



FISHERIES MANAGEMENT AND DEVELOPMENT PROCESSES IN LAKE VICTORIA

- ENHANCING REGIONAL FISHERIES MANAGEMENT PLAN

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ACRONYMS AND ABBREVIATIONS

AU	African Union
BCLME	Benguela Current Large Marine Ecosystem
BMU	Beach Management Unit
CAS	Catch Assessment Survey
CBD	Convention on Biological Diversity
CCLME	Canary Current Large Marine Ecosystem
CCRF	Code of Conduct for Responsible Fisheries
CIFA	Committee for Inland Fisheries of Africa
CIFAA	Committee for Inland Fisheries and Aquaculture of Africa
CITES	Convention on International Trade in Endangered Species of Wild Fauna and
CMI	Co-management Institutions
COFI	FAO Committee for Fisheries
CPUE	Catch per Unit Effort
EAC	East African Community
EAF:	Ecosystem Approach to Fisheries
EIFAC	European Inland Fisheries Advisory Council
ERA	Ecological Risk Assessment
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FMP	Fisheries Management Plan
FFMP	Framework Fisheries Management Plan
FS	Frame Survey
GDP	Gross National Product
GEF	Global Environment Facility
GPS	Geographical Positioning Station
IBAR	Inter African Bureau for Animal Resources
KMFRI	Kenya Marine Fisheries Research Institute
IUU	Illegal, Unreported and Unregulated (catches)
LVBC	Lake Victoria Basin Commission
LVEMP	Lake Victoria Environmental Project
LVFS	Lake Victoria Fisheries Service
LVFO	Lake Victoria Fisheries Organization
MCS	Monitoring, Control and Surveillance
NaFIRI	National Fisheries Research Institute (Uganda)
NGO	Non-Governmental Organization
NP	Nile perch
PFRS	Policy Framework and Reform Strategy for fisheries and aquaculture in Africa
RFMO	Regional Fisheries Management Organization
RWGs	Regional Working Groups
RPOA-IUU	Regional Plan of Action for Illegal, Unreported and Unregulated fishing
RPOA-Capacity	Regional Plan of Action for management of fishing capacity
SAP	Strategic Action Programme for Lake Victoria
TAFIRI	Tanzania Fisheries Research Institute
TDA	Transboundary Diagnostic Analysis
UNDP	United Nations Development Program
USD	United States Dollars
WB	World Bank

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EXECUTIVE SUMMARY

Inland water bodies are natural capital assets which must be managed in a manner to not only maintain existing benefits (food security, livelihoods and income), but also seek to increase the sustainable contribution of the sub-sector to the blue economy growth of our member states. The current benefits are however under threat from a variety of sources, key amongst which include poor governance frameworks, open access nature, unsustainable fishing practices, weak capacity, threats by climate change, environmental and other natural disasters, lack of alternative livelihoods etc. The vast majority of these water bodies are shared ecosystems which in turn pose significant management challenges to fisheries management bodies.

The overall goal of the Policy Framework and Reform Strategy (PFRS) for fisheries and aquaculture in Africa is to create an enabling environment for food security, livelihoods and wealth. Therefore one of the PFRS key policy arenas is to promote sustainable development of small-scale fisheries on the continent that includes inland fisheries development. The formulation of realistic fisheries management plans informed by assessment of management and development issues could be a precursor to solving some of the challenges in the subsector. This study which was commissioned by the African Union with support from the European Union under the Fisheries Governance Project, assessed the issues which could ultimately contribute to realistic regional fisheries management plans in shared water bodies on the continent.

Lake Victoria Basin is one of Africa's largest transboundary water resources; it surrounds the second largest freshwater Lake in the world and the most important source of freshwater fish on the African continent. The Lake also provides employment, income, and water for domestic and industrial use, lake transport as well as hydro-electric power generation; and additionally the lake is an important moderator of regional climate. For fisheries purposes, the Lake is shared by Kenya, Tanzania and Uganda. With high human population growth rate, pollution, and increased economic activities and benefits in the lake basin the fish stocks are declining; and this could exacerbate the poverty and food security problems of the region.

This paper, which is set against the above background, assesses the management of fisheries in Lake Victoria, analyzes the key strategic issues and challenges that affect fisheries management and development, identifies gaps in the existing fisheries management plan and suggests strategies, processes and mechanisms to enhance the fisheries management plan.

Lake Victoria Fisheries Organization (LVFO) established in 1994 as a regional fisheries management organization (RFMO) is mandated to over-see the management of the lakes' fishery resources. LVFO has elaborated a number of governance instruments and undertakes regular hydro-acoustic surveys, catch assessment and biennial frame surveys to inform management decisions. The Departments of Fisheries Management (State Department of Fisheries – Kenya; Fisheries Development Division – Tanzania; Department of Fisheries Resources-Uganda) and Fisheries Research Institutions (KMFRI–Kenya; TAFIRI – Tanzania; NaFIRI – Uganda) play very important role in the management of the fishery. The Local Government Acts in the three countries devolve specific services to be undertaken by local governments. One of the services decentralized to the local governments especially in Uganda is fisheries extension. The three Governments together with Burundi and Rwanda who are also Members of the East African Community (EAC) have drafted a Fisheries and Aquaculture Policy that is aligned

to the Policy Framework Fisheries and Reform Strategy for fisheries and aquaculture in Africa (FPRS).

However, Lake Victoria's fisheries basically operate under an unrestricted access regime; everyone is free to enter into the fishery after paying the fishing licenses. In addition the governments of the three Partner States have sought to manage Lake Victoria's fishery resources using methods of direct command and control. A combination of high catch rates from the dramatically expanded Nile Perch stocks and high prices from international markets attracted levels of fishing effort (legal and illegal) that were unsustainable. In the circumstances LVFO encouraged the creation of Beach Management Units (BMUs), a sort of co-management arrangement, whereby fisheries communities take on some responsibilities in the management of the resources. Over 1000 BMUs have been created. While many operate well, most are struggling mainly due to wrong choice of BMU leaders and inadequate operational funds.

Management of the fisheries is impacted by both environmental stresses and by strategic transboundary issues and challenges. The environmental stresses originate from the Lake, littoral zone (near shore), within the basin (upper watershed), and outside the basin. Cumulatively, they cause degradation of the Lake, reduce its resiliency and contribute to some loss of critical habitats, changes in biodiversity and the decline in species of fish, invertebrates and algae.

The key transboundary issues and challenges which affect and could potentially impact on the sustainable exploitation and management of the fisheries are related to inadequate fisheries governance. The main issues are: the non-harmonization of laws and regulatory standards; low compliance to fisheries laws and regulations and inadequate enforcement; and limited effective involvement of stakeholders in the fisheries management process. These issues together with the prevalence of poverty and increase in population in the lake's basin contribute to excessive pressure being exerted on the fisheries resources and the basin ecosystems; the gutting of Nile perch in fishing grounds for fish maws, the excessive extraction of ornamental fish, incidence of illegal, unreported and unregulated fisheries and poor management practices resulting in declining fish stocks, and destruction of critical habitats and the environment.

The key challenges are to correct the imperfections in the fisheries governance and in addition reduce excessive pressure on the resources; ensure the availability of reliable data and information to guide management, continue to generate appropriate scientific knowledge and incorporate local knowledge to guide resource management; and develop the human and institutional capacity to manage the complexity of resource uses and pressures; and also to understand and develop mechanisms for adaptation to climate variability and climate change.

LVFO is in the process of implementing its third fisheries management plan (FMP III). The FMP III like its predecessors was developed in the conventional manner by experts and the stakeholders were invited to approve the document through consultative workshops. There is no assignment of roles and responsibilities in FMP III giving the impression that the activities will be undertaken not by the Member States but by the LVFO Secretariat whereas from a functional perspective, implementation of the plan falls within the purview of Member States with LVFO Secretariat ensuring coordination and advice. The actions in the plan are not prioritized and the log-frame could be improved.

It is strongly suggested that priority is given to assist the LVFO Secretariat to develop a Framework Fisheries Management Plan (FFMP) for the transboundary fishery resources of Lake Victoria. Such a plan should address the shortcomings of FMP III. The suggested tool to use for developing such a plan is the Ecosystem Approach to Fisheries (EAF). The paper describes the strategies, processes and mechanisms to make this happen.

SECTION ONE: INTRODUCTION

1.1. Purpose of the Paper

This paper assesses the management of fisheries in Lake Victoria, analyzes the key strategic issues and challenges that affect fisheries management and development, identifies gaps in the existing fisheries management plan and suggests strategies, processes and mechanisms to enhance the fisheries management plan.

1.2. Context and Rationale

Inland water bodies are natural capital assets which must be managed in a manner to not only maintain existing benefits (food security, livelihoods and income), but also seek to increase the sustainable contribution of the sub-sector to the blue economy growth of our member states. The current benefits are however under threat from a variety of sources, key amongst which include poor governance frameworks, open access nature, unsustainable fishing practices, weak capacity, threats by climate change, environmental and other natural disasters, lack of alternative livelihoods etc. The vast majority of these water bodies are shared ecosystems which in turn pose significant management challenges to fisheries management bodies.

