

Current Status of Fishery Resources in Kenya

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Abstract Fishing in Kenya, until the discovery of Nile perch as an export commodity in the early 1990s, has basically a subsistence occupation for the lake and coastal communities. The government also did not recognize the importance of fisheries as a contributor to the macro-economy and therefore, did not pay much attention in terms of resource allocation for the development of the sector. Most fishing in Kenya is artisanal, with a little industrial fishing by prawn trawlers. The deep sea (EEZ) fishery resources are currently exploited by DWFNs through a licensing system. Only a small quantity of catch from the EEZ is landed in Kenya, primarily tuna loins for processing for export. Currently capture fisheries, mainly from Lake Victoria, earn local fishers over Kenya shillings (K Sh) 7 billion, while exports earn the country K Sh 5 billion (US\$ 50 million) in foreign exchange annually. The government has been putting in place an enabling environment to promote investment activities in order to achieve economic recovery as well as for the development and sustainable use of fisheries resources in the country within the specified period. The Department's major roles are to ensure sustainable exploitation of fisheries resources; to promote aquaculture development; to assure quality and safety of fish and fishery products; and to facilitate fish marketing in order to maximize the benefits that can be derived from fisheries. The contribution of fisheries to local incomes, subsistence and food nutrition is significant, as this occurs in areas with the highest incidences of poverty in the country.

Key words : Fisheries, inland fisheries, Kenya, marine fisheries

Introduction

The Kenyan coastline is 640 km long and forms part of the western border of the Indian Ocean (Fig. 1). It consists of 12 nautical miles of territorial waters and an EEZ extending to 200 nautical miles, with a total area of 142 400 km². It lies within the tropical zone extending from Kiunga in Lamu District at 1.5°S to Vanga in Kwale District at 4.5°S. Kenya has claimed, delineated and demarcated her EEZ, and is now in the process of delineating and claiming the Legal Continental Shelf. The EEZ's most distinctive feature is the almost continuous fringing coral reef that runs parallel to the coast.

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the importance of fisheries as a contributor to the macro-economy and therefore did not pay much attention in terms of resource allocation for the development of the sector. Most fishing in Kenya is artisanal, with a little industrial fishing by prawn trawlers. The deep sea (EEZ) fishery resources are currently exploited by DWFNs through a licensing system. Only a small quantity of catch from the EEZ is landed in Kenya, primarily tuna loins for processing for export. Currently capture fisheries, mainly from Lake Victoria, earn local fishers over Kenya shillings (K Sh) 7 billion, while exports earn the country KSh 5 billion (US\$ 50 million) in foreign exchange annually [4].

The government has been putting in place an enabling environment to promote investment activities in order to achieve economic recovery within the specified period. The agenda for creating the enabling environment is guided by the government's policy of main-

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tenance of a stable macroeconomic framework within the context of structural reforms that will lead to wealth and employment creation. The government therefore recognizes and is committed to a policy of sustainable development through judicious exploitation and use of natural resources. This commitment is clearly demonstrated by the creation of the Ministry of Livestock and Fisheries Development, responsible for policy formulation in the development and sustainable use of fisheries resources in the country. The Fisheries Department of the Ministry of Livestock and Fisheries Development has the mandate to manage and develop fisheries. The Department's major roles are to ensure sustainable exploitation of fisheries resources; to promote aquaculture development; to assure quality and safety of fish and fishery products; and to facilitate fish marketing in order to maximize the benefits that can be derived from fisheries. The contribution of fisheries to local incomes, subsistence and food nutrition is significant, as this occurs in areas with the highest incidences of poverty in the country.

Like many other countries, Kenya follows similar aquaculture practices in Africa. Fish culture was introduced as sport fishing at the beginning of the 1900s and it evolved to static water pond culture of tilapine fish in the 1920s, later supplemented by common carp and catfish. Trout was subsequently introduced as a riverine sport fish. In order to be able to produce seed for the warm water and cold water species for stocking of rivers, dams and ponds. Mariculture was introduced in the late 1970s with the establishment of the Ngomeini Prawn Farm as a pilot project. Although fish farming in rural Kenya has a relatively long history dating back to the 1920s, it was only made popular in the 1960s through the 'Eat More Fish' campaign. Following the campaigns of the post-independence era outlined above (Kenya achieved independence in December 1963, and was established as a republic in December 1964) the number of fish farmers increased considerably to over 20,000, but production only rose from 900 tonnes in 1980, to 1,080 tonnes in 1985 and to 1,012 tonnes in 2003 [3]. Since then it has maintained this level.

