



UNIVERSITY OF NAIROBI

# ***Sector Report on Fisheries and Aquaculture***

Dr. Jacob Ochiewo and Dr. Constance Gikonyo

# Introduction

- **Background information**

- Blue Economy encompass a range of productive sectors including capture fisheries, aquaculture, and non-fisheries maritime sectors
- Kenya is endowed with fisheries resources
- The fisheries sub-sector contributes about 0.5% of the national GDP and about 2% of export earnings
- Production declined in Lake Victoria fishery due to increased use of illegal fishing gears & proliferation of water hyacinth, due to increased nutrients from runoff
- Nationally, total fisheries production is estimated to be 146,543 MT (KNBS, 2019)

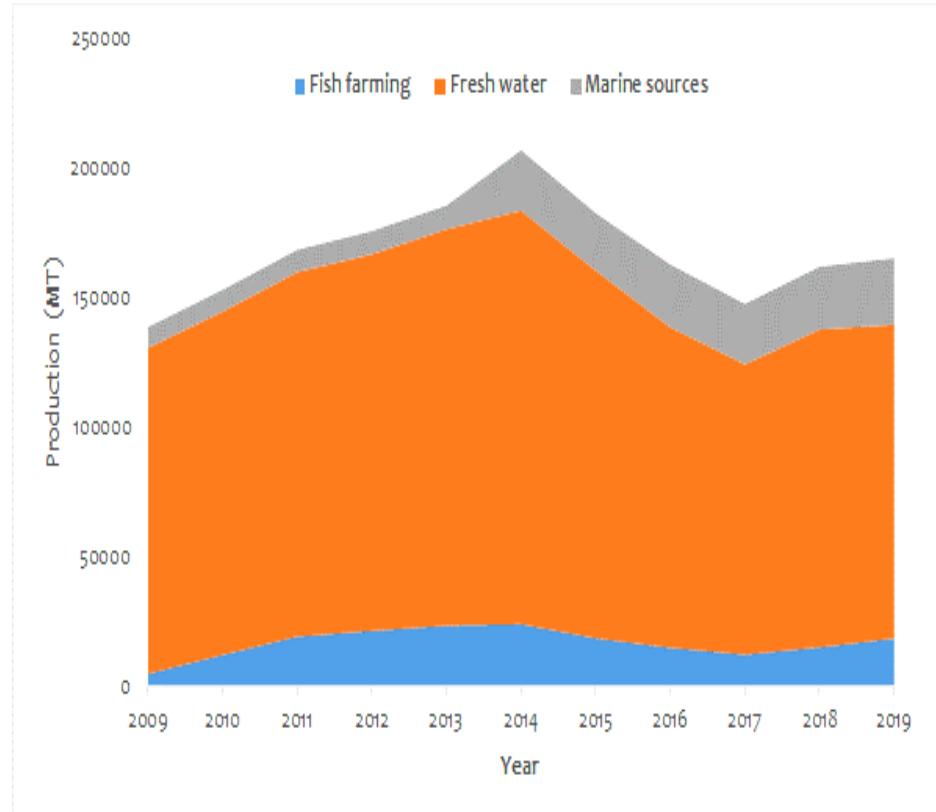


Figure 1. Total Fish production in Kenya, 2009-2019 (Source: KNBS, 2020)

# Importance of fisheries sector to Economy

- Fisheries sector provides livelihoods and income
- It provides direct livelihood to over 65,250 fishers
- About 1.2 million people are engaged in the fisheries value chain as fishers, traders, processors, and suppliers of inputs
- Fisheries have stimulated growth of a number of subsidiary industries and are an important source of foreign exchange
- Fisheries are a rich source of protein for riparian communities
- Overtime, contribution of fishing and aquaculture has grown steadily from KES 34.9 billion in 2016 to KES 48.82 billion in 2019

# Coastal and deep sea fisheries

- The coastal and deep sea fisheries consist of the small-scale, semi-industrial, industrial, aquarium and recreational fisheries
- It contributes >10% of annual national fishery production in KE
- Production from coastal and deep sea fisheries declined during 1990s and subsequently stabilized at about 9,000 MT annually
- The annual production estimate from the coastal and deep sea fisheries was revised to approximately 23,000 MT based on scientific Catch Assessment Surveys (CAS) as reported in Kimani *et al.* (2018)

