



MAFAP SPAANA

Monitoring African Food and Agricultural Policies
Suivi des politiques agricoles et alimentaires en Afrique

ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR FISH IN UGANDA

DECEMBER 2012



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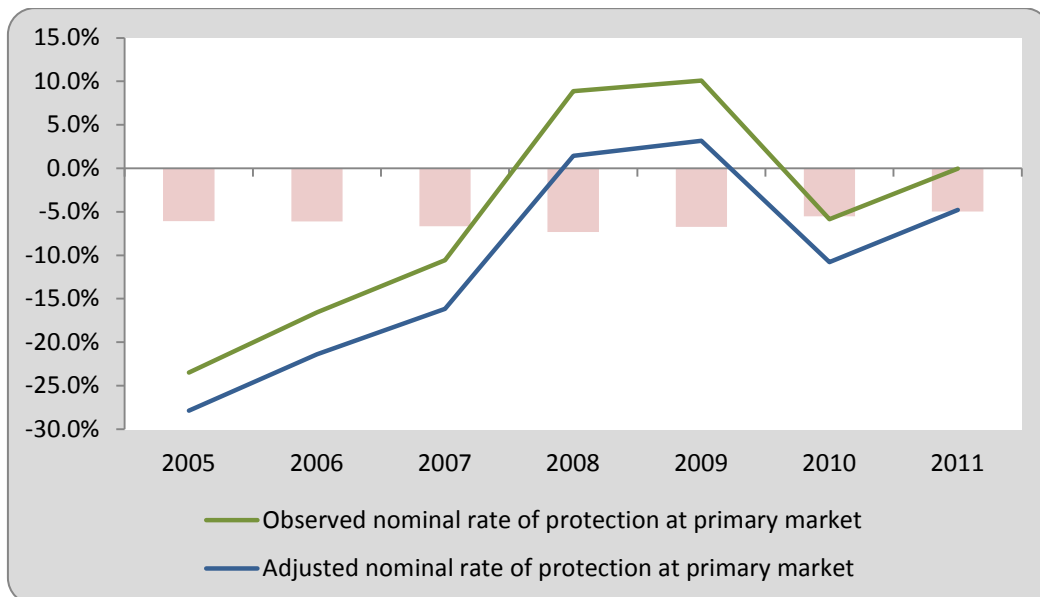
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SUMMARY

Product: Fish
Period analyzed: 2005 – 2011
Trade status: Export in all years

- Uganda is endowed with many aquatic resources covering about 18% of the total surface area and the major water bodies including Lakes Victoria, Kyoga, Albert, George and Edward
- Since the mid 2000s, fish production in Uganda has increased rapidly. Total fish production reached close to 0.5 million ton in 2007 but declined recently to 0.38 million ton 2010.
- Despite the high potential for fish capture and the high production level, fish export are quite small representing less than 10% of the annual catch. Nevertheless, fish exports generate substantial revenue averaging nearly US \$124 million in the last five years (2006-2010). During the same period, fish exports represent 6.6-15.2% of all agricultural exports.
- Uganda has had a series of laws and regulations governing fisheries resources including covering fish inspection, approval of landing sites, processing plant quality control, vessel licensing, net size, and legal minimum fish size. However, fish markets are highly liberalized.



At lake landing sites in Uganda, considered here as the primary and wholesale market for fish, domestic Nile Perch prices during the period of 2005-2011 tend to deviate negatively from reference prices as indicated by the generally negative price gaps and nominal rates of protection. As Uganda has liberalized its economic policy, there are no known policy measures to influence domestic fish prices other than the minimal local taxes and marketing levies, these price gaps are likely to be due to factors not related to agricultural or economic policies.

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1. PURPOSE OF THE NOTE

This technical note is an attempt to describe the market incentives and disincentives for fish in Uganda.

For this purpose, yearly averages of farm gate and wholesale prices are compared with reference prices calculated on the basis of the price of the commodity in the international market for an observed and adjusted scenarios. The price gaps between the reference prices and the prices along the value chain indicate the extent to which incentives (positive gaps) or disincentives (negative gaps) are present at farm gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection. These key indicators are used by MAFAP to highlight the effects of policy and market development gaps on prices.

The note starts with a brief review of the production, consumption, trade and policies affecting the commodity and then provides a detailed description of how the key components of the price analysis have been obtained. The MAFAP indicators are then calculated with these data and interpreted in the light of existing policies and market characteristics. The analysis that has been carried out is commodity and country specific and covers the period 2005-2011. The indicators have been calculated using available data from different sources for this period and are described in Chapter 3. The analytical results in this note focus specifically on Nile Perch since it is the major fish species in terms of productivity and international trade in Uganda. We believe that the results for other types of fish such as Tilapia will be similar.

While several publications are available on the exploitation and use of fish as a commodity in Uganda, the information/data are scattered in many published and unpublished documents. Therefore, the major aim of this note is to review, validate and amalgamate all the data available on fish commodity in Uganda regarding; production, consumption, marketing and trade, value chain and processing and policy decisions and processing into one general report to help understand the major trends and facilitate interpretation of the indicators.

The outcomes of this analysis can be used by those stakeholders involved in policy-making for the food and agricultural sector. They can also serve as input for evidence-based policy dialogue at country or regional level.

This technical note is not to be interpreted as an analysis of the value chain or detailed description of production, consumption or trade patterns. All information related to these areas is presented merely to provide background on the commodity under review, help understand major trends and facilitate the interpretation of the indicators.

All information is preliminary and still subject to review and validation.

2. Commodity CONTEXT

Production

Uganda is endowed with many aquatic resources covering about 18% of the total surface area and the major water bodies. These include; Lakes Victoria, Kyoga, Albert, George and Edward (Figure 1). There are also over 160 minor lakes and various rivers, flood plains and swamps that partly contribute to Uganda's fish production (Ikwaput, 2004). With these natural aquatic habitats, it implies that Uganda has got huge fisheries resources potential for both capture fisheries and fish farming (aquaculture) production.

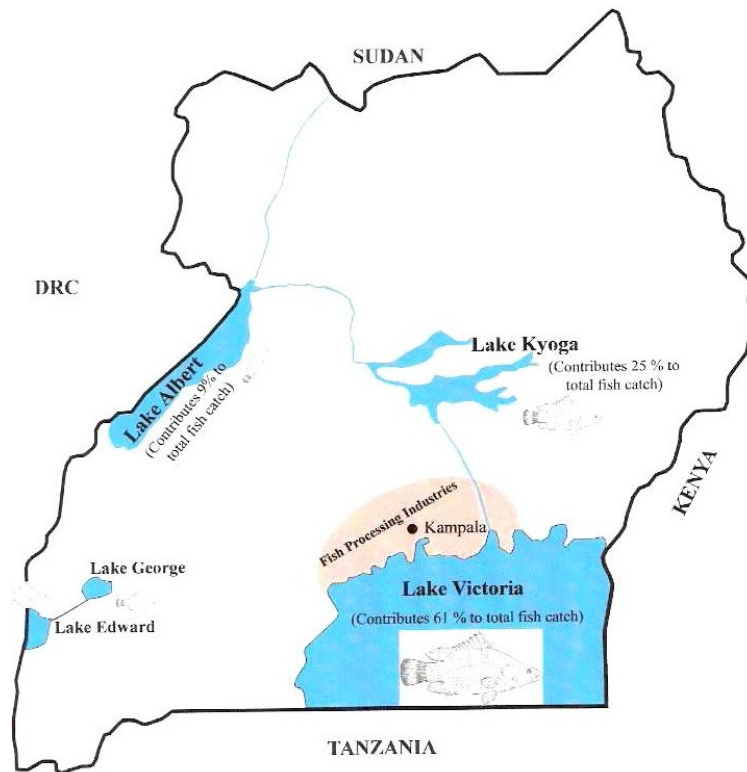
Fisheries and related activities from the production systems (natural aquatic habitats) to marketing (export trade at both international, regional and local) significantly contribute to Uganda's economic growth in terms of revenue and employment. The fisheries sector currently plays a big role in Gross Domestic Product (GDP) in Uganda. According to the Poverty Eradication Action Plan (PEAP), the fisheries sector contributes 6% of the national economy although only 2.4-2.6% is captured in the national accounts by the Uganda Bureau of Statistics (UBOS) while at the same time, other studies including World Bank (2003) have indicated that it can go as high as 12% if properly valued (Ikwaput, 2004). On average, Uganda's fishery industry employs over 700,000 people involved in various activities ranging from; fishermen, fishmongers, fish transporters and boat builders. The rapid development of the industry has been a result from the political stability that the country has enjoyed over the years (Balagadde, 2003).