Aquaculture takes many different forms ranging from the small hand-dug 'kitchen ponds' to fairly large earth ponds of 1 000 m². Dams and other impoundments used for storing water are often stocked with fish and harvested periodically. Intensive commercial fish culture



Fig. 1. Map of Kenya.

has been attempted at the Baobab Farm at Mombasa using circular concrete ponds and raceways. Cage culture, on the other hand, is being attempted along the shores of Lake Victoria and in some dams in Central Kenya with some degree of success.

Fishery resources

Kenya has a 640 km long coastline with Indian Ocean. Both inland and marine waters are fished but the bulk of fish landings (ca 95%) is from inland fisheries, of which Lake Victoria contributes about 92%. Marine capture fisheries are only 4% and aquaculture 1% of total national fish production.

Inland subsector

The main catches are Nile perch (*Lates niloticus*), freshwater sardine, known locally as *Omena* (*Rastrineobola argentea*), Nile tilapia (*Oreochromis niloticus*) and cichlids (*Haplochromis* spp.). Nile perch and Nile tilapia are exotic species, while the other two are endemic to Lake Victoria. The Nile perch, *Omena* and tilapia are the three major species of commercial importance. The *Haplochromis* species are not of much value to the fishers as they are not the preferred fish

by the local community. The haplochromine population declined significantly in the 1980s and 1990s during the Nile perch population boom, and there is reason to believe that there is an interrelation between the two fish stocks, as Nile perch is known to be a voracious feeder on other fish species, including auto-predation.

Freshwater capture fisheries

Freshwater fishery accounts for about 95% of Kenya's total fish production, principally from Lake Victoria. Kenya is endowed with extensive inland waters, covering between 10,500 and 11,500 km² depending on rainfall, but it is the country's 6% share of Lake Victoria that accounts for almost all (96%) national freshwater fish production. Other freshwater-bodies of commercial importance include lakes Turkana (Kenya's largest freshwater body), Naivasha, Baringo, Jipe and the Tana River dams. The major rivers include Tana, Nzoia, Kuja, Yala and Athi/Sabaki.

Fishing in Kenya is mainly small scale, by artisanal fishers using small non-motorized fishing crafts propelled by sail and paddle. Fishing gear includes gillnets, long-lines and seine nets. From 1963 to the 1970s, freshwater fish production remained below 50,000 t per year, but steadily increased from the early 1980s, reaching over 140,000 t in 1989, and then remained at 180,000 t on average until 2001. The highest recorded landed volume was 209,438 t in 1999, after which catches fell steadily to a low of 112,720 t in 2003. The decline was caused by the increase in fishing effort due to high demand, especially for Nile perch for export. However, action was taken by the Department of Fisheries to restore the lake fisheries and landings increased, with 127,700 t in 2004 and 139,026 t in 2005.

Lake Victoria is the second-largest freshwater body in the world, with a surface area of 68,800 km², of which 35,088 km² (51%) is in Tanzania, 29,584 km² (43%) is in Uganda, and 4 128 km² (6%) is in Kenya.

It has a shoreline of 3,450 km, of which 1,150 km (33%) is in Tanzania, 1,750 km (51%) is in Uganda and 550 km (16%) is in Kenya (Fig. 2). The lake has a catchment area of 192,890 km² (Uganda 30,880 km², 16%; Kenya 42,460 km², 22%; Tanzania 84,920 km², 44%; Rwanda 21,120 km², 11%; Burundi 13,510 km², 7%) with a rapidly growing population of over 30 million people. Lake Victoria is the most important fishery in the country, earning over K Sh 4 billion (US\$ 50 million) annually in foreign exchange from the export of Nile perch products and over K Sh 6.5 billion to the fishers. It has a multi-species fishery of tilapiines and haplochromines, cichlids and more than 20 genera of non-cichlid fish, including Mormyrus, catfish, cyprinids and lungfish. There has been a steady decrease in fish diversity and quantity due to increase in fishing effort as a result of commercialization of fishing in the last two decades.

Lake Turkana is Africa's fourth-largest lake, with an area of 7,400 km² lying in a low, closed basin, 365 m above sea level in the arid northwest of Kenya (Fig. 3). Over 90% of the annual water discharge by volume is from river Omo, originating in Ethiopia, while the rest is from the seasonal rivers Kerio and Turkwell. The lake has many unique characteristics, such as drastic lake level fluctuations, low fish species diversity and intermittent peak production in fish, especially tilapia. With no surface outlet, the water budget is a balance between river-inflow and evaporation, which imposes special physical chemical conditions, making the lake saline. Since 1998 production has fluctuated between 2 000 and 10 000 t/year.