# Coastal and deep sea fisheries cont'd

- Catches fluctuate between months with highest catches occurring between January and March when fishing for deeper water fish stocks take place.
- Approximately 80% of production is landed by small-scale fishers. The rest of the catches are landed by semi-industrial and industrial fishers.
- Demersal reef fish contribute approximately 50% to the coastal and deep sea fisheries production. The other groups include pelagic species (35%), molluscs (9%), crustaceans (3%).
- The small-scale reef finfish fishery has experienced overfishing.

# Coastal and deep sea fisheries cont'd

- The three most abundant species in demersal catches namely *Lethrinus lentjan*, *Siganus sutor*, and *Leptoscarus vaigiensis* have shown evidence of recruitment overfishing
- Overfishing is evident in:
  - tuna and large pelagic species
  - small and medium pelagic
  - some species of marine aquarium fishery
  - sea cucumber fishery
- Catch per unit effort (CPUE) data experienced 4-fold decline between 1980s and 1990s
- A decline of 1-2 kg per fisher per trip has occurred among the commonly used fishing gears from the year 2008

# Inland fisheries

- Inland water bodies produce more than 90% of the capture fisheries production in Kenya mainly from Lake Victoria, Turkana, Naivasha & Baringo
- Fish production from inland waters has increased from 15,000 MT in 1950s to a max. of over 180,000 MT in 1990s.
- Species contribution to the catch has changed over the years and is currently dominated by Omena (*Rastrineobola argentea*), Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*)
- The total production steadily increased until the late 1990s when the decline began mainly due to the drop of Nile perch landings from Lake Victoria. Nile perch landings has continued to drop from the late 1990s, while catches of Omena, the second most important fishery nationally, has steadily increased from the early 2000s
- The standing stock estimates from Lake Victoria remain relatively stable. Lake Turkana fishery is however under-exploited with catches remaining low, approx. 5,000 – 8,000 MT, against the estimated potential of over 30,000 MT.
- The catches from the smaller water bodies (Lakes Naivasha and Baringo) remain small and highly variable depending mainly on lake water levels.

# Inland fisheries cont'd

- More than 90 percent of fish landings from the inland capture fishery come from Lake Victoria
- Decline in fish catches from Kenya's portion of Lake Victoria is attributed to increased use of illegal fishing gears and proliferation of water hyacinth
- The observed catch decline in Kenya's portion of Lake Victoria could have far-reaching socio-economic consequences such as:
  - loss of income and livelihoods,
  - food and nutritional insecurity
  - conflicts over the limited resources



Table 3: Quantity and value of fish landed in Kenya's inland water bodies, 2015 – 2019 (Source: KNBS, 2020)

	2015	2016	2017	2018	2019*
Quantities (Tones)					
Freshwater fish					
Lake Victoria	109,902	98,666	92,727	98,150	90,743
Lake Turkana	10,605	7,926	4,021	5,430	7,031
Lake Naivasha	1,072	1,064	1,689	2,287	3,087
Lake Baringo	176	141	155	180	203
Lake Jipe	123	106	112	120	157
Tana River dams	852	444	422	630	750
Fish Farming	18,656	14,952	12,356	15,320	18,542
Other areas	312	214	332	350	360
<b>TOTAL</b>	<b>141,698</b>	<b>123,513</b>	<b>111,814</b>	<b>122,467</b>	<b>120,873</b>
Value – KES (million)	20,750	19,735	18,581	20,987	18,952

Table 5: Mean ( $\pm$ SEM) CPUE of common fishing gears in Lake Victoria (source: Lake Victoria Catch Assessment Surveys, LVFO/KMFRI (2016))

Gear type	CPUE (kg/fisher/trip)		
	2003/2004 FY	2008/2009 FY	2014/2015 FY
Gillnet	4.1	2.9	2.5
Longline	5.8	5.0	5.7
Handline	3.8	3.7	4.5
Small seine	38.3	23.6	33.5