The overall goal of the Policy Framework and Reform Strategy (PFRS) for fisheries and aquaculture in Africa is to create an enabling environment for food security, livelihoods and wealth. Therefore one of the PFRS key policy arenas is to promote sustainable development of small-scale fisheries on the continent that includes inland fisheries development. The formulation of realistic fisheries management plans informed by assessment of management and development issues could be a precursor to solving some of the challenges in the subsector. This study which was commissioned by the African Union with support from the European Union under the Fisheries Governance Project, assessed the issues which could ultimately contribute to realistic regional fisheries management plans in shared water bodies on the continent.

Africa has about 80¹ transboundary water basins that serve multiple functions. The transboundary water basins cover approximately 64% of the continent's land area, which contain 93% of the water resources and are inhabited by 77% of the population (UNEP, 2010). The water basins contain fisheries resources and a wealth of aquatic and other biodiversity. Lake Victoria Basin is one of Africa's largest transboundary water resources, surrounds the second largest freshwater Lake in the world with the largest freshwater fishery resources in Africa (LVBC, 2007).

Inland fisheries make very significant contributions to nutrition and food security, employment, income generation and improvement of livelihoods to populations in African countries. In several countries, especially land-locked countries and riparian communities along major rivers and lakes of the continent, fish is probably the major protein source. Inland fisheries are the fourth (10.66%) most important source of animal protein after cattle (22.4%), marine fish (21.10%) and chicken (15.79%) (AUC-NEPAD, 2014). Although most of the catch of inland water fisheries is consumed locally, products from inland fisheries are also important in regional, intra- and international trade. For example the value of the exports of catch from Lake Victoria in 2014 was over US\$300 million (LVFO, 2015a).

The most recent estimate (2014) of the total fish production from Africa is 10.35 million tonnes. Of

¹ Source: Water and Sustainable Development in Africa: An African Position Paper African Water Task Force, August 2002

this, about 2.85 million tonnes or 33.1% is from inland capture fisheries. Total aquaculture production was 1.71 million tonnes and marine capture fisheries 5.78 million tonnes (FAO, 2016, Garibaldi, pers. com). The value added by the fisheries sector as a whole in 2011 was estimated at more than US\$24 billion, 1.26% of the GDP of all African countries. Of this, about US\$6.2 billion was inland fisheries (US\$4.7 billion from direct fishing and US\$1.5 billion from post-harvest). The fisheries sector as a whole employs 12.3 million people as full-time fishers or full-time and part-time processors, representing 2.1% of Africa's population of between 15 and 64 years old. The share of inland fisheries was about 5 million (3.3 million as fishers and 1.5 million processors). The estimated number of women in the inland fisheries sector was slightly over 1.3 million with the majority of them (about 1.1 million) in the post-harvest sub-sector (de Graff and Garibaldi, 2014)

Conventional wisdom holds that the contribution of inland fisheries is grossly under-estimated because of the difficulty of collecting data from highly dispersed landing sites (Welcomme et al. 2014); implying that with good management, inland fisheries can become a strong engine for development and economic growth.

Effective fisheries management of transboundary fishery resources is dependent on among other things the availability and implementation of appropriate fisheries and aquaculture policies; the conduct of fisheries management practices in a regulatory framework that is consistent, harmonized and applicable, and the development and implementation of an appropriate fisheries management plan which should be a negotiated instrument between the fisheries management authorities of the concerned countries and their stakeholders; an instrument that provides a clear vision for the fishery, realistic and measurable objectives and other parameters as a road-map for moving the fishery forward on an agreed schedule of shared responsibilities among the fisheries management authorities and the stakeholders.

Efforts to promote the rational management of inland fisheries particularly in transboundary water bodies in Africa date back to 1970². At the Fifty-four Session of the FAO Council, African countries, Members of FAO, conscious of the fact that several rivers and lakes are common to two or more countries, and that their fisheries resources constitute a field of international interest requested FAO to establish a body similar to the European Inland Fisheries Advisory Council (EIFAC) for the African Continent. In follow up to this request, an ad hoc Consultation on the Proposed Establishment of an Inland Fishery Body for Africa was held in Rome in April 1971. The Consultation among other things estimated that the presence of several shared rivers and lakes as well as extensive floodplains and wetlands suitable for inland fisheries necessitated joint policy and the adoption of a uniform and standard methodology for resource appraisal and for collection of statistics and biological data in order to determine the consequences of fishing on stocks and strongly recommended the establishment of such body. Consequently, the FAO Council at its Fifty-six Session, in June 1971 established the Committee for Inland Fisheries of Africa (CIFA)³.

Since then several actions were taken by African countries with the assistance of development partners, including in particular FAO, to promote the sustainable development of inland fisheries particularly in transboundary inland water bodies. CIFA among other things established three sub-Committees, namely: the Sub-Committee for the Protection and Development of the Fisheries of the Sahelian Zone,

² The Author is aware that studies had begun in several water bodies as early as the late 1800s; but we refer to joint efforts at the international level.

³ The FAO Council at its Hundred and Thirty-third Session in 2007 changed the name to "The Committee for Inland Fisheries and aquaculture of Africa" (CIFAA) to reflect the importance of aquaculture in global fishery sector but also in Africa

(1974), the Sub-Committee for Development and Management of the Fisheries of Lake Tanganyika (1977), and the Sub-Committee for the Development and Management of Fisheries of Lake Victoria (1981) to coordinate fisheries research and development activities on these major inland water bodies, floodplains and wetlands.

1.3. Main Area Covered

This paper systematically

- Describes the main features of the Lake Victoria Basin and the fisheries of Lake Victoria;
- Presents the institutional arrangements and regulatory frameworks for the management of fisheries in Lake Victoria and recapitulates the main achievements of the Lake Victoria Fisheries Organization (LVFO) the principal management authority for this transboundary inland water fisheries resource;
- Analyzes the status and trends in the Lake Victoria fisheries;
- Assesses the fisheries governance and management approaches that are applied in the fisheries;
- Identifies and analyzes the environmental stresses and key strategic transboundary issues and challenges which affect and could potentially impact on the sustainable exploitation and management of the fisheries;
- Identifies major gaps in the existing fisheries management plan, and
- Suggests strategies, processes and mechanisms to enhance the fisheries management plan

1.4. Methodology

The assignment was essentially a Desk Study combined with a two day mission to the headquarters of the Lake Victoria Fisheries Organization (LVFO) in Jinja, Uganda. The approach for the study consisted of four distinct but interrelated phases of literature search/review and virtual search of websites; a field visit to Jinja at which Semi-structured interviews were conducted.

SECTION TWO: MAIN FEATURES OF LAKE VICTORIA BASIN AND THE FISHERIES OF LAKE VICTORIA

2.1 Main Features of Lake Victoria Basin

Lake Victoria Basin is one of Africa's largest transboundary water resources covering an area of about 194,200 Km², and surrounding the second largest freshwater Lake in the world (68,800 Km²), with the largest freshwater fishery resources. The Lake Victoria catchment is shared among five states in the following proportions: Tanzania 44% (85,448 Km²), Kenya 22% (42,724 Km²), Uganda 16% (31,072 Km²), Rwanda 11% (21,362 Km²) and Burundi 7% (13,594 Km²)(LVBC, 2007)⁴. Figure 1 shows the Lake Victoria Basin, the drainage and international boundaries.

The Lake is shared among three of the five Partner States of the East African Community (EAC),⁵ that is, Kenya, Uganda and Tanzania with a shoreline of approximately 3,450 Km long, demarcated among the riparian countries as shown in Table 1.



Figure 1: Lake Victoria Basin showing the drainage and international boundaries

⁴ Other East Africa's large transboundary water resources are among others the Lake Tanganyika with surface area of 32,000 Km², Lake Malawi/Nyassa with a surface area of 29,500 Km²

⁵ The other Members of EAC are Burundi and Rwanda

Table 1: Lake Victoria surface area, catchment and shoreline statistics

Country	Lake surface area		Catchment area		Lake Shoreline Length	
	Km ²	%	Km ²	%	Km ²	%
Kenya	4,128	6	42,724	22	550	16
Uganda	29,584	43	31,072	16	1,750	51
Tanzania	35,088	51	85,448	44	1,150	33
Burundi	0	0	13,594	07	0	0
Rwanda	0	0	21,362	11	0	0
Total	68,800	100	194,200	100	3,450	100

Source: Regional Transboundary Diagnostic Analysis for Lake Victoria Basin

The drainage pattern of Lake Victoria Basin consists of rivers, streams and wetlands. The Kagera River is the largest inflow, contributing up to 33% of the surface inflow into the Lake. It originates from Rwanda and Burundi (as River Akagera) and from parts of western Uganda passing through Tanzania (LVBC, 2007).

The Lake plays a major ecological role by supporting a wide range of flora and fauna. Over 35 million people live in the Lake Victoria Basin and depend directly or indirectly on the lake's resources. Lake Victoria is the most important source of fish in East Africa, as well as being the most important source of freshwater fish on the African continent. The Lake is a source of affordable protein food in the form of fish; provides employment, income, and water for domestic and industrial use, lake transport as well as hydro-electric power generation; and additionally the lake is an important moderator of regional climate. The fish species are of important evolutionary significance and have been extensively studied (Graham, 1929, Jackson, 1971, Welcomme, 1972, Kudhongania and Cordone, 1974, Ogari and Dadzie, 1988, Kosoma, 2005).