Lake Naivasha lies in a closed basin in the central rift Valley, with an area of about 115 km², fluctuating according to rainfall (Fig. 4). The lake supports a small commercial fishery based on four finfish species and one crustacean species.

Lake Baringo is a Rift Valley lake with an area of 130 km². The lake is shallow, with a mean depth of

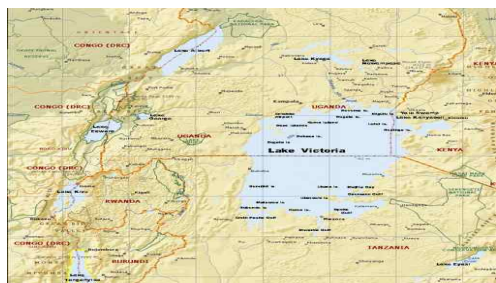


Fig. 2. Lake Victoria.



Fig. 3. Lake Turkana.



Fig. 4. Lake Naivasha.

about 5.6 m, and becoming shallower due to increasing siltation. The lake is fed from the south by rivers Ndao, Chemeron, Perkerra, Molo and Arabel.

Other lakes and rivers support minor fisheries, namely:

- Lake Victoria Basin: rivers Gucha/Migori, Mara Nzoia, Sondu and Yala;
- Rift Valley Basin: rivers Suam-Turkwel, Kerio, Ewaso Nyiro, Lessos Reservoir and Turkwel Gorge Reservoir;
- Athi River Basin: rivers Athi/Galana/Sabaki and Voi, lakes Chala and Jipe;
- Tana River Basin: upper Tana River and impoundments including Masinga, Kamburu, Gitaru

Kindaruma reservoirs, and lower Tana River and floodplain with numerous small lakes, including lakes Balisa and Shakababo. Several streams in the central and western highlands have been stocked with trout and provide sports fishing opportunities.

Freshwater aquaculture

Aquaculture was introduced in Kenya at the beginning of the last century. However, it has not performed as well as would have been expected. Aquaculture has the potential to contribute significantly to wealth creation, employment and food security. Kenya is endowed with climatic diversity, natural features and resources that favour the culture of a wide variety of species. It is estimated that there are 1.4 million hectare of land potentially available for aquaculture production, yet only 170 ha were in use in 2005, when there were 10,000 effective small pond units, mostly farming tilapia and common carp [1]. The small-scale ponds were owned by 7,800 farmers. Limited amounts of catfish are also being raised. Larger-scale commercial units in the highlands around Mount Kenya are devoted to trout production, whilst those at the coast are primarily involved in tilapia culture. With the declining stocks in the capture fisheries, the government is adopting a strategy to expedite aquaculture growth, through a collaborative and participatory approach, involving both public and private sectors through Public-Private partnerships. To achieve this, there is need to develop solid base-line information, which is currently being developed through the on-going aquaculture inventory and data analysis. The Fisheries Department Statistical Bulletin figures show that production has remained constant at around 1,000 t/year since 1985 [2].

Culture species

Tilapine species form about 90% of farmed fish in Kenya. Polyculture of the Tilapines with the North African catfish (*Clarias gariepinus*) is often done to control the prolific breeding of the former. Some exotic species, including the common carp (*Cyprinus carpio*), rainbow trout (*Oncorhynchus mykiss*) and largemouth bass (*Micropterus salmoides*), have been introduced in Kenya for aquaculture purposes. The rainbow trout was introduced in Kenya during colonial rule mainly for sport fishing. It has become quite important in terms of value, and a kg costs 300-1,200 Kenyan shillings or Kshs (i.e. US\$ 4-16) depending on where it is sold. The common carp was also introduced during the colonial period, but is not favoured by the market.

Marine sub-sector

The marine fisheries resources are both inshore and offshore. The inshore fish species are overexploited by local fishers, while the offshore resources outside the territorial waters are exploited mainly by Distant Waters Fishing Nations (DWFN). The marine fisheries contribute on average only 4% of the total national fish landings. The local fishers lack capacity to exploit deeper water resources. The major marine fish species include:

Demersal species — the major catches are rabbit fish, scavengers, parrot fish, pouter and black skin.

Pelagic species — mainly cavalla jacks, mullets, mackerels, barracudas, king fish, bonitos/tunas and sail fish.