- CPUE has been fluctuating between FY 2008/2009 and 2014/2015 with:
  - a decline of 0.4 kg per fisher per trip for gillnet
  - a general increase of 0.7 - 9.9 kg per fisher per trip among the commonly used fishing gears (longline, handline and small seine)

# Aquaculture

- Aquaculture is recognized as a source of food security in Kenya's Third Medium Term Plan and other legislative, policy, and institutional frameworks.
- It is increasingly expanding and is meeting part of the rising demand for fish

# Mariculture production in Kenya

- Mariculture in Kenya involves the culture of milk fish, mullets, mud crabs, seaweeds, oyster and prawns, Artemia and marine tilapia
- Mariculture projects involve production systems operated by self-help groups that consist mainly of female farmers
- Mariculture has made some progress over the past decades, through application of simple innovative technologies
- More recently, seaweed farming has attracted new farmers. Presently, there is focus on up-scaling production to other areas, increasing production per unit area and value addition

# Freshwater aquaculture production in Kenya

- Freshwater aquaculture was first developed in 1920s and became popular in 1960s.
- The Kenyan government identified the potential in aquaculture in 2009, and launched a nationwide Economic Stimulus Programme to speed up its devt.
- Nile tilapia is the most farmed fish species in Kenya, accounting for 80% of all aquaculture production.
- The Economic Stimulus Programme helped fish farmers by providing fingerlings, feed and pond building, resulting in an increase in the number of fish farmers, acreage under aquaculture, and output.
- Aquaculture production currently stands at 18,542 MT in 2019, up from 12 356 MT in 2017 (Figure 2).



Figure 2: Trends in aquaculture production in Kenya 2006– 2019 (Source: KNBS, 2020)

# Potential for aquaculture development

- There is a great potential in aquaculture due to diverse water resources e.g.
  - brackish water at River Tana delta & Athi-Sabaki River estuary, other rivers, small water bodies & fresh water can support coastal aquaculture
  - marine waters - Kenya is endowed with a 640 km coastline
- The coastline & marine waters provide significant opportunities for sustainable mariculture
- This potential can be tapped as part of Blue Economy development, which recognizes the productivity of healthy freshwater and maritime-based economies

# Challenges hindering development

- High cost of production and other constraints
- Inadequate or seasonal availability of seed and feed
- Inadequate extension services
- Ineffective monitoring and evaluation planning and execution to track mariculture project operations
- Lack of capital investments
- Inadequate access to market and limited technological capacity
- Small scale operations that do not allow economies of scale
- Insufficient water holding capacity by ponds in selected counties in the Eastern and Coastal regions
- Poor extension services, poor management practices, low price and limited fish farm inputs, deficient marketing structure, government/donor reliance, and the absence of value addition.



# Governance frameworks and gaps

- Governance of the fisheries sector is undertaken through various legal, policy and institutional frameworks.
- These include international and regional agreements that Kenya has ratified and are then domesticated at the national level.
- The Constitution of Kenya 2020 at Article 2(5) provides that, “the general rules of international law shall form part of the laws of Kenya.” Article 2(6) of the Constitution then stipulates that “any treaty or convention ratified by Kenya shall form part of the laws of Kenya under this Constitution.”
- These articles make international Conventions ratified by Kenya to be part of relevant laws of Kenya. Consequently any Convention that Kenya has ratified and has provisions addressing aspects of fisheries is relevant.

# International Framework

## **Convention on International Trade in Endangered species of Wild Fauna & Flora (CITES)**

- Kenya ratified on 13 December 1978.
- *Domestic Legislations: Wildlife (Conservation and Management) Act No. 47 of 2013; The East African Customs and Management Act, 2004 (Rev. 2008); and Environment Management and Co-ordination Act, 2015.* Through international cooperation states regulate international trade in certain species of flora and fauna that are listed.

## **Convention on the Conservation of Migratory Species (CMS) of Wild Animals (Bonn Convention)**

- Kenya ratified on 26 February 1999.
- *Domestic Legislation: Wildlife Conservation and Management Act, 2013.* The Act provides for the protection and conservation of migratory species, their habitats and migratory routes. CMS lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.