Uganda, with a total surface area 241,000 km², has a rich water body covering an estimated area of 44,000 km² of its territory. Among the major lakes in Uganda, the largest is Lake Victoria covering a surface area of 31,000 km² with in Uganda's territory. Lake Victoria's total area in the three East African countries is estimated to be 68,000 km² of which 45% is in Uganda, 49% in Tanzania and 6% in Kenya (Balagadde, 2003). These fresh water resources are the source of several fish species of economic importance for domestic consumption and export. Among these are Nile perch, Nile tilapia, Mukene, Semutundu, Cat fish, and Tiger fish.

Since the mid 2000s, fish production in Uganda has increased rapidly. Total fish production reached close to 0.5 million ton in 2007 but declined recently to 0.38 million ton 2010 (Figure 2). The production level of 2010 represents about 74% increase over the level of 2000. Despite this variability, this reflects the substantial potential for fisheries in Uganda.

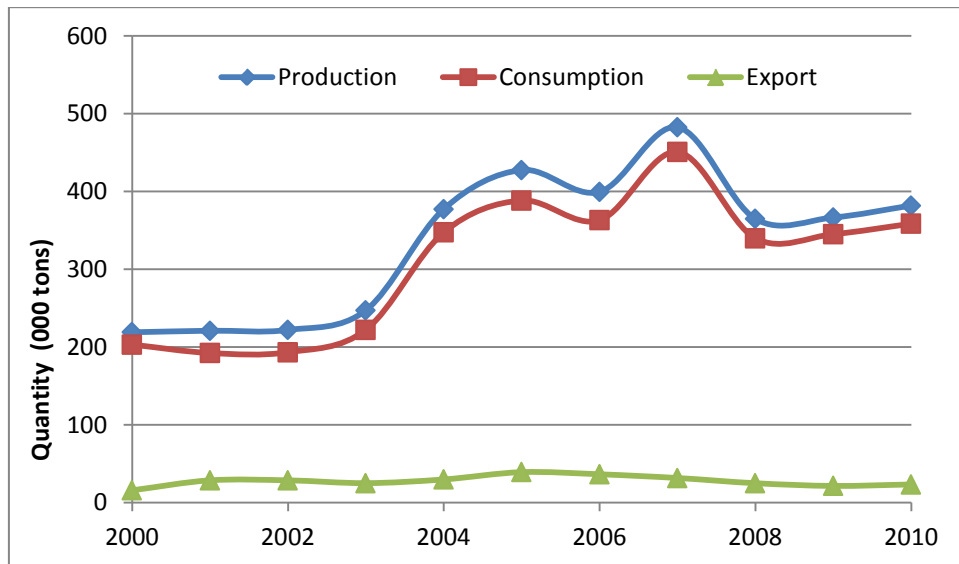
Of all the fish species described above, Nile perch, Nile tilapia and Mukene are the major fish species of commercial importance in Uganda. However, considering productivity and international market, Nile perch out-competes other fish species, and in terms production systems. Lake Victoria contributes nearly half of the national fish production followed by Kyoga, Albert, Edward and lastly George (Figure 3).

Figure 1: Major Sources of Fish in Uganda



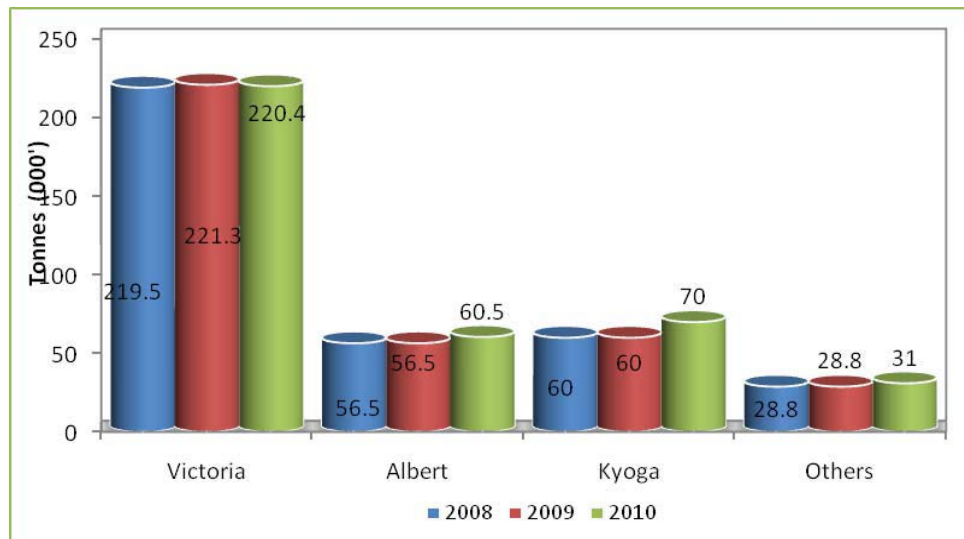
Source: James (2009).

Figure 2. Trends of production, Consumption and export of fish in Uganda (2000-2010)



Source: MAAIF (2010, 2011); FAO - Fisheries and Aquaculture Information and Statistics Service (2012); Nyombi and Bolwig, 2004.

Figure 3: Quantity of fish catches by Ugandan water bodies, 2008-2010



Source: MAAIF, 2011

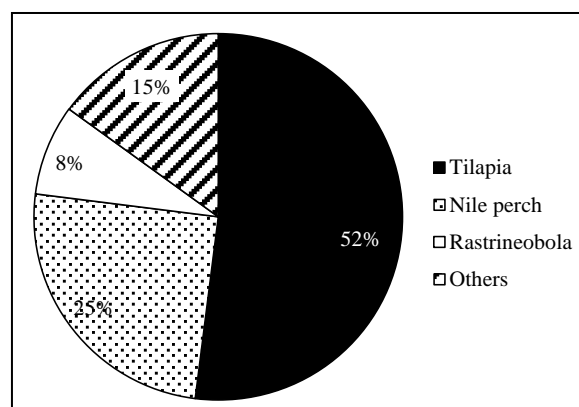
Consumption

The population of Uganda is composed of more than 30 ethnic tribes distinguishable to a greater extent in terms of languages and socio-culture including eating/diets habits. Considering the fish consumption in Uganda, the population in the proximity of major water bodies has higher consumption of fish than those in areas far from the major water bodies. In both cases however, income levels and access could as well be considered among others major factors determining fish consumption distribution in Uganda. Regarding access as a factor to fish consumption, generally the areas in the central region; Kampala, Entebbe, Jinja, Mukono, Tororo, Busia, and Masaka, have relatively higher fish consumption because fish supply and quantity is regular and because the levels of income are relatively higher than in the rural areas.

However access may not be the decisive factor in fish consumption. As stated above, tribal/cultural traits may influence fish consumption despite access to fish. For example, the western regions of Uganda (the Banyankore of Mbarara, and Bushenyi, the Batoro of Kabarole districts and Banyoro of Masindi and Hoima) although located in the fringes of productive lakes of Albert, Edward, George and Kazinga channel, their legacy of fish avoidance is high. This is attributed to the historical tradition of cattle keeping although in some areas crop cultivation has surpassed cattle rearing. This is also linked to the pastoralists of Karamoja region who are as well non fish eaters.

The fish eating communities also have fish species eating preferences. For example, among the common captured fish species from the water bodies in Uganda, Nile tilapia is the most preferred species and consumed the most (Figure 4). However, Nile perch is not common for the local consumption in Uganda because of its high demand for export.

Figure 4: Fish consumption in Uganda by species



Source: Ssebisubi, 2011.

Between 2000 and 2010, the estimated consumption of fish averaged 309,481 tons representing over 90% annual fish catch (Table 1). Fish contributes 40-50% of the total animal protein intake of Ugandans who have a strong culture for fish consumption (Nyombi and Bolwig, 2004). The retail price of fish has been rising steadily in recent years. For example, the retail price of fresh Nile perch has increased from US\$ 4000/kg in 2008 to US\$ 9000/kg in 2011 (DFR, 2012). The retail prices of other species such as tilapia have seen similar trends.

Table 1: Trends in fish production, exports and domestic/regional consumption, 2000-2010

	Production (tons)	Export (tons)	Domestic consumption ^a (tons)	Export as a percent of production (%)
2000	219,000	15,876	203,124	7.2%
2001	221,000	28,672	192,328	13.0%
2002	222,000	28,672	193,328	12.9%
2003	247,310	25,080	222,230	10.1%
2004	377,326	29,830	347,496	7.9%
2005	427,573	39,201	388,372	9.2%
2006	399,489	36,461	363,028	9.1%
2007	482,609	31,681	450,928	6.6%
2008	364,800	24,965	339,835	6.8%
2009	366,600	21,501	345,099	5.9%
2010	381,900	23,376	358,524	6.1%
Average	337,237		309,481	8.6%

a. Domestic consumption is estimated as the difference between production and export.