2.2. The Fisheries of Lake Victoria

Until the 1970s Lake Victoria supported a multi-species fishery dominated by tilapiine and Haplochromine cichlids. There were important subsidiary fisheries for more than 20 genera of non-cichlid fishes, including catfish (*Bagrus docmak* (Forskäll), *Clarias gariepinus* (Burchell), *Synodontis* spp. and *Schilbe intermedius* (Rüppell), the lungfish (*Protopterus aethiopicus* (Heckel)) and *Labeo victorianus* Boulenger (Kudhongania & Cordone 1974, Kudhongania and Chitamwebwa 1995). In addition, the Lake is reported to have had a rich fish biodiversity similar to that of Lakes Malawi and Tanganyika with 400-500 species of fish most of which were the cichlids against non-cichlids which were only about 50 species (Jackson, 1971). Stocks of most of these species declined and others disappeared following the introduction of four tilapiines (*Oreochromis niloticus* (L.), *O. leucostictus* (Trewavas), *Tilapia rendalli* Boulenger and *T. zillii* (Gervais)) and Nile perch (*Lates niloticus* (L.)) during the 1950s (Acere, 1985, Kayanda et al. 2008).

The contribution of haplochromines (cichlids) to fish biomass decreased rapidly from 83% during 1970s to less than 1% by the mid-1980s due, in part, to predation by Nile perch. *Oreochromis niloticus* on the other hand, hybridized and competed for food and space with *O. variabilis* and *O. esculentus*, leading to the decline of endemic tilapiines. It is believed that more than 60% of Lake Victoria's endemic fish species have become extinct between 1970 and 1986 with the remaining species reduced to insignificant levels.

The first systematic fish stock assessment of Lake Victoria was conducted by FAO/UNDP/EAC in the 1970s and the studies (Kudhongania & Cordone, 1974) revealed that the estimated total standing stock of fish in the whole of Lake Victoria was 679,007 metric tonnes with a density of 92.7 kg/ha. The haplochromines contributed up to 83% of this fish biomass followed by Bagrus ((5.8%), Clarias, 3.97% and Synodontis 3.4%. The tilapiines together made up less than 0.3%. The total biomass (amount of fish in the lake) in 2014 estimated during hydro-acoustic survey was at 2.89 million tonnes with increase in Dagaa and Nile perch since the last survey in 2011. However, the haplochromines which are the main food component for Nile perch registered a decrease. The hydro-acoustic survey results showed that majority of the Nile perch in the lake are young with only 5.9% above the lower limit of slot size (50 cm, Total Length). (LVFO, 2015b)

According to LVFO (2015a), the Lake has experienced dramatic ecosystem change over time resulting into loss of more than 500 endemic haplochromine fish species. Currently, the Lake ecosystem and its satellite wetlands is home for more than 200 different fish species. The commercial fishery is currently dominated by three species; the predatory Nile perch (*Lates niloticus*), Nile tilapia (*Oreochromis niloticus*) and Dagaa (*Rastrineobola argentea*) constituting over 95 % of total fish catch in Lake Victoria.

The estimated total fish landings from Catch Assessment Surveys (CAS) from 2011 to 2014 have been about 1 Million tonnes with a beach value increasing from about US\$ 550 Million in 2011 to about US\$ 840 Million in 2014. The estimated production of Dagaa for 2011 was 456,721.20 tonnes and increased to 509,598 tonnes in 2014; while Nile perch production was 198,624 tonnes with slight increase to 251,063.0 tonnes respectively. The value of Dagaa in 2014 at beach level remained relatively low (US \$ 135 million) compared with Nile perch (US \$ 545 Million) (LVFO, 2015b). The export value of Nile perch has increased further with the new market and high price for fish maws and is estimated at US \$300 million. However, this has come with the challenge of illegal processing of fish maws and increased illegal, unreported and unregulated (IUU) fishing and trade (LVFO, 2015a).

The fishery provides direct employment for more than 800,000 people. Fish production is estimated at 1,000,000 metric tonnes per annum and income generated from the fishery provides food and nutrition security, and supports the livelihoods of more than three million people (World Bank, 2009). Foreign exchange earnings generated from the Nile perch fishery is about US\$ 300 million⁶. The Lake fishery contributes to the GDP of the riparian Partner States as follows– Kenya 2 %, Tanzania 2.8 % and Uganda 3 % (World Bank, 2009).

The lake's fisheries also have significant inequalities. For example in the Nile perch fishery many agents (middlemen) are also boat owners. Landing site or camp managers employ supervisors and labourers to operate full fleets and arrange credits and loans to ensure a constant fish supply. In general, the socio economic dynamics of the lake sees greater financial benefits to big owners, and much less financial benefit reaches fishers and labourers. Similarly, while the representation of women in the decision-making has improved particularly in the Beach Management Units (BMU), this has not been significantly translated into increased benefits, access and to control of assets and resources (Lwenya et al. 2008).

⁶ Recognising that that the extent of the social and economic value of the Lakes fisheries is not fully quantified

During the past 15 years a number of major conferences have been organized to share experiences and knowledge about the fisheries of Lake Victoria. These Conferences include:

- The Regional Stakeholders' Conference on the State of the Fisheries Resources of Lake Victoria and their Management, Entebbe, Uganda, 24-25 February 2003
- The Lake Victoria Stakeholders' Conference, Kampala, Uganda, 27-30 October 2008

It should be noted that "The Nature Conservancy" in collaboration with other partners plans to hold "African Great Lakes International Conference" in 2017 on the theme "African Great Lakes International Conference: Sustainable Development in a Changing Climate". The conference aims to promote effective regional collaboration and cooperation, raise awareness of the value of African Great Lakes ecosystems; and the promotion of tools for an ecosystem-based approach to basin-scale management. The first planning meeting for the conference was held on 17 December 2015 in Nairobi, Kenya.⁷

⁷ Personal Communication from Dr. Modesta Medard, The Nature conservancy, African Great Lakes Research (AGLR) Manager, Africa Region, Arusha

SECTION THREE: INSTITUTIONAL ARRANGEMENTS AND ACHIEVEMENTS

3.1. Main Institutions

There are three regional institutional arrangements that are of great relevance to the development and management of the fisheries in Lake Victoria. These are the East African Community (EAC), the Lake Victoria Basin Commission (LVBC) and the Lake Victoria Fisheries Organization (LVFO).

East African Community (EAC)

The East African Community (EAC) is a regional intergovernmental organization of 5 Partner States: the Republics of Burundi, Kenya, Rwanda, the United Republic of Tanzania, and the Republic of Uganda, with its headquarters in Arusha, Tanzania.

The EAC is home to 145.5 million citizens, of which 22% is urban population. With a land area of 1.82 million square kilometres and a combined Gross Domestic Product of US\$ 147.5 billion (EAC Statistics for 2015), its realization bears great strategic and geopolitical significance and prospects for the renewed and reinvigorated EAC.

The work of the EAC is guided by its Treaty which established the Community. It was signed on 30 November 1999 and entered into force on 7 July 2000 following its ratification by the original three Partner States - Kenya, Tanzania and Uganda. The Republic of Rwanda and the Republic of Burundi acceded to the EAC Treaty on 18 June 2007 and became full Members of the Community with effect from 1 July 2007.

As one of the fastest growing regional economic blocs in the world, the EAC is widening and deepening co-operation among the Partner States in various key spheres for their mutual benefit. These spheres include political, economic and social.

At the moment, the regional integration process is in full swing as reflected by the encouraging progress of the East African Customs Union, the establishment of the Common Market in 2010 and the implementation of the East African Monetary Union Protocol

The EAC also has seven main organs and eight institutions. The Lake Victoria Basin Commission (LVBC) and Lake Victoria Fisheries Organization (LVFO) are two of these institutions.

The East African Community has designated Lake Victoria and its Basin as an “area of common economic interest” and a “regional economic growth zone” to be developed jointly by the Partner States. And Lake Victoria is the focus of new attention following the declaration by the East African Community Heads of State that a joint programme be developed for the overall management and rational utilization of the shared resources of the Lake

Lake Victoria Basin Commission (LVBC)

The East African Community established the Lake Victoria Basin Commission (LVBC) formerly known as the Lake Victoria Development Programme in 2001, as a mechanism for coordinating the various interventions on the Lake and its Basin; and serving as a centre for promotion of investments and information sharing among the various stakeholders. The programme/Commission is the driving force for turning the Lake Victoria Basin into a real economic growth zone.

The commission envisages a broad partnership of the local communities around the Lake, the East African Community and its Partner States as well as the development partners. The commission's activities are focusing on the:

- Harmonization of policies and laws on the management of the environment in the Lake and its catchment area;
- Continuation of the environmental management of the Lake, including control and eradication of the water hyacinth;
- Management and conservation of aquatic resources, including fisheries;
- Economic activities in the development of fishing, industry, agriculture and tourism; and
- Development of infrastructure, including revamping the transport system on and around the Lake.

The Commission further places emphasis on poverty eradication and the participation of the local communities. It is expected to make a significant contribution towards reduction of poverty by uplifting the living standards of the people of the Lake region. This is to be achieved through economic growth, investments and sustainable development practices that are cognizant of the environment.

