The status of Lake Victoria Fisheries under limited access fisheries

Rhoda Tumwebaze
Fisheries Management and Development Lake Victoria Fisheries Organization, Uganda, Lake Victoria Fisheries Organization

Abstract
Lake Victoria has a commercial fishery dominated by three species; Nile perch (*Lates niloticus*), Nile tilapia (*Oreochromis niloticus*) and Dagaa (*Rastrineobola argentea*). The estimated total fish landings are about 900 000 tonnes; fishing is conducted with about 76 929 fishing canoes operated by 219 919 fishers with a beach value of about USD 600 million. The main challenges of the fisheries of Lake Victoria include: increased fishing pressure; inadequate and unsustainable funding to implement research and agreed management interventions; increased illegalities due to weak enforcement; inadequate infrastructure for fish quality and safety and underdeveloped aquaculture to meet the demand of fish and relieve fishing pressure from capture fishery. The objective of this study was to assess the status of the fisheries of Lake Victoria and provide possible recommendations to improve management. The assessment drew on the data from Frame, Catch Assessment and Hydroacoustic surveys and management reports during regional meetings. Lake Victoria fisheries have been managed under lake-wide plans since 2003, but the hydro-acoustic survey results in 2017 showed that the majority of the Nile perch in the lake are young, with only 5.9 percent above the slot size (50 cm total length) allowed to be caught. The only legally recognized fishing rights are fishing vessel licenses. Anyone with legal fishing gears and seaworthy canoes can be given a license. Controls include gillnet/seine net mesh sizes, fishing methods and sizes of fish. However, the number of fishers, fishing gears, fishing canoes and illegal fishing gears have been increasing and fish catch decreasing despite enforcement on the lake. It is recommended to develop and implement a specific rights-based program for small scale fisheries with the participation of key stakeholders for the improvement of the fishery.

1. INTRODUCTION

1.1 Description of the fishery

Lake Victoria, with a surface area of 68 800 km^2, is the second-largest freshwater body in the world and the largest in Africa (Figure 1). The largest part of the lake, 35 088 km^2 (51%) is in Tanzania, followed by the Ugandan part 29 584 km^2 (43%) and the Kenyan part 4 128 km^2 (6%). The lake has a shoreline length of 3 450 km: 1 150 km (33%) in Tanzania, 1 750 km (51%) in Uganda and 550 km (16%) in Kenya. The lake's fishery is dominated by three species: Nile perch (Lates Niloticus), Nile Tilapia (Oreochromins Niloticus) and Mukene/Dagaa/Omena (Ratrineobola argentea) but there is also an upcoming haplochromine fishery especially in the Tanzanian part of the lake. The utilization of the catches is as follows: about 50 percent of Nile Perch is exported, Nile Tilapia is mainly for domestic consumption and regional exports while about 70 percent of Dagaa catches are used for the production of animal feeds.

Fishing takes place in the coastal areas, but the Nile Perch fishers are extending to the deeper waters with reduced catches. The lake has got 1 535 landing sites, and 76 929 fishing canoes operated by 219 919 fishers. The fishery is open to fishers within the fishing communities but also to those within the country so long as they meet the required conditions, such as being registered with Beach Management Units, having legal fishing gears and seaworthy canoes. Kenya and Tanzania do not allow persons outside the country to own fishing canoes, but in Uganda, non-citizens can pay a special fee to acquire a fishing license.

The ownership of fishing canoes is open to both men and women, but very few are owned by women (0.1%, 4 830) probably because of cultural influence and affordability. The fishing is a full-time job and is conducted through the year except for Dagaa where there is limited fishing during the moonlight period. The fishing operations are mainly night trips where the fishing gears are set at night and removed in the morning but there are also day trips. There are very few fishers who stay on the lake for two to three days, especially for Nile perch. The fishing canoes mainly use paddle (56.1%), 33.5 percent use outboard engines, 9.5 percent use sails while 0.1 percent of the canoes are towed. The main fishing gears used include gillnets, boat seines and longline hooks. Some illegal gears like cast nets, beach seines and traps are also used. The fishing gears are manually operated by the crew, with the exception of few fishing vessels for Dagaa in Uganda where a winch is used to operated lift nets. The only fish aggregation done is by use of light from kerosene lamps or solar lamps to attract Dagaa on moonless days.

The main conflicts reported on the lake are between the Nile Perch and Dagaa fishers regarding fishing grounds and use of light. Dagaa is one of the food sources for Nile perch. The increase in Dagaa catches coincided with the decline in Nile perch catches. Fishers of Nile perch in some parts of the lake blame the decline in Nile Perch catches to Dagaa fishing. The Nile Perch fishers also attribute the reduced catches to the use of light in Dagaa fishing, thinking it chases the Nile Perch. There have been cases of sand mining from the lake, especially in the northern part of the lake in Uganda. This activity affects the inshore areas which act as nursery and breeding areas for all the species. Agricultural practices close to the lake and use of fertilizers without adequate buffer zone results in a lot of nutrients entering the lake and encourage algal blooms which reduce oxygen levels as they decompose and change the aquatic environment.