## **Port State Measures Agreement (PSMA) against Illegal, Unreported and Unregulated Fishing (IUU) 2009**

- Kenya ratified on 23 August, 2017.
- *Domestic Legislations: Fisheries Management and Development Act, No. 35 of 2016.* The Act created an inter-agency Monitoring Control and Surveillance (MCS) unit. *The Kenya Coast Guard Service Act, 2018; and the Maritime Zones Act, Cap. 371.* The PSMA specifically targets IUU fishing and aims to prevent, deter and eliminate it.

## **International Convention for Regulation of Whaling, 1946**

- Kenya ratified on 2 December, 1981.
- *Domestic legislation: Fisheries Management and Development Act, 2016; and the Maritime Zones Act, Cap. 371.* The objective of the Convention is conservation of world whale stocks, to promote orderly development of the whaling industry.

# International Framework cont'd

## **United Nations Fish Stock Agreement (UNFSA) for Straddling and Highly Migratory Fish, 1995**

- Kenya ratified on 13 July 2004.
- *Domestic Legislation: Fisheries Management and Development Act, No. 35 of 2016; Maritime Zones Act, Cap. 371; and Legal Notices on Foreign Fishing Fleets.* To ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks. Kenya has the straddling and migratory tuna and tuna-like fish species, which need protection from over exploitation.

## **Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972, as amended by the London Protocol (London Convention 1972).**

- Kenya acceded to the London Convention 1972 on 7th January, 1976, and to the London Protocol on 14th January, 2008.
- *Domestic legislations: Kenya Maritime Authority Act, 2006; and Environmental Management and Coordination (Amendment) Act, 2015.* The Convention establishes a global legal framework to protect the marine environment from human activities.

## **Convention on the Continental Shelf (Geneva 1958)**

- Kenya acceded on 20 Jun 1969.
- *Domestic legislation: Maritime Zones Act, cap 371.* The objective of the convention is to define and delimit the sovereign and exclusive rights of states to explore and exploit the natural resources of the continental shelf.

# International Framework cont'd

## **Convention on Fishing and Conservation of the Living Resources of the High Seas**

- Kenya ratified on 20 June 1969.
- *Domestic Legislations: Fisheries Management and Development Act, No. 35 of 2016; and Maritime Zones Act, Cap 371.* It aims to encourage international cooperation among states towards conservation of the living resources in the high seas. Such measures should be formulated with a view to securing a supply of food for human consumption (art. 2)

## **The Ramsar Convention on Wetlands of International Importance**

- Kenya ratified on 5 June 1990.
- *Domestic Legislations: Environmental Management and Co-ordination Act, 1999; and Water Act, 2016.* The Ramsar Convention encourages the designation of sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity.

## **United Nation Convention on the Law of the Sea (1982)**

- Kenya ratified on 2 March 1989.
- *Domestic Legislations: Fisheries Management and Development Act, No. 35 of 2016; and Maritime Zones Act Cap 371.* UNCLOS provides a comprehensive regime governing the use of the oceans and seas and their resources. The convention establishes a framework for cooperation on conservation and management of marine living resources in the high seas.

## **Convention on Biological Biodiversity (1992)**

- Kenya ratified on 26 July 1994.
- *Domestic Legislation: Environmental Management and Co-ordination Act, 1999; and Wildlife (Conservation and Management) Act No. 47 of 2013.* The Convention on Biological Diversity has three objectives, namely: Conservation of biological diversity; Sustainable use of components of biological diversity and; Fair and equitable sharing of benefits arising out of utilization of genetic resources.

# International Framework cont'd

## International Convention for the Prevention of Pollution from Ships (MARPOL)

- Kenya acceded on 12 September, 1975.
- The convention seeks to preserve marine environment by addressing pollution emanating from ships.

## UN 1993 FAO Fishing Vessel Compliance Agreement

- *Domestic legislation: Fisheries Management and Development Act, 2016; the Kenya Coast Guard Service Act, 2018; and the Maritime Zones Act, Cap. 371.* The Agreement seeks to address the threat to international fisheries management posed by vessels that do not abide by fishing rules.

