in Tanzania) from early July to early August 2006 to analyse and provide insights into the effects of food-safety standards on the livelihoods of the actors in the Nile perch value chain in the country. This study was preceded by a reconnaissance survey conducted between late March and mid-April 2006 to identify the key actors in the fishery value chain and recommend the sampling frame for the main livelihood survey. This study constitutes part of the research activities under the Fish Sub-project of the Standards and Agro-food Exports (SAFE) for Developing Countries programme.[9]

Since the inception of the SAFE programme in 2005, the Fish Sub-project has produced five conference papers (see Mdoe *et al.*, 2005; Kadigi *et al.*, 2006; Mpenda, 2006; Kadigi *et al.*, 2007; and Mdoe *et al.*, 2007).[10] These papers have addressed various issues related to the Nile perch value chain in Tanzania and the effects of food-safety standards on the actors of the fishery value chain, including institutional and economic issues.

This Working Paper draws on the work in progress of the Fish Sub-project of the SAFE programme. It is mainly intended to enrich the on-going global debate on food-safety standards and

[9] SAFE is a research and capacity-building programme involving researchers in the Research Group on Trade and Development, Danish Institute for International Studies (DIIS), the Department of Agricultural Economics and Agribusiness at Sokoine University of Agriculture, Tanzania and the University of Copenhagen. It examines the role of food safety, social, labour and environmental standards in trade in agro-food products, with a particular focus on the impacts of these standards on developing-country producers and exporters. The programme runs from 2005 to 2010 and is funded by the Danish Ministry of Foreign Affairs' Consultative Research Committee for Development Research (FFU). Some of the individual projects are funded by the Danish Social Science Research Council (FSE). The organics project is funded by Export Promotion of Organic Products from Africa (EPOPA), the United Nations Conference on Trade and Development (UNCTAD), the International Trade Centre (ITC) and FFU.

[10] The Working Papers will be followed by other publications that will provide more insights into the economic effects of Food Safety Standards on the livelihoods of actors along the Nile perch value chain in Tanzania.

particularly over whether such standards constitute an "incentive" or an entry "barrier" to international trade, particularly for developing countries. The subsequent section presents the approach and methodology used in this study, followed by an overview of the existing Nile perch value chain in the country (Section 3). The evaluation of the asset status of actors along the value chain is presented in Section 4. The activities and income portfolios of the actors are analysed in Section 5. The paper ends with a synthesis and presentation of some of the policy implications arising from the study (Section 6). Some details on the contribution of fisheries to the Tanzanian economy, fisheries policy and livelihoods, regulatory framework and institutions/organizations are provided in Appendixes 1-4.

2.0 Research approach and methodology

2.1 RESEARCH OBJECTIVES AND QUESTIONS

The overall objective of this study is to quantify the economic effects of food-safety standards along the Nile perch value chain in Tanzania.

The specific objectives are:

(i) To analyse the effects of food-safety standards on the livelihoods of the actors in the Nile perch value chain in the country
(ii) To quantify the benefits and costs associated with compliance with food-safety standards along the artisanal Nile perch value chain, and
(iii) To provide relevant information to policy-makers that will help in the processes of negotiation of (or compliance with) food-safety standards and making policies on food-safety standards.

The study seeks to provide answers to the following questions:

(i) What are the distributional impacts of food-safety standards on the livelihoods of the actors in the artisanal Nile perch value chain?
(ii) What are the benefits and costs associated with compliance with food-safety requirements, and how are the net benefits distributed throughout the artisanal Nile perch value chain?

(iii) Do food-safety standards discriminate against certain types of economic actor, such as artisanal producers?
(iv) To what extent do food-safety standards affect vertical integration?

2.2 RESEARCH HYPOTHESES

The following hypotheses were put forward for the study:

(i) Actors complying with food-safety standards ("*with*"-compliance scenario) have higher livelihood capital and income portfolios than their counterpart actors in the "*without*"-compliance scenario, and
(ii) Actors complying with food-safety standards incur higher operating costs but also earn greater returns from fishery-related activities than their counterpart actors in the "*without*"-compliance scenario.

2.3 DATA COLLECTION AND ANALYSIS

The research started with a reconnaissance survey conducted in the study area between 31st March and 15th April 2006. The main purpose was to identify a sampling frame for the livelihood survey.[11] More specifically, the reconnaissance survey aimed to ascertain whether there were any actors specializing in Nile perch and in the alternative (other) fisheries and to provide recommendations with respect to the population to be covered during the main survey, the number of people to be interviewed and the means of obtaining access to them, as well as the overall logistics for the research activities.

During the reconnaissance survey, a checklist was used. This was designed in such a way that it could be used to interview several actors, not only in the Nile perch value chain, but also in other fishery chains of artisanal fisheries and other jobs created by fisheries (e.g. service providers, including cooks, boat-builders, net-menders, transporters and others who offer support services connected with fisheries). To facilitate the comparison of costs and benefits in the Nile perch value chain ("*with*"-compliance scenario) and in other fishery value chains ("*without*"-compliance scenario), the respondents were categorised into those specializing in Nile perch and those specializing in other species (e.g. Tilapia, *dagaa*). An attempt was also made to make a distinction

[11] The sampling frame is defined here as the structure or list from which the sample is drawn. A sampling frame can be devised once the target population has been identified and decisions made about observational units.

between permanent and shifting or temporary actors. In addition, the areas of origin and, where possible, contact information, including telephone numbers, of those interviewed were noted for further communication, particularly during the main livelihood survey.

The reconnaissance survey covered localities in Ilemela and Nyamagana (Mwanza City), Geita, Sengerema, Ukerewe, Magu and Misungwi Districts in Mwanza Region. The areas visited include five landing sites in Mwanza City and eleven in Geita, Sengerema, Ukerewe, Magu and Misungwi Districts. Visits were also made to Kirumba, Mwanza central market, Pansiasi, and other fish markets in the city of Mwanza. General information on the fishery industry was obtained through discussions with officials in the Ministry of Natural Resources and Tourism (MNRT); Regional and District Fisheries and Natural Resources officers; leaders and members of the Beach Management Units (BMUs), which were established by the Lake Victoria Environment Management Programme (LVEMP), and through a literature review.

While the complete Nile perch value chain could be construed as extending from the lake to industrial processors and exporters, both the reconnaissance and main survey concentrated largely upon artisanal fishery (covering boat-owners, artisanal fishers and processors) as well as shore-bound fish-collectors and service-providers in both the Nile perch and alternative fisheries. But, as Lenselink (2002) argues, the term "artisanal fishers" is too generic. covering a wide variety of groups which can be distinguished by a number of characteristics, including gear types, type of fisheries, professional categories and sources of income, migratory status, gender, culture and nationality, among others. Thus, a specification of the target population for artisanal fisheries was deemed worth making right from the reconnaissance survey.[12]

Based on the recommendations of the reconnaissance survey, a detailed livelihood questionnaire was designed for use in the main livelihood survey, which commenced in early July 2006 and ended in early August 2006. The questionnaire was used to interview actors in both the Nile perch and other fishery value chains, as well as participants in other jobs created by fisheries, including cooks in the fishing camps, boat-builders, net-menders, porters, transporters and other people who offered support services connected with fisheries.

The questionnaire included questions that were intended to identify the areas of origin of the actors, the type of fishery activity they were engaged in and the duration in the activity and to

[12] This study targeted small-scale actors, including fishers or crews and boat owners with less than five fishing boats, small-scale collectors, processors and traders.

ascertain whether the actors were staying with their families or not, shifting or part-time or permanent. It also included questions on the frequency of visits to families for those not staying with their families, other basic information on the actors' families, the type of fishing and/or processing assets and other livelihood assets, costs and income from fishery and non-fishery activities, and the types of contractual arrangements that the actors were engaged in (e.g. contractual arrangements between boat-owners and fishers, or fishers and factory agents, including the operating rules and other institutional engagements).

A total of 522 respondents were interviewed (384 and 138 in Mwanza and Mara regions respectively) covering twenty-three different localities in Mwanza (Ilemera and Nyamagana Districts), Geita, Sengerema, Ukerewe, and Magu Districts in Mwanza Region, and Musoma, Tarime and Bunda Districts in Mara Region. The sample sizes in the Nile perch export value chain ("*with*"-compliance scenario) and in other fishery value chains (*"without"*-compliance scenario) are given in Table 1.[13]

Table 1: The sample sizes for the "with" and "without" scenarios and other actors

Actor category	With Compliance	Without Compliance	Both	Total
Fishers/crews	134	29	2	165
Boat owners	17	74	1	92
Shore-bound small-scale collectors (*machinga*)	16	3		19
Independent Nile perch collectors with own fish van, motorized *karua*/boats	15			15
Factory agents	7			7
Factory employees	19			19
Assistants of factory agents/independent collectors/boat owners	24	1		25
Local traders (artisanal processed fish)		34		34
Shore-bound artisanal processors & sellers of fish		23		23
Exporters of artisanally processed fish (*kayabo*)		2		2
Home-based artisanal fish processors		5		5
Mabondo collectors		13		13
Further processors & subsequent sellers of waste fish products (*Punki*, *fat*, chips, *vifua*)		22		22
Service providers	38	21	22	81
Total	270	227	25	522

The major criterion used in categorizing actors according to the two scenarios was based on whether or not the actor was required to comply with food-safety requirements in the EU and other developed countries. Those who, by the nature of their fishery activities, were or were not

[13] The actors were chosen based on the sampling frame that was recommended in the reconnaissance survey.

required to comply with these requirements constituted the "*with"* and "*without"* compliance scenarios respectively. The two scenarios were considered different in many respects by importing countries, including the types of fish species or fishery products involved, as well as their respective end markets and food-safety requirements.

While many other types of actor categories were covered in this study, the comparison of livelihood assets and income portfolios was largely done for fishers and boat-operators, due to the fact that other categories under the "*with*"-compliance scenario (e.g., independent collectors with their own fish vans, boats or motorized *karua*) did not have similar actor categories to compare with in the alternative, "*without"*-compliance scenario. The opposite was also true for some categories in the "*with*"-compliance scenario [e.g., local traders of Nile perch not exported, factory rejects and small fish and artisan-processed fish, as well as collectors, processors and subsequent sellers of waste fish products, like the skeleton and heads of Nile perch (*punki*), and the swim bladder or maw (*mabondo*)] who had no appropriate counter-groups to be compared with in the "*with*"-compliance scenario.[14]

Yet, adding other actor categories (other than fishers and boat-owners) in the analysis of the effects of food-safety standards was deemed important, as it would help enrich our understanding of the differences between or homogeneity in the livelihood assets and income portfolios between the actors in the "*with*" and "*without*" compliance scenarios. Most important is probably the fact that the analysis would also help providr some insights on the spill-over effects that can be associated with compliance with food-safety standards (e.g., the spill-over benefits resulting from the processing and subsequent resale of Nile perch rejects and remains).

General information and data on the fishery industry in the study areas were obtained through discussions with Regional and District Fisheries and Natural Resources officials, leaders and

[14] In reality, this latter group, although dealing with artisanally processed Nile perch or its remains, it is not subject to food-safety requirements in the EU and other developed countries. In other words, the group does not qualify for the "*with*" scenario.

members of the BMUs, and other public- and private-sector individuals involved in the fisheries sector, as well as the draft report of the 2006 frame survey and other related literature.[15]

The data collected were analysed using the Livelihoods Analysis and Change in Net Income (CNI) approach. The asset and income portfolios of fishers and boat-owners were quantified using current prices. The results of the analysis for fishers and boat-owners under the "*with"*-compliance scenario were compared with those of the same actor categories in other fishery value chains ("*without"*-compliance scenario). In addition, the asset and income portfolios for other actors, besides fishers and boat-operators (e.g., fish-collectors, artisanal processors and traders, as well as service-providers) were also quantified and analysed.

The net benefits or revenues accumulated by actors in both the "*with"* and "*without"* compliance scenarios were calculated as the difference between the Gross Revenue (GR) and Operating Costs (OC). The CNI approach[16] was then applied to compute the benefits and costs of food-safety standards (i.e. the mean residuals in net revenues and OC between the "*with"* and "*without"* compliance scenarios for a specific actor category, let us say fishers or boat owners).[17] The residuals in the value of the assets owned, gross revenues, operating costs and net revenues (between fishers and boat-owners in the "*with*" and "*without*" compliance scenarios) were then tested for significance difference using the T-test.

Data on fish harvests, quantities sold and consumed as well as remittances/gifts and information on input and output prices constituted important variables in the analysis. As Young (1996)

[15] Four joint frame surveys between the three riparian states sharing Lake Victoria (Kenya, Uganda and Tanzania) have been conducted since 2000, repeated after every two years (i.e. in 2002, 2004 and the latest in 2006) to determine certain characteristics of the fishery to guide its development and management. The frame surveys were conducted with support from the Word Bank through the Lake Victoria Environmental Management Project (LVEMP) and the EU-funded Lake Victoria Fisheries Research Project (LVFRP).

[16] The CNI is a simplified approach derived from the Residual Imputation Method (RIA) which is commonly used to assess the costs and benefits for intermediate goods and services (i.e. when the goods or services are used as an input to produce another good or service). The value of the good/service in this method is basically derived from changes in the revenue of the associated enterprise output(s). The approach stems from the principle of production theory, which asserts that the value of an intermediate good is the net economic contribution of that particular good to the value of the final output. In other words, it entails identification of the incremental contribution of each activity or input to the value of total revenue or output (Young, 1996).

[17] Ideally, the "*before*" and "*after*" compliance scenarios could be used instead of the "*with"* and "*without"* scenarios, but data on the "*before*" compliance scenario were lacking.

points out, the CNI approach is highly sensitive to errors in computing the contribution of various inputs to the total residual value. If an input that should be represented in the activity function is omitted, this will permit the contribution of that input to be attributed to the residual claimant, thus overstating the net value. The CNI approach therefore requires that all cash and non-cash costs are captured. Over- or under-estimates of the levels of fish supply and marketing from given bundles of inputs will bring about corresponding over- or under-estimates of the residual values (see Hussain *et al.*, 2001; Renwick, 2001; and Young, 1996 for detailed discussions of the theoretical and practical considerations involved in using the CNI approach).

3.0 The Nile perch value chain in Tanzania

The Nile perch value chain in Tanzania is characterized by a complex system of supply chains that operate at three main levels (Figure 1):

- Production and localized trading within the lake zone and markets in other regions within Tanzania
- Cross-border trade between Tanzania and neighbouring countries of Kenya, Uganda, Zambia, the Democratic Republic of Congo (DRC) etc., and
- International exports to the EU and other developed countries' markets.[18]

The primary actors in the Nile perch export supply chain can be categorised as falling under the following three major groups:

- Fishermen/crews and fishing boat-owners or operators who catch fish and deliver them to the landing sites
- The agents and assistants or collectors who purchase fish at the landing sites for delivery to the processing plants, and
- Fish plants that process and export the fish.

[18] Note that food-safety management and the HACCP system are mainly applied to fish exported to the EU and other developed countries' markets.

3.1 FISHERS AND BOAT-OWNERS

The majority of fishers and boat-owners sell their landed catch at their home beach. The fishers and crews constitute a mixture of the indigenous people (individuals living in the villages close to the landing sites) and those from distant villages, districts or regions. Most of fishermen were more or less permanently operating in the same camps. A few (4 percent) were shifting from one camp to another depending on the availability of fish, doing so in April to October (a season of low catches) and usually coming back during the season of high catches, which was reported to commence in December and end in March (i.e. during the rainy season).[19]

3.2 COLLECTORS

The value chain for fresh Nile perch normally involved the direct supply of fish to factory agents or independent collectors by fishers and boat-owners. Most of the factory agents were provided with a truck by the factories they had entered into contracts with (usually a four-ton fish van). Using their own capital, they bought Nile perch and sold it to these factories. They normally employed supervisors or sub-agents responsible for most of the 'front-line' collection of Nile perch, both from the factory agent's tied vessel owners and from anyone else they could buy from.

The independent collectors were actors with varying scales of operation, including shore-bound collectors (*machinga*) and small local independent collectors who bought Nile perch from fishermen and resold them to the factory agents, as well as the independent collectors who used either their own or hired fish vans or small collector boats with ice containers and sold directly to processing factories.

3.3 PROCESSORS AND SELLERS OF NILE PERCH REJECTS AND REMAINS

The Nile perch catches that were not exported (factory rejects and small fish) were either traded locally (fresh or artisanally processed into smoked Nile perch or *vibambara vya sangara*) or sold through the cross-border trade between Tanzania and neighbouring countries (e.g. *Kayabo* to DRC and Uganda).

[19] Other fishermen who were interviewed reported a slightly different period for high catches (i.e. from October to February).