Source: MAAIF (2010, 2011); FAO Fisheries and Aquaculture Information and Statistics Service (2012) and Nyombi and Bolwig (2004).

Marketing and Trade

During the 1980's, Uganda's fish exports (whole fish) were predominantly regional, to Kenya and Democratic Republic of Congo (DRC). However this practice was stopped in the 1990's by the government of Uganda and by 1991, Kenyan investors started to set up fish processing plants in Uganda marking the beginning of Uganda fish export to EU countries (Balagadde, 2003).

By the time Uganda started exporting fish and fishery products to the international markets in 1991, there has been a gradual increase in terms of both volume (tons) and value (US\$) for the last fourteen years, 1991-2005 (DFR, 2012). Since this time, a drastic decrease in both volume and value has been witnessed (Table 1). This was accompanied with the closure of some fish processing plants in the country leaving others to operate at 30% of installed capacities (DFR, 2012). This has prompted the government of Uganda to encourage fish processing factories to as well invest in aquaculture (fish farming) for sustainability of their plants.

Despite the high potential for fish capture and the high production level, fish export are quite small representing less than 10% of the annual catch (Table 1). Nevertheless, fish exports generate substantial revenue averaging nearly US \$124 million in the last five years (2006-2010). During the same period, fish exports represent 6.6-15.2% of all agricultural exports.

The export data in table 1 represents the official quoted figures for only fish fillets and maws from certified established fish processing plants. Other estimates of fish exported and un-recorded to neighboring countries like DRC, Kenya, Rwanda and Tanzania may be as high as US\$ 80 million per year (DFR, 2012). With open access to the water bodies in Uganda and East Africa as a whole, domestic and regional fish trade is quite common.

Most of the regional trade is believed to be "informal". In 2007, Uganda Bureau of Statistics (UBOS) estimated regional fish trade at US\$ 61.54 million while in 2008 it was estimated at US \$ 69,603,975 (DFR, 2012). Whilst officials and stakeholders fully recognize the importance and potential of fish trade both to food security to the population in the Region and also as one of the pillars for long-term economic growth, there is a need to ensure that the damage caused by supplying undersized fish to regional (and international) markets is minimized.

Uganda remains among the countries allowed to export fish and fishery products from both capture (2001) and culture fisheries (2010) to the European Union (EU) countries (DFR, 2012). Apart from EU, other Regions that import Ugandan fish and fishery products include Australia, Middle East, United states, Egypt and South East Asia (DFR, 2012).

Although Uganda is famous of a rich biodiversity in terms of fish species, not all these fish species are exported internationally. Nile perch (*Lates niloticus*) remains the major fish export accounting for 90% of all the exports due to high consumers demand for its richness in omega-3-fatty acids that provide a beneficial effect on cholesterol dangers in the body and besides being palatable and bone free (DFR, 2012). However all the under sized Nile perch (illegally fished) are sold locally and in regional markets. Although vast of the Uganda's Nile perch is caught in lakes Victoria, Kyoga and Albert with little coming from other water bodies, Lake Victoria dominates the production of Nile perch in all the Ugandan water bodies.

Description of the Value Chain and Processing

A value chain is a high-level model of how businesses receive raw materials as inputs, add value to the raw materials through primary and support processes and self-finished products to customers (Ikwaput, 2004). Value chains involve links between social and economic characteristics of the chains. In marginal economies and for the commodity-like fisheries, analysis is also concerned with the resource sustainability and economic growth based on unregulated natural resource extraction (Ikwaput, 2004).

For the last five years, a marketing chain for Nile perch has developed on Lake Victoria where fishers sell their fish to middlemen who in turn sell it to agents and eventually to fish processing plants (Collinson, et al 2005). Although this kind of flow is from fishers to factories via middle men and agents, there are still some fishers that may still sell their fish directly to the agents or to the factories (figure 5). Transport boats operated by middlemen buy fish from fishermen in the remote landing sites (mainly in Lake Victoria islands) and sell to the main land landing sites or direct to factories where factories have their own landing sites adjacent to their factory premises (Collinson, et al 2005). Most of the factories have their approved landing sites on the shores of Lake Victoria. At the landing sites, prime quality fish (grade A) is sold to the land-based transporters (factory agents) for the factory processing while what is left is sold to the fish mongers which is later sold to the local market. Transport boats take 3 to 4 days per trip collecting 5 to 7 tons of fish and this period sometimes is the reason that causes fish spoilage and rejected by fish factories.

The transport boat provides the important link between the majority of the fishermen on Lake Victoria and the factories. In many cases, the factories value the strong relationship they establish with the transport boat operators who have in-depth knowledge of their supply and quality requirements (Collinson, et al 2005).

In the past, around the year 2000, some factories used their own transport boats to source fish directly from the fishermen in the islands. However all these initiatives have failed/collapsed because of the complicated logistics involved in gathering large quantities of fish from scattered locations in the remote landing sites of Lake Victoria (Collinson, et. al. 2005). Transporting fish from the islands is best carried out by small operators who have much better control over costs and their employees. There are situations where the fishermen in the islands are provided with credits especially from the factories and boat transporters in form of nets and fishermen are obliged to sell off their fish cheaply.

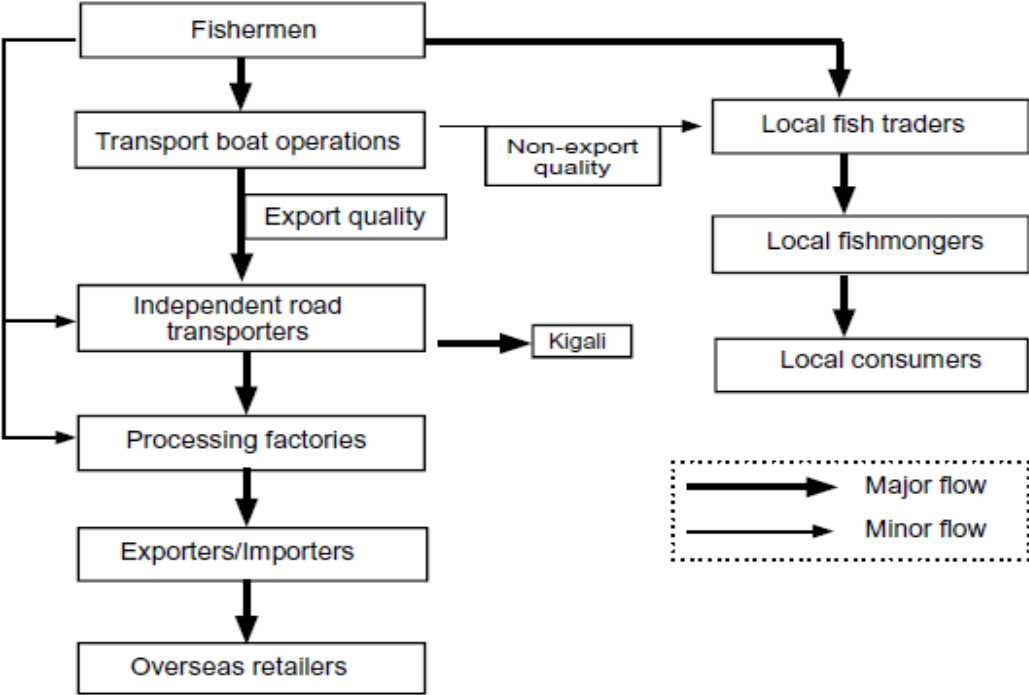
After prime quality fish has arrived in the factory, it is processed into fish fillets and packaged. The fillets are preserved as chilled, frozen, whole tilapia, headed and gutted (H&G) and fish maws. Factories exporting their fishery products may sell to either fish exporters FOB Entebbe or arrange freight for themselves and sell C&F to overseas importers. In reality, the chilled fish exporters are in-country branches of European fish importing companies and so the advantages to factories of selling C&F European airports over selling FOB Entebbe¹ are not substantial (Collinson, et al 2005).

¹ The FOB price is for the product and all costs to the point that the product is on board a ship, or aircraft, or whatever method is being used to ship. C&F is Cost and Freight. It means that the C&F price quoted is for the product and delivery to destination. In other words, shipping cost is not included in the FOB price while it is in the case of C&F.

There are twenty approved and certified fish processing plants and out of these 18 process chilled and frozen fish products for export while the two process cured fishery products (smoked, salted and sun dried). Other fish by-products, fish maws, are handled and processed by other five small scale certified fish processing plants which mainly export to Asian countries and Middle East (DFR, 2012). Air freight of chilled products packed in expanded polystyrene boxes is currently the main means to reach EU markets while frozen fish which is mainly in form of fillets and whole gutted fish is transported in refrigerated containers by truck to Mombasa seaport from where it is shipped to different destinations (UFPEA, 2012). Frozen products are also exported in containers through Mombasa on their way to a wide array of international markets.