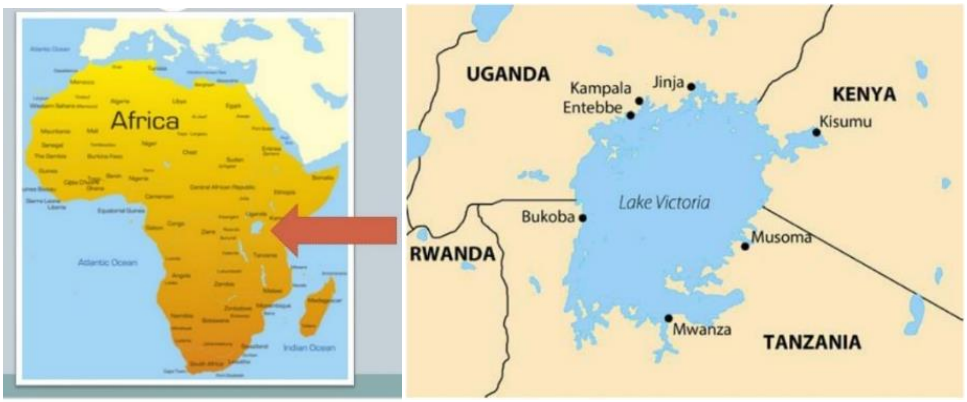

Figure 1. Map of Lake Victoria.
Source: Google Maps, with author's edits.

1.2 Economic contribution and social implications of the fishing activity

The estimated fish production in Lake Victoria is 876 547 tonnes (2015)[1]. Sixty-five percent of the catch is derived from Dagaa which is mainly sun-dried at landing sites and sold to the domestic and regional markets. However, Dagaa contributes only 32 percent to the total beach value (USD 588 680) because of the low value caused by poor processing. Of the three countries sharing Lake Victoria, Kenya is the main importer of Dagaa. The majority of Dagaa catch (70%) is used for the production of poultry, animal and fish feed, and only 30 percent is used for human consumption. Some Dagaa is sold to neighbouring countries like the Democratic Republic of Congo (DRC), Rwanda and South Sudan, but the trade is informal and data scanty. Dagaa is an important fishery targeted by 32 percent (70 513) of the fishers, but the

[1] Lake Victoria Fisheries Organization Catch Assessment Report, April 2016

majority are men; only 227 women are involved. Nevertheless, Dagaa provides employment opportunities to women, especially in the post-harvest sector. Dagaa can be sold in small quantities which are affordable to low-income earners and therefore, it is important for food security.

The most important fishery is Nile Perch, which is targeted by 52 percent (115 515) of the fishers. It contributes 19 percent to the total catch, but the contribution to the total values is 52 percent because it is a high-value species. The catch is sold fresh or chilled to industrial processing plants which export different products to international markets. The products include chilled fillets, frozen head and gutted/fillets/chops. Some of the Nile Perch is sold fresh or smoked to the domestic and regional markets while some are salted and sundried for the DRC market. The Nile Perch fish maws are exported fresh or sundried to Hong Kong and China. They are of high value compared with the fillets and driving the prices of Nile Perch upwards. Nile Perch is exported to more than 50 countries, with 60 percent exported to Europe. The export value is about USD 400 million annually.

The most appreciated fish within the region is Nile Tilapia. It contributes only two percent (20 370 metric tonnes) to the total catch but is targeted by 12.4 percent (27 723) of the fishers. The catch is mainly sold in the domestic market as fresh, smoked, sundried or fried. It is considered vital for food security, and Tanzania does not allow the export of Nile Tilapia. Uganda exports Tilapia to Kenya, Rwanda, South Sudan and DRC, but the trade is mainly informal, and the data is scanty. The estimated beach value of Tilapia from the lake is USD 34 651 annually. Other fisheries include haplochromines, clarias and protopterus, which contribute 3.4 percent to the total catch. These species are mainly for domestic consumption. The non-fishing livelihood activities around the lake include farming (crop/livestock), artisanal fish processing, boat repair and mending of nets.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

The three Partner States sharing Lake Victoria (i.e. the Republic of Kenya, the United Republic of Tanzania and the Republic of Uganda) have been managing the lake through agreed management plans to ensure the sustainability of the fisheries resources. The first Fisheries Management Plan was developed in 2001 and implemented from 2005 to 2008. This was followed by the second Management Plan for the period 2009 to 2014. The lessons from the first two plans were used during the review process to come up with the Lake Victoria Fisheries Management Plan III (FMP III) 2016-2020. The FMP III provides management goals and objectives for Nile perch, Tilapia and Dagaa with target indicators, reference points and decision control rules with proposed management measures. The plan also indicates the strategic actions and expected outputs.