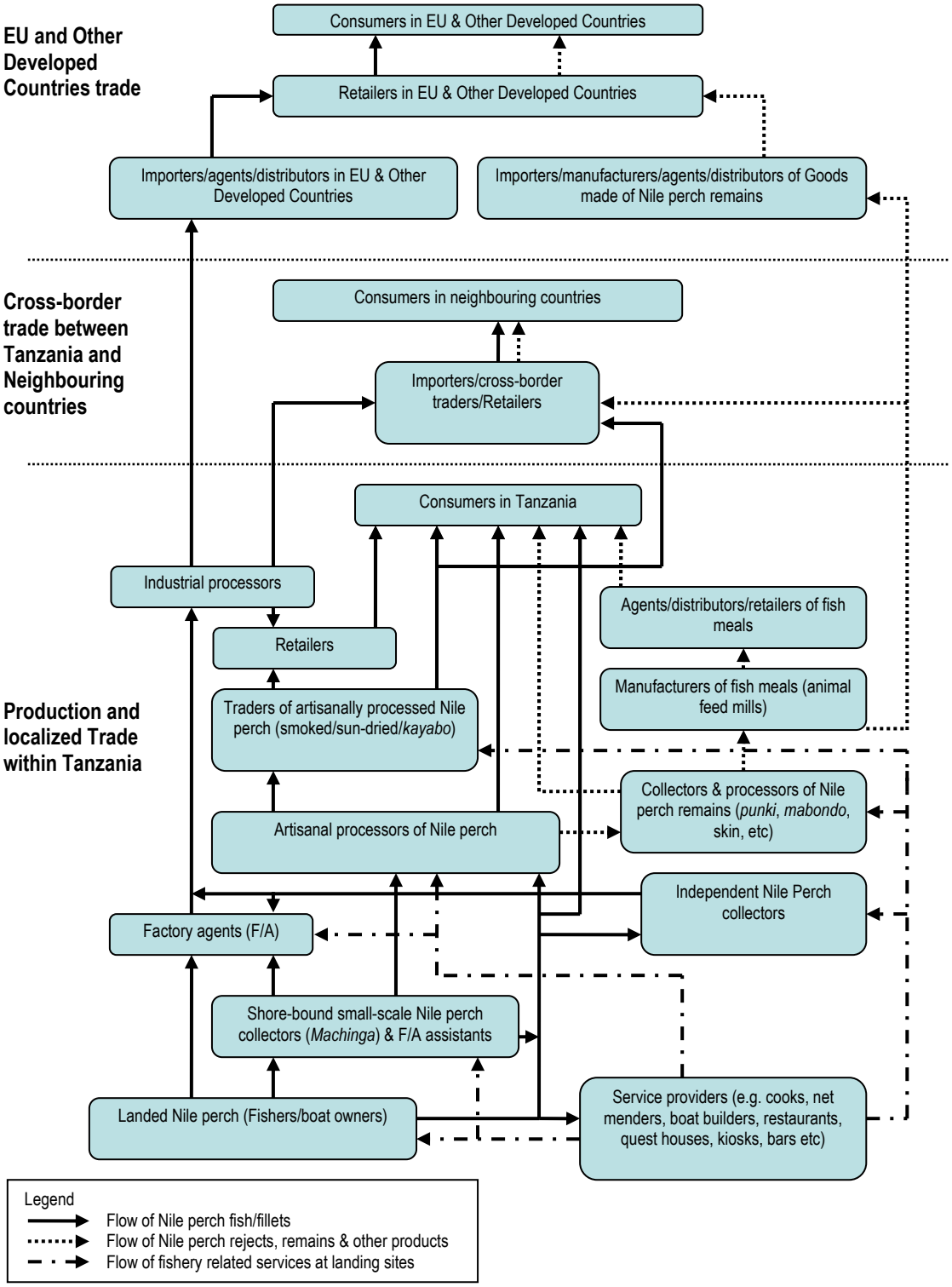


Figure 1: The Nile perch value chain

Artisanal processing of Nile perch and other species was common, particularly in the islands. Three major types of artisanal processors could be identified: those on various scales of operation, based most of the time at a specific landing or permanent camp; small-scale, based more or less permanently at inland/market centres, who came to specific landings on a more or less regular basis to buy and process *in situ* before returning with the processed fish to 'their' market centres; and larger-scale artisanal processors found overwhelmingly in the trade of *kayabo* (dried salted steaks of Nile perch), who shifted together with the larger, more mobile and more productive camps from one location to another.

Two basic artisanal processing methods for Nile perch were reported. The most important one was smoking**,** to produce *sangara moshi* or *vibambara vya sangara*, which is smoked for – eight to sixteen hours under a papyrus mat in multi-rack kilns built of earth and usually set over a mound, and dry-salting to produce *kayabo* (dried salted steaks). A good number of women were also actively involved in artisanal processing. In Bulongelo (Izumacheli) Island (Geita District), for example, out of fifteen artisanal processors of smoked Tilapia and *kayabo*, four were women.

The common processing methods were gutting, then sun-drying on rocks or smoking in earth kilns. Frying was practised to some extent for Tilapia but seldom for Nile perch. The artisanally processed fish from the islands were normally taken for sale to Kirumba Mwaloni in Mwanza, Shinyanga, Kahama and Geita as well as in the mining areas. Traders from these areas also came to the Island and bought the processed fish.

Alongside the processing of Nile perch, *mabondo* (Nile perch's swim bladder or maw) is collected, which involves collectors of various sizes (some touring the camps buying from the processors of reject fish or from camp cooks; others simply staying in the main settlements and hanging fliers reading '*mabondo* bought here' from their huts). Some of the larger collectors were agents of the main independent exporting companies, either working for a commission on capital advanced by these companies or supplying *mabondo* in part-repayment of personal loans from the exporter. A number of people were also engaged in purchasing, processing and selling Nile perch remains (e.g. processing and subsequent selling of the skeleton and heads of Nile perch, famously known as *punki*, have turned out to be an important business at Kanyama, around fifteen kilometres along the Mwanza–Musoma road, as well as at Buhongwa, a few kilometres along the Mwanza–Shinyanga road and at other similar sites).

4.0 Asset status of the actors along the value chain

In analysing the economic effects of food-safety standards on the livelihoods of actors in the Nile perch value chain, it is important that attention is also given to the assessment of the assets that the actors can draw upon for their livelihoods.[20] Assets interact with other factors (e.g. policies, institutions and processes, or PIPs) to shape the choice of livelihood strategies and the livelihood outcomes. The asset base upon which the actors in the Nile perch and alternative fishery value chains build their livelihoods includes a wide range of natural, physical, financial, human and social capital. This section presents an evaluation of the types, number, prices and value of fishing and other livelihood assets owned by various actors in the Nile perch and other fishery value chains.

4.1 FISHERY ASSETS

4.1.1 Types of fishing gears and fish handling equipment/facilities

The commonly owned and used fishing assets (gears and fish handling equipment) as observed and reported during the surveys in this study include:

- Fishing boats and outboard engines,
- Gillnets (*nyavu za makila*) of 5–8 inches (Ply 6, 9, 12) – for Nile perch,
- Longlines (*migonzo*) – for Nile perch,
- Hooks and lines – for Nile perch,
- *Dagaa* seine net (10mm; 8mm; 6mm),
- Beach seine (prohibited by law, but still used by some fishermen),
- Trays used for carrying Nile perch from the floating jetties or weighing stall to the fish vans,
- Catamarans ('*kipe'*, plural '*vipe'*) or '*hurry up'*,
- Boat paddle (*kasia*),
- Boat anchor (*nanga*),
- Torch,
- Anchor rope (*kamba ya nanga*),
- A canvas sheet ('*kavelo'*, plural '*makavelo'*) used by the fishermen to protect themselves from rainfall or cold,

[20] Variation in household access to assets is one of the determinants of capacities to cope with crises (DFID, 1999).

- A cuplike equipment for removing water from the boat locally known as '*sabujo'* (Sukuma) or '*mbehe'* (Ha), normally a half-cut plastic container,
- A cuplike equipment for scooping fish from the boat (*katangazi* or *koholo dogo la kupunguzia samaki*), and
- Wooden structures placed in fishing boats to prevent fish from spreading (*vigomezo* or *buti*).

Of the total number of interviewees, 92 were boat-owners and operators owning a total number of 111 boats (with an average of 1.2 boats per owner). About 59 percent of these boats were propelled by paddle, 10 percent by sails and the remainder 29 percent used outboard engines (Figure 2).

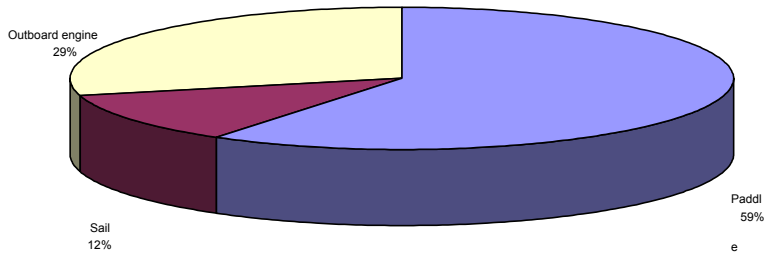
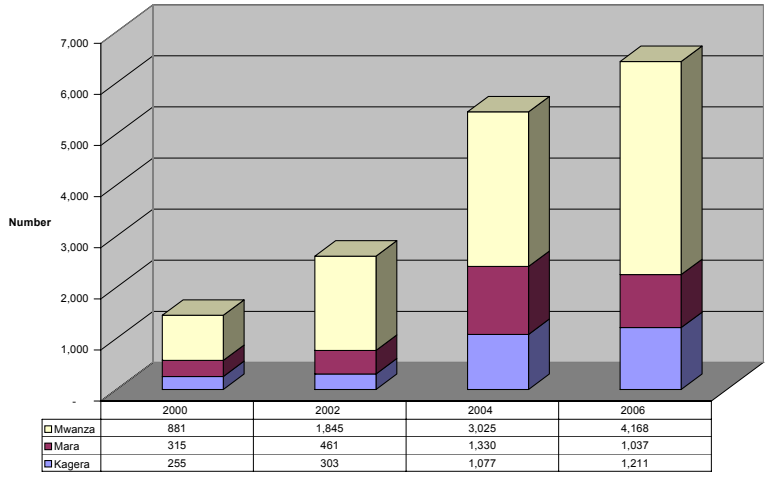


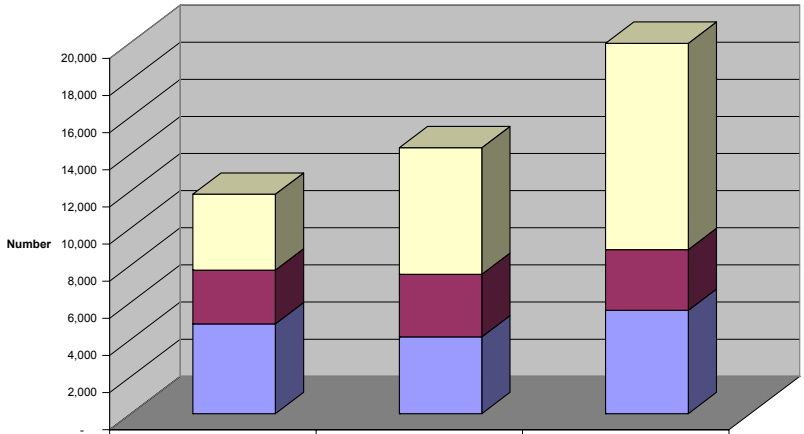
Figure 2: Percentage of fishing vessels by means of propulsion

Overall fishing assets and gear, and in particular those targeting Nile perch (e.g. gill nets of 5" mesh size and above; long line hooks), have increased considerably in the past five years (Frame Survey National Working Group, 2006). For the Tanzanian side of Lake Victoria, the number of outboard engines has increased from 5,576 in 2004 to 6,416 in 2006 (Figure 3). The number of crafts using paddles has also increased (Figure 4; see also the distribution of fishing crafts by region in Figure 5).



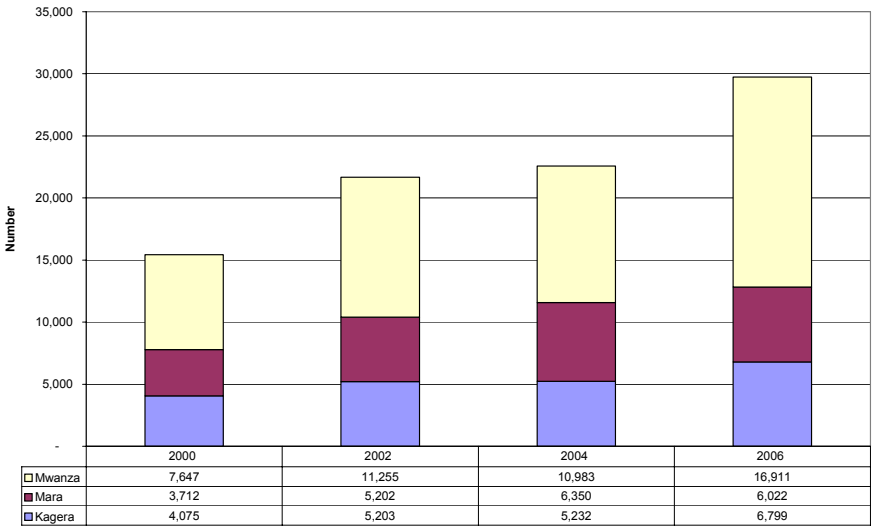
	2000	2002	2004	2006
Mwanza	881	1,845	3,025	4,168
Mara	315	461	1,330	1,037
Kagera	255	303	1,077	1,211

Figure 3: Number of fishing crafts with outboard engines by region
(Source: Frame Survey National Working Group, 2006)



	2002	2004	2006
Mwanza	4,087	6,819	11,114
Mara	2,900	3,374	3,273
Kagera	4,836	4,134	5,567

Figure 4: Number of fishing crafts using paddle by region
(Source: Frame Survey National Working Group, 2006)



	2000	2002	2004	2006
Mwanza	7,647	11,255	10,983	16,911
Mara	3,712	5,202	6,350	6,022
Kagera	4,075	5,203	5,232	6,799

Figure 5: The number of fishing crafts by region
(Source: Frame Survey National Working Group, 2006)

There has generally been some improvement in terms of the facilities that are available at the landing sites when compared to the situation in 2004 and before, at least for selected Nile perch landing sites (e.g. floating platforms or jetties and fish-weighing stalls have been installed at some Nile sites (Plate 1); *bandas* or sheds have been constructed and provided with electricity supplies, craft repair facilities, fish stores, potable water and toilet facilities, as well as fences and posters bearing words that sensitize people to the sustainable utilization of fishery resources (see Plate 2): "*Samaki wa Ziwa Victoria ni Mali Yako – Watunze*", literally meaning "The Fish of Lake Victoria are Your Inheritance – Conserve Them).

Plate 1: Improved fish handling facilities at Kayenze in Mwanza Region

Plate 2: The Nile perch landing site at Igombe in Mwanza Region

As fishing activities have increased, the number of fishers has also increased over time, from 11,000 in 1971 to 55,985 in 2006 operating on the Tanzanian side of Lake Victoria.[21] The latest frame survey reports a total of 98,015 fishermen in 2006 (Figure 6).

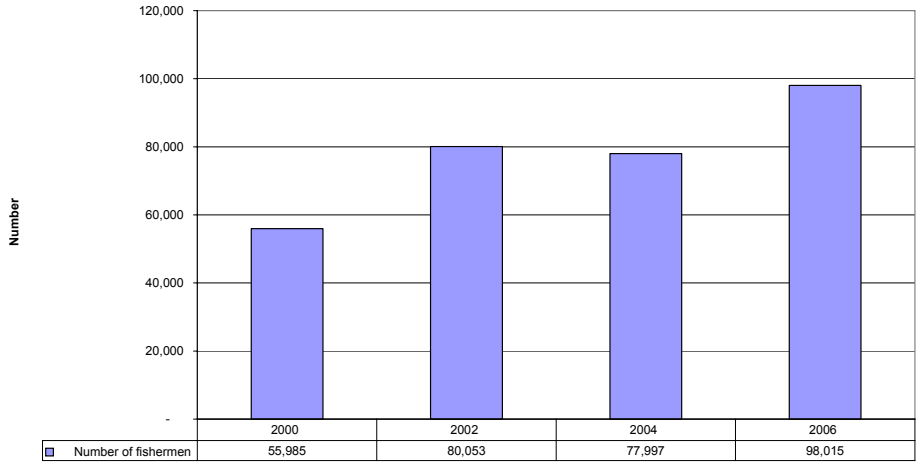


Figure 6: Number of fishers on the Tanzanian side of Lake Victoria
(Source: Frame Survey National Working Group, 2006)[22]

Target species differed between landing sites, craft type and gear combinations. Some landing sites were specific to Nile perch (*Lates niloticus*) or *dagaa* (*Rastrineobola argentea*)/*Haprochlomines*, while others were multi-species. The target species also depended on size of craft and gear combination. Most of the larger vessels (paddled, motorized or sail) using gill nets and long lines targeted Nile perch (*Lates niloticus*), while those using small seines targeted *dagaa* and *Haplochromines*. Small vessels, rafts and other crafts using hand lines and gill nets of mesh sizes below 5" targeted Tilapia and other small fish like *Labeo* and *Schilbe*.[23]

[21] Reynolds and Greboval (1988); Gibbon (1997); Jansen *et al.*, (1999); Bwathondi *et al.*, (2001) and Frame Survey National Working Group (2006) also report a significant investment in nets and associated technology.

[22] In 2006 the percentage distribution of fishers by region was 19 percent (Kagera); 58 percent (Mwanza) and 23 percent (Mara) (Frame Survey National Working Group, 2006).

[23] Note that there are several minor restrictions on fishing efforts, the most important being the minimum gillnet mesh size, which is five inches (125 mm) for Nile perch and Tilapia, and 0.4 inch (10 mm) for *dagaa*.

Dagaa is fished at night when the moon is dark, using pressure lamps to attract the fish. Due to the need for lamps, the choice of *dagaa* fishing locations is limited to sheltered environments and areas fishers can easily reach from own beaches.

Table 2 depicts the list of target species by craft types according to the results of the 2006 frame survey.

Table 2: Target species by craft type in the Tanzanian side of Lake Victoria

Craft type	Number of crafts	Target species	%
Catamarans	141	*Dagaa*	0.43
	2	*Dagaa* & *Haplochromis*	0.01
	45	Tilapia	0.14
Dugout	8	Protop	0.02
	114	Synodontis	0.35
	155	Tilapia	0.47
Parachute	1	*Dagaa*	0.00
	7	Lates niloticus	0.02
	1	Protop	0.00
	116	Tilapia	0.35
Rafts	3,253	Tilapia	9.89
	377	Tilapia & *Lates niloticus*	1.15
Sesse flat at one end	2,327	*Dagaa*	7.07
	5,235	Lates niloticus	15.91
	7	Tilapia	0.02
Sesse pointed at both ends	20,071	Lates niloticus	60.99
	1,046	Tilapia	3.18
Total	32,906		100.00

Source: Frame Survey National Working Group (2006).

The increasing use of fishing gear and increasing number of fishers as well as the general dynamics of Lake Victoria ecosystem have raised many concerns, particularly concerning sustainability. Continued heavy exploitation of Nile perch is seen as a threat to sustainability (FAO, 2001).[24] The Maximum Sustainable Yield (MSY) for the lake is estimated to range between 200 KT and 290 KT (The World Bank, 2005). The current catch of Nile perch is put at 235 KT, which falls within the range of MSY (*ibid.*). No matter precisely where the MSY is, the industry is seen as

[24] Other environmental perturbations that observers have documented, in addition to over-fishing, include changes in water quality, marked by increasing eutrophication and the development of an exotic aquatic weed water-hyacinth (*Eichhornia crassipes*), and declining water levels.

rapidly approaching its "tipping point" with respect to the Nile perch resource base on which it heavily depends (*ibid.*). In many ways, one may be tempted to conclude that the status of the Nile perch fishery in Tanzania is not clearly understood largely because of a lack of data on fishing efforts and stocks, complexities resulting from cross-border harvesting and a lack of integrity of stocks between regions. Until solid empirical evidence is available to demonstrate that further expansion and intensification of fishing activities is possible, a precautionary approach is indispensable.