The competition among fishermen and processors in Uganda’s fishing industry is very stiff. Fishermen actively compete for limited stocks in the lakes, especially for high value Nile perch. Uganda and East Africa as a whole do not have fishing quotas but instead specifies a minimum gear size and type (mesh or hook size and type) for a given fish size so as to limit the depletion of the fish stocks (Hammerle, et al, 2010).

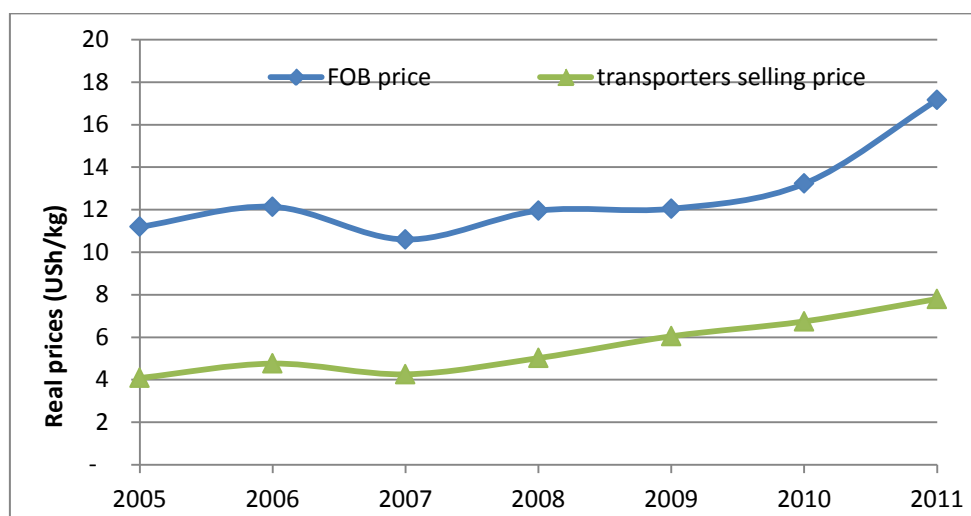
Figure 5: Fish marketing value chains in Uganda



Source: Foodnet (2002)

To examine relative price trends over time, the nominal FOB prices, boat transporters’ selling prices and factory buying prices in 2005-2011, converted into real prices by adjusting for inflation using CPI (2011=100), are presented in Figure 6. In real terms, the three price series have generally been rising since 2005. Prices received by boat transporters and prices paid by processors are almost similar indicating that factories buy directly from boat transporters rather than through traders or middlemen as many factories purchase through their agents at the landing site.

Figure 6: Real FOB price and domestic prices of Nile Perch in Uganda



Source: computed from data from MAAIF (2010), MAAIF (2011) and DFR (2012)

Policy Decisions and Measures

Uganda has had a series of laws and regulations governing fisheries resources including Uganda's Fish Act of 1964 which governed conservation, sale and processing of fish issues, Fish (Quality Assurance) rule of 1998 and the Fish (Immature Fish) Instrument of 2002 which covered fish inspection, approval of landing sites, processing plant quality control, vessel licensing, net size, and legal minimum fish size (Hammerle, et al, 2010). Despite these institutions and regulations, enforcement is a key challenge (Hammerle, et al, 2010).

For reviewing, reviving and validating all the above mentioned regulations/acts/instruments, the government of Uganda developed the National Fisheries Policy in 2004. This policy was developed amidst of the concerns by several stakeholders that Uganda's fisheries sector operated without an explicit national policy. Furthermore, the policy was developed to curb the mismanagement of natural resources that came about as a result of the decentralization program in 1997 (UNEP, 2006). Decentralization shifted governance of local resources from the national institution (Ministry of Agriculture Animal Industry and Fisheries (MAAIF)) to the hands of local government. The fisheries resources managers needed a policy to streamline their own oversight of the fishery industry.

The national Fisheries Policy of 2004 provides strategies to ensure sustainable exploitation of the fisheries resources at the highest possible levels, thereby maintaining fish availability for both present and future generations without undermining the environment. The general principal of the policy is that government should provide a flexible system of managing, utilizing and conserving the fisheries resources of Uganda together with an institutional structure to achieve the same. Several factors hindering the fisheries resources development in Uganda triggered the formulation of a national fisheries policy. These include:

- dwindling of important commercial fish species, free access to the resource and increased population that exerted too much pressure,
- increased pollution load and siltation to aquatic ecosystems, and introductions of non-endemic fish species and alien aquatic plants like water hyacinth,
- increased demand by quality fish for both domestic and export,

- Co-management of the resources, budgetary allocation of resources from the central government, new policies like decentralization and outdated fish act of 1964.

The Department of Fisheries Resources is the government agent chiefly responsible for the implementation and administration of the policy in MAAIF (Nyombi and Bolwig, 2004). The fisheries policy targets fishers and fishing communities, fish processors and exporters, fish consumers, fish mongers, fish net makers, boat manufacturers and fish resource users. The fisheries policy also encourages an equal stake in the management of the resource. The indigenous people are also a priority in the beneficiary of the resource (fisheries) especially the poor who have always lost out to the rich fishers. The poor are encouraged to apply for tenders through the local government administration and at the same time they are empowered to look after their resources and have a platform to debate/urge how it should be managed (Nyombi and Bolwig, 2004).

In addition, there are a number of other instruments that are closely linked to the fisheries policy and among them include the trade policy. Like the National Fisheries Policy, Uganda's policy on trade aims to contribute to poverty reduction through promotion of employment, economic growth, export diversification and vertical diversification through further processing of or adding value to primary products (Nyombi and Bolwig, 2004).

National Trade Policy is currently recognized as a new instrument (draft) in Uganda because the responsibility for setting trade policy was retained by the individual sectors where trade was generated. For instance, agriculture, mining and wildlife and tourism sectors used to meet "one-on-one" with officials from the Ministry of Tourism, Trade and Industry (MTTI) and the ministry of Finance, Planning and Economic Development (MFPED) to debate the individual sector policies (Nyombi and Bolwig, 2004). The practice is now for the sectors to generate trade to share information with the MTTI. This is particularly the case with the agricultural sector, including the fisheries subsector.

The Zero Draft National Trade Policy proposes the following objectives:

- Promote competitiveness and raise efficiency in domestic production
- Increase the integration of Uganda into both the regional and global economies
- Stimulate domestic and foreign in export-oriented activities
- Promote the diversification of exports of goods and services
- Ensure the benefits of the growth and diversification of the traded goods sector are broadly distributed with the explicit intention of reducing poverty.

The draft National Trade Policy also notes the role of Non-Tariff Barriers (NTBs) in trade that could be used to reduce imported substances that lead to pollution and dumping, or are a threat to health, or could damage the environment or reduce the competitiveness of the domestic producers. This provision is covered broadly by the World Trade Organization (WTO) General Agreement on Tariffs and Trade and more specifically by the WTO agreement on anti-dumping and the Agreement on Subsidies and Counter vaillance. The East Africa Union Agreement regulations on imported goods under the Customs Union already bar entry of such commodities (Nyombi and Bolwig, 2004).

Policies, standards and regulations governing fisheries are national, regional and or international. However in Uganda and many African countries, policies have remained stagnant and poorly harmonized. The policy processes have been constrained by limited and declining government institutions with weak capacity to pursue their original mandate, a weak and inappropriate legal

system and lack of political support for new investments and funding for recurring fisheries policy implementation.

3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

To calculate the indicators needed to estimate incentives or disincentives to production (NRP, NRA) as well as the Market Development Gaps (MDGs), several types of data are needed. They were collected and are presented and explained hereafter. The analysis focuses on the period of 2005-2011 using the fish marketing site at Lake Victoria as representative for other fish markets in Uganda. In this analysis, we focus on Nile Perch as the major fish species traded. Data from Kasenyi, the major landing site on Lake Victoria is used in this analysis since Lake Victoria represents the major source of Nile Perch in Uganda.

The fish value chain strongly focused on a small number of official landing sites on Lake Victoria, together with smaller outlying beaches on Lake Victoria and on Lakes Kyoga and Albert, at its start and on processing factories at its end (James, 2009). The landing sites represent both the fish primary market and the wholesale markets. The sellers of fish are boat transporters and fishers who fish along the lake shore². Buyers of fish include traders, processing factories and consumers. The point of competition is considered to be the border (Entebbe airport) for shipping processed fish to international markets.

