

# Chapter 9

## Historical Trends in Fisheries Management

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**Abstract** The management of the fisheries of Lake Victoria has had several successes and failures. These failures were either due to inadequate awareness of the fishing communities on the proposed protocols, and/or little attention paid by the government during the colonial period on the importance of lake fisheries. After independence of the riparian states, each country developed her own approach, but based on the findings of research and recommendations from Lake Victoria Fisheries Organization (LVFO). Lately, through the LVFO and especially under the Lake Victoria Environmental Management Project (LVEMP), more concrete and harmonised fisheries management programmes have been developed. In Tanzania, the evolution of the management of fisheries can be divided into four major historical periods: The pre-colonial period, the colonial period, the state-owned economy period (1961–1985) and the liberalised economy period (after 1986). This chapter summarises all the events that took place during these four major periods. It also discusses the results and proposes the way forward. In particular, the chapter emphasises the threats to the lake fisheries resources and other aquatic living organisms arising from effluent discharges from towns and the agricultural areas surrounding the lake. The different effective management organs such as BMUs (developed under LVEMP I and incorporated into Fisheries Act of 2003) have been mentioned as the products of LVEMP I. Finally, the chapter makes three recommendations related to future management of the lake.

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## 9.1 Introduction

The management of the fisheries of Lake Victoria has had several successes and failures. The failures can be attributed to the inability of members of fisheries staff to manage the fisheries well due to lack of knowledge on which to base management plans or due to the stakeholders' illiteracy and the former colonial rulers' negative attitudes towards the management of the fisheries of the lake. For example, during the colonial era (1950–1953) the colonial government had a variety of conflicting laws and regulations on the fisheries for the three riparian colonies of Kenya, Tanganyika and Uganda (Lake Victoria Fisheries Service 1953).

Whereas Kenya and Uganda had Fish and Crocodile Laws for regulating and managing the fisheries, Tanganyika had a Fisheries Ordinance and a Trout Protection Ordinance (Tanganyika Territory 1950) for controlling the fisheries. The colonial rulers considered fish as a native food of little economic value, a view that led to management of the fisheries receiving little government attention.

Attempts to manage the lake were made for the first time in 1927, when the first survey was conducted by Graham (1929). At that time, it was noted that gillnets were negatively affecting the stocks, a situation which necessitated setting of a minimum mesh size of 5 inches in 1933. However, gillnets were first introduced to the Tanganyika waters of Lake Victoria in 1908 in Mwanza (Fisheries Division 1966). When these nets were introduced to Lake Victoria, people fished the lake for mainly subsistence purposes and only a small percentage of the fish caught was sold. However, as the demand for fish increased, more fish were harvested, which resulted in overfishing.

It is argued that by 1953, the introduced seine nets (long drag-nets) had contributed to the decrease in catches. It was reported that the control of prices, especially in Kenya and Tanganyika, reduced the amount of fish sold in Mwanza and Kisumu. In Uganda, however, the price for tilapia was not controlled, hence the increase in sales.

Prior to 1953, the Kenyan rules governing the management of Lake Victoria had not been harmonized with those of Tanganyika and Uganda. This led to the use of 2½ inches mesh size gillnets. These nets were said to be harmless to the tilapia stocks, additionally the nets were used to catch other kinds of fish, which were either predators or competitors to the tilapias. As such, seine nets were used in the lake until the decision to reduce their number was made. In Tanganyika, the licensing of the nets was hampered by a lack of ground support, particularly vessels and a small number of workers. As a result, most fishermen fished without fishing licences.

In Uganda, the use of 4-inch nets was illegal. The use of mosquito nets started before 1955. The implementation of the ban on the use of illegal nets was difficult in Uganda since at the time nets were made of synthetic fibres and so could be left in the water for a long time and be removed when fish had been caught. In addition, the colonial government established the Lake Victoria Fisheries Board, which was mandated to make recommendations for the management of the fish resources of Lake Victoria. For example, in 1956, the Board had a meeting to review the mesh sizes of gillnets in the lake (Lake Victoria Fisheries Service 1953 and 1955/1956).

It has been noted that the fishermen in the Tanganyika waters were licenced by the local authorities because of the small number of workers. As a result, a large number of fishermen operated without licences as a result it caused discontent among those who were licenced.