Crustaceans — lobsters, prawns and crabs.

Migratory species — tuna and tuna-like species.

Fish production

The Kenyan marine waters support a wide variety of fish species, including finfish, both pelagic (king fish, barracuda, mullets, queen fish, etc.) and demersal (rabbit fish, snapper, rock cod, scavenger, etc.), crustaceans (prawns, lobsters, crabs, etc.), and molluscs (squids and octopus). These are commercially exploited and therefore support the economy and livelihoods of the coastal residents. The most productive fishing areas are on the north coast, in the Lamu area, including Kiunga, Kizingitini and Faza; Malindi and Tana River delta; and on the south coast around Majoreni and Vanga. Fishing by local fishers is restricted to inshore

areas within the reef ecosystem because the fishers lack vessels to venture offshore to exploit other resources in the EEZ.

Artisanal fishing activities are undertaken by more than 10,000 fishers, of which 9,600 are boat fishers using 2,400 boats and 675 are foot fishers, according to the 2006 Kenya Marine Frame Survey. Of the fishing crafts along the coast, 135 are motorized, 991 use paddles while 1,179 use sails for propulsion. The most common fishing gear are gillnets, traditional traps, seine nets, long-line hooks, hook-and-line and traps.

Annual marine fish production from artisanal fishery in Kenya during 1980 to 2005 show a high of 9,972 t in 1990 and a low of 4,336 t in 1993 [7]. For the most of the period, production fluctuated between 6,000 and almost 10,000 t. Over fishing in inshore area has continued to cause a decline in fish catches, while the deeper territorial waters remain underexploited due to lack of deep sea fishing capacity by the local fishers. The EEZ is estimated to have an annual potential of more than 150,000 t, according to a desk study conducted in 2002 with Commonwealth Secretariat assistance. A significant amount of tuna is landed by the foreign vessels in Mombassa for either transshipment or local processing.

Sport fishing

Kenya enjoys a reputation as one of the world's great big game sports fishing destinations. Kenya's marine waters contain most of the major target game species, primarily billfishes, especially sailfish, swordfishes, the marlins, sharks and some tunas. Sport fishers are registered in the several sport-fishing clubs, which coordinate the fishing activity and record data. There is also an underdeveloped but popular angling recreational activity in trout rivers in central and western Kenya, and also in inland lakes such as Lake Naivasha. There is need to start a stocking programme and concession some of the rivers to ensure expeditious development of this fishery.

Gross fish production

Both inland and marine waters are fished but the bulk of fish landings (approx. 95%) are from inland fisheries, of which Lake Victoria contributes about 92%. Marine

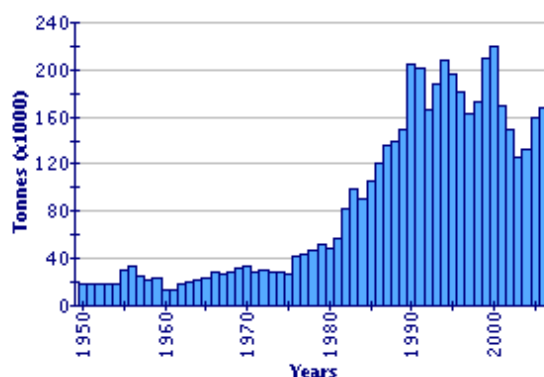


Fig. 5. Kenya's fish production 195-2006) [7]

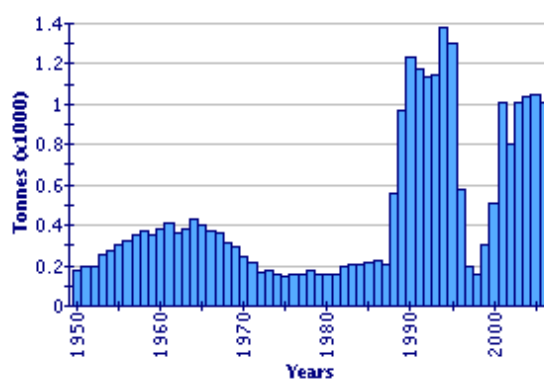


Fig. 6. Aquaculture production in Kenya (1950-2006) [7]

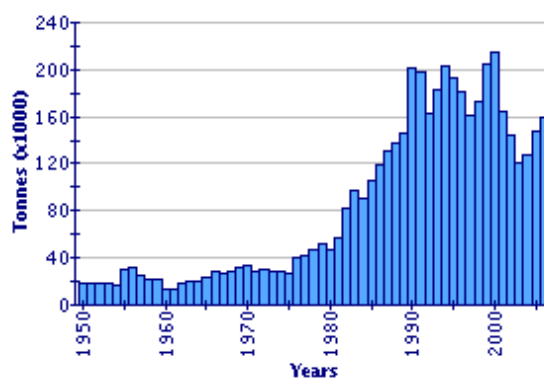


Fig. 7. Capture fisheries production in Kenya (1950-2006) [7].

capture fisheries are only 4% and aquaculture 1% of total national fish production. The total, aquaculture and capture fisheries productions are shown in the following graphs (Figure 5-7).