TRADE STATUS OF THE PRODUCTS

Although Uganda export less than 10% of the annual capture, fresh water fish is considered as one of the non-traditional exports of the country (Table 1). Imports are limited to sea fish and sea food in rather small quantities. In this analysis, Uganda is considered as a net exporter of fish.

BENCHMARK PRICES

Observed

Uganda exports variety of fish products, namely chilled, frozen, whole tilapia, headed and gutted (H&G) and fish maws, fish fillets of mainly Nile Perch and other fish by-products. Factories exporting their fish products either to fish exporters FOB Entebbe or arrange freight for themselves and sell C&F to overseas importers. In this analysis, the benchmark price of fish constitutes the export price of processed fish (fresh and frozen fillets) and export value of other by-products. Unit export prices of processed fish are derived from the value and quantity of fish export reported in the official statistics of the Fishery Department at MAAIF (2010, 2011). Actual export prices were preferred because quoted international prices may vary from those at which transactions actually occur, due to quality, timing, mode of payment and delivery, or other practical considerations. The use of actual export prices of fish also helps to address the issue of quality differences and the resulting price differences between domestic and international commodities. These actual prices represent a weighted price series of processed Nile Perch fish fillet since Nile Perch products represent over 90 percent of exports. Figure 6 presents the real FOB fish prices (adjusted for inflation) in local currency and Table 2 presents the nominal export prices (US \$/ton) of processed fish fillet.

² Local fishers receive the same prices as boat transporters and at times higher prices as a premium for freshness of their fish.

In addition to export price received for processed fish fillets, processors also profit from sale of fish by-products given the low retention rate of 44% on average. By-products contribute significantly to processors' revenues. For instance, average value of fish by-products including maws, fats, head and red meat in 2011 is estimated at U Sh 3,311 per kg (US \$ 1.37/kg) or 19.4 percent of the export price. In this analysis, the benchmark price of fish is estimated as the weighted average of fish fillet and by-product with the retention rate as the weights (0.44 and 0.54 respectively). Table 2 presents the benchmark price of fish per unit of whole fish.

Adjusted

In this analysis, adjusted benchmark prices are not used assuming that the export unit value reflects the opportunity costs of fish export.

Table 2. Estimation of benchmark prices of fish in Uganda (2005-2011).

year	Fish fillet unit export price (US \$/ton)	Benchmark price (US \$/ton) of whole fish ^a
2005	3,639.98	2,152.89
2006	3,999.92	2,317.12
2007	3,936.39	2,189.02
2008	4,984.42	2,469.33
2009	4,807.78	2,703.14
2010	5,460.77	3,426.54
2011	6,401.36	3,873.24

a. Weighted average of fillet value and by-products. Value of fish by-product is assumed to be 19.4 percent of unit value fillet.

Source: Department of Fisheries Resources, MAAIF, 2012.

DOMESTIC PRICES

Observed

The analysis for conventional commodities is usually carried out at the farmgate and wholesale markets. Ideally, fishermen could be treated as the initial commodity suppliers and the price received would be treated as the farmgate price. However, these prices are difficult to obtain as fishers residing inside the lake are inaccessible and price data is unavailable. The analysis, therefore, considers the landing site market as the primary market where fish transporters and fishers supply fish to the market. The selling price of fish at the site approximates fishermen prices since some fishers also directly sell their fish in these markets³. Prices at the primary markets are expressed in terms of unit price of unprocessed (whole) fish. The price series for 2005-2011 were obtained from the Department of Fisheries Resources (FDR) at the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) of Uganda (Table 3).

Fish products are mainly exported through Entebbe airport by processing companies themselves. This is considered as the point of competition. Given the export incentives measures in Uganda, the processors receive the full export price. This represents, therefore, the domestic price at the point of competition (Table 3).

³ The price paid by boat transporters to fishermen inside the lake is lower than the price at the lake side and the difference represents the boat transporters' costs and unknown profit margin.

Table 3. Domestic prices of Nile Perch in Uganda in the primary market and the point of competition (2005-2011)

Year	Domestic price in the primary market (U Sh/ton) of whole fish	Price of processed fish at the point of competition ^a (U Sh/ton)
2005	2,369,842	3,756,696
2006	2,871,763	4,165,039
2007	2,723,981	3,694,084
2008	3,599,792	4,169,645
2009	4,898,954	5,409,775
2010	5,684,317	7,385,405
2011	7,799,592	9,256,917

a. The price at the point of competition is the equivalent FOB prices for exporters of processed fish.

Source: Department of Fisheries Resources, MAAIF, 2012.

EXCHANGE RATES

Observed

This data is used to convert the benchmark price in domestic currency and therefore plays an important role in determining the level of incentives for producers and wholesalers. Year-average exchange rate observed in the free foreign exchange market in Uganda is obtained from UBOS (2012).

Adjusted

The exchange rate during the period covered in the analysis has been free and floating. There is no evidence of exchange rate misalignment and therefore we assume that the observed exchange rate measures the equilibrium exchange accurately.

MARKET ACCESS COSTS

To correctly be compared with the domestic price, the benchmark (border) price must be adjusted for marketing margins, which include the costs of processing, transportation and handling of a product incurred between the domestic markets and the border (OECD, 2010). Noting that MAFAP indicators are calculated for observed and adjusted scenarios, the OECD methodology referred to above represents the adjusted scenario where transfers including taxes and subsidies are not included in the access costs⁴.

Fish marketing costs in Uganda are quite simple and involve access costs from the wholesale (primary) market to the borders based on movement of fish from the wholesale markets to

⁴ The treatment of access costs as observed and adjusted costs corresponds closely to private versus social costs or financial versus economic costs where financial costs (observed) are derived from the market prices (current or expected) of the transactions as they are experienced. By contrast, in economic analysis (such as cost benefit analysis), the (adjusted) costs and benefits of a project are analyzed from the point of view of society and not from the point of view of a single agent (). As such, interest on borrowing, taxes, direct or indirect subsidies are transfers that do not therefore constitute an economic cost.

processing plants for export processing via Entebbe airport. Access costs from the fishers to wholesale markets include collection and transportation from the lake to the landing site profit margins are irrelevant here given that the initial entry of the product is the landing site as these represent part of the production cost.

Observed

In its study of the domestic resource cost, Bank of Uganda (2008 and 2011) reports detailed processing and export costs of fish in Uganda for 2007-2010. These costs include processing, packaging, inland transport to and handling at Entebbe airport, overhead costs and taxes paid by boat owners and processors. Table 4 summarizes the access costs of fish marketing, processing and export.

Table 4. Summary of marketing and processing cost of fish in Uganda 2007-2010 (Ush/kg)

Cost	2007	2008	2009	2010
Taxes paid by boat-transporters ^a (collectors)	14.79	14.79	14.79	14.79
Transportation to processing factory (processed)	910.30 ^b	11.10	44.36	222.55
Processing and packing per unit of processed fish	-	78.90	235.15	630.47
Transport, handling at Entebbe and overheads	-	1132.20	897.62	1050.24
Taxes paid by processors ^a	194.00	194.00	194.00	194.00
Total processing and marketing costs	1,119.09	1,430.99	1,385.92	2,112.05

a. The taxes are reported only for 2008 and assumed to be the same in other years.

b. The data reported for 2007 aggregates transportation, processing and handling.

Source: Bank of Uganda (2008) and Bank of Uganda (2010).

This above data is used to estimate the observed marketing costs and margins for 2007-2010 and to extrapolate the costs for 2005-2006 and 2011. For 2011, the observed access costs are assumed to be the average costs of 2007-2010 expressed in 2011 prices⁵. Similarly, the average access cost of 2011 is expressed in 2005-2006 prices to derive the observed access costs for these two years. For all years, collectors' and processor's taxes are assumed to have not changed.

Since fish is delivered as FOB at Entebbe airport, all costs elements are considered as part of the observed access cost from the primary market to the point of competition. Observed access costs at the border are, therefore, zero. The profit margin for processors is assumed to be 9% of the investment cost following Ikwaput (2004). Table 5 presents the costs elements involved in each market segment based on the data in Table 4.

⁵ The observed access costs (in Table 4) in each year are adjusted for inflation using CPI (2011=100).