The development of fisheries in Mainland Tanzania commenced in 1965, when the Fisheries Division was established under the Ministry of Agriculture, Food and Cooperatives. A director was appointed and an administrative structure to administer the fisheries and to implement the development plans was created. Training was the major activity, which was carried out by the Fisheries Division. In Mwanza, the regional Fisheries Officer was responsible for training as of 1960/61. By the middle of 1965, there were 24 pre-service students, 20 trainees from the Tanganyika African National Union (TANU) Youth Fishing Unit, 14 fishermen and 12 student boat builders. The training was conducted in Mwanza at Nyegezi Training Institute. However, there were no training facilities, equipment and teachers at Nyegezi, apart from boarding and lodging services. The Nyegezi Training Institute became the nucleus of the Ministry of Agriculture, Food and Cooperatives and training started in 1960/61. At the end of 1965, the number of trainees had grown to 41 pre-service students, 15 National Service men, 24 fishermen and 12 student boat builders.

Furthermore, plans were made to establish a certificate in fisheries training centre for staff in the field and fishermen at Mbegani, Bagamoyo and a diploma in fisheries training institute for field officers at Kunduchi, Dar es Salaam. Mbegani Training Centre and Kunduchi Training Institute became operational in 1966. Graduates from Mbegani and Kunduchi were posted to Lake Victoria regions to provide extension services to fishermen and fish processors.

The management of fishery resources in Tanzania can be divided into four historical periods, starting with the pre-colonial period, when the fishery resources were managed by traditional rules. During that period, the destruction of the resources was minimal because the demand for fish and fish products was low owing to a small population, poor processing, handling and preservation methods and poor transportation networks. This period was followed by the colonial period when certain regulations were formulated for use in the Great Lakes region and in the rivers with exotic fish species like the trout. In general, fishing was characterized by the use of poor traditional fishing methods, very few motorized fishing vessels and poor fishing, processing, handling and preservation methods. This period was followed by two post-independence periods: the state-owned economy period (1961–1985) and the liberalised economy period (after 1986).

Due to the decline in stocks, all the riparian states have introduced a fisheries Monitoring, Control and Surveillance (MCS) programme. Currently, the programme is geared towards educating stakeholders on the effects of destructive fishing gears and methods and on the destruction of such gears. In addition, the riparian states have established the Collaborative Fisheries Management (CFM) Programme since the end of 1990s and early 2000s in order to curb illegal, unreported and unregulated (IUU) fishing activities in the lake. Despite the intensity of the programme including the burning of illegal nets, there is still rampant illegal fishing in the lake. This has resulted into the decline in the fish stocks, particularly the Nile perch.

In addition, the stock assessment project carried out by the European Union (EU)–Lake Victoria Fisheries Research Project (LVFRP)–also revealed that the stocks were declining. It is acknowledged worldwide that different scientists develop and use different tools for assessing different stocks. The data gathered by the LVFRP (2001) showed an alarming deterioration of the sex ratio of the Nile perch, that is, there were only a handful of mature female Nile perch. If this is the case, then the female Nile perch in the lake are in grave danger. To save them, the LVFRP recommended a project to institute a slot size of 50–85 cm TL for the Nile perch so that large females can be given chance to spawn. The riparian states have been enforcing the slot size for the Nile perch since the year 2000.

## 9.2 Results

The evolution of the management of fisheries during the colonial era (pre-1961), post-independence period (state controlled economy, 1961–1986) and the liberalised economy period (post-1986) is described in Table 9.1.

## 9.3 Discussion

The riparian communities of Lake Victoria, the partner states and the international community benefit in one way or another from the fishery resources of the lake. However, there are environmental threats, which include rapid deterioration of the quality of water due to increased nutrients and discharges of effluents from the towns and industries around the lake. The infestation of the lake by water hyacinth, increased nutrient enrichment, discharges of effluents and increased algal growth is causing de-oxygenation and threatening artisanal fisheries and biodiversity, thus leading to disappearance of indigenous fish species and destruction of the wetlands, among others (Government of Kenya, GoK/Government of Uganda, GoU/Government of Tanzania, GoT 1996). All these have lead to loss of biodiversity and short and long-term socio-economic benefits for the people and the country as a whole. During the life of LVEMP I, positive efforts were made to reduce the amount of water hyacinth infestation in the lake. Those positive efforts are still being implemented although the weed has resurfaced in some spots in the lake. The reinforcement of the weevil rearing station has been done and are operationalized by the BMUs to sustain the activity. Fisheries Education and Training Agency (FETA) Nyegezi Campus staff have been trained and are also handling one weevil rearing station. This will enable the institution to train their students as well as the BMUs for purposes of building sustainability. The fishermen and the communities living along the lake also do manual removal of the water hyacinth.