4.1.2 Value of fishing assets

Table 3 presents the results of analysis of the value of fishing assets owned by fishers/crews and boat-owners in the study area. The average values of fishery assets for Nile perch collectors are compared in Figure 7.

When tested for significance difference using the T-test, the mean values of fishing assets were found to be higher for both fishers and boat-owners in the Nile perch value chain ("*with*"-compliance scenario) than those of the same actor categories in other fishery value chains (the "*without*"-compliance scenario) ($P<0.01$).

Table 3: Average value of fishing assets for fishers/crews and boat owners

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		25,005	12,753	21,612
	Std. Dev		19,413.37	9,678.71	18,063.56
	Mean Difference				12,252***
	95% Confidence Interval of Difference	Lower			2,650.61
		Upper			21,853.38
Boat owners	N		17	74	91
	Mean		2,703,298	1,033,500	2,240,892
	Std. Dev		2,115,547.06	1,016,574.08	2,014,528.55
	Mean Difference				1,669,798***
	95% Confidence Interval of Difference	Lower			626,630.30
		Upper			2,712,965.00

***Significant at $P<0.01$ level.

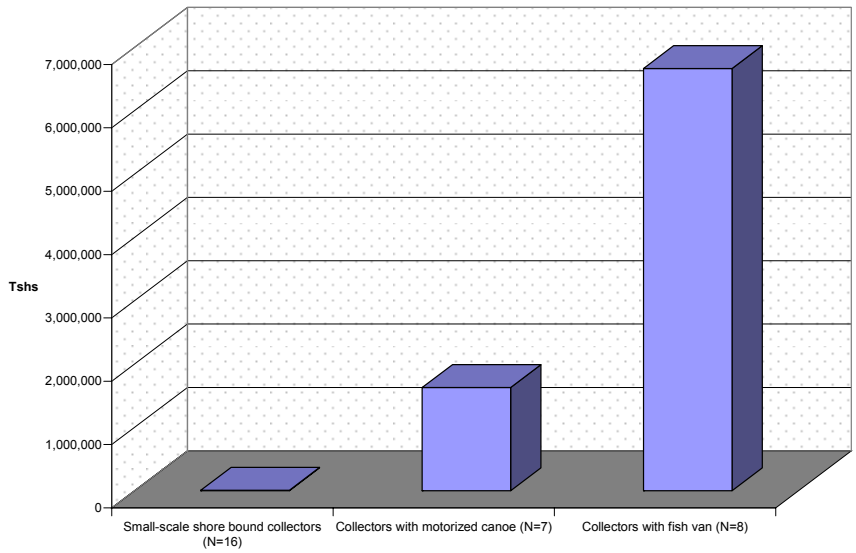


Figure 7: Average values of fishing assets for Nile perch collectors

4.2 LAND ASSET OWNERSHIP AND UTILIZATION

Land lies at the heart of social, political and economic life in most of the rural societies in developing countries. As in other domains of smallholder production systems, land underpins the socio-economic fabric of fishing communities and influences access to other livelihood assets, including fishing assets. Access to land therefore has direct impacts on the pace and nature of the economic growth of fishing communities, contributing to the emergence of great divergence in household incomes (see, for example, in Deininger and Squire, 1998).

In terms of land ownership, the determining factors in relation to livelihoods for fishing and other rural communities in developing countries include total area owned and total area cultivated (farmed land).

Table 4 presents a summary of the results of analysis of land-ownership for fishers/crews and boat-owners in the Nile perch value chain ("*with*"-compliance scenario) and other fishery value chains ("*without*"-compliance scenario). The average sizes of land owned and cultivated by fishers as well as boat-owners are compared with those of other actor categories in Figure 8 (for land owned) and Figure 9 (for farmed land).

Table 4: Land holdings for fishers/crews and boat owners (ha)

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		2.40	1.70	1.88
	Std. Dev		1.88	1.67	1.84
	Mean Difference				0.70**
	95% Confidence Interval of Difference	Lower			0.26
		Upper			1.14
Boat owners	N		17	74	91
	Mean		3.48	2.80	2.88
	Std. Dev		2.72	2.75	2.59
	Mean Difference				0.68**
	95% Confidence Interval of Difference	Lower			0.26
		Upper			1.10

**Significant at P<0.05 level.

On average, the actors in the Nile perch value chain owned relatively larger land holdings than their counterpart actors in other fishery value chains (P<0.05), averaging 2.4 versus 1.7 ha and 3.5 versus 2.8 ha for land owned by fishers/crews and boat-owners in the Nile perch and other fishery chains respectively (Table 4). This implies that the former are in a relatively better position to build up their livelihood portfolios using the relatively larger land resource base they own than the latter actors.

Overall, land acquisition through purchase constituted only 4 percent, whereas inheritance and bequest constituted the major types of land acquisition (62 percent), followed by land clearing (21 percent) and village government allocation (13 percent). Of all the actors covered in this study, factory agents had the highest portfolio of land assets (see Figure 8 and Figure 9 for land owned and farmed by different actor categories).

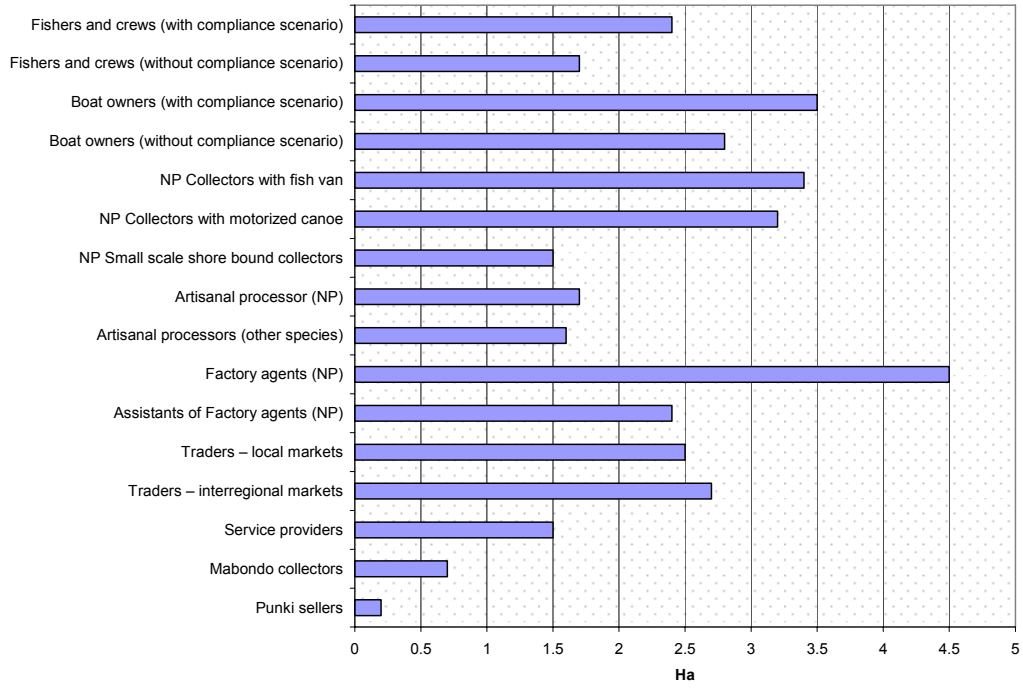


Figure 8: Average land owned by actor category

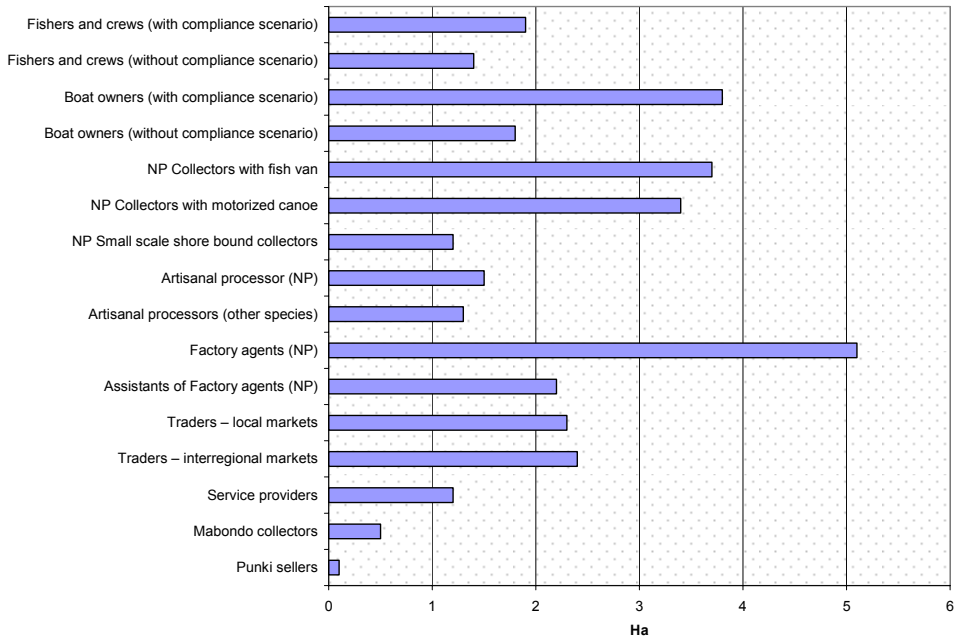


Figure 9: Average farmed land by actor category (ha)

4.3 LIVESTOCK OWNERSHIP

As for land and other livelihood assets, livestock constitutes one of the most important assets that the fishing communities can draw upon for their livelihoods. Its central role in natural resource-based livelihood strategies is well acknowledged in the literature (see, for example, in Horne *et al.*, 2005; Ashley *et al.*, 1999; Delgado *et al.*, 1999; and Parthasarathy *et al.*, 2004). Livestock keeping contributes to livelihoods in many ways: income from products, insurance against drought, emergency cash requirements for fishing activities and other needs, tenancy for share-cropping, household nutrition, fuel for cooking, manure for crops and draught power for farming, to mention just a few (see Ashley *et al.*, 1999 for a detailed discussion of the contribution of keeping livestock to rural livelihoods).

The results of analysis for the number of livestock owned by fishers and boat-owners under the "*with*" and "*without*" compliance scenarios are presented in Table 5. In addition, a comparison of average livestock holdings for the various actor categories in both the Nile perch and other fishery value chains is given in Figure 10.

Table 5: Livestock ownership for fishers and boat owners (TLUs)*

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		1.3	1.2	1.3
	Std. Dev		0.1802	0.1411	0.1751
	Mean Difference				0.0998**
	95% Confidence Interval of Difference	Lower			0.0053
		Upper			0.1943
Boat owners	N		17	74	91
	Mean		3.7	3.8	3.7
	Std. Dev		0.4930	0.4028	0.4688
	Mean Difference				-0.1006
	95% Confidence Interval of Difference	Lower			-0.3611
		Upper			0.1599

*The average number of livestock owned was converted into Tropical Livestock Units by applying the Tropical Livestock Units (TLUs) conventionally used for Sub-Saharan Africa. According to the International Livestock Centre for Africa (ILCA) (1990), Jahnke (1982) and Williamson and Payne (1978) the units are given as follows: adult cattle is equivalent to 0.7 TLU; a donkey to 0.5TLU; a pig to 0.3 TLU; goats and sheep to 0.1TLU; and poultry 0.01TLU.
**Significant at $P<0.05$ level.

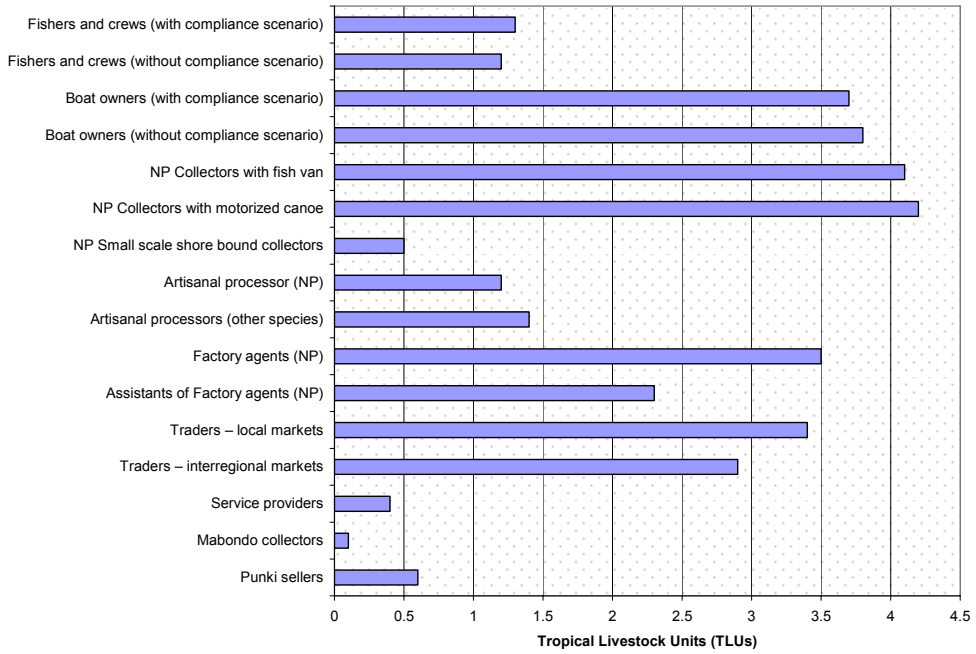


Figure 10: Livestock holdings by actor category (TLUs)

When tested statistically using the T–test, the difference in livestock holdings between fishers under the "*with*" and "*without*" compliance scenarios was significant at $P<0.05$ level. However, the difference in livestock holdings between boat-owners in the two scenarios was insignificant at $P<0.10$ significance level. This implies that, although important in most rural areas in Tanzania, livestock ownership could not be the main factor determining the differences in asset portfolios between boat-owners in the Nile perch and alternative fisheries. What is interesting is the observation that it is not livestock itself that is the major contributor of income for actors in the fisheries industry. As emerges later in the analysis of income portfolios, the income composition of actors was mainly dominated by incomes from fisheries-related activities.

Yet a closer analysis of the income portfolios would also serve to illustrate the interlocking nature of relative livelihood success for those who were diversifying fisheries with other economic activities. Livestock, for example, is sold in order to make some investments in fishing (e.g. purchase of fishing gear) or in small businesses, and the income obtained from these latter activities can be used to build up herds. The ordering of these sequences, however, will depend on personal and market opportunities that prevail over a given period of time.

4.4 HUMAN CAPITAL

Typically, human capital is broadly defined as a combination of individuals' own innate talents and abilities, and the skills and learning they acquire through education and training (OECD, 2007).[25] Dess and Picken (1999) define human capital as consisting of the individual's capabilities, knowledge, skills and experience, as they are relevant to the task at hand, as well as the capacity to add to this reservoir of knowledge, skills, and experience through individual learning.

It is argued in the literature that the most valuable capital is that invested in human beings (see, for example, in Deutsche Bank Research, 2005). Human capital is seen not only as a key determinant of growth and poverty alleviation, but also as critical for human development more generally (Squire, 1993; Ravallion and Chen, 1997; Ventura, 1997; 2005; Sen, 1999; Romalis, 2004; and Schultz, 1999).

It is argued further that higher human capital, acquired through better and longer education, allows an individual to perform higher value-added tasks more efficiently and more quickly (Deutsche Bank Research, 2005). This individual can also apply more new ideas and be more innovative. Higher human capital leads to more output per hour worked – productivity is generally higher (Barro, 1991; Benhabib and Spiegel, 1994, 2005; Kahn and Lim, 1998; Klenow, 1998; Acemoglu, 2003; Caselli, 2005).

The best available proxy for human capital in rural communities in developing countries (including fishing communities) is the average years of education of the population aged 25 to 64 (Deutsche Bank Research, 2005).[26] In addition, the average enrolment figure for the population aged 25 to 35 can also be used as one of the indicators.

The available labour for production activities in a household can be evaluated by considering the family size and the extent of contribution of each sex and age group in the family labour pool. Since different types of labour make different contributions to production depending on the

[25] Human capital measures the quality of the labour supply and can be accumulated through education, further education and experience. A distinction is made between *education*, which is an investment in human capital, and *learning*, which is a process of acquiring knowledge or skills through study, experience or teaching (Deutsche Bank Research, 2005). Knowledge is the awareness and understanding of interconnected facts, truths or information gained in the form of experience, learning or introspection (*ibid.*).

[26] It is reported that one additional year of education boosts an individual's income by around 10 percent (Deutsche Bank Research, 2005).

nature of the task performed, the age and sex of the person performing it and the family size variable were used in this study to calculate a common denominator for all age and sex groups (the Adult Labour Equivalent).[27] The results of the analysis for the differences in level of human capital between fishers and boat-owners under the "*with*"-compliance and "*without*"-compliance scenarios are presented in Table 6, Table 7 and Figure 11.

Table 6: Fishers and boat-owners: average years of education for family members aged 25 to 64 years

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		4.3	4.2	4.2
	Std. Dev		0.5962	0.7390	0.6336
	Mean Difference				0.0656
	95% Confidence Interval of Difference	Lower			-0.2877
		Upper			0.4190
Boat owners	N		17	74	91
	Mean		6.8	6.1	6.6
	Std. Dev		0.9428	1.1093	1.0305
	Mean Difference				0.6879**
	95% Confidence Interval of Difference	Lower			0.26
		Upper			1.10

**Significant at P<0.05 level.

When we proxy human capital levels using average years of schooling for family members aged 25 to 64 years (Table 6) and enrolment figures for family members aged 25 to 35 years (Table 7), as well as Adult Labour Equivalent (Table 8), we find statistically significant higher portfolios of human capital for boat-owners in the Nile perch value chain ("*with"*-compliance scenario) than for their counterpart boat owners in other fishery value chains – "*without"*-compliance scenario (P<0.01). This can partly be attributed to the fact that wealthier actors with higher levels of in-

[27] The term Adult Labour Equivalent (ALE) can be defined as a multiplier used in converting man-hours into the number of full-time workers or employees needed to complete a job within a given time-frame, taking into account the type of sex and age of the workers. Different coefficients have been used by different authors to convert child and female labour into Adult Labour Equivalent (ALE). A combination of ALE proposed by Due *et al.,* (1982), Collinson (1972), Panin (1986) - cited in ILCA (1990), Ruthernberg (1976) and Swift (1985) were used in this study with minor modifications to suit the situation in the study area. The adult labour equivalent for households in this study was calculated as follows: adult males and females 15 to 60 years were assigned 1, males above 60 years 0.67, females above 60 years 0.6 and children between 10 and 14 years 0.25. Children below 10 years were considered as contributing insignificantly to family labour. For family members who worked occasionally, the percentage of the year was used in quantifying their contribution to family labour.

come (boat-owners in the "*with*"-compliance scenario in this case) are more likely to afford investment costs in education (e.g., paying school fees for their children and other family members) than their counterpart actors with low incomes.[28] However, the differences in human capital between fishers and crews under the "*with*" and "*without*" compliance scenarios were insignificant (P<0.05).