## Code of Conduct for Responsible Fisheries, 1995

- Kenya signed in 1995.
- *Domestic legislation: Fisheries Management and Development Act, 2016.* FAO-CCRF sets international standards and practices for responsible and effective conservation, management and development of living aquatic resources.

## FAO Voluntary Guidelines for Flag State Performance

- Provides guidance to strengthen and monitor compliance by flag States with their international duties and obligations regarding the flagging and control of fishing vessels.

## WTO Agreement on Technical Barriers to Trade

- Kenya ratified on 12 December 1994.
- *Domestic legislation: Trade Licensing Act, Cap 497; Companies Act, No. 17 of 2015; Trade Descriptions Act, No. 15 of 2003; Industrial Property Act, No. 3 of 2001; Cap 509 Copyright Act, No. 12 of 2001; Anti-Counterfeit Act, 2008; Trade Mark Act, 1982 (Rev. 2012) Cap 506; and Nairobi Centre for International Arbitration Act, No. 26 of 2013 (Rev. 2015).* The convention seeks to strike a balance between trade liberalisation and regulation.

# Regional Framework

## **Southern Indian Ocean Fisheries Agreement, 2006**

- Kenya signed on 7 July 2006.
- *Domestic Legislation: Fisheries Management and Development Act, No. 35 of 2016 and Maritime Zones Act Cap 371.* The Agreement seeks to promote the conservation and sustainable use and development of fisheries resources in the designated area among the contracting parties.

## **The Common Market for Eastern and Southern Africa Fisheries Strategy (COMESA FS).**

- Kenya signed in 2008.
- Kenya has benefited from this Agreement through devt. & implementation of common regional agricultural and fisheries policies and investments across the entire value chain.

## **Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna & Flora (1994).**

- Kenya Ratified on 17 January 1997.
- *Domestic legislation: The Wildlife Conservation and Management Act, 2013; and East African Community Customs Management Act, 2004 (Rev. 2008).* The agreement is similar to CITES in seeking to reduce and ultimately eliminate illegal trade in wild fauna and flora. However, the Lusaka Agreement operates at a regional level; the eastern and southern Africa countries.

# Regional Framework cont'd

## **Revised African Convention for the Conservation of Nature & Natural Resources (Algiers 1968)(Maputo 2003)**

- Original version Kenya ratified on 12th May, 1969; revised version signed on 17th December, 2003(Maputo). Kenya signed the agreement on 17 December 2003. The instrument is not yet domesticated in Kenya. The objects of the Convention are: to enhance environmental protection; foster the conservation and sustainable use of natural resources and harmonize and coordinate policies.

## **Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi 1985)**

- Kenya has ratified the convention and its three protocols.
- *Domestic legislation: Fisheries Management and Development Act, No. 35 of 2016, Environmental Management and Co-ordination Act, 1999.* The convention has the following protocols: Protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region , adopted in 1985; Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region, adopted in 1985; and Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities, adopted in 2010.
- Entry into force May 30, 1996- ratification by Kenya on 11 Sept 1990.

## **Indian Ocean Tuna Commission (IOTC) Agreement**

- Kenya ratified on 29 September 2004.
- *Domestic Legislation: Fisheries Management and Development Act, No. 35 of 2016.* The Indian Ocean Tuna Commission (IOTC) is an intergovernmental organization mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The objective of the Commission is to promote the conservation and optimal utilization of tuna and tuna-like stocks covered by the IOTC Agreement, and to encourage sustainable development of fisheries.