**Table 9.1** Evolution of Lake Victoria fisheries management during the colonial and post-independence periods

		Status	
		Colonial period	Post-independence period
Issue/Activity		Before 1961	1961–1985 (State owned economy)
Extension service			1986–2005 (Liberalized economy)
Training of national Fisheries Staff in extension and management skills	There were no national Fisheries training institutes	Training was provided by Nyegezi, Mbegani and Kunduchi Fisheries Training Institutes and higher and medium training institutes inside and outside the country	Training has been provided by Nyegezi, Mbegani (FETA) and Kunduchi Fisheries Training Institutes and higher and medium training institutes inside and outside the country
Training of fishermen in long lining, trawling, gillnetting, engine repair and maintenance and gear repair	Nil	Done at Nyegezi Freshwater Fisheries Training Institute (NFFTI) and Fisheries extension staff	Nil
Training of fishermen in lift net fishery and live bait fishery	Nil	Nil	Training has been conducted by Fisheries extension staff in collaboration with experienced fishermen
Training of fishermen, processors and traders in improved fishing methods and improved fish handling and processing methods	Extension services were provided by colonial staff	Training was provided by national trained fisheries staff	Training was provided by national trained fisheries staff
Training of fish inspectors, managers and workers in fish processing plants, Beach Management Units (BMUs) in fish quality control and safety assurance aspects	Nil	Nil	Training provided by the Government, Higher learning institutions (public and private)
Training on Fisheries Policy of 1997	Nil	Nil	Training provided to Fisheries Training Institutions and extension staff

(continued)

**Table 9.1** (continued)

		Status	
		Colonial period	Post-independence period
Issue/Activity		Before 1961	1961–1985 (State owned economy)
Fisheries policy and fisheries legislation			1986–2005 (Liberalized economy)
The National Fisheries Policy was in place	Nil	Nil	The National Fisheries Sector Policy and Strategy Statement was put in place and was approved by the Government in 1997. Its overall goal is to promote conservation, development and sustainable management of the fishery resources for the benefit of the present and future generations. Fisheries Development Division became the Competent Authority on issues related to fish quality control and safety assurance.
The National Fisheries Policies of the riparian states were harmonized	Nil	Nil	Nil
The National Fisheries Legislation was in place	Trout Protection Ordinance Cap. 160 which was enacted in 1929 provided for the protection of species in highland streams for sport fishing and did not cover Lake Victoria	Fisheries Act No. 6 of 1970 provided for the Minister to make regulations for the protection, conservation and wise use of natural resources. Regulations relevant to Lake Victoria included GN 5 of 21.1.1982 prohibits fishing in closed fishing areas	GN. 276 of 1.9.1989 prohibits the possessing and using of poison to kill fish.  GN. 369 of 10.3.1994 prohibits the use of beach seine nets, dagaa nets <10 mm and gillnets < 5” GN. 370 of 7.10.1994 prohibits the use of trawl nets GN. 189 of 6.6.1997 Amendment of fines from Tsh 20,000 to 100,000 GN. 624 of 9.10.1998 Amendment of fines to not less than Tsh 300,000.

<p>Fisheries Ordinance No. 36, which was enacted in 1950 provided for the establishment of boards for specified water bodies. The boards were empowered to make their own regulations and did not cover Lake Victoria. Regulations to control fish nets in Lake Victoria became effective in 1951.</p>	<p>GN. 5 of 21.1.1982 prohibits fishing in closed fishing areas.</p>	<p>Local Government (District Authorities) Act No. 7 of 1982 Section 169, Local Government (Urban Authorities) Act No.8 of 1982 Section 71 provided for Local Government to manage fishery resources in their jurisdictions.</p>	<p>GN. 193 of 1.8.2003 prohibits the fishing and sale of the Nile perch &lt;50 cm and &gt;85 cm total length (slot size)</p> <p>GN. 300 of 8.9.2000 Fish Quality Control and Standards Regulations 2000, Fisheries Act No. 22 of 2003 provides for policy formulation and implementation of the Act for sustainable conservation, development and management of the fishery resources.</p>
<p>Registration and licensing of fishing vessels and licensing of fishermen</p>	<p>Done under Colonial Regulations</p>	<p>Done under Fisheries Act No. 6 of 1970</p>	<p>Done under Fisheries Act No. 6 of 1970 and Fisheries Act No. 22 of 2003 and Fisheries Regulations, 2009</p>
<p>The National Surveillance Unit was in place</p>	<p>Nil</p>	<p>Nil</p>	<p>Established under Fisheries Act No. 22 of 2003</p>
<p>The National Fisheries Development Fund was in place</p>	<p>Nil</p>	<p>Nil</p>	<p>Established under Fisheries Act No. 22 of 2003 and Fisheries Regulations, 2005</p>
<p>Co-management had already begun</p>	<p>Nil</p>	<p>Nil</p>	<p>Incorporated in Fisheries Act No. 22 of 2003 and Fisheries Regulations, 2005</p>
<p>The Fish Levy Trust Fund for Lake Victoria was in place</p>	<p>Nil</p>	<p>Nil</p>	<p>The National Fisheries Development Fund was established under Fisheries Act No.22 of 2003 and Fisheries Regulations, 2005</p> <p>Establishment of the Fish Levy Trust Fund for Lake Victoria is at different stages of implementation (Regionally, Harmonized Study report was in place and Tanzania had a Business plan).</p>