Table 5: Observed access costs of Nile Perch between wholesale market in fish landing sites and the point of competition in Uganda (2005-2011)

Cost element ^a	2005	2006	2007	2008	2009	2010	2011
Boat transporters tax	14.79	14.79	14.79	14.79	14.79	14.79	14.79
Transportation to processing factory	64.69	67.23	910.30	11.10	44.36	222.55	111.44
Processing and packaging	222.21	230.94	-	78.90	235.15	630.47	382.80
Transport and handling at Entebbe	761.02	790.93	-	1,132.20	897.62	1050.24	1311.01
Taxes for processors	194.00	194.00	194.00	194.00	194.00	194.00	194.00
Profit margin for processors/exporters	585.06	702.15	694.82	919.95	1208.21	1450.27	1908.77
Total cost per kg of processed fish	1,841.77	2,000.04	1,813.91	2,350.94	2,594.13	3,562.31	3,827.12
Observed access costs to the point of competition	632.43	673.66	605.71	781.99	822.10	1,174.82	1,187.67
Adjusted access costs to the point of competition	548.92	590.14	522.19	698.47	738.58	1,091.30	1,142.42

a. The above costs are estimated on the basis of kg of whole fish except for the observed and adjusted access costs which are adjusted by retention factor of 0.4 (0.4 kg of processed fish for each 1 kg of whole fish).

Source: Observed access costs are compiled from Bank of Uganda (2008; 2011) and DFR (2012).

Adjusted

Adjusted access costs are calculated on the basis of the opportunity cost of marketing services by excluding collection and processing taxes. The adjusted access costs at the point of competition are presented in Table 5.

EXTERNALITIES

The major source of externality are the possible impact of fish exports on resource sustainability. In the context of fisheries, increased trade on one hand poses a significant risk of increasing pressure on the stocks which may indirectly or directly lead to over-exploitation of the fish resources. Unfortunately, no data is available to monetize this impact.

BUDGET AND OTHER TRANSFERS

This data is expected to be computed in the expenditure analysis, an integral part of this analysis. This is on-going work and will be included as it becomes available.

QUALITY AND QUANTITY ADJUSTMENTS

Processed fish fillets constitute 44 percent of the whole fish and fish by-products represents 54 percent. These ratios are used to calculate the equivalent observed and adjusted access costs, domestic prices at the point of competition and the benchmark prices per unit of whole fish. We assume that there are no quality difference between exported and domestically traded fish and hence quality adjustment is irrelevant. Table 6 summarizes sources of the data used in estimating the policy indicators for fish.

Table 6: Summary of the description of the data used in the estimation of policy indicators for beef in Uganda

<i>data</i>	<i>Description</i>	
	<i>Observed</i>	<i>Adjusted</i>
Benchmark price	<i>FOB price calculated as unit value from export data reported in by DFR (2012) (see Table 2)</i>	<i>N.A.</i>
Domestic price at point of competition	<i>Weighted prices received for processed fish and by-products parts by by processors obtained from DFR (2012) (see Table 2)</i>	<i>N.A.</i>
Domestic price at primary markets ^a	<i>Annual average price received by boat transporters and fishermen at Kasenyi fish landing sites obtained from DFR (2012) (see Table 2)</i>	<i>N.A.</i>
Exchange rate	<i>Annual average of exchange rate as reported by UBoS (2012)</i>	<i>NA</i>
Access cost to point of competition	<i>All observed marketing costs involved in transportation, processing and exporting fish, and local taxes as reported by BoU (2008; 2011) and estimated processors margins. (see table 4)</i>	<i>All observed marketing costs involved in transportation, processing and exporting fish as reported by BoU (2008; 2011) and estimated normal processors margins. (see table 3) (see table 5)</i>
Access costs to primary market ^a	<i>All observed marketing costs involved in transportation, processing fish, and local taxes as reported by BoU (2008; 2011) and estimated processors margins (9 percent)</i>	<i>All observed marketing costs involved in transportation, processing fish as reported by BoU (2008; 2011) and estimated normal processors margins. (see table 3) (see table 5)</i>

- a. In this note and unlike other conventional commodities, fishers' prices (equivalent to farmgate prices) are unavailable. The primary market is assumed to be the fish landing site where both fishermen along the Lake and boat transporters who purchase fish from fishermen in the lake are the primary sellers of fish at the site.

CALCULATION OF INDICATORS

The indicators and the calculation methodology used is described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking here. The data used in the calculations of the indicators, as described above, is presented in Table 7.

The estimated indicators include the observed and adjusted price gaps and the associated observed and adjusted nominal rate of protection at the primary markets for boat transporters and the wholesale market for processors/exporters. Table 8 and Figure 7 present the estimated price gaps at the two markets for 2005-2011 while Table 9 and Figure 8 present the estimated rates of protection for the same time period.

Table 7. Data used in the analysis of MAFAP policy indicators for Nile Perch in Uganda

DATA	Unit	Symbol	Year rade status	2005	2006	2007	2008	2009	2010	2011
				x	x	x	x	x	x	x
Benchmark Price										
Observed	US \$/TON	P _{b(int\$)}		2,153	2,317	2,189	2,469	2,703	3,427	3,873
Adjusted	US \$/TON	P _{ba}								
Exchange Rate										
Observed	USh/US \$	ER _o		1,781	1,831	1,723	1,720	2,030	2,178	2,410
Adjusted	USh/US \$	ER _a								
Access costs border - point of competition										
Observed	USh/TON	AC _{o,wh}		0	0	0	0	0	0	0
Adjusted	USh/TON	AC _{a,wh}		0	0	0	0	0	0	0
Domestic price at point of competition										
	USh/TON	P _{dwh}		3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
Access costs point of competition - farm gate										
Observed	USh/TON	AC _{o,fg}		736,706	800,014	725,565	940,376	1,037,651	1,424,926	1,530,848
Adjusted	USh/TON	AC _{a,fg}		548,917	590,141	522,194	698,470	738,581	1,091,300	1,142,423
Farm gate price										
	USh/TON	P _{dfg}		2,369,842	2,871,763	2,723,981	3,599,792	4,898,954	5,684,317	7,799,592
Externalities associated with production										
	USh/TON	E								
Budget and other product related transfers										
	USh/TON	BOT								
Quantity conversion factor (border - point of competition)										
	Fraction	QT _{wh}		1	1	1	1	1	1	1
Quality conversion factor (border - point of competition)										
	Fraction	QL _{wh}								
Quantity conversion factor (point of competition - farm gate)										
	Fraction	QT _{fg}		1	1	1	1	1	1	1
Quality conversion factor (point of competition - farm gate)										
	Fraction	QL _{fg}								

Note that the farmgate represents the primary market assumed to be the Lake landing site and the point of competition is the border (Entebbe airport).

Source: compiled from the data described above.

Box 1: MAFAP POLICY INDICATORS

MAFAP analysis uses four measures of market price incentives or disincentives. *First*, are the two observed nominal rates of protection one each at the wholesale and farm level. These compare observed prices to reference prices free from domestic policy interventions.

Reference prices are calculated from a benchmark price such as an import or export price expressed in local currency and brought to the wholesale and farm levels with adjustments for quality, shrinkage and loss, and market access costs.

The **Nominal Rates of Protection - observed (NRPo)** is the price gap between the domestic market price and the reference price divided by the reference price at both the farm and wholesale levels:

$$NRPO_{fg} = (P_{fg} - RPO_{fg})/RPO_{fg}; \quad NRPO_{wh} = (P_{wh} - RPO_{wh})/RPO_{wh}$$

The $NRPO_{fg}$ captures all trade and domestic policies, as well as other factors which impact on the incentive or disincentive for the farmer. The $NRPO_{wh}$ helps identify where incentives and disincentives may be distributed in the commodity market chain.

Second are the **Nominal Rates of Protection - adjusted (NRPa)** in which the reference prices are adjusted to eliminate distortions found in developing country market supply chains. The equations to estimate the adjusted rates of protection, however, follow the same general pattern:

$$NRPa_{fg} = (P_{fg} - RPa_{fg})/RPa_{fg}; \quad NRPa_{wh} = (P_{wh} - RPa_{wh})/RPa_{wh}$$

MAFAP analyzes market development gaps caused by market power, exchange rate misalignments, and excessive domestic market costs which added to the $NRPO$ generate the $NRPa$ indicators. Comparison of the different rates of protection identifies where market development gaps can be found and reduced.

Table 8: MAFAP price gaps for Nile Perch in Uganda 2005-2011 (U Sh per Mt)

	2005	2006	2007	2008	2009	2010	2011
Trade status for the year	x	x	x	x	x	x	x
Observed price gap at point of competition	0	0	0	0	0	0	0
Adjusted price gap at point of competition	0	0	0	0	0	0	0
Observed price gap at primary market	-727,748	-570,861	-322,138	292,924	449,229	-353,762	-4,077
Adjusted price gap at primary market	-915,537	-780,735	-525,509	51,017	150,159	-687,388	-392,502

Source: Own calculations using data as described above.