Lake Victoria Fisheries Organization (LVFO)

The Lake Victoria Fisheries Organization (LVFO) is an institution of the EAC with the mandate to manage the fisheries and aquaculture in the EAC region. The three Partner States namely the Republic of Kenya, the United Republic of Tanzania and the Republic of Uganda established the LVFO by the Convention of 1994. It was subsequently registered under the UN Charter of the Food and Agriculture Organization (CAP 102) as a Regional Fisheries Management Organization (RFMO).

The key partners of LVFO are the fisheries management and research institutions, Beach Management Units (BMU), Fish Processors and Exporters Associations in the EAC Partner States. The fisheries activities of the partners are coordinated by the LVFO Secretariat based in Jinja, Uganda.

The principal objectives of the LVFO are to foster co-operation among the Partner States, harmonize national measures for the sustainable utilization of the fisheries and aquaculture resources of the EAC water bodies and to develop and adopt conservation and management measures. LVFO functions have both regional and national dimensions. In this regard, issues to do with collaboration, harmonization, coordination and communication are within the ambit of the Secretariat while those in the realm of policy development, review, implementation, enforcement, extension and monitoring among others are within national mandates (LVFO, 2015c).

The LVFO Secretariat collaborates with Member States to:-

- a. Promote proper management and optimal utilization of the fisheries and aquaculture resources;
- b. Enhance capacity building of national institutions;
- c. Provide for the conduct of research concerning the fisheries and aquaculture resources and related activities;
- d. Consider and advice on the effect of direct and indirect introductions of any known aquatic animal or plant;
- e. Serve as a clearinghouse and databank for information on fish, fisheries and aquaculture products

The LVFO is revising its constituting Convention as recommended by the eighth Regular Session of the LVFO Council of Ministers and the 24th EAC Council of Ministers to bring onboard the Republic

of Burundi and Republic of Rwanda and any other EAC state as provided for under Article XXI of the Convention.

The LVFO has undertaken a SWOT Analysis (Table 2), to enable it better fulfill its mandate.

Table 2: Outcomes of the SWOT Analysis of LVFO

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Organization is well established with a permanent secretariat which has ownership of the institution 2. Existing policy organs which are directly linked to EAC decision making organs and recognized by UN bodies 3. Ability to secure funding through strategic fund raising 4. Harmonized Systems and instruments 5. Institutions with skilled human resource and infrastructure 6. Modern infrastructure which includes, vessels (research and patrol), hatcheries, experimental fish ponds, well developed fish landing sites, fish quality laboratories 7. Repository of historical and current data and information in fisheries and aquaculture 	<ol style="list-style-type: none"> 1. Weak enforcement of fisheries regulations and lack of mechanisms to enforce compliance at national level 2. Uncompleted harmonization processes for policies, regulations and guidelines at regional level and this exacerbated by weak fisheries governance 3. Limited capacity building programs and limited knowledge and applications in aquaculture practices 4. Lack of resource mobilization strategies for funding fisheries programs 5. Poor communication strategies and limited collaboration and linkages 6. Limited research and extension linkages and the results are not implemented
Opportunities	Threats
<ol style="list-style-type: none"> 1. Integration in EAC means that there are more human skills; more markets, and expansion of fisheries and aquaculture. 2. Organised fisher associations and industry and existing fisheries management regimes. 3. Abundant water resources with high fisheries and aquaculture potentials. 4. Growing market demand for white meat, which is also increased by a growing human population. 5. Growing awareness of potential of sector – through the media. 6. Resource mobilization strategies can be supported by the EAC and Development partners 	<ol style="list-style-type: none"> 1. The factors of lack of sustainable funding, political instability and adverse climate changes 2. Inadequate appreciation of the roles of LVFO by stakeholders 3. Increased human population growth which put pressure on the limited natural fisheries resources 4. High prevalence of HIV and AIDS among fishing communities; and 5. Unemployment fueled by inadequate opportunities for alternative livelihoods amongst the fisher communities resulting into increased fishing pressure

Source: LVFO Strategic Plan 2016-2020

3.2. Main accomplishments of LVFO

The key achievements of the Lake Victoria Fisheries Organization Secretariat include: the elaboration of three fisheries management plans (FMP) for managing the fisheries of Lake Victoria. The first two plans were implemented between 2005-2008 and 2009-2014 respectively, while the third plan is expected to be implemented between 2016 and 2020. The Secretariat has also developed a Strategic Vision (1999-2014) and a Strategic Plan 2016-2020. The implementation of FMP I and FMP II as well as the Strategic Vision brought fundamental changes in the management of the Lake Victoria fishery that informed the development of FMP III and the Strategic Plan 2016-2020 (LVFO 2015c).

The Secretariat has in addition:

- Facilitated the harmonization of policies, regulations, standards and guidelines; supported capacity strengthening of key stakeholders in fisheries and aquaculture management; and provided technical support to stakeholders;
- Provided a forum for coordination, interaction and experience sharing among Partner States and other stakeholders around fisheries and aquaculture development,

- Established itself as an authority and repository for scientific knowledge and information on fisheries and aquaculture for the EAC region through its network of research institutions at Partner States. LVFO is able to conduct annual census, surveys and studies to support science-based planning and decision making. It also facilitates the publication of African Journal of Tropical Hydrobiology and Fisheries

In collaboration with its Partners:

- Community based structures for the management and sustainable use of fisheries and aquaculture resources have been formed. This consists of 1,069 BMUs, three national Fish Processors and Exporters Associations; as well as thematic working groups with experts which also participate in the planning and decision-making process of the organization, thereby enhancing ownership and sustainability,
- Developed an effective mechanism for quality assurance of the export of fish and fishery products that has guaranteed uninterrupted access to international markets in over 24 countries over the past 16 years. This has resulted in increased exports from USD 51 million in 1994 to USD 340 million by 2014.
- Developed and adopted a number of instruments to promote good governance in the fisheries sector of the Lake.

These instruments include:

1. Regional Plan of Action to prevent, deter and eliminate Illegal, Unreported and Unregulated (RPOA-IUU) fishing on Lake Victoria and its Basin and complemented by the Regional Plan of Action to control fishing effort (RPOA-Capacity),
2. Report on harmonization of Fish Levy Trust Fund studies, 2004,
3. Guidelines on the harmonization of BMUs on Lake Victoria, 2004
4. Information, Communication and Outreach Strategy for Lake Victoria Fisheries, 2005,
5. Human Resource Development Strategy and Action Plan for Lake Victoria Fisheries, 2006,
6. Strategy and Action Plan for Monitoring, Control and Surveillance (MCS) of Fisheries on Lake Victoria, 2005,
7. HIV/AIDS in the Fisheries Communities of Lake Victoria: A Strategic Action Plan, 2006

SECTION FOUR: STATUS AND TRENDS OF THE FISHERIES

Hydro-acoustic surveys, Frame surveys and Catch Assessment Surveys as well as socio-economic surveys are the principal tools used by LVFO to generate information to monitor the status and trends of the fisheries and evaluate management interventions and provide baseline data for research, fisheries planning and development. The first lake-wide frame survey was conducted by LVFO in 2000.⁸ There after these surveys are conducted biennially.

The work done by LVFO's three Regional Working Groups (RWGs), Hydro-acoustic, catch assessment survey (CAS) and frame survey (FS) after completion of the hydro-acoustic survey, CAS and FS in 2014 have been synthesized in the Report Stock Assessment Report: Status of the Fish Stocks -2014 (LVFO, 2015b). It was generally observed that, the total biomass in the lake has remained fairly stable over time, and only changed in species composition. The highlights of the status and trends in the fishery are given below.

4.1. Stock abundance

Hydro-acoustic survey results show a drastic decline in Nile Perch from about 1.44 million tonnes in 2006 to about 0.55 million tonnes in 2008 in the biomass (also referred to as the standing stock). However a gradual increase was recorded since 2009 to 1.23 million tonnes in 2014 but with dominance of juvenile (immature) fish with only 5.9% of the spawners biomass (parent stock) above the low limit of slot size (50cmTL) (LVFO, 2015b).

The biomass of Dagaa in hydro-acoustic results of 2014, showed an increase from 0.49 million tonnes in 2005 to 1.28 million tonnes in 2014 but a decrease from 439,000 to 380,000 tonnes for haplochromines and others. Data on Nile perch feeding show that the main food for Nile perch of >20 cm TL is haplochromines contributing over 60% of the food items. There are a number of indicators that point to over-fishing: reduction in age/length at maturity, higher mortality, especially caused by fishing pressure, reduction in catch per unit effort, reduction in mesh size of nets used and an increased proportion of immature fish in the catches. However, overall the most recent hydro-acoustic survey suggests that the Nile perch and Dagaa stocks have improved (LVFO, 2015b).