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**Table 9.1** (continued)

		Status	
		Colonial period	Post-independence period
Issue/Activity		Before 1961	1961–1985 (State owned economy)
National Fisheries Legislations were harmonized		Nil	1986–2005 (Liberalized economy) Areas of harmonization have been identified and Tanzania has incorporated those areas in Fisheries Act No. 22 of 2003 and Fisheries Regulations, 2005. However, these Regulations were revoked and replaced by the Fisheries Regulations, 2009 which are currently, effective.
Lake Victoria Convention was in place		Lake Victoria Fisheries Service	Nil The Convention was signed in 1994 by the riparian states. Article XVIII of the Convention provides for the Organization to perform any legal acts that are necessary for of the discharge of its functions.
Fish quality control and safety assurance			
Traditional and improved fish handling and processing methods		Traditional smoking, smoke kilns, salting and sun drying	Traditional smoking, smoke kilns/ or Chorkor kilns, salting, sun drying and an experimental processing plant was established at NFFTI.
Industrial fish processing		Nil	One plant was established in Mwanza to process Haplochromis.
Fish export market			11 Nile perch processing plants have been established in the Lake Zone regions, and by 2005 eight plants were operational.
Fish export market within East Africa		Smoked and salted fish of indigenous fish species were exported to Kenya and Uganda.	Smoked, salted and sun-dried fish indigenous and exotic fish species were exported to Kenya and Uganda.



Fish export market outside East Africa (Smoked and salted Nile perch and Rastrineobola argentea)	No smoked and salted fish of indigenous fish species were exported outside East Africa or Tanzania.	Smoked, sun dried and salted fish of exotic and indigenous fish species were exported to Burundi, Rwanda, Zambia, Malawi and Zaire.	Smoked, sun dried and salted fish of exotic and indigenous fish species were exported to Burundi, Rwanda and Zaire.
Fish export of fresh, chilled and frozen Nile perch and its products	Nil	Fresh Nile perch were exported to Kenya.	Chilled and frozen products of Nile perch were exported to Europe, Asia, Australia, Middle East, the USA, etc.
Aquaculture			
Training to the fisheries' extension officers (long and short courses) and to farmers	Nil	Training was provided by NFFTI and the fisheries' extension staff.	Training was provided by NFFTI and Mbegani Fisheries Development Centre, Higher and medium learning institutions inside and outside the country and fisheries extension staff institutions.
Establishment of fingerlings breeding ponds	Nil	NFFTI, Malya and Rwamishenye fish breeding ponds were established.	Nyegezi (TAFIRI), NFFTI and several farmers provided fingerlings to farmers.
Aquaculture development strategic plan was in place	Nil	Nil	A draft National Aquaculture Development Strategic Plan (NADSP) was prepared and was planned to be completed by the end of November 2005. However, it was completed in 2009.
Fisheries collaborative management (co-management)			
Co-management was introduced for major and minor waters	Nil	Nil	511 Beach Management Units (BMUs) were established between 1998 and 2000 in Kagera, Mara and Mwanza regions. They were reformed in 2005 and remained 433 BMUs
Individual and joint patrols between the BMUs and the fisheries staff had already begun	Nil	Nil	Both individual and joint patrols were being conducted.

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**Table 9.1** (continued)

Status		Post-independence period	
Colonial period		1961–1985	1986–2005
Issue/Activity		(State owned economy)	(Liberalized economy)
The BMUs participated in the maintenance of beach hygiene and sanitation and the management of floating barges and the beach environment management in general	Before 1961	Nil	Beach hygiene and sanitation in 575 (2004 Lake Victoria Frame Survey) beaches were being maintained by the BMUs and ten constructed floating barges were being managed by the BMUs.
The National BMUs Guideline/operational manual was in place	Nil	Nil	The Harmonized BMU Guideline was domesticated to National BMU Guideline printed and distributed to the Lake Zone regions and the riparian states. Distribution of copies of the manual to other regions in Tanzania was ongoing and translation of the manual into Kiswahili was completed by the end of 2005.
National guidelines for establishing the BMUs were in place	Nil	Nil	The guidelines (English and Kiswahili Languages) were finalized and e printed and distributed by the end of November 2005.
Fisheries association			
Fishermen's association was in place	Nil	Fishermen's associations/cooperatives were formed in Kagera, Mara and Mwanza regions.	Most of the associations/co-operatives died a natural death. However, fish traders established their own associations/co-operatives.
BMU Savings and Credit Co-operatives Societies (SACCOS) were in place	Nil	Nil	The BMUs established sources of finances which include SACCOS in Kagera, Mara and Mwanza regions and the SACCOS were at different stages of registration.