Table 7: Fishers and boat-owners: average school enrolment for family members aged 25 to 35 years

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		3.0	3.0	3.0
	Std. Dev		0.4159	0.3209	0.3895
	Mean Difference				-0.0001
	95% Confidence Interval of Difference	Lower			-0.2176
		Upper			0.2173
Boat owners	N		17	74	91
	Mean		4.0	3.4	3.8
	Std. Dev		0.5546	0.3668	0.5685
	Mean Difference				0.5713***
	95% Confidence Interval of Difference	Lower			0.26
		Upper			1.10

***Significant at P<0.01 level.

Table 8: Fishers and boat-owners: average Adult Labour Equivalent (ALE) as the percentage of household size

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		51.1	51.0	51.1
	Std. Dev		6.8887	5.5066	6.4934
	Mean Difference				0.1028
	95% Confidence Interval of Difference	Lower			-3.5223
		Upper			3.7279
Boat owners	N		17	74	91
	Mean		68.4	62.3	66.7
	Std. Dev		8.1401	7.9786	8.4913
	Mean Difference				6.1002***
	95% Confidence Interval of Difference	Lower			1.6151
		Upper			10.5851

***Significant at P<0.01 level.

[28] As will be shown later, boat-owners in the Nile perch value chain ("*with*"-compliance scenario) had generally accrued relatively higher net incomes than their counterpart boat-owners in the "*without*"-compliance scenario.

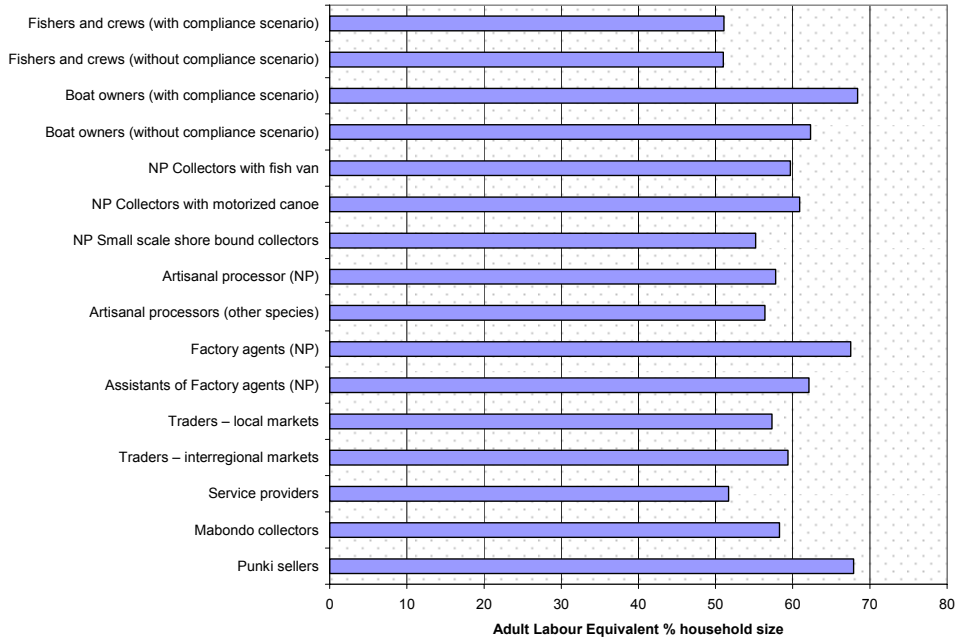


Figure 11: Adult Labour Equivalent (ALE) by actor category

4.5 OTHER ASSETS

Other assets owned by the actors included a variety of home assets (e.g. furniture, farm equipments, car/motorbike, bicycles, radios, television sets and cooking utensils), the average values of which are compared in Table 9 and Figure 12 for fishers and boat-owners as well as other actor categories respectively. The results of the analysis showed insignificant differences (at $P<0.10$ significance level) between the values of other assets owned by fishers and boat-owners in the Nile perch value chain and those of their counterpart actors in other fishery chains (Table 9).

Table 9: Values of other assets owned by fishers and boat-owners (Tshs)*

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		398,800	345,677	384,089
	Std. Dev		337,697	416,536	358,645
	Mean Difference				53,122
	95% Confidence Interval of Difference	Lower			-146,659.0
		Upper			252,903.4
Boat owners	N		17	74	91
	Mean		1,208,000	954,987	1,13,935
	Std. Dev		1,172,460	776,347	1,077,568
	Mean Difference				253,013
	95% Confidence Interval of Difference	Lower			-345,202.0
		Upper			851,227.6

*Refer to average values of other assets owned – besides fisheries based assets, land and livestock holdings (e.g. cars, furniture, radios, bicycles, TVs, cooking utensils and other assets owned).

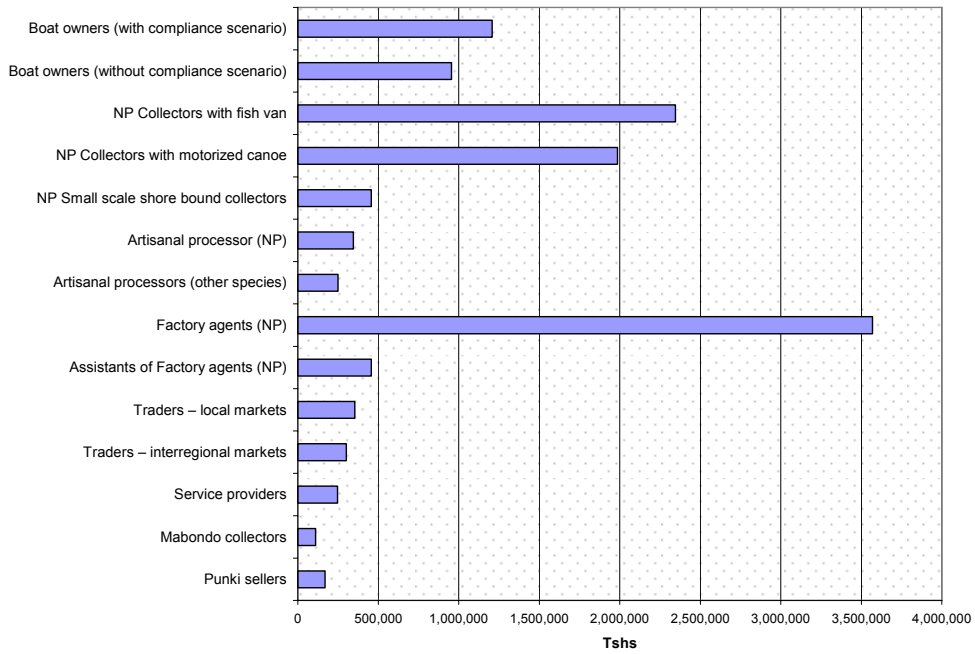


Figure 12: Value of other assets by actor category (Tshs)

5.0 Activities and incomes

Both the Nile perch and other fishery value chains involved a myriad of actors, activities, prices, operating costs, benefits and livelihood outcomes. Aside from fishermen/crews and boat-owners, the lake directly and indirectly supported livelihoods of specialised fish processors, traders and employees of other jobs created by fisheries. A number of women, for example, were employed as cooks in the fishing camps. Other populations supported by the fishery industry included boat-builders, gear artisans (including net-menders), transporters and other people who offered support services connected with the fisheries. On the periphery of some of the larger camps were kiosks, eating places, bars, tailors' premises and video halls. Porters residing particularly close to the main *dagaa* fishing camps earned money from loading bags of *dagaa* on to trucks or lorries. The prices, operating costs, benefits and net incomes accrued by various actors in the Nile perch and other value chains are presented and discussed in the subsequent sub-sections.

5.1 PRICES

The average selling prices for fresh Nile perch were Tshs 1,450 and 1,900 per kilogramme for fishers/boat-owners and factory agents respectively, while those for *dagaa* were Tshs 534.60 (for fishers/boat-owners) and 796.20 (for local traders) per kilogramme. For artisanal processors and traders of artisanally processed Nile perch (*sangara moto* or *vibambara vya sangara*), the selling prices averaged Tshs 440.63 and 648.00 per piece respectively. The average selling price for *Kayabo* (dried salted steaks of Nile perch) averaged Tshs 793.75 and Tshs 1,271.43 per piece for artisanal processors in the fishing camps and at Kirumba Mwaloni respectively.[29] For artisanally smoked Tilapia (*vibambara vya sato*), the average selling prices were Tshs 440.63 and 648.00 (per piece) for processors and traders in the regional/central markets respectively. The selling prices for other fishery products/by-products were as given in Table 10. In general, actors in the Nile perch value chain obtained better prices than their counterpart actors in the other fisheries value chains.

Table 10: Average selling prices for selected fishery products/by-products

Fishery commodity	Producer/ Processor Price	Trader Price
Nile perch (fishers/boat owners & factory agents) (Tshs/kg)	1,450.00	1,900.00
Dagaa (Tshs/kg)*	535.00	796.00
Artisanally processed (smoked) Tilapia (*vibambara vya sato*) (Tshs/piece)	440.63	648.00
Kayabo (Tshs/piece)	793.75	1,271.43
Tilapia – fresh (Tshs/piece)	266.67	383.33
Mabondo (Tshs/kg)	8,646.15	10,730.77

*The average selling prices for *dagaa* fisher/boat owners and traders were Tshs 2,673.02 and 3,981.02 per debe respectively - 1 debe (Tin) = approx. 5 kg of dried *dagaa*.

5.2 COSTS AND BENEFITS

5.2.1 Costs and benefits for fishers and boat-owners

Both the average operating costs and net revenues accrued by fishers and boat-owners under the "*with*"-compliance scenario were substantial (Table 11 and Table 13). Fishers and boat-owners in the Nile perch value chain ("*with*"-compliance scenario) received the higher gross revenues (Table 12) and net returns (Table 13), but also incurred higher operating costs (Table 12) than their counterpart fishers and boat-owners in other fishery value chains.

[29] Most of the *kayabo* sold at Kirumba Mwaloni crosses the border with neighbouring countries, mainly to Zaire and Uganda.

Table 11: Average operating costs for fishers and boat-owners (Tshs per week)

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		58,473.28	32,185.30	52,498.74
	Std. Dev		61,248.77	15,043.67	55,359.73
	Mean Difference				26,287.98**
	95% Confidence Interval of Difference	Lower			3,913.57
		Upper			48,662.40
Boat owners	N		17	74	91
	Mean		173,161.13	89,719.61	150,054.25
	Std. Dev		102,341.93	88,250.30	104,941.61
	Mean Difference				83,441.52***
	95% Confidence Interval of Difference	Lower			28,749.47
		Upper			138,133.60

**Significant at P<0.05 level.
***Significant at P<0.01 level.
Note: The operating costs refer only to variable costs incurred during the fishing season and were estimated on a weekly basis (fixed/investment costs exclusive).

Table 12: Average gross revenue for fishers and boat-owners (Tshs per week)

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		97,245.04	53,317.37	87,261.48
	Std. Dev		101,860.86	24,920.96	92,078.72
	Mean Difference				43,927.67**
	95% Confidence Interval of Difference	Lower			6,719.97
		Upper			22,034.37
Boat owners	N		17	74	91
	Mean		295,390.40	147,957.67	254,562.88
	Std. Dev		168,838.00	145,534.54	174,743.62
	Mean Difference				147,432.74***
	95% Confidence Interval of Difference	Lower			57,212.31
		Upper			237,653.20

**Significant at P<0.05 level.
***Significant at P<0.01 level.

Table 13: Average revenue (income) from fishing for fishers and boat-owners (Tshs/yr)

Actor Category	Group Statistics		With Compliance	Without Compliance	Total
Fishers/Crews	N		134	29	163
	Mean		1,900,177	1,148,019	1,729,232
	Std. Dev		1,276,293.78	768,554.61	1,219,329.18
	Mean Difference				752,158.09***
	95% Confidence Interval of Difference	Lower			266,441
		Upper			1,237,875
Boat owners	N		17	74	91
	Mean		6,184,168	2,662,965	5,209,071
	Std. Dev		3,440,753.20	2,663,845.77	3,593,813.00
	Mean Difference				3,521,182.8***
	95% Confidence Interval of Difference	Lower			1,721,266
		Upper			5,321,100

***Significant at P<0.01 level.

The mean difference or residual costs between the "*with*" and "*without*" compliance scenarios were estimated at Tshs 26,288 per week for fishers/crews (P<0.05) and Tshs 83,442 per week for boat-owners (P<0.01). On average, the fishers and boat-owners under the "*with*"-compliance scenario accrued residual benefits of Tshs 16,703 and 63,991 per week per actor respectively (i.e. extra net benefits above those accrued by fishers and boat-owners in the "*without*"-compliance scenario). The higher operating costs and revenues between the actors in the Nile perch value chain, compared with those in other fishery chains, can largely be attributed to the residual effects of compliance with food-safety standards in the former value chain.

Operating costs also included the costs of registration for the fishing vessels. Most boat-owners considered the current registration system for fishing boats as more of a double registration process because the boats were registered twice, once with the FD of the Ministry of Natural Resources and Tourism (MNRT) and again with the then Ministry of Communication and Transport (MCT), now called the Ministry of Infrastructure Development (MID). Registration under the latter Ministry was implemented by a government agent, famously known as "*Mbondo*", which provided registration numbers starting with TMZ letters (Plate 3). The boat-owners interviewed at Bwiro (Ukerewe) reported an annual registration cost of Tshs 34,000 (for the latter type of registration, by *Mbondo* agent) and Tshs 13,500 (in 2005) or Tshs 21,500 (in 2006) per annum for the former.

Plate 3: A boat with registration number TMZ 5065

In addition, the District Council also collected levies of Tshs 30,000 per annum per boat using fishing nets, Tshs 20,000 per annum for boats using longlines (*migonzo* or *ndoano*), and Tshs 30 per kg of fish catch for fishermen.[30]

5.2.2 Costs and benefits for other actor categories

The value of collection, operating costs and net income for shore-bound, factory and independent Nile perch collectors varied depending on the scale of operation (Table 14).

Table 14: Value of collection, operating costs and net income for factory agents and other Nile perch collectors

Type of collector	Value of assets for fish collection	Value of fish collected/week	Operating cost/week	Net income per week	Net Revenue (income)/year
Collectors with fish van	6,666,667	15,766,000	12,594,625	3,204,708	12,402,108
Collectors with collector boat	1,629,091	14,302,545	11,807,492	2,489,599	9,047,360
Small-scale shore bound collectors	7,344	39,552	0	39,552	180,459
Total	1487987.18	6,481,551	5,267,952.82	1,217,188	4,569,902

[30] Traders who processed *kayabo* in the islands and transported it for sale in Mwanza also had to pay a levy of Tshs 30 per piece at Kirumba.

The average gross revenues, operating costs and net revenues for artisanal fish processors, traders, collectors/sellers of *mabondo* and purchasers/sellers of skeletons and heads of Nile perch (*punki*) are presented in Table 15.

Table 15: Average sales, operating costs and net income for other actor categories

Actor category	Gross revenue (Tshs/week)	Operating costs (Tshs/week)	Net revenue (Tshs/year)
Artisanal processors of Nile perch (*Kayabo, vibambara vya sangara*)	284,286	209,429	294,284
Artisanal processor of Tilapia	306,500	276,113	121,552
Dagaa/furu local traders	601,608	490,594	379,016
Mabondo collectors	37,714	30,009	78,684
Punki sellers	410,500	329,833	411,776

The results of the analysis for the average net income of service-providers varied depending on the type of service offered. For labour-providers (e.g. cooks, porters), accommodation, food and drinks, net incomes averaged Tshs 542,678; 1,878,725; 483,909, and 1,027,740 per annum respectively. Average net revenues for those owning guesthouses and shops averaged Tshs 1,003,810 per annum.

5.3 DIVERSIFICATION AND INCOME PORTFOLIOS

Diversification is a key feature of livelihood strategies in rural areas in the developing world, being defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and improve their standards of living (Ellis, 1998). Although fishery may dominate the income portfolio of fishing households, very often many households also have livelihood strategies that merge it with other economic activities, including farming and micro-enterprises. This helps them reduce the risk of losing all income sources simultaneously as a result of climatic, economic and other shocks (Ellis, 2000; Start, 2001). A livelihood analysis that focuses only on immediate micro-level employment and constraints for households can therefore overlook these important opportunities and how they influence trajectories of change in key variables such as the opportunity cost of labour or choice of livelihood strategies. A good example is perhaps the state of the rural non-farm economy and whether it is a residual sector offering only coping activities and absorbing labour displaced from traditional activities of farming and fishing etc., or a dynamic one creating new jobs, exerting upward pressure on wages, and with livelihood diversification as a positive adaptation leading to accumulation by rural households (Smith *et al.*, 2005; Ellis, 1998; Reardon *et al.*, 2000; Start, 2001).