# National Framework

- The Constitution of Kenya 2010
- Fisheries Management and Development Act - No. 35 of 2016
- County Government Act
- Land Act No. 6 of 2012
- Land Control Act
- Physical Planning Act of 1996
- Wildlife (Conservation & Management) Act No. 47 of 2013
- Water Act No. 43 of 2016
- Merchant Shipping Act No. 4 of 2009
- Maritime Zones Act, Cap 371
- Forest Conservation and Management No. 34 of 2016
- Environmental Management & Coordination Act No. 8 of 1999
- Science, Technology and Innovation Act No. 28 of 2013
- Coastal Development Authority Act, Cap 449
- Kenya Coast Guard Service Act no. 11 of 2018



# Policy Documents

- Kenya Vision 2030
- Medium Term Plan III (Blue Economy Sector)
- Draft Integrated Coastal Zone Management Policy
- National oceans and fisheries policy 2008
- Draft Environmental policy 2013
- Wetlands Conservation and Management Policy, 2015
- Kenya Climate Smart Agriculture Strategy 2017-2026

# Institutional Framework

- The State Department of Blue Economy and Fisheries (SDBE&F)
- Kenya Marine and Fisheries Research Institute (KMFRI)
- Kenya Fisheries Service (KeFS)
- Kenya Wildlife Service (KWS)
- National Environment Management Authority (NEMA)
- National maritime centre (Bandari College)
- Kenya Maritime Authority (KMA)
- Kenya Ports Authority (KPA)
- Kenya Forest Service (KFS)
- Kenya Fishing Industries Corporation (KFIC)
- Kenya Fish Marketing Authority (KFMA)
- Fish Levy Trust Fund
- Blue economy committee

# Regulatory & Governance Challenges

- Overlap in various laws e.g. different statutes create different criminal offences and penalties over the fisheries resources. This leads to Institutional conflicts, lack of co-ordination and inefficiency in implementation
- There are gaps, omissions and loopholes in the current legal and policy framework governing the fisheries industry, due to delays in development of regulations required to support specific laws. This leads to loopholes/gaps which can be exploited since the relevant guidelines are lacking
- The problems above are aggravated by ineffective enforcement of fisheries laws and regulations due to lack of sufficient number of staff to ensure enforcement
- There are omissions in terms of laws and regulations including an integrated national ocean law and ocean fisheries and mariculture policy and law
- There is lack of consistency in the institutional governance over aquaculture. There has been no consistent institutional governance framework, since this sector has moved from one ministry to another.

# Conclusions and recommendations

- Primary fishing is carried out by men while fish trade, processing and distribution are dominated by women.
- Overall, about 80% of the fish catches is landed by small-scale/artisanal fishers who use simple fishing technology; mainly the traditional fishing boats and gear that confine them to nearshore waters.
- The catches landed from the artisanal-scale reef finfish fishery and Lake Victoria are declining due to overfishing. Appropriate measures should therefore be put in place to address overfishing within the coral reefs and Lake Victoria.
- Mariculture has registered some growth with seaweed farming attracting a number of villages. However, it has not realized its potential with most mariculture initiatives stagnating at the pilot phase for many years due to challenges of seed and feed, ineffective monitoring and evaluation planning and execution, lack of capital investments, inadequate access to market and limited technological capacity, and small scale operations that do not allow economies of scale. A coordinated effort by the national and county governments, private operators, and non-governmental organizations is therefore needed to address the constraints and unlock the full potential of mariculture.

# Conclusions and recommendations

- Robust governance frameworks for fisheries and aquaculture exist with the Fisheries Management and Development Act, 2016 providing the necessary primary legal framework. A comprehensive institutional framework has been developed to ensure effective management and development of capture fisheries and aquaculture.
- While KMFRI has built comprehensive capacity with a long experience in overall Blue Economy research, the institutions that were recently established by the Fisheries Management and Development Act, 2016 are still in the process of building the necessary capacity to enable them discharge their mandates effectively. They are however being supported by the State Department of Blue Economy and are expected to have sufficient capacity soon.
- The Fisheries Departments at the various County Governments are also in the process of building the necessary capacity to enable them deliver their mandate effectively.
- Some aquaculture technologies that may need to be promoted towards development of Blue Economy through mariculture and freshwater aquaculture include cage culture in the ocean, lakes and rivers, re-circulatory aquaculture systems, aquaponics, pens, breeding, re-stocking of commercially important indigenous species, and tailor-made production for the live-fish market.
- Finally, in order to have effective development planning and to support the sustainable management of fisheries resources, timely scientific data and information on the capture fisheries, aquaculture and associated ecosystems is essential.

**Thank You!**