Research and development			
Biological, limnological, stock assessment, and socio-economic studies	Done by the East African Freshwater Fisheries Research Organization (EAFFRO) and private institutions and individuals.	Carried out by the EAFFRO and International Organizations and private institutions and individuals.	Carried out by TAFIRI, the Fisheries Development Division, higher learning, private and public, institutions and International Organizations inside and outside the country.
The Lake Victoria Fisheries Organization (LVFO) was in place.	Nil	Nil	Established by a convention signed by the three countries in 1994.
Regional and national projects			
Haplochromis Ecological Survey Team (HEST) funded by the Government of Netherlands	Nil	Conducted taxonomy, limnological and ecological studies on Haplochromis, the Nile perch and Rastrineobola argentea in the main lake.	Conducted taxonomy, ecological studies and limnological studies on Haplochromis, the Nile perch and Rastrineobola argentea.
Inland Fisheries Planning, Development and Management in Eastern/Central/Southern Africa (IFIP) – FAO and UNDP-funded project	Nil	Nil	Conducted socio-economic studies.
Lake Victoria Fisheries Research Project (LVFRP) – EU-funded project phase 1	Nil	Nil	Long and short courses were provided to TAFIRI staff. Procured research equipment.
Lake Victoria Fisheries Research Project (LVFRP) EU-funded project phase 2	Nil	Nil	Conducted fish stock assessment on the Nile perch and Rastrineobola argentea, limnological and socio-economic studies in the main lake.

(continued)

**Table 9.1** (continued)

Status		
Colonial period	Post-independence period	
Before 1961	1961–1985 (State owned economy)	1986–2005 (Liberalized economy)
Nil	Nil	Field and research equipment was procured and training (long and short courses) was provided to the project's staff. Management interventions were executed by the Government implementing institutions. Biological, ecological, limnological and biodiversity studies were done on both the main lake and rocky habitats and satellite lakes. Socio-economic, aquaculture and information and data base studies were conducted.
Nil	Nil	Socio-economic studies and training to the BMUs were conducted. See above change to be 1986–2016
Nil	Nil	Field and research equipment would be procured. Management interventions were at different stages of implementation. Stock assessment, trawl, hydro-acoustic, gillnets, experimental fishing, catch assessment surveys, biological and environmental data collection were at different stages of implementation. Capacity building was at different stages of implementation.

<p>Lake Victoria Environmental Management Project II (LVEEMP II) World Bank- and GEF-funded project (2009–2017)</p>	<p>Nil</p>	<p>Nil</p> <p>Implementation of the research findings of LVEEMP I. Institutional capacities were strengthened.</p> <p>Field and research equipment for Fisheries Development Division were procured (e.g., vehicles, patrol boats, chemical laboratory facilities, data base equipment) and training (long and short courses) was provided to the project staff and Local Government Authorities.</p> <p>Management interventions were executed by the Government implementing institutions.</p> <p>Biological, ecological, limnological and biodiversity studies were done on both the main lake rocky habitat and satellite lakes (e.g., Frame surveys, Catch assessment surveys and Hydroacoustic surveys).</p> <p>Socio-economic, aquaculture and information and data base studies were conducted.</p>
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### **9.3.1 *Extension Services***

The major barriers to the development of the fisheries sector include inadequate capital, education and poverty (Fisheries Division 1968). Before independence, there were no national fisheries training institutes. Since the establishment of the Fisheries Development Division in 1965, training has been provided both inside and outside the country. Fisheries staffs have continued to advise on and train fishermen in the establishment of fisheries associations, adoption of improved fishing technology, fish preservation, processing and handling methods, aquaculture development and beach sanitation and hygiene.

### **9.3.2 *Fisheries Policy and Fisheries Legislation***

The Fisheries Policy provides guidelines for fisheries conservation, protection, development and management. Before independence, there were no national fisheries policies. Although the Fisheries Development Division was officially established in 1965 under the Ministry of Agriculture, Food and Co-operatives, the First National Fisheries Sector Policy and Strategy Statement was launched by the Government in 1997 and reviewed in 2015. The overall goal of the National Policy is to promote conservation, development and sustainable management of the fishery resources for the benefit of present and future generations. The Fisheries Policy 2015 and legislation (Fisheries Act 2003) operate within the macroeconomic framework of the country such as the Tanzania Development Vision 2025 and the Second National Strategy for Growth and Reduction of Poverty (NSGRP II) and the United Nations Sustainable Development Goals, particularly Goal 14 (SDG 14). The overall goal is to contribute to national poverty reduction through sustainable management and utilization of the fisheries resources.