The analysis of the major sources of income for actors in the Nile perch and other fishery value chains on the Tanzanian side of Lake Victoria is presented in Table 16 and Figures 14-17). The results show that income from fishery-related activities is supplemented by income earned from other activities, including crop-farming, livestock-keeping, transfers and other small-scale income-generating activities. What is interesting is the observation that more than 80 percent and 85 percent of total household income for fishers/crews and boat-owners respectively in the "*with*"-compliance scenario comes from fishing (cf. 70 percent and 68 percent in the alternative scenario respectively). Again, this can be attributed to the residual effects or benefits of compliance with food-safety standards in the Nile perch value chain. Crop-farming, livestock-keeping and other activities involving the use of natural resources also constituted an important source of income – in fact, second to fishing for both actors under the "*with*" and "*without*" compliance scenarios – and constituted shares of 14–22 percent and 10–21 percent for fishers/crews and boat-owners respectively.

In general, however, the income portfolio for the fishermen and crews, who are the most numerous actors upstream of both the Nile perch and other fishery value chains, is generally less favourable than that of boat-owners and fish-collectors (Figure 13 and Table 16).

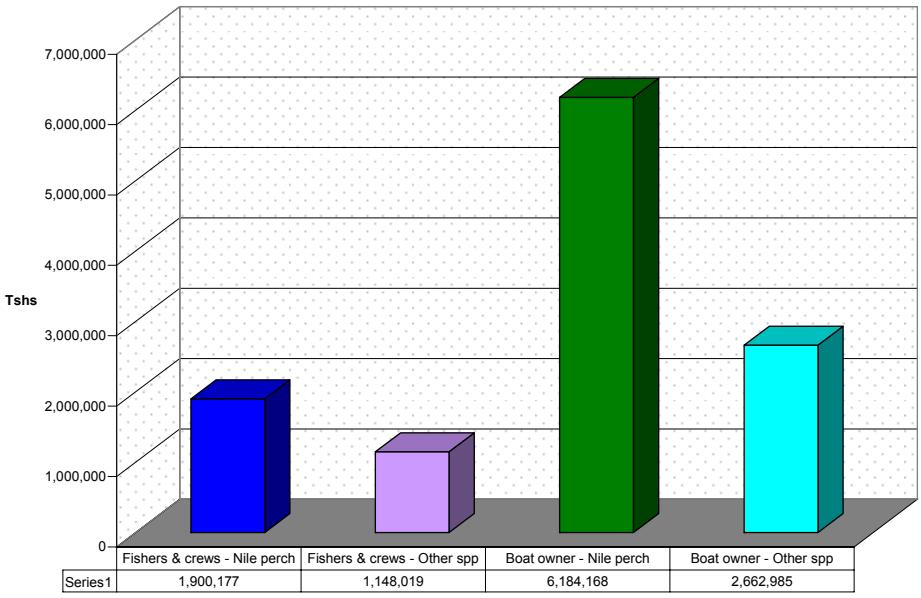


Figure 13: Net annual household incomes for fishers/crews and boat owners

Table 16: Annual incomes for different actors in the Nile perch and other fishery value chains (Tshs)

Actor category	Fishery	Transfers	Crops	Livestock	Other Other Activities	Total Net Income	Fishery income % Total Fishery
Fishers & crews (*with* compliance scenario)	1,533,708	65,000	210,569	65,000	25,900	1,900,177	81
Fishers & crews (*without* compliance scenario)	800,949	75,010	199,560	60,000	12,500	1,148,019	70
Boat owner (*with* compliance scenario)	5,372,163	120,500	450,005	185,000	56,500	6,184,168	87
Boat owner (*without* compliance scenario)	1,832,820	234,090	363,060	190,000	43,015	2,662,985	69
Collectors with fish van (*with* compliance scenario)	12,402,108	0	650,950	205,000	237,890	13,495,948	92
Collectors with collector boat (*with* compliance scenario)	9,047,360	0	490,250	210,000	598,500	10,346,110	87
Small-scale shore bound collectors (*with* compliance scenario)	180,459	240,000	250,680	25,000	14,050	710,189	25
Processors – (*Kayabo*, *vibambara vya sangara*)	294,284	155,050	350,770	60,000	33,700	893,804	33
Processors - Other species	121,552	104,015	211,809	70,000	40,124	547,500	22
Factory agents (*with* compliance scenario)	16,374,982	0	750,505	250,901	143,570	17,519,958	93
Assistants of factory agents (*with* compliance scenario)	570,122	124,012	211,560	115,000	65,809	1,086,503	52
Traders – local markets (*without* compliance scenario)	379,016	120,450	390,501	170,000	96,890	1,156,857	33
Traders – interregional markets (*without* compliance scenario)	890,980	0	560,560	200,500	114,098	1,766,138	50
Service providers (e.g. cooks, accommodation, foods)	183,456	240,125	178,150	120,450	68,908	791,089	23
Mabondo collectors	78,684	110,234	120,505	51,981	30,768	392,172	20
Punki sellers	411,776	112,005	254,043	14,852	8,791	801,467	51

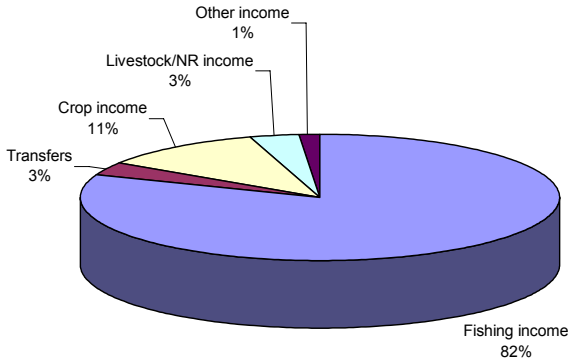


Figure 14: Income portfolio for Nile perch fishers and crews ("*with*" compliance scenario)

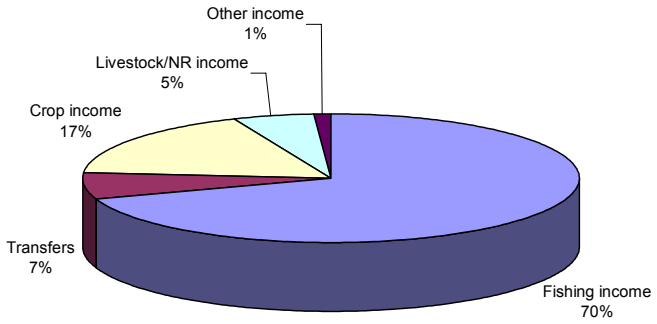


Figure 15: Income portfolio for fishers and crews of other fish species ("*without*" compliance scenario)

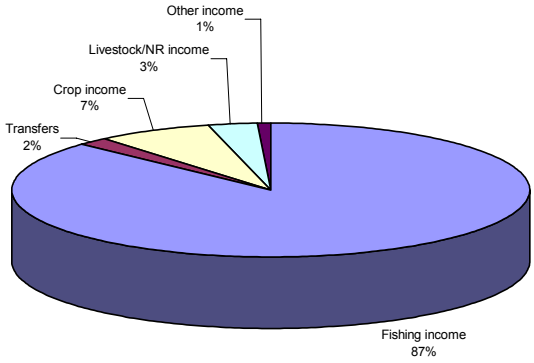


Figure 16: Income portfolio for boat owners who specialized in Nile perch ("*with*" compliance scenario)

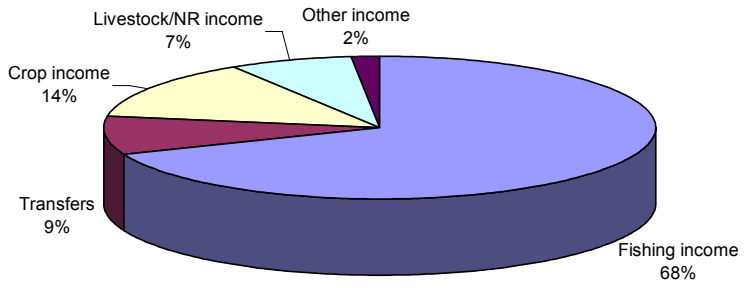


Figure 17: Income portfolio for boat owners who specialized in other species ("*without*" compliance scenario)

The annual total net incomes for all fishers and boat-owners on the Tanzanian side of Lake Victoria were estimated at Tshs 221.2; 29.0; and 2.4 billion (as total net incomes for all fishers / crews and boat owners specialized in Nile perch, other species and those who were non-specializing respectively) (Table 17).[31] This implies that overall the net benefits for fishers and boat-owners under the "*with*"-compliance scenario are substantially higher that those in the "*without*"-compliance scenario.

Table 17: Estimates of aggregate income per annum for fishers and boat-owners on the Tanzanian side of Lake Victoria

Target species	Number of Crafts	Annual Net Income (Billion Tshs)*		
		Fishers	Craft owners	Total
Nile perch (*with* compliance scenario)	25,313	85.02	136.16	221.19
Other species (*without* compliance scenario)	7,216	15.76	13.23	28.99
Nile perch & other species (Tilapines)	377	1.06	1.36	2.42
Total	32,906	101.85	150.75	252.60

*Exchange rate in 2006/07: 1 US$) = Tshs 1,200.

[31] The annual net incomes for fishers/crews and owners of fishing craft were estimated by extrapolating the primary data collected in this study and the results of the 2006 frame survey. The annual net incomes were estimated using the number of fishers/crews per boat of 3, obtained by dividing the number of fishers given by the Frame Survey National Working Group (2006) (i.e., 98,015) by the number of fishing craft (32,906). The average numbers of boats per owner as estimated in this study were 1.3, 1.1 and 1.2 for those specializing in Nile perch, other fishery species and those involved in both categories of fisheries respectively.

6.0 Synthesis and policy implications

This Working Paper presents an analysis of the effects of food-safety standards on the livelihoods of actors in the Nile perch value chain in Tanzania. The effects have been computed using the Livelihoods Analysis and Change in Net income (CNI) approach using the "*with*" and "*without*" compliance scenarios. The paper is intended to inform fisheries-related policies in the country and enrich the ongoing global debate on the effects of food-safety standards on the livelihoods of players in the Nile perch value chain (i.e. the generic debate on agro-food exports from developing countries, namely are they a "catalyst" or a "barrier" to entry into international markets?).

The empirical evidence in this study suggests that compliance with food-safety standards in the Nile perch value chain is generally expensive but also beneficial. While generally incurring higher operating costs, the actors in the Nile perch export value chain have earned higher gross revenues and net returns than their counterpart actors in other fishery value chains. In general, the former actors (under the "*with*"-compliance scenario) have obtained better prices than their counterpart actors in the alternative, "*without*"-compliance scenario.

The fishers and boat-owners in the "*with*"-compliance scenario have accrued residual revenues of Tshs 16,703 and 63,991 per week per actor respectively (i.e. extra net benefits above those accrued by fishers and boat-owners in the "*without*"-compliance scenario) ($P<0.01$). The mean differences in operating costs between the "*with"* and "*without"* compliance scenarios were estimated at Tshs 26,288 per week for fishers/crews ($P<0.05$) and Tshs 83,442 per week for boat-owners ($P<0.01$). As expected, the net values of assets and income portfolios for actors located upstream of the value chains (fishers and boat-owners) were generally lower than those of other actors in the subsequent stages. This was true for both the "*with*" and "*without*" compliance scenarios, implying a skewed distribution of the benefits accrued from fisheries or, put differently, a general discrimination against those actors operating upstream of the fisheries value chains in Tanzania. The higher operating costs and net income (revenues) for actors in the Nile perch value chain can largely be attributed to the residual effects of compliance with food-safety standards.

The analysis of livelihood assets also showed higher portfolios of fishing assets for actors in the "*with*"-compliance scenario than in the alternative, "*without"*-compliance scenario ($P<0.01$). When tested for significance difference using the T-test, the mean values of land-holdings were higher for fishers and boat-owners in the "*with*"-compliance scenario than in the "*without*"-compliance scenario ($P<0.05$). This implies that the former are in a relatively better position to build up their

fishing assets using the larger portfolios of land resource base they own than the latter actors ("*without*" compliance). However, the analysis of other livelihood assets (e.g. livestock holdings and human capital) showed mixed results. The mean difference in livestock holdings between boat-owners in the two scenarios was insignificant at $P<0.10$, but that of fishers and crews was significant ($P<0.05$). This implies that livestock ownership, although important, could not feature as the main factor determining the differences in asset portfolios between boat-owners under the "*with*" and "*without*" compliance scenarios.

The differences in human capital between the two scenarios were significant for boat-owners ($P<0.01$) but insignificant for fishers and crews ($P<0.05$).[32] The mean differences (residuals) for the values of other assets owned (e.g. furniture, farm equipments, car/motorbike, bicycles, radios, television sets and cooking utensils) were also insignificant for both fishers and boat-owners between the "*with*" and "*without*" compliance scenarios (at $P<0.10$ level).

In a nutshell, the Nile perch value chain in Tanzania provides higher returns to a myriad of actors in the fisheries industry, including the poor fishers and crews. Aside from fishermen/crews and boat-owners, the chain directly and indirectly supports the livelihoods of specialized industrial and artisanal fish-processors, traders and employees of other jobs created by fisheries (e.g., cooks and porters in the fishing camps). Other populations supported by the value chain include boat-builders, gear artisans (e.g. net-menders), transporters and other people who offered support services connected with Nile perch fishing (e.g. owners of kiosks, eating places, bars, tailors' premises and video halls). Moreover, the Nile perch value chain supports actors in the other fisheries chains by, for example, the processing and resale of Nile perch rejects and factory remains, plus a large number of service-providers in other fishery value chains. It is therefore worth supporting the development of the Nile perch value chain, while at the same time ensuring maximum sustainable yields, thus avoiding fish stock depletion and ensuring the integrity of Lake Victoria's ecosystem.

As Jaffee and Henson (2004) argue, the increasingly stringent food-safety standards can be a basis for competitive repositioning and enhanced performance. The key to this is the ability to upgrade capacity and make the necessary adjustments in the structure and operation of the Nile perch supply chain. Non-compliance with food-safety standards (e.g. the HACCP standards) may lead

[32] The differences in human capital were analysed using proxies of average years of schooling for household members aged 25 to 64 years, enrolment figures for members of the family aged 25 to 30 years and the household Adult Labour Equivalent (ALE).

to a sudden loss of export markets for Nile perch, which in turn may also cause significant impacts on the livelihoods of actors in the chain, as well as employees of other jobs created by the Nile perch value chain.[33] Some of the costs of compliance could be considered necessary investments, while an array of foreseeable and unforeseeable benefits might arise from the adoption of different technologies and management systems (*ibid.*).

Arguably, the strong "opportunity window" for ensuring sustainable benefits from the Nile perch value chain in Tanzania may improve the quality and product presentation. On one hand, this proposal can be seen as suggesting a complex reality in which close attention needs to be paid to the specifics of particular markets, products and importing countries to understand how changing food-safety standards are providing both challenges and opportunities in respect of increasing export markets for Nile perch.[34] On the other hand, however, this proposal also suggests the need to:

- Ensure more effective and coherent planning of the fishery resources in the country in order to safeguard the future of the sector,
- Ensure appropriate regulatory and monitoring mechanisms,[35]
- Strengthen the capacity of the stakeholders to manage the resource sustainably, particularly for actors operating upstream of the value chains, and

[33] The 1998/98 EU embargo is a case in point, which had several micro- and macroeconomic repercussions for Tanzania and other riparian states on Lake Victoria (Uganda and Tanzania), which reverberated back down the chain to devastate the livelihoods of both fisherfolk and workers in other jobs created by the Nile perch fishery industry.

[34] Obviously resources are limited, and implementing this proposal may prove costly.

[35] To meet the challenges posed by food-safety standards in international markets, developing counties need institutional frameworks to help them overcome the problems associated with being poor or small (Jaffee and Henson, 2004). Administrative and technical capacities for food-safety management are embodied in institutional structures and procedures, physical infrastructure and human capital. It is frequently assumed that managing food safety is predominantly a public sector responsibility (Jaffee and Henson, 2004). While some crucial regulatory, research and management functions are normally carried out by governments, the private sector also has important roles to play (*ibid.*). Although many countries have struggled to meet ever stricter standards, even some very poor countries have managed to implement the necessary capacity. This has most commonly occurred where the private sector is well organized and the public sector is well focused and supports the efforts of exporters. By thinking strategically, countries, producers and exporters can programme capacity-enhancement into wider and longer term efforts to enhance conformity with food-safety standards and export competitiveness (*ibid.*).

- Increase collaboration among the riparian states of Lake Victoria and improve the capacity of local organisations to manage fishery resources effectively. Development partners can also contribute by increasing collaboration and harmonization among supported interventions and promoting the involvement of stakeholders in the development and implementation of policy and programmes. In addition to supporting the modern fish export industry, the government and development partners should discuss and agree how income, employment and food security can be ensured for the great majority of poor people who are dependent on fisheries for their livelihoods.

APPENDIX 1: FISHERIES IN THE TANZANIAN ECONOMY

The fisheries industry

The fisheries industry in Tanzania plays an important role in supporting the livelihoods of approximately 150,000 artisan fishermen and women, as well as their households (World Bank, 2005).[36] Small-scale artisan fishers using traditional methods account for around 99 percent of the nation's total fish catch (*ibid.*). On the Tanzania mainland, fisheries made up 2.7 percent of GDP (2001).[37] The sector accounts for an estimated 30 percent of the country's supply of animal protein (FAO, 2001). For the lowest-income segments of the population, fish is generally the major animal protein consumed because of the price of some of the cheaper fish products, in particular dried *dagaa*, in relation to meat and poultry. In areas lying along major lakes and rivers, fish assumes an even more predominant food-security role for local inhabitants.

Furthermore, artisanal fishing provides opportunities for annual earnings well above national averages for the agriculture sector. Fisheries work offers at least some chance for gainful employment in many rural localities, especially where other forms of work are difficult to find or are insufficient to generate enough earnings to meet household needs.

The fisheries industry in Tanzania can be categorised as constituting three major types of fisheries: the marine fisheries, inland fisheries and aquaculture.[38] The marine fishing activity is generally concentrated inshore and around the islands of Zanzibar, Pemba and Mafia. Various estimates place the number of full-time coastal marine fishers in the 10,000–15,000 range,

[36] With the boom in the shrimp fishery along the southern coast from the late 1980s, and especially with the boom in Nile perch catches in Lake Victoria beginning at around the same time, the industry has become linked with international markets and has therefore assumed a more visible role in the Tanzanian economy in general. It has been estimated that the export trade for Nile perch fillets alone had reached the US$ 50 million range by the mid-1990s (FAO, 2001).

[37] System Science Consultants (2002).