Table 9: MAFAP nominal rates of protection (NRP) for Nile perch in Uganda 2005-2011 (%)

	2005	2006	2007	2008	2009	2010	2011	average
Trade status for the year	x	x	x	x	x	x	x	x
Observed NRP at at point of competition	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Adjusted NRP at point of competition	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observed NRP at primary market	-23.5%	-16.6%	-10.6%	8.9%	10.1%	-5.9%	-0.1%	-23.5%
Adjusted NRP at primary market	-27.9%	-21.4%	-16.2%	1.4%	3.2%	-10.8%	-4.8%	-27.9%

Source: Own calculations using data as described above.

Table 10: MAFAP Market Development Gaps for Nile Perch in Uganda 2005-2011 (USD per Mt)

	2005	2006	2007	2008	2009	2010	2011
Trade status for the year	x	x	x	x	x	x	x
International markets gap (IRG)	0	0	0	0	0	0	0
Exchange policy gap (ERPG)	0	0	0	0	0	0	0
Access costs gap to wholesale market (ACG _{wh})	0	0	0	0	0	0	0
Access costs gap to primary market (ACG _{pr})	-187,789	-209,874	-203,371	-241,907	-299,070	-333,626	-388,424
Market Development Gap	-6.1%	-6.1%	-6.7%	-7.3%	-6.7%	-5.5%	-5.0%

Source: Own calculations using data as described above.

4. INTERPRETATION OF THE INDICATORS

Fish prices have been characterized by numerous fluctuations due to a variety of factors especially variability of supply (catches) and demand for export processing. The processing industry has influenced market prices at various landing sites (Ikwaput et al., 2004). Fish destined for export processing has generally attracted higher prices than fish sent directly to domestic and regional markets. Kaelin and Cowx (2002) noted that the current fish trade on Lake Victoria is a major constraint to greater benefits accruing to fishing communities. Under current arrangements the fish buyers not only determine the price but also use the perishable nature of fish as a negotiating tactic to keep the price low.

Processors/exporter at the point of competition

At the point of competition, processors/exporters enjoy substantial support as a result of the export promotion policies adopted by the government of Uganda. Under these policies, fish exports, like other exports, are not subject to any export tax. Besides, the foreign exchange regime is fully liberalized and exporters are entitled to retain 100 percent of their foreign exchange earnings accruing from their export transactions. Price control as a development and trade policy measure is no longer practiced by the government. Accordingly, exporters can exchange their export earnings at the market exchange rate. All prices are determined by the market.

Consequently, exporters receive the FOB price for fish export and as a result price gaps at the point of competition are eliminated (Table 8). Therefore, the observed and adjusted nominal rates of protection are zero since there is no divergence between the benchmark price and the domestic price at the point competition for fish exports.

These results are consistent with the operational incentives advanced by the policy environment aims at compensating exporters for the infrastructure inadequacies in the country and promoting both traditional and nontraditional exports of Uganda. This policy tends also to promote vertical integration of processing and marketing within the fish industry. This situation appears to be optimal from policy perspective since it eliminates disincentives at the point of competition.

As many of the processing factories are operating below full capacity due to insufficient supplies and the global demand for Nile Perch is increasing, the export promotion incentives is likely to increase the competition for fish at the domestic market. This is likely to increase the prices of fish. In fact, the price of fish destined to processing plants increased from US\$ 2,370 in 2005 to 7,888 per kg in 2011. Domestic consumers ultimately bear the burden of high prices of fish in the domestic market.

Indicators in the primary market

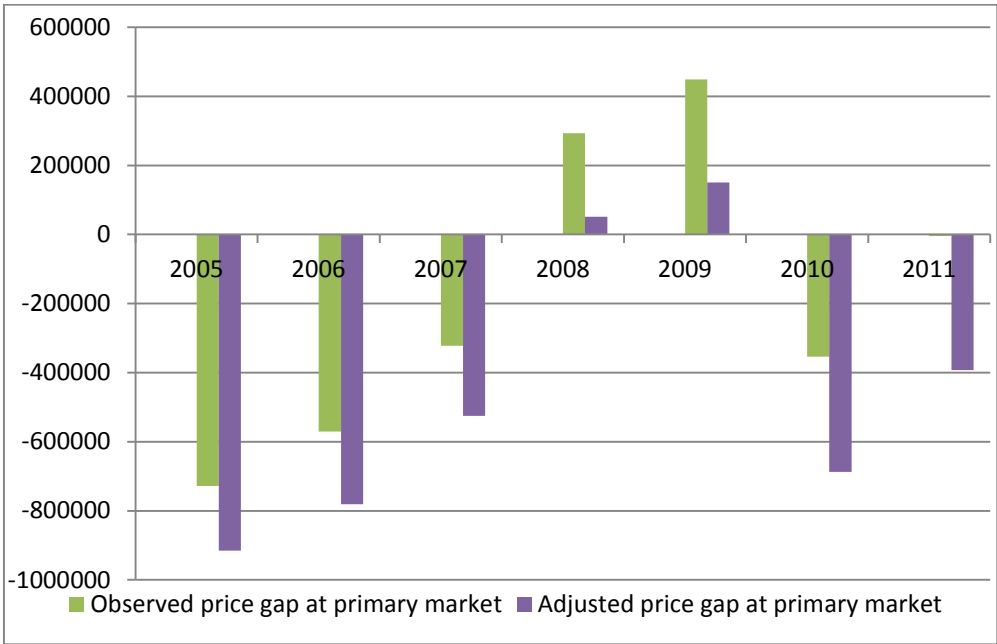
In contrast to the indicators for fish processing and exporting market, the price gaps and nominal rate of protection at the primary market are mixed. Both indicators at the primary market are generally negative with the exception of 2008-2009. The observed price gap averaged U Sh -176 633 (US \$ -99.18) per ton of unprocessed fish as compared to U Sh -442 928 (US \$ -248.70) per ton for the adjusted gap over the period of 2005-2011 (Table 8). Consequently, the observed nominal rate of protection ranges from -23.5 to 10.1 percent while the adjusted rate ranges from -27.9 to 3.2 percent (Table 9). The divergence between the observed and adjusted indicators is due mainly to collection and processing taxes levied at the primary market. As a result of this divergence, a market development gap of 5.0 to 7.3 percent is detected (Table 10).

The indicators in the primary market for Nile Perch suggest that fish sellers including boat transporters and fishermen receive significant disincentives in most of the years except in 2008-2009. During these two years, catches decreased substantially by about 24 percent compared to 2007 (Figure 1). As a result, fish exports also decreased. As a result of these supply factors, domestic prices of Nile Perch in the primary market increased by 32.2 and 80.0 percent in 2008 and 2009, respectively compared to the prices of 2007. These price hikes led to positive gains in terms of incentives to fish sellers.

Uganda pursues a liberalized economic policy with minimal policy measures such as export taxes or restrictive trade measures. Local taxes on fish exports are minimal. The role of the Department of Fisheries Resources (DFR) at MAAIF of Uganda retains setting and enforcing standards and regulations for practices pertaining to fisheries (FDR, 2012). As fish prices are solely determined by the market, the above market disincentives in the primary market cannot be attributed to policy interventions. Rather, these incentives are the results of demand and supply forces in the global and domestic fish markets. However, these disincentives suggest that export promotion policies do not necessarily trickle down to the primary commodity producers.

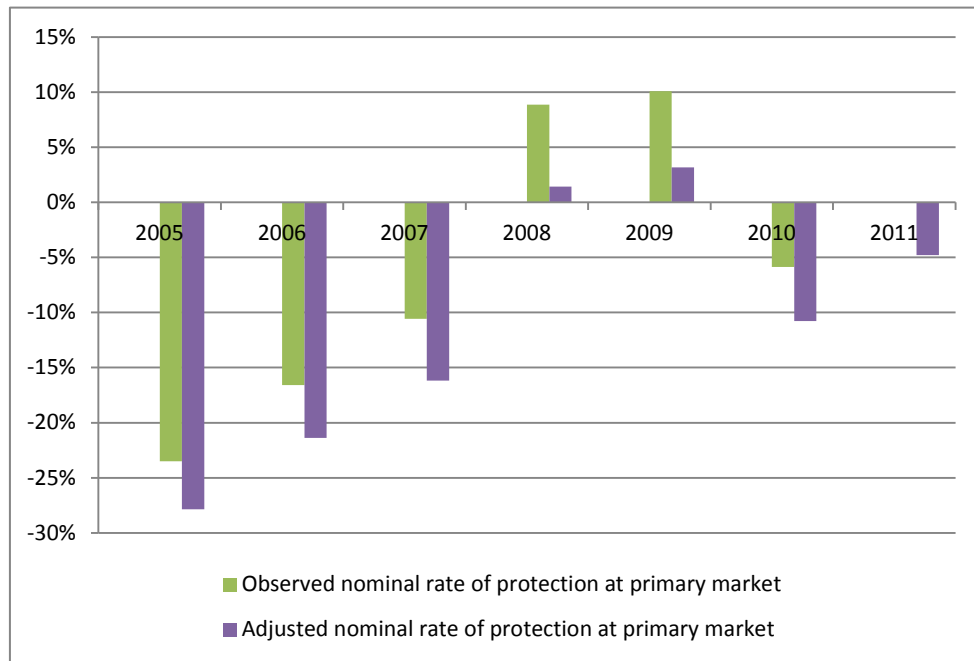
During the period of analysis, the export prices of processed Nile Perch increased from US \$3.65 in 2005 to US \$6.40 per kg in 2011 by 75 percent (Table 2). In addition, the demand for fish export is stimulated by the dramatic increase in regional export markets to neighboring countries in recent years together with lifting of

Figure 7: MAFAP price gaps for Nile Perch in Uganda 2005-2011 (U Sh per Mt)



Note. Indicators at the point of competition are zero.
Source: Authors.