4.2. Fishing Effort

Fishing effort has increased rapidly since the mid-1980s due to the explosion of Nile perch fishery. The number of fishers in recent years has tended to stabilize. It was 206,425 in 2014, an increase of only 0.6% to the number in 2012 but significantly lower than the historic number in 2006. To the contrary the number of fishing crafts and many other parameters increased. The fishing crafts increased from 42,519 in 2000 to 70,696 in 2014. Similarly, the total number of gillnets increased from 650,652 in 2000 to 982,400 in 2014 and Long line hooks, from 3,496,247 in 2000 to 14,244,518 in 2014. The increment in long line hooks was mainly recorded in smaller hook size (>10) which are illegal, while the big sizes showed a marked decrease over time. This indicates a major shift from the usage of big to small hooks mainly to target smaller Nile perch below the lower limit of slot size which comprise higher proportion of biomass and hence increase the problem of overfishing and catching of immature fish. Beach/boat seines increased by 30.3%; monofilaments by 28.5%; cast nets by 6.5%; and traps/baskets by 16.4%. These destructive gears affect mainly the juveniles and brooders because they are operated in breeding/nursery grounds.

⁸ Between 1970 and 2000 frame surveys were conducted sporadically by the three countries but the information provided benchmark against which subsequent regional surveys can be compared.

It should be noted however that IUU fishing remains one of the biggest threats to the fisheries of the Lake (LVFO, 2015d). The 2014 Frame survey also indicated that the fishers who go offshore in search of fish are increasing over time but still a very low proportion (29% engines and 11% sails) of all the fishing crafts. This indicates that about 60% of the fishing on Lake Victoria is in relatively inshore/shallow waters which are mainly sensitive nursery and breeding grounds

4.3. Catches of the main commercial species

The estimated total catch in 2014 was 919,310 tonnes valued at US \$ 840 million at beach. The estimated value of Nile perch at beach level has been increasing from \$ 238 million in 2005 to \$545 in 2014, an increase value by 129% over 10 years. The catches however declined from 232,838 tonnes in 2005 to 198,624 tonnes in 2011 but increased to 251,000 tonnes in 2014 reflecting an improvement in the stocks (LVFO, 2014a). Dagaal landings increased from 453,000 tonnes in 2005 to 509,598 tonnes in 2014; Tilapia decreased from 71,531 tonnes to 59,681 tonnes and haplochromines decreased from 131,258 tonnes to 73,556 tonnes from 2005 to 2014 respectively (LVFO, 2014b). The export value of Nile perch has increased further with the new market and high price for fish maws and is estimated at US \$300 million. However, this has come with the challenge of illegal processing of fish maws and increased unreported and unregulated fishing and trade

4.4. Social amenities

The 2014 Frame survey showed marked improvement in social amenities such as schools, health clinics, services at landing sites for HIV/AIDS awareness, the percent of landing sites visited by factory agents, landing sites with BMU offices, etc. (LVFO, 2014b).

SECTION FIVE: Fisheries Governance and MANAGEMENT OPTIONS APPLIED

5.1. Initial Efforts prior to the year 2000

Attempts to manage Lake Victoria's fisheries date from 1927 when Graham (1929) conducted the first fishery survey. It was noted that the gillnet fishery was negatively affecting the stocks. Thus a minimum mesh size of 5 inches was set by 1933. In 1947, management and research of the lake's fisheries were placed under the Lake Victoria Fisheries Service (LVFS)⁹. With the collapse of the EAC in 1977, the Food and Agriculture Organization of the United Nations (FAO), through the CIFA subcommittee for Lake Victoria¹⁰, continued to co-ordinate the activities of the riparian states on Lake Victoria's fisheries. FAO also assisted the three riparian states to establish the Lake Victoria Fisheries Organization (LVFO) which became effective in 1994. During the 1990s two other projects were established, namely the Lake Victoria Fisheries Research Project (LVFRP), financed by the European Union; and the Lake Victoria Environment Management Project (LVEMP) financed by the World Bank and the Global Environment Facility (GEF). LVFRP was executed through the LVFO and LVEMP through the LVBC.

The output of the LVFRP contributed to increased understanding of biological, limnological and socio-economic conditions in the lake and also contributed in strengthening capacity in the management and research institutions of the riparian countries. On the other hand, the outputs of LVEMP informed the Regional Transboundary Diagnostic Analysis (LVBC, 2007)

5.2. Governance of the fisheries:

The key regional regulatory tools/documents guiding the management and development of fisheries in Lake Victoria include:-

- The Convention for the Establishment of the Lake Victoria Fisheries Organization signed 1994;
- The Lake Victoria Fisheries Organization Strategic Vision (1999-2015) adopted in 1999;
- The Treaty for Establishment of the East African Community signed in 1999 especially Article 114(b);
- The Protocol for Sustainable Development of the Lake Victoria Basin signed in 2003 (especially Article 8 of the Protocol); and
- The Fisheries Management Plan III (FMP III): 2016-2020
- The East African Community Fisheries and Aquaculture Policy (Draft)
- Strategic Plan: 2016-2020

In addition to the above there are the National Fisheries Legal Frameworks which embody the principal fisheries laws (Fisheries Acts/Codes/Laws) and subsidiary legislation; international fisheries legal framework reflected in national laws; and non-fisheries specific laws impacting on fisheries such as environmental laws, health/veterinary laws, and Customs laws. In this respect, the three countries are Party to the Convention on Wetlands of international Importance especially as Waterfowl Habitat (RAMSAR Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Convention on Biological Diversity (CBD). The three countries also are implementing National Environmental Action Plans. These plans provide a framework for integrating environmental concerns when designing and implementing projects. These can and are being applied by LVBC to maintain the health of the water bodies in which fish live by: taking measures to avoid excessive nutrient enrichment.

⁹ LVFS was dissolved in the early 1960s.

¹⁰ CIFA was established in 1971 and established the Sub Committee for the Development and Management of fisheries of Lake Victoria in 1981.

The Code of Conduct for Responsible Fisheries has been incorporated in the national fisheries legal frameworks either through legislation, regulations or administrative decisions, or policy in all the three riparian countries.

The Departments of Fisheries Management (State Department of Fisheries – Kenya; Fisheries Development Division – Tanzania; Department of Fisheries Resources-Uganda) and Fisheries Research Institutions (Kenya Marine Fisheries Research Institute (KMFRI), Tanzania Fisheries Research Institute), National Fisheries Research Institute of Uganda (NaFIRI) play very important role in the management of the fishery.

In all of the three countries, there is a Local Government Act, which specifies the services to be undertaken by local governments. One of the services that have been decentralized to the local governments especially in Uganda is fisheries extension. Local governments have also been charged with protection of the environment, including the banks of lakes, rivers, streams and wetlands and the collection of fees and revenues from fishing activities.

5.3. The Emphasis on Nile Perch

In view of the economic importance of the Nile perch two Nile Perch Fishery Management Plans have been implemented since 2009 with the following priority objectives: Optimize sustainable fish production, maximize contribution to macro-economic growth through foreign exchange generated by exports of fish products, and maximize net income of participating artisanal fishers; rebuild the biomass of the Nile perch stock to the level that will sustain catches above 300 000 tonnes per annum; increase wealth generated by Nile perch fishing and related activities by at least 10% through improved regulation of fishing activities and enhanced value addition in the artisanal and industrial post-harvest sector; and improve wealth sharing to the benefit of local communities.

The strategies to attain these objectives include:

- Control access to the fishery resource through minimal conditions of access and formalization of all fishers and boat-owners in the NP fishery.
- Regulate all post-harvest activities with a focus on regional trade and fish maw trade.
- Enforce existing priority fishing regulations through effective MCS, with priority given to those designed to prevent the most harmful fishing practices.
- Restrict fishing capacity to the 2015 level.
- Strengthen the NP fishery regulatory framework with the objective of further reducing fishing effort (notably through introduction of a closed season for two months a year) and protecting the NP resource (notably to protect the largest spawners targeted by fish maw traders).
- Evaluate the feasibility of introducing secure fishing rights.
- Strengthen post-harvest sector in respect to fish quality and wealth generation in both artisanal and industrial value chain (processing and trade).

There are also management plans for the Daga fishery which is the principal species for local consumption.

5.4. Management Options

The above notwithstanding, Lake Victoria's fisheries basically operate under an unrestricted access regime whereby everyone is free to enter into the fishery after paying the fishing licenses. In addition

the governments of the three Partner States have sought to manage Lake Victoria's fishery resources using methods of direct command and control. A combination of high catch rates from the dramatically expanded Nile Perch stocks and high prices from international markets attracted levels of fishing effort (legal and illegal) that were unsustainable and, using the existing management approaches, uncontrollable.

In 1997 Local management bodies, known as local enforcement units, were initiated in the Mwanza Gulf, of Tanzania (Hoza and Mahatane, 1998). The name was later changed to Beach Management Units (BMUs) and in the early 2000s, the Lake Victoria Fisheries Research Project introduced the BMU approach to fisheries management lake-wide (Geheb, 2000a, 2000b; Medard, 2002), and operational guidelines were developed (Ogwang et al., 2004). These initial initiatives were further consolidated under the Implementation of the first Fisheries Management Plan (FMP I) Project from 2005 to 2008 through mentoring, training and networking processes. To date, a total of 1 067 BMUs have been formed: (281 in Kenya, 355 in Uganda, and 433 in the United Republic of Tanzania (LVFO, 2015a).

The BMUs are technically responsible for ensuring that no fishing illegalities take place in their areas of jurisdiction and that breeding areas are protected (Ogwang et al., 2004). Their role and modalities for establishing and operational procedures are outlined in the BMU Guidelines. Some of the key roles include: ensure the beach environment is kept clean; assist in the collection of data and document fisheries information; undertake monitoring, control and surveillance (MCS) in collaboration with the relevant authorities.