[38] However, aquaculture has not lived up to expectations. An estimated 8,000 to 10,000 ponds had been constructed by 1963, representing a total surface area of up to about 1,000 ha and a total potential production of perhaps 2,000 T / yr (FAO, 2001). The number of functional ponds fell to less than 2,000 by the mid-1970s and to less than 1,000 by the mid-1980s. FAO statistical reports indicate that aquaculture harvests of Tilapia reached a high of 400 T in 1991, but have since fallen off to the 200–250 T/yr level (1996/97).

operating with some 4,000 to 5,000 small craft (FAO, 2001). Fishing craft are primarily *ngalawa* (outrigger canoes) or small dhow-type planked boats (*mashua*), and are mostly propelled by sail.

Inland waters cover about 6.5 percent of the total land area, and their combined production in recent years has accounted for between 80 and 90 percent of the national total for capture fisheries (FAO, 2001). The inland fisheries provide direct employment for perhaps about 200,000 artisanal and subsistence operators, who deploy gillnets, lift nets, beach seines, longlines, traps and pole-and-line for a wide range of species, including Nile perch, Tilapia, small pelagic *dagaa* and catfish (*ibid.*). An estimated 25,000 small craft, mainly traditional dugouts and planked canoes, make up the national inland fishery fleet.

Numerous rivers are found within the country's drainage basins. The major rivers flowing into the Indian Ocean include the Rufiji (640 km in length and one of Africa's largest rivers) and its principal tributary, the Great Ruaha (*Ruaha Mkuu*) River, draining the southern highlands. The Ruvuma River (640 km) drains the highland area northeast of Lake Nyasa and forms the border between Tanzania and Mozambique for much of its length. The Pangani River (360 km) drains the northern highlands and the southern slopes of Mt. Kilimanjaro. The Malagarasi River (560 km) is the principal river of the Lake Tanganyika basin, and includes important swamp areas in its middle reaches. Other and smaller rivers are associated with the Lake Victoria basin (e.g., the Kagera and the Mara Rivers) or the interior drainage, including the Lake Rukwa basin and drainages of the Rift Valley and Maasai Steppe.

The balance of Tanzania's inland water resources, apart from the three Great Lakes, comprises the comparatively large Lake Rukwa (2,300 km^2) and many minor or seasonal lakes, swamps and floodplains. Numerous water-conservation and flood-control reservoirs have also been stocked with fish. While these various rivers, minor lakes, swamps and reservoirs host small but locally important commercial or subsistence fisheries, some 86 percent of Tanzania's inland waters are contained in the Great Lakes of Victoria, Tanganyika and Malawi (Nyasa). All three lakes host remarkably diverse assemblies of fish and other aquatic life. Their waters, with the particularly heavy contribution of Lake Victoria, provide the bulk of Tanzania's inland fisheries production.

Lake Victoria, covering some 68,000 km^2, is shared between Tanzania (49 percent), Uganda (45 percent) and Kenya (6 percent), and is the second largest body of freshwater in the world by area (after Lake Superior). It supports by far the most important of the African Great Lakes fisheries, owing to the tremendous upsurge in harvests of Nile perch (*Lates niloticus* – introduced to the lacustrine ecosystem in the late 1950s) from around the mid-1980s. Reports indicate that Tanzanian landings of Nile perch from the lake increased from about 43,000 T in 1985 to a peak of

nearly 180,000 T in 1990, before falling off to about 152,000 T in 1997 (FAO/FISHSTAT estimates). For more than a decade (since 1993), the annual Nile perch catch has comprised around half of total annual inland production in the country. The boom in the Nile perch fishery has been accompanied by a number of dramatic developments. The 1960s and 1970s were marked by a relative stagnation in reported catch, at around the 100,000 T/yr level, composed mainly of Tilapines (15 - 20 percent), haplochromines (30 - 40 percent), the small pelagic 'sardine' or *dagaa* (*Rastrineobola argentea*) (10 - 20 percent), the catfish *Bagrus docmac* (10 percent) and the lungfish *Protopterusaethiopicus* (5 - 10 percent), along with other species of the genera *Clarias*, *Barbus*, *Synodontis*, *Momyrus* and *Labeo* (collectively 10 percent). Today there are three commercially important species: Nile perch, *dagaa* and the Tilapia, which constitute 60 percent, 20 percent and 10 percent respectively of Tanzania's total Lake Victoria landings (Ssentongo and JIhuliya, 2000).

In the 1980s, Nile perch began to show a dramatic rise in both absolute and relative quantities, accounting for upwards of 60 percent of the total 500,000 T annual harvest from the lake late in the decade (FAO, 2001). This same interval was marked by a fall in haplochromine catches to only negligible levels. It was also marked by varying degrees of decline in the catches of other common target species, with the notable exceptions of the native small pelagic *dagaa* (*R. argentea*) and the exotic Nile Tilapia (*Oreochromis niloticus*). From a harvest point of view, therefore, lake-wide by 1990 the fisheries had been transformed from a complex multispecies array to a much simplified one based largely on two exotic and one endemic species (*ibid.*). The significant expansion of the *dagaa* fishery is of particular note. Some observers have suggested that stocks of this cyprinid have increased in absolute terms, along with those of the freshwater benthic shrimp *Caridina niloticus*, as part of a wider process of ecosystem adjustment (*ibid.*). The *dagaa* now has a commercial importance second only to Nile perch, and it is widely fished and traded, both within and beyond the lake basin.

Lake Tanganyika covers some 32,900 km^2, shared between Tanzania (41 percent), the Democratic Republic of Congo (45 percent), Zambia (6 percent) and Burundi (8 percent). It is the second-deepest lake in the world (after Lake Baikal), with a mean depth of 570 m. Fishing intensified considerably over the course of the twentieth century in association with the dramatic expansion of human population and settlements around the lake and the introduction of various technical innovations, such as paraffin-oil (kerosene) pressure lamps for night-fishing, synthetic netting material and motorized craft. Modern harvest operations primarily exploit six endemic non-cichlid pelagic species. These include the two schooling clupeid 'sardines' (locally known as *dagaa*), *Limnothrissa miodon* and *Stolothrissa tanganicae*, together with their major predators, all centropomids of the genus *Lates*, namely *L. stappersii*, *L. angustifrons*, *L. mariae* and *L. microlepis*. Of the *Lates* species, the latter three are incidental to the catch: the lake's commercial fishery is essentially

based on the two clupeids (ca. 65 percent by weight) and *L. stappersii* (ca. 30 percent by weight). Lake-wide annual harvest levels in recent years have been estimated to be in the range of 165,000 to 200,000 T – volumes that translate into annual earnings of the order of tens of millions of US dollars. Tanzania's share of the total lake-wide catch in 1995 was around 31 percent or 55,000 T (FAO, 2001).

Lake Malawi (Nyasa) shares many of the features of Lake Tanganyika in being very large in area (30,800 km^2), long (600 km) and deep (758 m maximum; 426 m mean). It is a Rift Valley lake containing a richly diverse assembly of more than 1000 species of fish. Estimates given in FAO (2001) suggest that annual global production for the lake in recent decades has ranged between highs of 55,000–75,000 T (1970–1975; 1984–1990) and lows of 25,000–45,000 T (1976–1983). During the late 1980s and early 1990s, nominal Tanzanian landings were in the range of 20,000–40,000 T. However, a lack of adequate gear and craft is known to be a severely limiting factor for the fishery along the Tanzanian shore. The main reported catches from Lake Malawi/Nyasa consist of *Haplochromis spp.* for the inshore areas and *Engraulicypris sardella* for the open waters.

Available figures (late 1980s) indicate that the gear kit of the Tanzanian-based fishery was principally gillnets, and some 2,400 planked canoes and dugouts and about 5,500 artisanal and subsistence operators were also to be found (FAO, 2001). Scoop nets, beach seines, boat seines and basket traps are reported as other types of gear in use.

Fish exports

The world market share of Tanzania's fish exports, though low, has been experiencing significant increases, rising almost twenty-fold from USD 8.1 million in 1990 to USD 154 million in 2003 (World Bank, 2005). In 2003, fish exports made up 15 percent of the country's total merchandise exports, making them the second largest export commodity after gold (*ibid.*). In this respect, Tanzania has performed substantially better than Kenya, whose world market share of fish exports has risen only modestly from 0.09 percent to 0.15 percent, and it has also surpassed that of Uganda, whose world market share has risen from 0 to 0.14 percent (*ibid.*).[39]

[39] Among developing countries, China is emerging as the dominant player, with its fish exports nearly doubling from 4.7 percent in 1990 to 8.8 percent in 2003 of the world market, making it the largest fish exporter in the world (World Bank, 2005).

There is particularly strong world market demand for the two main Tanzanian fish exports (i.e. Nile perch and shrimp), for which world demand continues to exceed world supply.[40] However, Nile perch is Tanzania's major fish export by far. The export of Nile perch fillet amounted to $81 million in 2003, constituting over 80 percent of all fish exports in the country (World Bank, 2005). Nile perch was developed as a "table fish" substitute for cod in the northern hemisphere market in the second half of the 1990s, and today it is a highly valued premium-priced table fish in Europe, the former Soviet Union, North America and Japan (*ibid.*).[41]

Shown in Figure 18 is the trend in quantities of Nile perch fillets exported to the EU from the three riparian states of Lake Victoria for the period 1997–2005. The respective values of Nile perch fillet exports are shown in Figure 19.

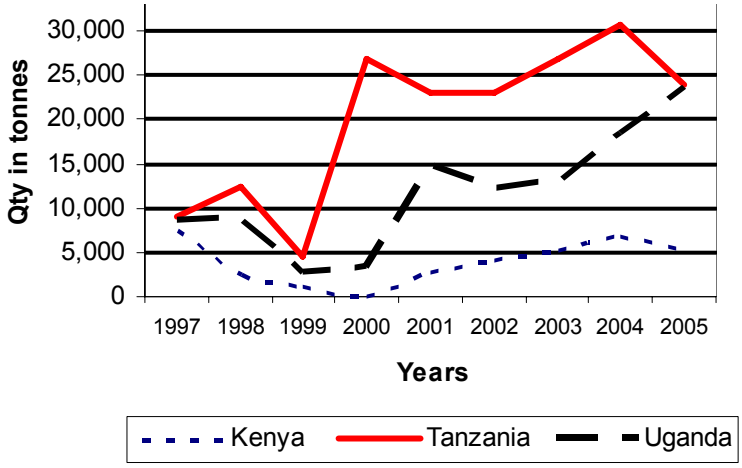


Figure 18: Nile perch exports from the Lake Victoria's riparian states to the EU countries
(Source: Eurostat)

[40] There is also a strong demand for the rest of Tanzania's fish exports (lobsters, crabs, octopuses), which generally fall into the highest end of the international fish market and whose markets are supply-constrained (World Bank, 2005). But it is quite difficult at the moment to foresee the future of this market given the emergence of fish-farming (particularly of Nile perch) in countries like Vietnam and China.

[41] However, Tanzania enjoys less of a competitive advantage in shrimps vis-à-vis other producers such as Egypt, Madagascar, Mozambique than it does in the Nile perch market.

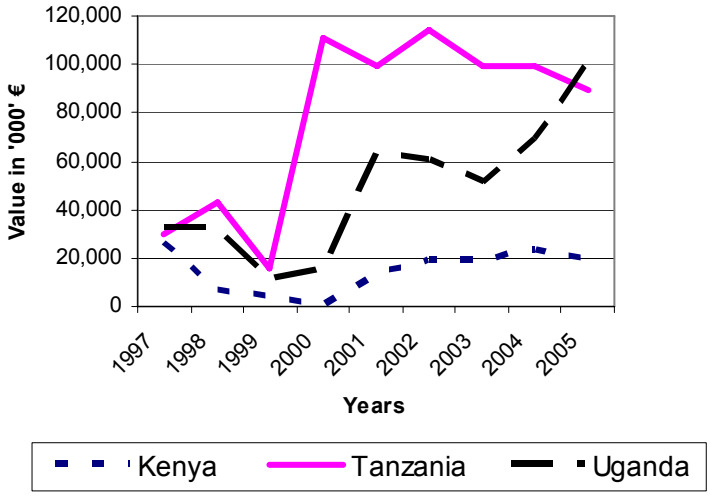


Figure 19: Value of Nile perch exports to the EU by main exporting countries ('000'€)
(Source: Eurostat)

Among the three riparian states of Lake Victoria, Tanzania has recorded the highest exports, followed closely by Uganda. In 1999, however, exports of Nile perch fillets declined by 65 percent as compared to the previous year. This was mainly attributed to the EU export ban. In 2000, one year after the EU ban, Nile perch exports increased by over 400 percent compared to those in 1999. The highest export peak was recorded in 2004 but declined again in 2005. Leading the East African exports of Nile perch since 1997, in 2005 Tanzania exported fillets worth 89,723 million Euros, while Uganda exported fillets worth over 101,318 million Euros.[42]

A number of factors are attributed to the development of the Nile perch export industry in Tanzania.[43] Among others, these include the provision of several forms of investment incentives in Tanzania to the industry to build plants and facilities within the country, such as tax holidays, remission of import duties and sales taxes on capital equipment, 100 percent foreign exchange retention, and automatic access to leases on land for intended investment sites (World Bank, 2005). Consequently, much of Tanzania's production capacity is currently quite modern. The upgrading of the fishing fleet of artisan fishermen, which since 1995 has been designated by law as the only source of freshwater fish for factory operators, is also seen as a major factor (*ibid.*).

[42] The reason for the decline in Nile perch exports from Tanzania in 2005 is not known with certainty, but it can be described as a natural phenomenon attributed mainly to the complexity of the dynamics of the fishery stock (biological growth) and harvesting efforts – in other words, a result of interactions between the biotic and abiotic components of Lake Victoria's ecosystem.

[43] See World Bank 2005 for a detailed discussion of these factors.

The number of landing sites, commercial fishermen and essential support facilities required by the fishing industry increased accordingly.

Processing and export industries were established in Kenya and Uganda during the 1980s and in Tanzania in the early 1990s. Although the industrial processing sector in Tanzania was extremely profitable in the early to mid-1990s when the first facilities were established, today the sector is characterized by significant levels of structural over-capacity: most facilities are currently operating at less than 50 percent of capacity (Table 18).

Table 18: Installed capacity and current production in the Nile perch industrial processing sector in Tanzania

Factory	Installed capacity (T/day)	Current production (T/day)	Current production % installed capacity
Omega Fish Ltd.	70	25	36
Mara Fish Packers Ltd	50	20	40
Prime Catch Ltd	100	30	30
Tanzania Fish Processors Ltd	120	90	75
Vic-Fish Ltd	140	60	43
Nile Perch Fisheries Ltd	100	70	70
Tan Perch Ltd	120	12	10
Mwanza Fishing Industries Ltd	60	40	67
Chain Food International Ltd	15	5	33
Musoma Fish Processors	60	25	42
Kagera Fish Company Ltd	20	5	25
Victoria Fisheries Ltd	Closed		

Europe has traditionally been, and continues to be, Tanzania's main fish export market (Table 19), taking 80 percent of Tanzanian fish exports in 2003, which also represented a major recovery from the EU embargo in 1999 (World Bank, 2005), when Tanzanian fish exports to that market fell by one-third in dollar terms. The second fish export destination is East Asia (Hong Kong, Japan and Singapore), which took 10 percent of Tanzanian fish exports in 2003. Other export destinations include the U.S. and Mexico, Israel and Australia. In 2004, Tanzania's primary competitor in the fresh and frozen freshwater segments (Vietnam) was itself embargoed by the EU when traces of antibiotics were found, and they continue to be present in Vietnamese farmed fish.

Table 19: Tanzania's fish export destinations (US $ m)

Destination	1990	1995	1999	2000	2001	2002	2003
Europe							
Netherlands	20	9,311	4,726	29,374	18,051	32,087	38,265
Belgium-Luxembourg	365	441	4,970	65,776	62,056	38,961	27,552
Spain	1,696	6,407	7,362	8,824	10,301	8,157	12,914
France	1,029	1,026	1,726	7,358	10,444	11,005	12,014
Germany	169	681	1,312	1,587	3,354	5,142	10,711
Greece	72	2,618	1,408	4,230	4,706	5,688	8,195
Italy	163	322	1,340	2,137	3,070	8,889	7,305
Portugal	2,151	6,934	4,138	8,255	4,933	4,492	6,474
East Asia							
Hong Kong, China	823	2,420	3,478	6,170	6,828	7,353	8,590
Japan	0	7,880	15,304	7,761	7,869	9,045	4,210
Singapore	630	1,335	1,638	861	1,197	1,522	2,183
United States	40	1,904	8,109	3,356	5,213	5,462	4,730
Israel	0	2,060	1,172	160	2,539	4,794	3,050
Australia	0	1,280	2,533	1,533	3,592	3,051	1,751
Mexico	0	0	9	76	56	322	1,392
World	8,111	49,907	66,731	154,185	150,545	148,963	154,456

Source: World Bank (2005).

About 50-60 percent of total factory output of processed fish is sold chilled primarily on a fob basis at Mwanza International Airport, and air-freighted to the Netherlands, Ukraine and Belgium, as well as to Israel and Japan. An average of five heavy-lift cargo planes per week land at the airport in Mwanza from the Netherlands, Belgium and Ukraine (*ibid.*). The remaining 40-50 percent is sold frozen on both fob and cif bases at Dar es Salaam or Mombassa, and exported generally by sea freight to the USA, Australia, South Africa, Malaysia, Hong Kong and the EU (*ibid.*).

APPENDIX 2: FISHERIES POLICY AND LIVELIHOODS

A need for a Fisheries Sector Policy statement in Tanzania was felt in the mid-1980s, at a time when the country had embarked on policy and institutional reforms in order to revamp the national economy and improve the livelihoods of the poor. A series of stakeholder workshops that followed in 1988 and 1991, together with the 1992 Rio Declaration on Environment and Development (contained in the Agenda 21), expanded the scope of the fisheries policy, which was adopted in December 1997. The fisheries policy statement focuses on the promotion of the sustainable exploitation, utilization and marketing of fishery resources to provide food, income, employment and foreign exchange earnings. The overall goal is to promote the conservation, development and sustainable management of fishery resources for the benefit of present and future generations.