Figure 8: MAFAP nominal rates of protection (NRP) for Nile perch in Uganda 2005-2011 (%)



Note. Indicators at the point of competition are zero.

Source: Authors.

the ban of fish export to EU countries since 2000 (DFR, 2012). As a result, fish processing industry expanded but most factories are operating at less than 40% of their capacity (DFR, 2012) due to decreasing catches particularly from Lake Victoria caused by low stocks, overfishing and expansion in neighboring countries sharing the lake. With the increased demand and the reduced supplies, the prices of fish in Uganda have inevitably been rising.

The analysis cannot establish whether these incentives trickle down to fishers for lack of data on prices received by fishers. However, early research cited concerns over the welfare of the fishing communities around Lake Victoria as income distribution is thought to be increasingly skewed in favor of fish processors against fishers (Ikwaput, 2004). Further research is needed to investigate the level of incentives to fishers.

5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

MAIN MESSAGE

At lake landing sites in Uganda, considered here as the primary and wholesale market for fish, domestic Nile Perch prices during the period of 2005-2011 tend to deviate negatively from reference prices as indicated by the generally negative price gaps and nominal rates of protection. As Uganda has liberalized its economic policy, there are no known policy measures to influence domestic fish prices other than the minimal local taxes and marketing levies, these price gaps are likely to be due to factors not related to agricultural or economic policies. Rather, the analysis suggests demand factors and existence of market power in the fish market partly explain the gap between the observed domestic market prices and reference price. Apparently, processors/exporters are not willing to pay a price higher than the reference price in order to obtain the fish, a condition necessary for higher capacity for the factories except when supplies decline. The analysis cannot establish whether some of the benefits is trickling down to fishermen.

PRELIMINARY RECOMMENDATIONS

With the country well-advanced in its plan for liberalizing the economy and commercialization of agriculture and adoption of policies geared towards the development of livestock sector, the Government of Uganda may need to focus on ensuring that benefits from the fish resource utilization trickle down to fishermen and domestic consumers are protected from the fish price surge.

LIMITATIONS

As prices of fish at the fishery level are unavailable, the results above cannot establish the level of incentives/disincentives at the fishery level. The analysis and indicators presented in this notes are limited to boat transporters and processors/exporters. These prices may give a better insight of the distribution of benefits to the primary producers of fish. Earlier studies (Ikwaput, 2004) raised the concerns over the welfare of the fishing communities around Lake Victoria as income distribution is thought to be increasingly skewed in favor of fish processors against fishers.

FURTHER INVESTIGATION AND RESEARCH

This research may benefit substantially from a comparison of the indicators for fish with similar analysis in other countries in the region.

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ANNEX I: Methodology Used

A guide to the methodology used by MAFAP can be downloaded from the MAFAP website or by clicking [here](#).

ANNEX II: Data and calculations used in the analysis

DATA		Unit	Symbol	Year	2005	2006	2007	2008	2009	2010	2011
				trade status:	x	x	x	x	x	x	x
Benchmark Price	Observed	US \$/TON	P _{b(int\$)}		2,153	2,317	2,189	2,469	2,703	3,427	3,873
	Adjusted	US \$/TON	P _{ba}								
Exchange Rate	Observed	US\$/US \$	ER _o		1,781	1,831	1,723	1,720	2,030	2,178	2,410
	Adjusted	US\$/US \$	ER _a								
Access costs border - point of competition	Observed	US\$/TON	AC _{Owh}		0	0	0	0	0	0	0
	Adjusted	US\$/TON	AC _{Awh}		0	0	0	0	0	0	0
Domestic price at point of competition		US\$/TON	P _{dwh}		3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
Access costs point of competition - farm gate	Observed	US\$/TON	AC _{Org}		736,706	800,014	725,565	940,376	1,037,651	1,424,926	1,530,848
	Adjusted	US\$/TON	AC _{Arg}		548,917	590,141	522,194	698,470	738,581	1,091,300	1,142,423
Farm gate price	Observed	US\$/TON	P _{drg}		2,369,842	2,871,763	2,723,981	3,599,792	4,898,954	5,684,317	7,799,592
	Adjusted	US\$/TON	AC _{Arg}								
Externalities associated with production		US\$/TON	E								
Budget and other product related transfers		US\$/TON	BOT								
Quantity conversion factor (border - point of competition)		Fraction	QT _{wh}		1	1	1	1	1	1	1
Quality conversion factor (border - point of competition)		Fraction	QL _{wh}								
Quantity conversion factor (point of competition - farm gate)		Fraction	QT _{fg}		1	1	1	1	1	1	1
Quality conversion factor (point of competition - farm gate)		Fraction	QL _{fg}								

CALCULATED PRICES		Unit	Symbol	2005	2006	2007	2008	2009	2010	2011
Benchmark price in local currency	Observed	US\$/TON	P _{b(loc\$)}	3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
	Adjusted	US\$/TON	P _{b(loc\$a)}	3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
Reference Price at point of competition	Observed	US\$/TON	RP _{Owh}	3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
	Adjusted	US\$/TON	RP _{Awh}	3,834,296	4,242,639	3,771,684	4,247,245	5,487,375	7,463,005	9,334,517
Reference Price at Farm Gate	Observed	US\$/TON	RP _{Org}	3,097,590	3,442,624	3,046,119	3,306,868	4,449,725	6,038,079	7,803,669
	Adjusted	US\$/TON	RP _{Arg}	3,285,379	3,652,498	3,249,490	3,548,775	4,748,795	6,371,705	8,192,094

INDICATORS		Unit	Symbol	2005	2006	2007	2008	2009	2010	2011
Price gap at point of competition	Observed	US\$/TON	PG _{Owh}	-	-	-	-	-	-	-
	Adjusted	US\$/TON	PG _{Awh}	-	-	-	-	-	-	-
Price gap at farm gate	Observed	US\$/TON	PG _{Org}	(727,748)	(570,861)	(322,138)	292,924	449,229	(353,762)	(4,077)
	Adjusted	US\$/TON	PG _{Arg}	(915,537)	(780,735)	(525,509)	51,017	150,159	(687,388)	(392,502)
Nominal rate of protection at point of competition	Observed	%	NRP _{Owh}	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Adjusted	%	NRP _{Awh}	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Nominal rate of protection at farm gate	Observed	%	NRP _{Org}	-23.49%	-16.58%	-10.58%	8.86%	10.10%	-5.86%	-0.05%
	Adjusted	%	NRP _{Arg}	-27.87%	-21.38%	-16.17%	1.44%	3.16%	-10.79%	-4.79%
Nominal rate of assistance	Observed	%	NRA _o	-23.49%	-16.58%	-10.58%	8.86%	10.10%	-5.86%	-0.05%
	Adjusted	%	NRA _a	-27.87%	-21.38%	-16.17%	1.44%	3.16%	-10.79%	-4.79%

Decomposition of PWAfg		Unit	Symbol	2005	2006	2007	2008	2009	2010	2011
International markets gap		US\$/TON	IRG	-	-	-	-	-	-	-
Exchange policy gap		US\$/TON	ERPG	-	-	-	-	-	-	-
Access costs gap to point of competition		US\$/TON	ACG _{wh}	-	-	-	-	-	-	-
Access costs gap to farm gate		US\$/TON	ACG _{rg}	(187,789)	(209,874)	(203,371)	(241,907)	(299,070)	(333,626)	(388,424)
Externality gap		US\$/TON	EG	-	-	-	-	-	-	-
Market Development Gap		US\$/TON	MDG	(187,789)	(209,874)	(203,371)	(241,907)	(299,070)	(333,626)	(388,424)
Market Development Gap		%	MDG	-6.06%	-6.10%	-6.68%	-7.32%	-6.72%	-5.53%	-4.98%



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