To date, the establishment of BMUs has delivered a considerable return in areas of raising awareness, training, lesson-learning (cross-border) and networking, as well as in repositioning and restructuring the role and scope of the various management institutions within the existing national and regional structures. However, in terms of co-management, many challenges still exist as the priorities of the communities are to solve their day-to-day problems including poverty, livelihoods and health-related issues and not only to address top-down-decided control measures in the fishery that they do not necessarily believe in or agree with (Kateka, 2010).

While the national or regional management institutions see the BMUs primarily as their new implementation tools for centrally decided harmonized regulations adopted from elsewhere (Kolding and Zwieter, 2011), the fishers see them as fora for solving local problems and conflicts, and particularly as instruments for reducing theft and piracy (which is rampant and increasing around the lake), for securing access to shared fishing grounds, for ensuring fair and transparent price and enumeration systems, for facilitating access to markets and government financing and lending schemes, and, not least, for curbing corruption (Medard, 2010).

SECTION SIX: KEY TRANSBOUNDARY STRATEGIC ISSUES AND CHALLENGES

6.1. Environmental Stresses and Potential Effects on Fish Stocks and Fisheries

Lake Victoria is an important warehouse of fisheries resources both in diversity and number and what happens in the lake environment has potential beneficial or adverse effects on the fisheries. The literature (LVBC, 2007, Mugidde, 2001, Kolding et al. 2008, Hecky 1993, Hecky et al. 1996) reveals that there are four main sources of environmental stresses that are adversely impacting the Lake Victoria's ecosystem, as well as the region's economy and livelihoods. These distinct sources of stresses originate from the Lake, littoral zone (near shore), within the basin (upper watershed), and outside the basin. Cumulatively, they cause degradation of the Lake, reduce its resiliency and contribute to some of the conflicts over resource use.

- i. **Stresses within the Lakes** - mainly from unsustainable fishing practices and pollution in the Lake and on satellite lakes (e.g. from fuel and oil spills, solid wastes, and untreated liquid wastes). Pollution reduces fish stocks and diversity and destroys important spawning areas.
- ii. **Stresses from outside the basin** - include nutrients transported into the basin as airborne particulates and climate change.
- iii. **Stresses from the basin** - include reduced water inflows into the Lake, over abstraction of lake water, inflow of water hyacinth, increased watershed degradation, including soil erosion and loss of vegetation cover; and increased water pollution from industries, livestock, agriculture, and urban runoff. These stresses are altering the hydrological and ecological processes. As a result, they accelerate eutrophication, impact fisheries and navigation.
- iv. **Stresses on the littoral zone** - result from conversion of shoreline wetlands for urban and agricultural development. Farming along sensitive littoral zone without adequate environmental mitigation measures (e.g. buffering strip, sewage treatment and disposal) increase liquid and solid waste loads into the lakes. In addition, wetland conversions for these purposes result in loss of aquatic habitat and reduced filtering capacity).

In summary, these human activities and accelerated eutrophication of rivers, lakes and wetlands in the Lake Victoria Basin has: resulted in loss of habitat, changes in biodiversity and loss of recreational potential; contributed to the decline in species of fish, invertebrates and algae in Lake Victoria; led to elevated risks to human health through increased frequency and spatial extent of toxic algal blooms in lakes; and increased the economic burden to fishing communities as a result of the need for treatment, monitoring and remediation of contaminated water (LVBC, 2007)

6.2. Strategic transboundary issues and challenges

The key transboundary issues and challenges which affect and could potentially impact on the sustainable exploitation and management of the fisheries in Lake Victoria are related to inadequate fisheries governance. The main issues are: the non-harmonization of laws, regulatory standards at regional level; low compliance to fisheries laws and regulations and inadequate enforcement; and limited effective involvement of stakeholders in the fisheries management process.

These issues together with the prevalence of poverty and increase in population in the lake's basin contribute to exertion of excessive pressure on the fisheries resources and the basin ecosystems; the gutting of Nile perch in fishing grounds for fish maws, the excessive extraction of ornamental fish, incidence of illegal, unreported and unregulated fisheries and poor management practices resulting in

declining fish stocks, and destruction of critical habitats and the environment.

The key challenges are to correct the imperfections in the fisheries governance and in addition reduce the excessive pressure on the resources; ensure the availability of reliable data and information to guide management, continue to generate appropriate scientific knowledge and incorporate the use of local knowledge to guide resource management and develop the human and institutional capacity to manage the complexity of resource uses and pressures ; and also to understand and develop mechanisms for adaptation to climate variability and climate change.

Absence of harmonized laws, regulations and standards

The starting point for good fisheries management is policy from which should be derived legislations, regulations etc. The three riparian States Members of LVFO together with Burundi and Rwanda who are members of EAC have taken the important step to develop “The East African Community Fisheries and Aquaculture Policy” which is aligned to the FPRS (LVFO, 2015c). The instrument is yet to be approved by the Council of Ministers. The instrument will promote coherence and coordination in the fisheries and aquaculture sector; promote sustainable fisheries and aquaculture development, and contribute to food security, nutrition, and wealth creation in the EAC Partner States. The three Member States of LVFO have yet to update their fisheries Laws /Acts. It will be appropriate for the countries to take advantage of the process to harmonize their laws and regulatory standards.

Low compliance to fisheries laws and regulations and inadequate enforcement:

Major challenge in the management of the fisheries is the low compliance to fisheries laws and regulations by resource users. Compliance and enforcement levels of the various laws of relevance to the Lake vary among the three countries. In all cases where compliance and enforcement is poor, the causes are more or less the same namely: shortage of manpower, financial constraints, logistical constraints, lack of awareness by the fisheries communities, and inadequacy in the dissemination of relevant information, inadequate capacity and laxity on the part of the enforcement agencies and high poverty levels.

These weaknesses could be addressed through awareness campaigns, improvement in information exchange, greater involvement of the community in management, such as ensuring properly functional BMUs, focus on increased cooperation on monitoring, control and surveillance (MCS) and promote the more effective involvement of resource users in enforcement through the institution of participatory MCS, etc. and capacity building through training and logistical support.

Additional problems of implementing regulations relate to non-deterrent penalties that do not discourage the offender, and would be offenders, from committing a similar offence and varied levels of penalties applied in the four countries. Given the transboundary nature of the fisheries, it is important to reflect the gravity of each offence in respective penalties in a uniform manner. The penalty for an offence should carry the same gravity no matter where it is committed. This would deter offenders from committing particular offences on the basis of the weakness in the penalty in one country as opposed to the other. Furthermore, incentives must be adopted to support behaviour that fosters the conservation objectives and encourage resource users to go beyond mere compliance with the rules.

Non- effective involvement of all stakeholders in the management process

The many problems and challenges that the fishery faces, especially declining fish stocks and habitat loss, poor data and data management, low legitimacy of regulations and the consequent poor enforcement of

regulations can be better solved by fisheries management authorities partnering with local communities, CSOs and the private sector, indeed involving (representatives of) all stakeholders in all the functions and responsibilities of fisheries management. Stakeholders should not merely be consulted to rubber-stamp decisions but should participate. The fisheries management authorities cannot and will never be able to achieve the ambitious objective of the sustainable development of fisheries of Lake Victoria alone. It is believed that the reason effective involvement of stakeholders in the fisheries management process is limited is because such partnerships have to be carefully designed to be appropriate for the situation, as well as accountable and effective. These are some of the problems being faced with the operation of BMUs. However, knowledge and experiences accumulated over the past three decades allow the identification of the conditions and situations which are good predictors of successful partnerships.

Partnering would among other things permit the making of appropriate regulations that are consistent, harmonized and applicable; permit the monitoring of compliance to regulations by both the management authority and local communities; permit common access to data and data analysis on the status of the resource; contribute to the effective enforcement of regulations; permit the resolution of conflicts in a timely manner through informal and formal means. The BMUs were in principle expected to make these happen but failure to select good leaders and inadequate operational resources (funding) have been major problems.

Limited scientific and other knowledge to guide resource management-

Through collaborative work between the fisheries research institutes and the Universities of the three Member states of LVFO, as well as the regular conduct of catch assessment surveys and biennial frame surveys, scientific information for management is available. The cooperative management of transboundary fishery resources that are highly vulnerable to various factors requires the adoption of a systematic, inclusive and accelerated process/working style to better understand the abundance and distribution of fish stocks over time, hence no efforts should be spared to conduct the hydro-acoustic, Catch and Frame surveys. Emphasis should also be placed on fundamental research.

Scientists in charge of stock assessments, including economists and sociologists must work with managers and other users of fishery resources to develop appropriate methods to collect, manage and use biological, economic and social data and eventually produce information that is as accurate and precise as possible relying, as appropriate, on local and traditional knowledge to fulfill their responsibilities. In addition to undertaking stock assessment, research should also focus more on the definition of management measures. Emphasis should be placed to address gaps in knowledge about the socio-economic aspects of the artisanal and industrial fisheries and to better assess the interactions between the categories of the fishery. The importance of socio-economic research and on aspects of governance cannot be over-emphasized, because experience has shown that in fisheries management, many biological recommendations are undermined by the lack of consideration of the social and economic implications or governance systems required to implement these recommendations.