The main policy strategies are:

- To institute an effective mechanism for monitoring fishing activities, especially in deep-water fishing, for export to minimize unrecorded exports and to ensure that appropriate government revenue is collected,
- To establish conservation centres in all lake and sea waters and ensure effectiveness in maintaining quality and managing the natural ecosystems,
- To strengthen research and extension services for fishermen, and
- To improve infrastructure for the handling, processing, packaging, preservation, storage and marketing of fish.

The government has therefore been working hard to improve the fisheries industry (e.g. through the construction of improved infrastructure, reduction of post-harvest losses and fisheries management), focusing mainly on the following four targets of fisheries development:

- Increased supply source of protein to the people and increased employment opportunities,
- Increased export of fish products,
- Activation, upgrading and development of fisheries industry through the sustainable use of fisheries resources, and
- Increased fish production and income for artisanal fishers.

The National Fisheries Sector Policy is supported by a number of other documents and instruments.[44] Of paramount importance is perhaps the Fisheries Master Plan (2002), which aims to operationalize the fisheries policy and strategy statement (1998). The ultimate goal is to develop a feasible and integrated development strategy that will stimulate the sustainable economic growth of the sector in terms of food security and the fisheries environment, as well as the socioeconomic welfare of those involved in the sector, including artisanal fishers, fishing craft owners and operators, as well as fish processors and traders. The master plan identifies the following fifteen priority programmes for achieving this goal:

- The Marine Fisheries Sub-sector Capacity Building Programme,
- The Dar es Salaam Fisheries Infrastructure Improvement Programme,
- The Lake Victoria Fisheries Sub-sector Capacity Building Programme,
- The Lake Victoria Fish Marketing Improvement Programme,
- The Lake Tanganyika *Dagaa* Fisheries Development Programme,
- The Lake Nyasa Planked Canoe Extension Programme,
- The Aquaculture Extension Programme,
- The Fisheries Financial Support Programme,
- The Fisheries Co-management Programme,
- The National Fish Export Promotion Programme,
- The Lake Victoria Major Landing Beach Improvement Programme,
- The Fisheries Communities Development Programme,
- The Fisheries Information System Improvement Programme,
- The Fishing Training Institute Improvement Programme, and
- The Fisheries Master Plan Implementation Training Programme.

[44] Other instruments include the Fisheries Act (1970), which is the major legal instrument for the current fisheries policy, the Territorial Sea and Exclusive Economic Zone Act (1989), the Tanzania Fisheries Research Institute Act (1980) and the Marine Parks and Reserves Act (1994), to mention just a few. Most of these, however, need to be revised and the subsidiary legislation updated.

APPENDIX 3: REGULATORY FRAMEWORK ON FISH-SAFETY STANDARDS IN TANZANIA

As an export-oriented value chain, the Nile perch fishery in Tanzania is subject to a number of regulatory and customer requirements, both domestically and in major export markets. The basic requirements for fishing, cross-border trade, processing and marketing are summarized in Box 1.[45] The quality-control system for fish currently operating in Tanzania is the result of adjustments made in the late 1990s and early 2000s in response to three import bans placed by the EU on Tanzania as well as Kenya and Uganda between 1997 and 2000 (see the summary of bans in Box 2).

The first import ban took place in 1997 as a result of reported instances of high bacterial contamination in some Nile perch exports from Lake Victoria to Spain and Italy, including *salmonella*, and was limited to these two countries. The second was imposed for seven months in 1997/98 as a result of an outbreak of cholera in the three riparian countries (plus Mozambique). Based on the results of the border inspections and detection of salmonella in consignments of Nile perch, the EU introduced a requirement for the testing of all consignments of frozen fish from Tanzania, Kenya, Uganda and Mozambique for salmonella, *Vibro cholerae* and *Vibrio parahaemoliticus* in December 1997, which were rescinded on 30th June 1998. Instead, the so-called Competent Authority in Tanzania and the other countries was required to provide a declaration with each consignment (as part of the standard veterinary health certificate) that all persons handling fish and fishery products had undergone medical checks.

The third and longest ban lasted from April 1999 to January 2000. Exports of fresh fish and frozen Nile perch from Tanzania and Kenya were prohibited as a result of a suspected case of fish poisoning by pesticide identified in Uganda. In Tanzania, the ban was lifted on 31 January following EU inspections towards the end of 1999 and implementation of a comprehensive plan that met EU standards. However, the lifting was subject to a declaration in the standard veterinary health certificate that the product had been produced under monitoring checks for environmental contaminants such as pesticides

[45] The regulatory and customer requirements in major export markets (e.g. European Union, Japan, Australia and United States) are discussed in detail by Ponte (2005), Globefish (2000), Mortimore and Wallace (2000); and Henson and Mitullah (2004).

Box 1: Some requirements for the fisheries industry in Tanzania

Fishing

i) No foreign fishing vessels shall enter territorial waters for any purpose unless such entry is authorised by Director of Fisheries (*Part IV Section 30 of The Fisheries Principal Regulations, 1989*).
ii) No foreign fishing vessel shall enter the territorial waters with the intention of fishing either by change of ownership or change of vessel flag without prior consent in writing by the Director of Fisheries (*Government Notice No. 189 of 6th June 1997*).
iii) No person can fish in the gazetted breeding grounds of Lake Victoria during the closed period (1st January to 30th June each year) except if they use handlines with hooks of size 8, 9, 10, 11 or scoop-nets (*The Fisheries [Inland waters] Regulations of 1981 and Government Notice No. 624 of 9th October 1999*).
iv) It is illegal to use the following fishing gears and methods: beach seine, trawl nets, splashing methods locally known as "*Katuli*", gill net of less than 5" mesh sizes (The new proposed bill, recommends a minimum size of 6") and a mesh size of less than 10mm for the *dagaa* fishery (*Government Notice No. 37 of 7th October 1994*).
v) No person is allowed to use monofilament nets, harpoon guns and spears for fishing except where authorized to do so by the Director of Fisheries (*Government Notice No. 317 of 15th September 1989*).
vi) No person shall land his/her catch in areas other than designated fish landing stations (*Government Notice No. 6 of 22nd January 1982*).
vii) It is an offence to use poison, dynamite or electric devices for fishing (*Part IV Section 26 of The Fisheries Principal Regulations, 1989*).
viii) No fish establishment owners shall carry out fishing activities in Lake Victoria (*Part V Section 22 [3] in the new proposed Bill*).

Fisheries Licensing

i) No person is allowed to engage in fishing without a fishing license and all fishing vessels must be registered (*Part II Section 3 [3] of The Fisheries Principal Regulations, 1989*).
ii) It is an offence for a fisherman to fish without a fishing licence. Fishing licenses for small-scale fishers are obtained from the District Fisheries Officers who may delegate licensing power to any other authorized officer working in the same district. The registration is done for one year but the licensing period remains in force until 31st December (*Part III Section 13 [1] and Section 17 [1] of The Fisheries Principal Regulations, 1989*).
iii) The Director of Fisheries may refuse or suspend a license if s/he finds that the holder of such a licence has violated or failed to comply with any of the conditions or restrictions attached to or imposed on the licence or permit (*Part III Section 16 of The Fisheries Principal Regulations, 1989*).

Cross border fish trade

i) No one is allowed to engage in export of fish or fish products without having a valid export licence from Director of Fisheries (*Part III Section 13 [1] of The Fisheries Principal Regulations, 1989*).
ii) Movement of fish from Tanzania by road or boat is allowed, provided one has a valid export licence from Director of Fisheries (*Draft New Fisheries Act 2003*).
iii) No one is allowed to import or export live fish or weed without a written permission from the Director of Fisheries (*Part IV Section 23 of The Fisheries Principal Regulations, 1989*).

Fish processing and marketing

i) No one is allowed to engage in the processing of fish or fish products without a valid processing licence from the Director of Fisheries (*Director of Fisheries [General] Regulations, 1973 and Government Notice No. 138, 27th June 19759*).

Offences and penalties

i) Any person found in possession of poison to kill fish is committing an offence and upon conviction shall be liable to a fine of not less than million shillings or imprisonment of not less than seven years or both such fine and imprisonment (*Part IX Section 47, Draft New Fisheries Act, 2003*).

Authorized officers

The enforcement of the above mentioned regulations including patrolling the border, are implemented by Fisheries Staff authorized by the Director of Fisheries; Police; Immigration officer; and/or Customs officers.

Source: Extracted from IUCN/LVFO (undated).

Box 2: Chronology of EU fish import bans

- February 1997 – Spain and Italy claim that their authorities have detected high levels of bacterial contamination (including *salmonella*) in products from Lake Victoria: they impose a bilateral ban on fishery product imports
- March 1997 – EU inspection confirms 'serious microbiological contamination'
- April 1997 – EU requires mandatory tests for salmonella on imports of Nile perch from the three East African countries; these tests are paid by exporters or importers
- December 1997 – June 1998 – following an outbreak of cholera in East Africa, the EU bans the import of fresh fish and imposes mandatory tests on frozen fish from East Africa; lifted because it was not based on scientific evidence, but on EU claims that the competent authorities were not applying sufficient measures to control the outbreak of cholera (Waniala 2002:2)
- April 1999 – EU holds a meeting in Brussels with representatives of competent authorities from Uganda, Kenya and Tanzania to discuss the results of tests; the EU announces a ban of exports of fresh and frozen fish from the three countries.
- October 1999 – EU mission to assess resources and capabilities of competent authority in Tanzania in relation to control of pesticide residues heavy metal levels in fish, water and sediments on the lake.
- January 2000 – ban lifted as the EU accepts that Tanzania had put in required guarantees for safety of exports; country qualifies for certification in category A.

Source: Adapted and expanded from Waniala (2002). See also Ponte (2005), and the World Bank (2005) for a detailed discussion of these bans.

In Uganda and Kenya, the bans were lifted on 4th August 2000 and 1st December 2000 respectively. After lifting the third ban, Tanzania was placed in Category A. Fish and fishery products from countries in this category go straight to the market without being re-inspected.

However, the EU prohibition on exports of fresh fish from these East African countries received widespread criticism, especially from the World Health Organization (WHO), on grounds that the risk of cholera transmission was very small and could be dealt with by means other than an embargo on imports. The WHO suggested that it would have been better for the EU to deal with its concerns through agreements on good hygienic practice for the handling and processing of fish aimed at preventing, eliminating or minimising the risk of any potential contamination. The EU responded that the inspections it had undertaken of food-safety controls in these countries had identified significant deficiencies, but also that once proper safeguards and modifications had been put in place, the EU would accept these procedures as an alternative to the ban on imports of fresh fish and the border testing of frozen fish (WTO, 1998).

In November 2002, the EU threatened to ban fresh fish imports from Tanzania if a new bill on food and drugs was passed by the Tanzanian parliament. The bill sought to place fish-processing, control and safety-assurance procedures under the supervision and monitoring of two different authorities, the newly formed Tanzania Food and Drugs Authority (TFDA), and the Fisheries Department (FD) within the Ministry of Natural Resources and Tourism (MNRT). The EU

standing Veterinary Committee considered the move a 'stumbling block' to recent achievements in quality control and safety assurance for fish, which started in 1998. The European Commission (EC) recommended FD as the competent authority to oversee fishing activities in the country.[46] Consequently an agreement was reached to give the FD the sole mandate for regulating all matters relating to the quality of fish and fishery products. The TFDA, which has the mandate to regulate all matters relating to the quality and safety of food, drugs, herbal drugs, medical devises, poisons and cosmetics, was excluded from regulating food quality standards (The Tanzania Food, Drugs and Cosmetics Act, 2003).

The operations of the FD are legally based on the Fisheries Act of 1970. The act stipulates the rules and regulations governing the sector in all the water bodies in Tanzania. However, in 2000, the Government passed an Act on fish quality control standards, which was reviewed in 2004. This is a specific Act dealing with the quality and safety of fish from source to market.[47]

The Fish Quality Control and Standards Regulations, 2000 (revised in 2004) regulate inspections in detail, including the approval of establishments and official landing sites. They also prescribe the application of HACCP systems, good hygiene and manufacturing practices, conditions for storage, transport and packaging, and set modalities for issuing sanitary certificates for export.[48]

[46] The EC undertakes checks to ensure that the Competent Authority undertakes its tasks in a satisfactory manner and to ensure that provisions of the Directive are complied with. Imports from developing countries are required to comply with requirements that are at least equivalent to those of the EU. Furthermore, specific import conditions are established according to the particular health situation of that country. In most cases, the Commission undertakes periodic inspections for the purpose of determining local health conditions and establishing specific import conditions for the country concerned. Only establishments approved by the Competent Authority are permitted to export to the EU. The Competent Authority provides the EC with a list of approved establishments, and this is subsequently published in the Official Journal of the European Communities. Countries for which the EC has approved local requirements as being at least equivalent to those in the EU and for which specific import requirements have been established are subject to reduced physical inspection at the border.

[47] The Act was passed after the EU inspection of fish quality and assessment of the quality control bodies involved, such as the Nyegezi laboratory, the Tanzania Bureau of Standards (TBS) and the Tanzania Food and Drug Agency (TFDA).

[48] EU legislation lays down detailed requirements regarding the landing of fish, the structure of wholesale and auction markets and processing facilities (e.g., the construction of walls and floors, lighting, refrigeration, ventilation, staff hygiene etc.), processing operations, transportation, storage, packaging, checks on finished products, laboratories and water quality (Henson and Mitullah, 2004). More generally, the legislation requires that fish-processing facilities undertake their 'own checks', broadly based on the principle of HACCP. The phrase 'own checks' refers to all actions aimed at ensuring and demonstrating compliance with the standards laid down by EU legislation.

Under these rules, three main regulatory instruments have been created: (a) Standard Operating Procedures to guarantee the quality and safety of fish and fishery products; (b) Procedures for Inspections of Fish for Export; and (c) a programme for monitoring residues and trace elements in water, sediments and fish.

The joint industry-government response to the EU ban of Lake Victoria fish in 1999 had also provided a further stimulus to the industry. During that crisis period, through its two trade associations (the Tanzania Fish Processors Association or TFPA, which represents processors of marine products based mainly around Dar es Salaam, and the Lake Victoria Fish Processors Association of Tanzania or LVFPAT, which represents processors of Nile perch), the private sector has worked effectively with the Tanzanian Bureau of Standards (the designated certificating agency with respect to food safety) and the DF to comply fully and quickly with EU food-security certification requirements.

These two associations have proved notably successful in influencing public policy, including those pertaining to the Sanitary and Phyto-sanitary (SPS), improving the industry's business climate and assuring that the services provided by third parties were responsive to the industry's needs. Tanzania's response to the EU ban has therefore resulted in a growth spurt which gives the Tanzanian-based industry a lead over both its Ugandan and Kenyan counterparts. The existing institutional arrangements have played a key role towards this achievement. Since the FD has been the designated authority responsible for all aspects of the management of the fish and fishery products sector in Tanzania (including fish quality and safety) since 1970, compliance with EU requirements did not involve substantial organizational reforms, especially in respect of the designation and operation of a Competent Authority. In addition, the strengthening of safety and quality capacity is an integral element of the Master Plan on Fisheries Development, which aims to strengthen the capabilities of artisanal fisheries in the country (System Science Consultants, 2002). As part of efforts towards the sustainable development of fishery exports, the plan includes the enhancement of export product competitiveness through improvements in quality control capabilities, including the upgrading of laboratory infrastructure. Furthermore, efforts to enhance the infrastructure at landing beaches on Lake Victoria include the construction of land-

ing sites for Nile perch destined for export. The inspection and approval of processing facilities is the responsibility of the Fisheries Quality Control and Standards Division of the FD.[49]

Within the industrial processing sector, major improvements have been made in both the structure of facilities and operating procedures. These include upgrading of the general structure of processing facilities, the rearrangement and segregation of processing operations, the installation of flake ice, water treatment and effluent treatment plants, the construction of changing rooms and toilet facilities, the purchase of new tables and utensils etc. Laboratories had to be installed or upgraded. Staff had to be trained and quality control personnel employed or enhanced in order to implement HACCP.

[49] The FD harmonized its regulatory controls with those of the EU under the Principal Regulations, Fish Quality Control and Standards Regulation (2000). To facilitate effective implementation and enforcement, a Manual of Standard Operating Procedures for Fish Inspectors was prepared in October 2001.

APPENDIX 4: INSTITUTIONS AND ORGANISATIONS

Introduction

The capacity to improve the livelihoods of the actors in the Nile perch and other fishery value chains depends on the opportunities offered by fishery resources as conditioned by not only the wider economic but also institutional and political environments. The choice of livelihood strategy is driven in part by the preferences and priorities of the individual actors. However, as already mentioned elsewhere in this paper, the choice is also influenced by policies and by the formal and informal institutions and processes (PIPs) that impinge on actors' daily activities. In Tanzania, there are a wide range of regional, national and international institutions and agencies that influence the development of the fisheries sector. Only a few will be discussed in this section.

The Fisheries Department (FD)

The FD of the Ministry of Natural Resources and Tourism (MNRT) is responsible for developing and implementing the national fisheries policy. As already noted, the FD is responsible for the inspection and certification of fish and fisheries products destined for export. It has four sections namely: Quality and Safety Standards Control, Licensing and Control, Training and Data Collection, and Planning and Development.

The Quality and Safety Standards section is responsible for ensuring the quality and safety of fish and fish products from upstream in the fishery value chains through processing to the destined markets. The Licensing and Control section is responsible for licensing, surveillance, control of illegal fishing, laws and regulations, as well as conducting patrols. The Training and Data collection section deals with training, research and fisheries statistics, while the Planning and Development section deals with planning and development issues, including those which relate to aquaculture development, seaweed farming etc.

There are three zonal offices involved in quality and safety standards control throughout the country: the Lake zone, Dar-es-Salaam and Southern zone, Tanga and Northern zone, and the South Western zone. These offices have been given full mandate to ensure the quality control, licensing and control of fish and fish products.

The Lake zone office has its headquarters in Mwanza (at the Nyegezi Fisheries Institute) and has three sub-zonal offices in Mwanza city (Mwanza region), Musoma municipality (Mara region) and Bukoba (Kagera region).

The zonal offices have a major role in controlling fish quality and ensuring that food safety standards are met. With assistance from the sub-zonal offices, they undertake fish inspection to ensure that food-safety standards are met, starting from upstream of the value chain (from fishers and boat operators) to processing and packing industries. They also carry out laboratory tests.