LVFO provides a forum for discussion and consultation about the issues that affect the lake. Once the measures have been agreed upon, the implementation is conducted by the Central, regional and Local/Devolved Governments as well as the communities. The Central Governments are responsible for the formulation of national policies, strategies, guidelines and standards. They are also responsible for technical support, guidance, mentoring, supervision and monitoring of implementation and reporting. The Local/Devolved Governments also perform the oversight role to the fishing communities. LVFO established community management Units at all gazetted/designated landing sites called Beach Management Units (BMUs). The BMUs leadership are responsible for the management of the landing sites which include vetting of fishers before issuance of fishing vessel licenses, catch data collection, management of conflicts and ensuring the use of recommended fishing gears and methods. The BMUs have formed networks with leadership at the national and regional level.

The main control of access to the fisheries of Lake Victoria is licensing. Fishing canoes are required to be vetted and approved by BMU leadership to ensure that they have the recommended fishing gears before they are licensed. The fishing canoes are also inspected for seaworthiness by the appropriate authorities before being licensed. A fee is charged to get a fishing vessel license, and other charges include a daily landing fee. Both the fishing and landing fees are the same for all fishing vessels on the lake in each country regardless of the commercial value of what they catch.

At the regional level, the number of fishing canoes for Lake Victoria since March 2018 was agreed to be 70 696 of which 13 403 in Kenya, 29 154 in Tanzania and 28 139 in Uganda. The number of fishing vessels for Nile Perch was also agreed not to go beyond 37 679 (7 531 in Kenya, 15 327 in Tanzania and 14 821 in Uganda). Other controls in the lake include the size of Nile perch to be caught (50 cm to 85 cm total length) and the minimum size of Tilapia to be caught, which is 20 cm. In addition, the minimum gillnet mesh size for Lake Victoria is 5 inches while for the Nile Perch fishery it is 7 inches. A number of breeding and nursery areas have been identified and some gazetted for protection. For Dagaa, fishing is not allowed within 2.5 km from the shoreline to reduce harvesting of juvenile fish.

The Central Government is responsible for the development of rules and regulations and ensuring compliance. It collaborates with the Local/Devolved Governments and BMU leadership in monitoring, control and surveillance (MCS). The MCS systems used to monitor fishing activities including the vetting of fishers,an inspection of fishing gears and vessel, lake patrols, an inspection of catch at landing time, during transportation, in markets and inspection of processing plants. The enforcement measures which are used to ensure compliance with the fishery's regulations include: fines, suspension from fishing, confiscation of fishing equipment, peer pressure from the community and criminal charges and imprisonment. The frequency of enforcement varies from country to country and may be irregular, thus affecting the rate of compliance. The most non-compliance experienced on Lake Victoria is the use of illegal fishing gears and catching of undersized fish.

2.2 Brief history of the former rights-based approaches used in the fishery

Lake Victoria does not have an elaborate rights-based approaches other than the licensing system.

2.3 Rights-based approach: allocation and characteristics

Access to fishing in Lake Victoria occurs through fishing vessel licensing. To obtain a fishing vessel license, one needs to be registered with BMUs, have legal fishing gears and a seaworthy canoe. In March 2018, the Fisheries and Aquaculture Sectoral Council decided to limit the number of fishing vessels for Lake Victoria and for the Nile Perch fishery as per the numbers indicated in the Frame Survey of 2016. Each country is to limit the total number of fishing vessels, including the number of fishing vessels for the Nile Perch fishery, to the numbers they had in their countries as per Frame Survey report of 2016. The incorporation of the decision in national regulations is yet to be done. When implemented, it is expected to control the increase in fishing effort and promote sustainability.

The right to own a fishing vessel license varies from country to country. In Kenya and Tanzania, only nationals have the right to get a fishing vessel license while in Uganda, non-citizens pay a higher fee to acquire a fishing license. Within the countries, there are no restrictions regarding women or ethnic groups in obtaining a fishing vessel license.

A fishing vessel license is valid from the date of issue to 31 December of that calendar year, and it cannot be leased or sold to another person neither can it be inherited. Currently, there is no limit to the number of fishing vessels an individual can have. There is also no customary and traditional consideration when

issuing fishing licenses. In addition, there is no special consideration to the poor and vulnerable individuals, women and other categories.