Excessive Pressure on fisheries resources and other basin resources

The root causes for the excessive pressure on the resource is poverty and the growing population in the lake basin. This is compounded by the lack of alternative livelihoods and employment, the high demand for fish and the non-selective nature of the market in that almost all sizes of fish are acceptable. These conditions have induced fishers to fish both intensively and extensively, and encroaching in waters under the jurisdiction of neighbouring states, adopt poor management practices and engage in

IUU fishing. The results are declining fish stocks.

It is important to involve stakeholders in the management process, ensure compliance and enforcement but also put in place Conflict Resolution Mechanisms, identify and promote alternative sources of livelihoods, and introduce rights-based management.

Rights-based management is an approach to fishery management that focuses on the rights, together with the responsibilities held by individuals, communities and governments relating to fishing. Rights-based management is an effective way to manage access and harvesting. There are many types of rights approaches and it is important to decide which is appropriate for the particular purpose.

Alternative sources of livelihoods: An integrated fisheries management approach¹¹ usually has two axes: the Vertical axis that refers to everything pertaining to the fisheries and the Horizontal axis which addresses non- fisheries issues (FAO, 1984, Satia, 1993). Usually these non-fisheries issues could include the opening up of feeder roads to fishing communities, building schools, health clinics in or close to fishing communities, community ran supplies shop; the creation of alternative sources of livelihoods through for example market gardening, apiculture, livestock raising; skills empowerment through programmes as knitting, crocheting, literacy and numeracy training, boat building and mending, to reduce pressure on the resources while improving income generating capacity of fishing community and food security and improve the standard of living of fishers.

The activities on the horizontal axis are often beyond the competence of fisheries staff. Some of the capital works and the provision of social amenities fall within the competence of other government ministries and agencies. Others such as skills empowerment are better handled by CSOs. It is important to collaborate with these agencies and CSOs to ensure the desired activities for improved livelihoods are realized and this emphasizes the need for partnering in the development and management of the fisheries in the Lake basin.

Fragmented data and information to guide management

The effective management of the natural resources in the Lake Victoria will depend on the timely provision of key information to planners and decision makers. LVFO (2015a) highlights the fragmented nature of data and information to guide management as a major concern. The situation arises because of inadequate funds for resource monitoring, limited research agenda setting and weak linkages between research and management intuitions. These challenges can be better addressed through improved dialogue, better partnering, increased transparency and accountability and the effective implementation of the Fish Levy Trust Fund.

A further challenge to the effective collection of information and data is the reliability of the data from data collectors using manual entry of the data several days after collection. Consideration should be given to the introduction of electronic data collection mechanism using Tablets which permits the input of the data virtually instantly. This would require that resources are provided to a central information service, responsible for maintaining a GIS database, a literature reference system and other shared data sources.

Inadequate human and institutional capacities

Managing transboundary fishery resources requires a portfolio of skills that cut across disciplines

¹¹ *The Integrated Strategy for the Development of Small-scale Fisheries was adopted at the World Conference on Fisheries Management and Development held in Rome in 1984*

(fisheries, political, economic, social and environmental). Even in the strictly fisheries discipline capacity is limited in several areas (science/research, fisheries economics, development, statistics, organizational aspects, etc. In the three countries, fisheries offices have inadequate budgets, and are poorly staffed and equipped, which hinder the provision of technical services, build capacity at local community level and to monitor fisheries activities in the lake. In such a context the need for an on-going and targeted capacity enhancement and development preferably through partnering with CSOs is readily evident.

Destruction of critical habitats and ecosystems

Several critical habitats as detailed below are being destroyed and this has adverse effects on the sustainability of the fisheries, with impacts on the economy and livelihoods of fisheries communities:

- a. Wetlands destruction:** Fringing wetlands and the littoral zones are closely connected to the ecological health of the lake. Development around the littoral zone of the Lake has resulted in the destruction and/or degradation of fringing wetlands that are sites for fish breeding. Wetlands are also involved in the exchange of nutrients with the Lake and act as filters, trapping incoming sediments and pollutants.
- b. Increased Sedimentation:** Land degradation in the Lake basin is the main cause of the increased sediment loads into the rivers discharging into the lake. High population growth, coupled with poverty and unsustainable agricultural practices have increased pressure on land. The small scale farmers have resorted to cultivating in areas with steep slopes, riverbanks, forests, and wetlands. Their activities have contributed to increased soil erosion, decreased nutrient retention in soils and wetlands, hence increased mineral and biogenic sedimentation. These unsustainable land use practices, together with high demand for fuel wood, contribute to the denudation of the hill tops. The highest erosion risks are fields cultivated with annual crops, and rangelands on bare hills.
- c. Invasive Aquatic Weeds Problem:** Water hyacinth (*Eichhornia crassipes*) - is native to tropical America, and was introduced in the Congo River and Lake Victoria several decades ago. The water hyacinth is a serious threat to aquatic ecosystems, affecting fish stocks and water quality. Extensive, tightly packed water hyacinth mats along the shoreline impair environmental quality for biodiversity maintenance, fish breeding grounds and nurseries of young fish, inshore feeding zones, and refuges for fish. The interior of extensive mats are normally deoxygenated and or have low levels of light and oxygen, and produce poisonous gases like ammonia and hydrogen sulphide. Water hyacinth contaminates watering points for domestic supply, livestock and game. Mobile mats obstruct access to landing beaches, fishing grounds and transport routes. The aquatic weeds are also a preferred breeding habitat for the alternative host for Schistosomiasis (bilharzia), namely the *Biomphalaria* snail, a home for the vector mosquito for malaria, and a haven for snakes.
- d. Forest degradation:** This is caused by encroachment of agriculture and increasing demands of the growing population for fuelwood, charcoal, timber, and construction purposes. Deforestation has been severe over the last few decades, including loss of high altitude forests, riverine forests, and lowland forest/woodlands in national parks and reserves. The loss in permanent vegetation cover has accelerated runoff and increased exposure of soils to sheet and gully erosion.

Climate change (Adaptation to climate variability and climate change)

It has been suggested that any future climate change may potentially have a relatively strong impact on the hydrology of inland waters of Africa. Already in Lake Victoria declining wind speeds and rising temperatures, which have reduced the mixing of nutrient-deep rich waters with the surface waters that support fish production, may be responsible for the declining fish yields from the lake.

SECTION SEVEN: SUGGESTIONS TO STRENGTHEN THE FISHERIES MANAGEMENT PLAN

This Section of the report provides suggestions to enhance the fisheries management plan III and provides suggestions to enhance the fisheries management system by elaborating a Frame-work Fisheries Management Plan (FFMP) premised on the principles of the Ecosystem Approach to Fisheries (EAF) and ensuring its effective implementation in collaboration with the Partner States and other stakeholders, donors, Non-governmental organizations, etc.

7.1. Gaps in the Fisheries Management Plan (FMP III) for Lake Victoria

Fisheries is a dynamic sector and presently it is recognized that to ensure the proper management of the sector three concepts – sustainable fisheries, responsible fisheries and ecosystem based approach should be adopted in tandem. The LVFO has developed three fisheries management plans. The first two plans were implemented in collaboration with Research institutes and fisheries management agencies in the three Partner States. The countries have demonstrated in several ways their commitment to the declarations of the Rio World Earth Summit of 1992 and the Code of Conduct for responsible Fisheries adopted by the FAO Conference in 1995.

The FMP III document states clearly that “the FMP III embraces Ecosystem Approach to Fisheries Management to improve the collaborative management of fisheries resources of Lake Victoria basin for the shared benefits of the EAC Partner States....” However, neither in process nor content is the EAF applied in the document. Experience has shown that an effective manner of incorporating ecosystem-based management in other transboundary fisheries such as are found in the Benguela Current Large Marine Ecosystem (BCLME), or the Sardinella stocks in the Canary Current Large Marine Ecosystem (CCLME), the Black Sea, etc., where transboundary diagnostic assessments had been carried out, is by developing a fisheries management plan on the principles of the Ecosystem Approach to Fisheries (EAF). This is because TDAs¹² do not amplify and prioritize the problems and challenges related to fisheries to permit the elaboration of the appropriate management plans (Cochrane et al. 2008, B. Samb, pers, com.).

The FMP III was not developed through a participatory process with the active involvement of the stakeholders. Broad participation of the interested parties from all the Member States would ensure judicious choices in the design of the plan and provide legitimacy to the output and is likely to facilitate its implementation. The FMP III like its predecessors was developed in the conventional manner by experts and the stakeholders were invited to approve the document through consultative workshops.

There is no assignment of roles in the FMP III giving the impression that the activities will be undertaken not by the Member States but by the LVFO Secretariat whereas from a functional perspectives implementation of the plan falls within the purview of Member States with LVFO Secretariat ensuring coordination and advice.

Even with abundant resources and goodwill it is generally impossible to address all issues. Some issues are more important than others and since resources are often limited it is important to prioritize. However the issues and actions in the FMP III are not prioritized.

¹² A Regional TDA has been developed for Lake Victoria Basin which addresses a number of issues relevant to fisheries, an important resource in the Lake.

Plans do not just document the way to reach management goals in the future, but also describe how to manage the fishery in the present and these are better illustrated by having a robust log-frame, which is not the case in the FMP III.