Currently, the landing sites are inspected weekly by the sub-zonal offices, while the factories are inspected on a daily basis and are required to show their quarterly auditing reports. During the inspection, factory managements are reminded to practice their individual factory HACCP methods and are informed of any new standards that apply.

The zonal officers undertake inspections related to:

- Processing procedures, taking note of any anomalies,
- Workers' working equipment and health status. The health records of the workers are kept for inspection by the zonal officers when needed,
- Packing materials are also checked to see whether they meet the traceability requirements and procedures introduced in 1999. The traceability codes are prepared by factory owners and must be in the packing materials together with other required labelling information, including the EU code number, factory name and expiry date for the product.

Landing sites are inspected in order to verify whether fishermen are using the constructed platforms (floating jetties) when selling fish. The platforms were constructed in three out of ten upgraded landing sites that were selected for handling Nile perch (see Plate 1) to ensure that the fish are not contaminated by sand or dirt water at the lakeshore.[50]

The vessels and trucks (fish vans) that carry the fish are also inspected. The former are required to have icing boxes (containing powdered ice), while the latter are supposed to have sealed haulers. Inspection is also conducted to ensure that fish collectors are wearing uniforms to help the inspecting officers identify them from other people at the landing sites.

[50] In the case of the remaining seven landing sites, the platforms were constructed using local materials such as wood in place of bricks and iron bars.

Because of the small number of employees in the zonal and sub-zonal offices, the district fisheries offices also do the factory inspections. The inspections at the landing sites are assisted by the Beach Management Units (BMUs).

Laboratory services are provided both locally and abroad. Fish and fillet testing is done at the Nyegezi Fisheries Institute, while water, mud and soil testing is currently done in South Africa. The laboratory tests are done twice a week to check on microbial levels. Factory in-house laboratories are also allowed to conduct microbial tests with the exception of *salmonella* tests, which can be done if and only if the processing unit is located far away from the laboratory.[51]

Beach Management Units (BMUs)

The BMUs were established by the Government of Tanzania with the support of the World Bank through LVEMP to ensure community participation in the quality control of fishing activities. The concept of BMU is rather historical in the context of Tanzania. Before the introduction of food safety regulation in 1997, the fishermen who shared common landing sites used to have Beach Management Committees, commonly known as *Kamati za wavuvi*. The main roles of *Kamati za wavuvi* were:

- To ensure clean beach environments,
- To plant trees along the landing sites,
- To collect revenues from fishermen at the landing sites,
- To help provide rescue services in case of accidents on the lake, and
- To control the entry of new and illegal fishermen in the lake.

Being legally recognized by the FD, the first LVEMP BMUs were established in 1998, and they operated and still operate under the Village Government as part of the village security unit. They also have constant interaction with the District fisheries officers and sub-zonal officers. They have been trained in food-safety standards (specifically for fish and its products), environmental care, control and surveillance, record-keeping, leadership, cooperatives and data collection. This training is currently provided regularly through seminars, workshops or meetings organized by the FD and TAFIRI.

The BMU management comprises members of the fishermen and business community (e.g. beach-based shop, bar, restaurant and kiosk owners). The management of most BMUs is re-

[51] This is done to avoid re-contamination between the laboratory and the processing unit.

stricted to 16 members, with both women and men being represented. For example, at the Kayenze landing site in Mwanza, there were 16 members, 12 fishermen and four businessmen (out of the 16 members, five were women). As for the Kayenze landing site, the BMU at Bwai (one of the landing sites in Mara region), also comprised 16 members (11 fishermen, three artisanal processors and two farmers), of whom three were women.[52]

The BMU management elects the chairperson, acting chairperson and secretary, as well as the acting secretary and accountant as their leaders, with the secretary and accountant being fully involved in the day-to-day beach activities. The rest of the management team works once a week.

The major roles of BMUs are:

- To create awareness among fishermen and to promote sustainable fishing,
- To ensure that the fishermen meet the required food-safety standards and adhere to the fishing rules and regulations,[53]
- To oversee the selection of quality fish by the factory agents at the landing sites,
- To collect data on behalf of the TAFIRI and FD, including data on the number of fishing vessels by type, number of fishermen using the landing site, volume of fish harvested per day and any other data as required by the FD.

Some BMUs also collect revenues from fishing after bidding and winning the Government tender as agents of local government. They also carry out some activities that used to be undertaken by the erstwhile *Kamati za wavuvi* (e.g. planting trees around the landing sites, cleaning the landing sites and assisting in providing rescue services to fishermen in case of accidents on the lake).

BMU operations are in sense community self-help activities without direct financing from the government but only virtual recognition. However, the BMUs raise funds for their operations through activities like levy collection on behalf of the Village Government. As already noted, they can also bid for government tenders for collecting fishery-related revenues on behalf of the cen-

[52] All those fishermen who share a particular fish landing site have to be members of the BMU.

[53] It should be noted that the BMUs do not have any legal authority, but they can identify culprits to the enforcement officials. According to a study by Lokina (2004), BMUs have increased efficiency in both the Nile perch and *dagaa* fisheries, which is possibly to be explained by fishers exchanging information and learning from each other at the regular BMU meetings.

tral government and retain 10% of the total collection. A typical example is that of the Kayenze BMU. The BMU managed to win the government tender for 2001 and has since retained 10% of the total revenues from levies collected at the Kayenze landing site. In addition, the Kayenze BMU also operates as an agent for the Coca Cola Company by supplying soft drinks in the Kayenze area. Other BMUs also generate money from undertaking small income-generating activities like investing in kiosks, restaurants or guest house businesses.

Under the new arrangements the BMUs, which are sometimes referred to as the Beach Fishery Management Units (BFMUs), will be given responsibility for managing fishery resources at the village level subject to the basic fisheries law, the rules and conditions which are set by the FD. This will require a formal memorandum of agreement (MoA) between the FD on behalf of the government and the BFMU on behalf of the fishing community in a fishing village. The BFMU will develop general management plans (GMPs) as 'road maps' for fisheries management activities at the village level. The GMPs will describe strategies for the implementation of fisheries management activities. They will also contain basic information on geographical parameters, demographic data, livelihood data (including occupational structures), traditional knowledge and the socio-economic status of the fishing village. A GMP will become effective once it has been certified by the FD.

The Lake Victoria Fisheries Organization (LVFO)

The LVFO was established by a Convention (mandate) signed on 30th June 1994 in Kisumu, Kenya by the *"Contracting Parties*", who consisted of the Governments of the Republic of Kenya, the Republic of Uganda and the United Republic of Tanzania. The objectives of the LVFO are:

- To foster co-operation amongst the *"Contracting Parties*" in matters related to the fishery resources in Lake Victoria,
- To harmonize national measures for the sustainable utilization of the living resources of the lake, and
- To develop and adopt conservation and management measures to assure the lake's ecosystem health and sustainability of the living resources.

Recently, the efforts of the LVFO have received renewed political support at the highest level within the East Africa Community (EAC) through the Lake Victoria Fisheries Conference, conducted on 24th-25th February 2005 in Entebbe, Uganda. The Entebbe Declaration acknowledges the importance of the sustainable management of Lake Victoria's natural resources and endorses a wide range of measures, including, among others:

- Measures for accelerating the harmonization and implementation of environmental and fisheries policies, laws and regulations,
- Strengthening the existing BMUs and facilitating the creation of new ones,
- Strengthening national and regional institutions for fisheries research, and
- Enforcing of laws to protect the fisheries resources from abusive harvesting and destructive extraction.

The LVFO is supporting various national institutions, including the FD and TAFIRI. Under the current government structure, the Ministry of Natural Resources and Tourism (MNRT) formulates policies and laws and revises fisheries legislation. It has the role of ensuring that resources are managed in a sustainable way and optimally utilized for the benefit of the people.

The Lake Victoria Environmental Management Project (LVEMP)

The LVEMP has evolved through the process guided by the Tripartite Agreement signed on 5th August 1994 by the Republic of Kenya, the United Republic of Tanzania and the Republic of Uganda, which provided for both the preparation and the implementation of the project.

The LVEMP is one of the projects that were financed by a government loan from the World Bank. Funds were also received from the Global Fund and the government itself. The funds were aimed at financing research activities in relation to eight sub-projects in the lake zone, which included fisheries management, control of weeds in the lake, soil and water management, catchments and forest, wetland management, water quality management and aquatic sciences. When food-safety standards were introduced, the project had to provide assistance through fisheries management.

The fundamental objective of the LVEMP was to restore a healthy, varied lake ecosystem that is inherently stable and can support, in a sustainable way, the many human activities in the catchment and in the lake itself. In this regard the project provided funds for rehabilitation, laboratory construction and the upgrading of the fisheries offices. The LVEMP rehabilitated the Nyegezi laboratory (in Mwanza), purchasing a generator and other equipment and materials for it. It also financed the construction of a new laboratory at Nyegezi and trained laboratory technicians and fisheries officers to Masters and PhD levels (28 Masters and 8 PhD students have been trained since 1997).

At the landing sites, the LVEMP financed the construction of floating jetties and provided funds for training in the safe handling of fish at the landing sites, improved fishing methods and environmental care. It has also established areas that were considered to be critically unhygienic to

enable the fisheries officers to put more emphasis on those areas and undertake regular checks in them.

The Tanzania Fisheries Research Institute (TAFIRI)

TAFIRI is a parastatal organization which was established in 1980 to cater for fisheries research in the country. The institute has five centres: Mwanza and Soti for Lake Victoria, Kigoma for Lake Tanganyika, Kyela for Lake Nyasa and Dar es Salaam for the Indian Ocean. The latter also serves as the institute's headquarters. The main objectives of TAFIRI are:

- To promote, conduct and coordinate fisheries research within the country,
- To improve and protect the fishing industry through the development and promotion of better fishing methods and techniques, fish farming and processing of fish and fish products,
- To investigate fish diseases so as to develop ways of controlling or preventing them,
- To document and disseminate research findings for use by the Government, public institutions or persons engaged in the fishing industry in the country,
- To advise the Government, public institutions and persons or bodies engaged in the fisheries sector in the country on the practical applications of the findings of research done by or on behalf of the institute,
- To promote and provide facilities for instruction and training of local fisheries research and management personnel in cooperation with the Government or any persons within or outside Tanzania,
- To assume responsibility for the control and management of the business and affairs of any center which may be established or vested in the institute, and
- To do anything or enter into any transaction which, in the opinion of the institute's Board, is necessary or desirable for the purposes of better performance of the institute's functions.

Private actors

The private actors in the Nile perch value chain are represented by the Tanzania Fish Processors Association (TFPA) and the Tanzania Fishers Union (TAFU). Most of the fish-processing industries in the country are members of TFPA. What brought them together are mainly regulatory issues that affect the business environment, such as the royalties to be paid by the processors, the high electricity costs, and the many other levies and taxes that have to be paid to various ministries and local authorities.

For Lake Victoria, the Lake Victoria Fish Processors Association (LVFPA) was established and registered in 1997 with a common remit on:

- Collaboration with the government, especially on tax and royalty issues,
- Sustainability of fish as the main resource of the lake,
- Nile perch markets, especially external markets,
- Assistance in research, and
- Assistance to ensure that food-safety standards are met by the members of the association.

TAFU was formed by fishermen in 2001 and presently has more than 100 members. In November 2004, it was registered as a non-governmental organization (NGO) under the Societies Ordinance, Cap 337. TAFU has a wide range of objectives, the most important being:

- To cooperate and bind together all fishers in solving problems confronting their activities,
- To advocate and supervise prices of fish so as to remove tensions and misunderstandings,
- To negotiate among the buyers – the fishing industries – concerning prices of fish and fish products, and
- To ensure environmental protection for the lake.

Other organizations

Other organizations that are directly and indirectly involved in the Nile perch sub-sector are the Tanzania Chamber of Commerce, Industries and Agriculture (TCCIA) and some NGOs like the Nyanza Social Economic Development Association (NSEDA). A brief overview of the regulatory and support organizations is presented in Table 20 below.

Table 20: Regulatory and supporting organisations/agencies in the Nile perch sub sector

Function	Organisations
Regulation and monitoring	EAC, LVFO, MNRT
Research and development	TAFIRI, LVFO
Environmental protection	EAC, LVFO, MNRT, LVEMP, TAFIRI, LVFO, FD via BMUs
Stakeholders representation	TFPA, TAFU, SUFICO,[54]
Supportive Agencies	TCCIA, NSEDA

[54] SUFICO (Subuti Fishery Cooperative) is a fishery association based in Musoma (Mara region).

Markets, taxes and levies

The accumulation of fishery and livelihood assets in general is one of the key determinants of fishery-related livelihoods, but opportunities must exist to exploit these assets. Well-functioning markets, improved bargaining power for the actors – particularly upstream of the fishery value chain – harmonized and rationalized taxes and levies, and a demand for fishery products are just as important as good infrastructure, roads and general economic policies.

Generically, the export supply chain for fish in Tanzania is much more developed than the domestic one. The supply chain through which Nile perch is purchased (most of which is imported) is much better managed than the chains through which fish for the domestic market move. The export chain is integrated by large export-processing companies: inventory flows are transparent; prices are set based primarily on guidelines set collectively by the industrial processors, which normally provide a significant premium above local market prices; quality-control standards are rigorously enforced; and trade credits and preferential leasing terms are extended to quality vendors who have established themselves with the large processors (World Bank, 2005).

The fish-processing and exporting companies in Tanzania are also well prepared to develop further sources of competitive advantage in value-added food-processing (*ibid.*). However, several value-chain issues need to be addressed to ensure the maintenance and enhancement of Tanzania's existing competitive advantage in fish exports in the world market. The existing taxation system is singled out as one of the stumbling blocks (see, for example, in World Bank, 2005). On the part of processors and fishermen, there are many complaints about the existing taxation system in the fisheries industry. It is not only the taxation system that concerns them, but also the inconveniences caused by the fact that taxes and fees can be independently imposed by multiple agencies, levels and jurisdictions of the government without effective recourse or appeal (*ibid.*).

Most of the burden of existing taxes in the fish sector falls on licensed exporters, who must pay royalties and fees primarily based on the weight of fish shipped (
Box 3). Different rates apply to different categories of fish. The levels of taxes imposed within

Tanzania on exporters are reported to be much higher than those imposed on exporters of the same categories of fish products from Uganda and Kenya (*ibid.*).[55]

Box 3: Royalties, taxes and levies for processors

- Royalties: USD 0.15 per kg of finished product paid to the Fisheries Department of the Ministry of Natural Resources and Tourism (c.f. USD 0.02 per kg of finished product and NIL for Kenya and Uganda respectively).
- Levies vary in different districts from Tshs 7 to 10 per kg of raw fish. In addition the Mwanza City Council imposes an additional, fish levy of Tshs 7 per kg. The total fish levy exceeds Tshs 14 for most processors.
- Mwanza Service Levy: based on 0.3 percent of the value of the finished product [FOB (export) value]. This "service levy" is in addition to the "fish levy" noted above.
- Withholding Tax: Based on 2 percent of purchased price from the agent or fisherman.
- Stamp Tax: Based on 1.2 percent of the purchased price from the agent or fisherman.
- Multiple Licenses and Registration Fees: These include annual boat license fees of Tshs 40,000.
- Annual "boat fitness" certificate of Tshs 109,000 per boat paid to the Ministry of Communication and Transport (currently called the Ministry of Infrastructure Development); Water rights for boats of Tshs 150,000 per filing plus Tshs 10,000 per boat paid to the Ministry of Water; Boat parking fees of Tshs 150,000 per boat per month is some districts; and fish container placement fees of Tshs 50,000 per month in various districts.
- Multiple Processing Fees and Establishment Licenses: These include a fish processing fee of Tshs 750,000; Import License Fee of Tshs 500,000; Export License Fee of Tshs 125,000 all paid to the Ministry of Industry and Trade. In addition, a Food License Fee of Tshs 50,000 paid to the Ministry of Health and an export license of Tshs 200,000 paid to the Ministry of Natural Resources. Additional levies and fees include a waste disposal license, a dumping levy, a TBS annual subscription, a radio call license, and a water usage license from the Ministry of Water and Livestock.
- Export related Fees and Charges: This include documentation charges; Certificate of Origin Charges (Tshs 20,000 per shipment) paid to the Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA); Movement Certificate Charges (Tshs 20,000 per shipment) paid to the Board of External Trade (BET); Bank Charges for the Payment of Royalties (the Government does not accept company cheques); and Cargo Handling (USD 1,800 per shipment) paid to the Air company.
- Business Taxes: These include corporate tax, payroll levy, National Social Security Fund (NSSF) contribution, land rent.
- Other payments include the Lake Victoria Basin contribution (Tshs 10,00 per year); District contribution for fish collector boats (Tshs 150,00 per month) and Container Fee (Tshs 50,000 per month per container) paid by processors to the District Council.

Source: Updated from the World Bank (2005).

Most of the business arrangements between Nile perch fishers and factory agents and between factory agents and factory operators are in the form of debits against credit advances provided by

[55] According to the Tanzania Fish Processors Association (TFPA), the industry's tax bill has increased over time, as the industry has become subject to cesses, fees and taxes imposed by several levels of Government (ibid.). The World Bank (2005) estimates that the various taxes, fees and levies that Tanzanian fish processors pay add an additional of Tshs 120 to 200 per kilogramme to the cost of raw fish inputs.

the latter for inputs and boat use. Factor agents provide ice blocks, freezer cases, fishing nets, sometimes boats, as well as fuel, oil, food and maintenance fees on credit to the fishers. In some cases, a separate boat-owner provides the fishing boat and fishing gear. When the fishers or factory agents sell their fish to factory agents or industrial plants respectively, they receive debits against the credits they had earlier received for these supplies (see the World Bank, 2005 for a detailed discussion on these settlements). The World Bank (2005) views this system as providing its own internal credit mechanism, based on the superior credit standing and access of the chain participants who own the most substantial fixed assets.

However, the bargaining power of the fishers and crews is weak, as exemplified by the common system of sharing total sale proceeds among fishers/crews and boat-owners: the boat-owner first deducts the expenses owed to him or her from total sales, and the remaining net income is split 50-50 (locally known as the *pasu* system). The fishers and crews will then share among themselves their 50 percent and the boat operator will retain the remaining 50 percent as profit. This kind of arrangement puts the boat-owners in a very strong bargaining position with respect to the fishermen, allowing the former to realize extremely high profits at the expense of the latter.

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