The Trout Protection Ordinance was enacted in 1929 (Tanganyika Territory 1929) with the aim of protecting trout in 24 streams in the then colony (Trout Protection Ordinance 1929). However, it was realized that the Trout Protection Ordinance had certain defects, and so the Colonial Government enacted the Fisheries Ordinance in 1950 (Fisheries Ordinance 1950). The second ordinance dealt primarily with Marketing Boards and had nothing to do with the management of Lake Victoria. The fisheries of Tanganyika continued to operate under colonial laws until 1970 when a new Fisheries Act was enacted. A number of regulations were included in the Fisheries Act of 1970 and fisheries regulations (the Principal Regulations 1973) were developed to ensure the smooth implementation of the Act (see Table 9.1).

The Fisheries Act No. 6 of 1970 mandated the Minister responsible for fisheries to manage, protect and develop the fishery resources (Fisheries Act 1970). Since the Act was enacted during the one-party system, a number of issues were related to the National Policy on Socialism and Self-reliance. The passing of the Fisheries National Policy in 1997 by the Government and the transformation of the national

economy from a state-owned economy to a liberalized economy forced the Fisheries Division to repeal and replace the Fisheries Act No. 6 of 1970 with a new Fisheries Act No. 22 of 2003. This law mandates the Minister as the person responsible for the formulation of policies and the implementation of the law for sustainable conservation, development and management of fishery resources (United Republic of Tanzania 2004).

The management of the fishery resources of Lake Victoria requires joint management and common strategies through harmonized national fisheries policies and laws. The partner states have initiated a process of harmonizing their national fisheries laws, an initiative which is currently at different stages of implementation. The three countries have signed a convention for the establishment of a Lake Victoria Fisheries Organization (LVFO), which became operational in 1996. The objective of the Organization “shall be to foster cooperation among contracting Parties, harmonize national measures for sustainable utilization of the living resources of the lake and develop and adopt conservation and management measures” (LVFO 2001).

### ***9.3.3 Fish Quality Control and Safety Assurance***

Fish deteriorate rapidly and therefore it is essential to preserve fish immediately after capture so that they can be processed and transported to distant domestic markets or consumed later. Fish smoking was one of the traditional fish processing methods. However, the product, which came from traditional method, were of poor quality and did not last long. Smoking kilns were introduced in the 1950s to improve the traditional methods (Lake Victoria Fisheries Services 1953). Modern smoking kiln was introduced at TAFIRI Mwanza. The processors however, did not adopt this technology, because it was expensive to construct despite its energy saving capability.

After independence, fisheries extension services were strengthened and more improved fish handling and processing methods such as salting, chorkor kilns, freezing and chilling were introduced. Important processing methods include fish smoking using chorkor kilns and salting for both Nile tilapia and Nile perch, sun drying for *Rastrineobola argentea* (dagaa) and icing for Nile perch and Nile tilapia. In addition, modern preservation methods are used to keep fillets in the processing plants. These include chilling and freezing products for the domestic and export markets.

### ***9.3.4 Fish for Export Market***

In 1965, it was reported that the Tanzanian part of Lake Victoria contained the most important commercial fisheries in East Africa. In addition to supplying fish to local markets, Tanzania exported fish to Kenya and Uganda. In 1968, the export of processed fish from the West Lake Region to Uganda went down, but exports to both Kenya and Uganda from Ukerewe Island (Fisheries Division 1968) were good. It

was observed that there was a high demand for fish in the two neighbouring countries, which could be supplied by Mainland Tanzania. However, it was reported that poor roads, communication and distribution facilities hindered the distribution of fish to the different markets. In addition, lack of capital often limited the people's capacity to buy considerable amounts of fish.

Fish and fishery products from Lake Victoria took on a new trend in the mid-1980s, during the Nile perch boom. The export of fresh, smoked, salted Nile perch and dried *Rastrineobola argentea* to Burundi, Uganda, Rwanda, Democratic Republic of Congo (DRC), Sudan and Kenya increased the income of fishermen and fishmongers, as well as the national income. In early 1992, Nile perch processing plants were established in the Lake Zone such that fish production (particularly the Nile perch), increased and Nile perch fillets and other products found a market in Europe, the Far East, the Middle East and USA, among others. The major importers of Nile perch fillets from Lake Victoria include several EU countries and in 2004 the total export was 42,354 tonnes, which were valued at US\$ 100.1 million, while the total royalty to the Fisheries Division was US\$ 6.4 million (Fisheries Division 2004).