7.2. Suggestions to enhance/strengthen the existing fisheries management plan –FMP III

It is strongly suggested that priority is given to assist the LVFO Secretariat to develop a Framework Fisheries Management Plan¹³ for the transboundary fishery resources of Lake Victoria. Such a plan should address the shortcomings of the present plan, some of which are given above. The tool to use for developing such a plan is the Ecosystem Approach to Fisheries (EAF). The following paragraphs succinctly describe EAF, the process and output.

First it is important to stress that a FFMP for transboundary fishery resources should be seen as a negotiated instrument between the fisheries administrations of the concerned Member States and their stakeholders; it provides a clear vision for the fishery, realistic and measurable objectives and other parameters as a road-map for moving the fishery forward on an agreed schedule of shared responsibilities among the fisheries administration and stakeholders.

There are several reasons why it is advisable to work on the basis of a well-developed FMP: It provides a blue print for action based on current information; it provides realistic milestones with which to measure achievements and assess results, it fosters successful communication and team work among stakeholders of the transboundary inland water body (Lake Victoria), it also permits bilateral partners and other donors and NGOs to realistically contribute to the sector on the basis of an agreed programme rather than each organization promoting its own agenda which may not be in line with endorsed programmes, etc.

Why use the EAF process and tools.

The Ecosystem Approach to Fisheries (EAF) has been adopted by the FAO Committee on Fisheries (COFI) as the appropriate and practical way to fully implement the Code of Conduct for Responsible Fisheries. EAF is a risk based management planning process that covers the principles of sustainable development including the human and social elements of sustainability, not just the ecological and environmental components. EAF is also an effective planning framework that facilitates the planning, coordination and prioritization of current and proposed activities, making them clearer by giving a “home” to the many strategies and monitoring programmes that are underway. In addition, EAF helps to develop comprehensive fishery management systems that seek the sustainability and equitable use of the whole system (ecological and human) to best meet the community’s needs and values.

However, the effectiveness of the EAF process and the contribution of EAF to long-term sustainable development of the resources are greatly enhanced by the conduct of an Ecological Risk Assessment (ERA) as an integral and essential part of the process. Ecological Risk Assessment is a means of identifying the ecological risks associated with the management of the major fisheries in a given region, and to prioritize appropriate management responses. As a tool, it is helpful in ensuring cost-effective decisions and actions are taken because it ensures that time, effort and resources are not wasted on pursuing issues, which may appear important but which are generally insignificant in the context of the broader fishery.

¹³ It is termed a framework fisheries management plan because Member States would be expected to on an annual basis or following the customs in the country extract from the FFMP for inclusion in their national plan.

As a process, the conduct of the ERA is fundamentally participatory and seeks to build consensus among diverse stakeholders about identifying and prioritizing ecosystem issues and a programme of action. Secondly the ERA process sees the “ecosystem” in its broadest definition, including the biological, social, and economic as well as governance systems. This latter principle is of particular importance given the fact that in fisheries management, many biological recommendations are undermined by the lack of consideration of the social and economic implications or governance systems required to implement these recommendations. The conduct of an ERA also makes it clear that contrary to the concerns of those skeptical of the intentions of EAF, humans are seen as an integral component of the ecosystem in the approach¹⁴.

A four step process is used to develop FFMP using EAF principles:

1. Develop a clear description of the fishery, identify high policy goals and the relevant societal values attached to the fisheries;
2. Identify issues, assets, and challenges; and assess the risks associated¹⁵ with each issue and prioritize these issues and consider the key elements that will deliver successful outcomes. The process is facilitated by using an EAF Log-Frame¹⁶ to provide a snapshot version of all the important elements of the management system (plan). The elements are besides an identification of the issue number and its risk value:
 - a. **Management objectives that provide a link between the principles**, policy goals, major issues and what participants agreed the fishery should try to achieve.
 - b. **Operational objective(s) that is/are clear**, measurable and directly linked to one or more of management objectives; noting that an operational objective could be applicable to more than one issue.
 - c. **Management measures**, specific controls applied in the fishery to contribute to achieving the objectives¹⁷.
 - d. **Indicators**, variables that can be monitored to give a measure of the state of the fishery at a given time. Each indicator should be linked to one or more reference points and used to track the state of the fishery in relation to those reference points.
 - e. **Reference points**, benchmark against which to assess the performance of management in achieving an operational objective, corresponding to a state considered to be desirable (target reference point) or undesirable and requiring immediate action (limit reference point).
 - f. **Performance measure**, a function that relates the value of an indicator to its reference point, and that guides the evaluation of fisheries management performance in relation to its stated operational objective.
 - g. **Means of verification**, the sources of information used to indicate accomplishments, in other words sources of information on the indicators. They are usually recorded details such as publications, reports, databases, statistics, surveys, etc.

¹⁴ It is important to emphasize that we manage fish mainly through managing people. Indeed, our failure to manage people effectively has turned out to be the main limiting factor in fisheries management today.

¹⁵ Because the EAF approach is a risk based management planning tool it assists with making the best decisions with the information available by using the Precautionary approach (to reflect the risk) and an adaptive approach (to improve knowledge and adjust decisions).

¹⁶ The Logical Framework Approach (LFA) was developed in 1969 by the United States Agency for International Development (USAID) as a planning and management tool for designing, tracking and evaluating projects. An important output of the LFA was a Log-Frame (Document) which has since been adopted and modified by several bilateral and multi-donor organizations and NGOs. The Log-Frame that is proposed is that modified by FAO for EAF management plans.

¹⁷ In some cases such as in the US and in Canada the column « Management Measures » is represented by “Strategies”. Strategies here refer to the full set of management measures applied to reach the operational objectives in a given fishery.

- h. Data requirements:** the type of data/information that would need to be collected to ensure suggested measures could be implemented within the time-frame and in a cost-effective manner.
 - i. Responsibility:** who or what institution would be responsible for specific management actions or arrangements that will achieve the desired level of performance.
3. Identify and select key elements for the management systems and summarize the elements by component (ecological wellbeing, human wellbeing and governance) to fit into the management plan
 4. Elaborate the Log-frame for the Management Plan

The framework (EAF Log-Frame) which is a major product of the process can be considered an asset. It provides countries elements on which they can establish coherence between national plans and the regional initiative. **Table below is an extract of the log-frame for the management plan of a transboundary fishery.**

If the FFMP is properly developed it will naturally capture and adequately address the governance issues and challenges that the sector confronts, improve the overall fisheries management system, improve the livelihoods of fisheries communities and contribute more significantly to the economies of the riparian States of Lake Victoria.

Issue #	OPERATIONAL OBJECTIVE	MANAGEMENT MEASURES	INDICATORS	REFERENCE POINTS	PERFORMANCE MEASURES	MEANS OF VERIFICATION	DATA REQUIREMENTS	RESPONSIBILITY
ECOLOGICAL WELLBEING								
Management Objective No.1: Rebuild over-exploited stocks and protect those stocks that are threatened								
EW 1, 9 & 17	1. Reduce fishing mortality and adopt regional cooperative management approach for Sardinella aurita, Trachurus species, and Ethmalosa fimbriata in the Gambia and Senegal	1. Limits on catches, 2. Protection of spawning areas, 3. Zoning by fleet type, 4. Biological Rest 5. Harmonize size at first capture	Level of catch and spatial distribution	Catch level compared to those recommended by scientists	Reported level of actual catches in relation to recommended level of catches	Stock Assessment reports	1. Catch statistics, 2. Scientific reports 3. Scientific survey data	Scientists, Fisheries Administrations, Fisheries Operators
EW 18	2. Reduce fishing mortality of Sardinella pilchardus in Morocco Zone A+B	1. Limit catches, 2. Protection of spawning areas, 3. Zoning by fleet type, 4. biological Rest	1. Catch level 2. Spatial distribution	Catch level compared to those recommended by scientists	Reported level of actual catches in relation to recommended level of catches	Stock evaluation reports	1. Catch Statistics 2. Scientific reports 3. Scientific survey data	Scientists, Fisheries Administrations, Fisheries Operators
EW 4, 8, 12 & 19	3. Reduce catches of juveniles of Sardinella aurita, Sardinella maderensis, Trachurus sp. And Sardinella pilchardus in Morocco Zone A + B	1. Concerted monitoring system, 2. Mesh size regulation 3. Revision of size at first capture 4. Use of VMS 5. Better control of landings	Level or quantity of juveniles caught	1. Size at first capture 2. Limits of juveniles authorized in the catches	1. Significant reduction of juveniles caught 2. Recommended sizes of fish are caught	Scientific reports with emphasis on demographic structure	1. Trade statistics of catches, 2. Sampling data at landing sites	Scientists, Fisheries Administrations, Fisheries Operators
EW 3, 7 & 11	4. Reduce impacts of illegal fishing on Sardinella aurita, Sardinella maderensis & Trachurus sp.	1. Sensitize operators 2. Strengthen control systems	1. Number of observed infractions 2. Number of complaints by fishers 3. Number of illegal (pirate) vessels	1. Recommended mesh sizes; 2. Authorized fishing zones; 3. Total allowable catch and rejects	Significant reduction in the number of infractions	Reports on violations of regulations	1. Statistics on surveillance missions, 2. Observations	Fisheries Administration (Surveillance Unit) and Operators

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