3. CONTRIBUTION OF THE RIGHTS-BASED APPROACH TO ACHIEVING SUSTAINABILITY

3.1 Sustainable use of the resources

Hydroacoustic surveys conducted on Lake Victoria show a decline of Nile perch stock over-time from 1.23 million tonnes in 2014 to 0.851 in 2016. During the survey of 2017, there was a 32 percent increase to 1.12 million tonnes but the size structure did not change much. The stocks were dominated by juvenile fish, and 96 percent of the stocks were below the slot size of 50 cm total length. The Dagaa stocks, which increased to 1.29 million tonnes in 2014, dropped to 0.718 million tonnes in 2016 and further reduced to 0.706 in 2017. The haplochromines, which are the main food for Nile Perch show wide fluctuations between surveys but overall have been on the increase for the last ten years. To ensure the sustainability of the different species, LVFO has agreed to the Species-Specific licensing, and regional guidelines have been developed to guide the process.

3.2 Economic viability of the fishery

LVFO has been conducting biennial Frame Surveys since 2000, and the trends on fishing characteristics provide variable information about the fisheries of the lake. Between 2006 and 2016, the number of fishers increased by 12 percent, the fishing vessels by eight percent, the seines targeting Dagaa increased by 221 percent and the longline hooks targeting mainly Nile Perch increased by 67 percent. The continuous increase in the number of fishing gears has contributed to the decline in fish catches. This may necessitate limiting the number of fishing gears per vessel to ensure the sustainability of the target species. There has also been an increase in the number of fishing vessels using outboard engines by 102 percent during the same period, thus indicating that fishers are travelling longer distances to fish as the catches reduce in the coastal areas. While the laws of member states regarding gillnets allow single nets, the majority of gillnets have triple panels (62%).

3.3 Social equality

In the Lake Victoria fisheries, the requirements to acquire a fishing vessel license do not consider the social aspect but rather the biological, ecological and sustainability of the fisheries resource. Therefore, issues of social equality, gender equality, human rights, rights to the new generation of fishers to the resource and the right to food are yet to be considered.

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

The Lake Victoria fisheries are faced with increased Illegal, Unreported and Unregulated fishing. Between 2006 and 2016, small hook (≥ 10), which are illegal and mainly targeting Nile Perch increased by 302 percent from 3 million to 14 million. Monofilament nets, which catch fish discriminately and are illegal, increased from 2 293 to 72 101 during the same period. The catching of smaller sizes of Nile Perch has resulted in the decline in Nile Perch catches by 37 percent from 264 070 metric tonnes in 2016 to 165 083 metric tonnes in 2015. The number of industrial processing plants decreased by 59 percent from 41 to 17 with loss of jobs and redundant processing capacity. The volume of Nile Perch exports to international markets decreased by 57 percent from 109 million tonnes to 47 million tonnes. However, the value increased by 115 percent from USD 186 in 2006 to 400 million in 2015 as a result of the increase in fish prices and the trade-in Nile Perch fish maws. The high-,value maw trade is becoming a threat to the fishery and needs to be regulated and controlled.

The illegal small seines mainly targeting Dagaa also increased by 170 percent from 4 370 in 2006 to 11 805 in 2016. Catching of young Dagaa could have contributed to the decline in Dagaa catches from 602 295 in 2006 to 566 570 in 2015 and also the reduction in fish stocks by 45 percent from 1.29 million tonnes to 0.71 million tonnes. LVFO has agreed on mesh size for Dagaa seines to be 10 mm and fishing to be beyond 2.5 km from the shoreline to avoid catching of juvenile Dagaa which have concentrations in shallow waters. But this requirement is not always complied with.

Partner states have intensified enforcement in the effort to ensure the sustainability of fish stocks. Uganda has deployed the army which reports to the President and Tanzania has also increased the number of lake patrols. The last hydroacoustic survey of 2017 showed some increase in Nile perch stocks but with the dominance of juvenile fish. If the enforcement efforts are maintained, there will be the recovery of the Nile perch and Dagaa stocks. However, there is a need to enhance engagement of the users for long term benefits.

4.2 Improving fishery sustainability in the future

Recommendations for improving fishery sustainability are analyzed as follows:

a) Currently, there is no limit on the number of fishing vessels an individual can have. Information on individual ownership is not documented, but field visits show that some individuals have more than 100 fishing vessels. There is a need to limit the number of fishing vessel per individual and provide for social equitability.
b) The increase in effort is mainly on the number of gears compared with the number of fishing vessels. There is a need to establish appropriate limits on the number of fishing gears per fishing vessel according to the target species.
c) The fishing vessel license charges are the same despite the target fishery. The economic value of these fisheries is not the same. There is a need to evaluate and set licensing charges according to the commercial value of the species.
d) Several processing plants closed due to the shortage of Nile Perch. The value of Nile Perch maw is encouraging catching of bigger sizes of Nile Perch which have a higher value. There is a need to regulate and control the processing and trade of fish maws.

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