### ***9.3.5 Aquaculture***

During the colonial era, insufficient efforts were made to promote aquaculture in the Lake Victoria Basin. After independence, farmers were trained on aquaculture development and two fish breeding ponds namely Malya and Rwamishenye were established. By the end of 1968, there were 705 stocked fishponds in the Western Lake Region (Fisheries Division 1968). However, from the 1970s to the early 1990s fish farming activities were undertaken at a lower scale. In 1997, fish farming was promoted again, reaching its peak by mid 2005 when there were a total of 404 fishponds in the Lake Victoria Zone. The major problems relating to fish farming have been the absence of strategic plans for aquaculture development, inadequate supply of quality fingerlings, and inadequate supply of water in some parts, poor feeding and cropping and stunted growth. These drawbacks are currently being addressed, including possibility of cage farming in the lake.

### ***9.3.6 Collaborative Management of the Fisheries***

There is a weakness in the enforcement of the existing laws and regulations in the fishing industry, particularly now when there is a growing demand for fish in both domestic and external markets. Overfishing, the use of illegal fishing gear (beach seines, mosquito nets, under meshed gillnets, etc.) and other illegal fishing practices are rampant particularly in fish breeding areas, fishing grounds and estuaries. These practices threaten the fishing industry and are contrary to the objectives of Fisheries



Act No. 22 of 2003, that is, protection, conservation, development and wise use of fishery resources (United Republic of Tanzania 2004).

Co-management of the fisheries as an alternative to centralized command and control of fisheries management is often said to be a solution to the problems of resource use conflicts and overexploitation. In 1997, the Government realized that it could manage fishery resources more effectively in partnership with stakeholders (Fisheries Development Division 1997). Collaborative Fisheries Management (CFM) was introduced for the first time in the Mwanza Gulf in 1998 by the establishment in every landing site of a Beach Management Unit (BMU). More than 511 BMUs had been formed in all the twelve riparian districts by July 2000 (LVEMP 2000). The development in terms of the number of functioning BMUs is an indicator of the level of the participation of the community in the management of Lake Victoria fisheries.

Since co-management began, the Beach Management Units have been collaborating with fisheries staff to curb illegal fishing practices, to participate in data collection for Catch Assessment Surveys and Frame Surveys, in ensuring beach hygiene and sanitation and in environmental conservation activities, among others. The Fisheries Act, 2003 under Section 18 has incorporated co-management whereby members of the BMUs have been empowered to enforce the Fisheries Act, 2003 for sustainable management and development of fishery resources (United Republic of Tanzania 2004).

### ***9.3.7 Fisheries Associations***

Attempts to enable fishermen form fisheries organizations/associations started in the mid-1960s. It was found that most individual fishermen worked in remote areas and were not organized. As a result, they were in an unfavourable situation for a long time. Although fishermen were making reasonable incomes, individually, they had no bargaining power and fishmongers usually exploited them. Attempts were made to foster co-operation among the fishers and in fact, one association was officially registered in 1968. In addition, there were several unregistered associations, but all had common problems such as lack of capital, poor leadership and lack of competent and honest managers to run them efficiently (Fisheries Division 1968).

Consequently, most of the associations died a natural death. Fortunately, since the inception of the Lake Victoria Environmental Management Project, attempts have been made to sensitize the fishing communities through the members of Beach Management Units to establish Savings and Credit Cooperative Societies (SACCOS). The aim is to establish formal fisheries associations from the grassroots level to the national level, which will provide a platform for fishermen to air their grievances relating to fish prices and other related issues. These initiatives have started to bear fruits and today there are a number of registered SACCOS such as Kayenze (Ilemela District), Burugu, Kiamba and Suguti (Musoma Rural District), Chole, Kigongo Ferry and Mwasonge (Misungwi District). It is observed that the fishers, who are

mainly artisanal, should formalize their associations so that they may have strong voice in bargaining for fish prices, borrowing funds from financial institutions.

### **9.3.8 Research and Development**

Up until 1977, freshwater fisheries research was under the East African Freshwater Fisheries Research Organization (EAFFRO) whose headquarters were in Jinja, Uganda. The studies carried out by EAFFRO were on limnology, stock assessment and socio-economics.

Despite the collapse of the East African Community (EAC) in 1977, research on the fisheries of the three East African states continued but was now carried out separately by the individual countries. In Kenya, fisheries research was carried out by the Kenya Marine and Fisheries Research Institute (KMFRI) whereas in Uganda, it was carried out by the Ugandan Fisheries Resources Research Institute (FIRRI). In Tanzania, fisheries research activities were handed over to the Tanzania Fisheries Research Institute (TAFIRI), which was instituted in 1980 by an Act of Parliament (No. 6).

Fisheries management issues of Lake Victoria were handed over to the Food and Agriculture Organization of the United Nations (FAO) under the CIFA–Subcommittee for Lake Victoria (from 1977 to 1994) when the Lake Victoria Fisheries Organization (LVFO) was formed. A convention was signed in 1994 by Kenya, Tanzania and Uganda.

### **9.3.9 Regional and National Projects**

Despite the work done by EAFFRO, existing records do not show whether prior to independence, there were fisheries research and management projects geared towards developing fisheries management activities in the Tanzanian part of Lake Victoria. The first project on Lake Victoria was implemented by the Haplochromis Ecological Survey Team (HEST), which was funded by the Government of the Netherlands from the mid-1970s to the early 1990s. The project conducted research on the taxonomy, limnology and ecology of haplochromines and the dagaa (*R. argentea*). Another project was the Inland Fisheries Planning and Development in Eastern/Central/Southern Africa (IFIP), which undertook socio-economic studies. This project was followed by the Lake Victoria Fisheries Research Project (LVFRP), which was funded by the European Union. The project was concerned with capacity building in terms of training and equipment, limnology, stock assessment of *Lates niloticus* and *R. argentea*, including socio-economic studies. The project developed a fisheries management plan for Lake Victoria.

The Lake Victoria Environmental Management Project (LVEMP) was established by a tripartite agreement signed by the three countries in 1995. The project was undertaken between July 1997 and 31st December 2005. The project carried out fisheries research and management activities, for example, undertaking biologi-

cal, biodiversity, ecological, aquacultural, socio-economic and information and database studies. Fisheries management interventions included surveillance, co-management, aquaculture development, frame surveys, fish quality control, the curbing of fish post-harvest losses and the undertaking of fish levy trust studies, among others.

The Implementation of Fisheries Management Plan (IFMP) project was a five-year (2000–2008) regional project funded by the EU. However, it was extended up to 2010. It was expected that it would support fisheries research and management activities (see Table 9.1). All these projects generated useful information for the development of Lake Victoria fisheries resources for the benefit of all the three riparian countries.

## 9.4 Conclusion

The development of fisheries in Tanzania can be divided into three major periods, namely the colonial period, the post-independence period and the period of liberalized economy. The colonial period was characterized by a slow growth in the sector because of the absence of a national fisheries policy and a lack of fisheries training institutes. Fisheries regulations were introduced in 1951, but before then, fishery resources were managed through traditional rules. The processed fish products were of low quality because the processing involved poor smoking (using different firewoods), salting (using unspecified amount of salt per kg of fish), and sun drying (depending on the amount of solar energy at the time of drying).

The post-independence period was characterized by new developments in the fisheries sector, for example, the establishment of three national fisheries training institutes. Many fisheries staff were recruited and fisheries extension services for engine maintenance, fishing gear making and mending, aquaculture, fish handling, processing, preservation, marketing, data collection, among others, were provided. There were no fisheries policies at that time. The Fisheries Act of 1970 together with Fisheries Regulations were enacted and enforced.

The period of liberalized economy was characterized by the passing of the first National Fisheries Policy and Strategy Statement. The Fisheries Act of 2003 replaced the Fisheries Act of 1970, with the aim being to come up with a Fisheries Act that would adequately cope with the developments in the National Policy on Privatization. The incorporation of co-management and the Fisheries Development Fund in the Fisheries Act of 2003 has significantly enhanced fisheries management. The Fisheries Development Division has established a sustainable funding mechanism through a “Retention Scheme” that supports fisheries management and research activities in the country. However, this scheme has been suspended since 2016.

The fishing communities are participating in monitoring, controlling and surveillance activities and beach sanitation and hygiene. Fish processing plants use improved fish handling and processing methods and the Fisheries Development Division is the competent authority on issues pertaining to fish quality assurance. To a great extent, fisheries management and research activities have been strengthened

in the three countries because they are regionally coordinated by the Lake Victoria Fisheries Organization.

## 9.5 Recommendations

- The government should continue to review the Fisheries Policy and Act in order to accommodate new developments in the sector. Currently, there is an updated National Fisheries Policy of 2015. The fishing communities should be facilitated and empowered so that they can establish fishermen's associations and Savings and Credit Cooperative Societies (SACCOS) from the beach level to the regional level.
- The Government's efforts to monitor fish post-harvest losses should be expanded to cover all the three commercial fish species and this intervention should start from the fishing grounds up to the markets. In addition, sensitization of fishing communities on issues relating to improved fish processing, handling and processing methods, beach sanitation and hygiene should continue in all the riparian districts so as to guarantee socio-economic benefits to the communities.

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