Post-harvest use

Fish utilization

Annual per capita supply of fish was estimated at 5.8 kg, according to FAO Food Balance Sheets for

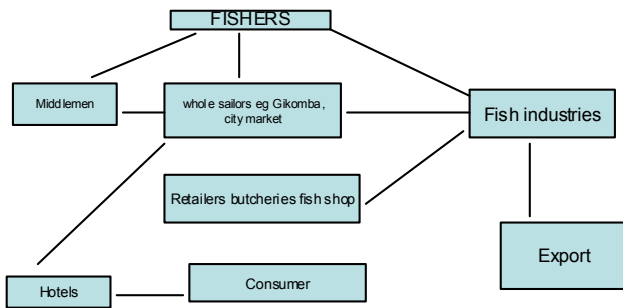


Fig. 8. Fish marketing channel.

1999, a figure which dropped to 1.9 kg in 2005, according to the Kenya Central Bureau of Statistics report on National Food Balance Sheets, 2000–2005. This reduced supply is due to population increase coupled with declining fish production. Production was 205,587 t in 1999 and 149,171 t in 2005. The processing of frozen and chilled fish for export requires development of an efficient cold chain infrastructure and stringent adherence to the developed Hazard Analysis Critical Control Point (HACCP) system. Product and system traceability of finished products must also be demonstrable. Filleting lines, chill rooms, freezers, cold rooms and refrigerated tracks, together with qualified fish inspectors, are essential in production of high standard fish products. Kenya

has achieved all these requisites, which have helped support a lucrative K Sh 5 billion (US\$ 70 million) of fish exports.

Fish markets

Domestic markets comprise supermarket chains, butcheries, auction markets and local authority Markets (Fig. 8). Regionally, product goes to east Africa and COMESA. Product is exported to the European Union (EU), Israel, Japan, Malaysia, Australia, USA, Singapore, UAE and China [5].

Fisheries sector contribution

The Kenya fisheries subsector has the potential to significantly contribute to the national economy through employment creation, foreign exchange earnings, poverty reduction and food security support. This potential is yet to be realized. In 2005, fish production was approximately 149,000 t, mainly from inland fisheries, earning the fishers over K Sh 7 billion (US\$ 100 million). The subsector directly supports over 63,000 Kenyans as fishers, with approximately one million

people directly or indirectly depending on the industry. The subsector contributed 0.5% to GDP in 2005. Sport fishing is also an important facet of the tourist industry and contributes to that sector's earnings of foreign exchange.

Fisheries sector development

Development prospects and strategies

Although there is a great opportunities to develop this sector to boost-up the national economy but it has not been recognized yet because of negligence of the policy-makers. In 2003, the government created a Ministry of Livestock and Fisheries in an effort to expedite fisheries growth and development. There has been no fisheries policy in place and therefore the Department of Fisheries started to develop one, in 2004, through a participatory process involving all stakeholders in the sector, policy experts and development partners [9]. This will give the sector the status it deserves.

Main constraints to development

The main constraints that impede development include:

- Inadequate physical and cold chain infrastructure.
- Lack of easy access to affordable credit.
- Lack of modern fishing ports to promote profitable exploitation of marine fish, including transshipments.
- Lack of skills for alternative livelihoods for fishers when fishing is inadequate to sustain them.
- Uncertainty of capture fisheries sustainability.
- No National Fisheries Policy for the fisheries sector.

Research

The main fisheries research institution in Kenya is Kenya Marine and Fisheries Research Institute (KMFRI), which carries out both applied and basic fisheries research. However, due to financial constraints, research programmes are limited and unable fully to address fisheries management and development issues. The Fisheries Department has a research section that both coordinates fisheries research in various learning and research institutions and carries out simple applied fisheries research and survey with various collaborators and donors, to enhance fisheries management and development. Moi and Nairobi Universities collaborate with the Department of Fisheries to conduct fisheries

research, especially aquaculture.

Legal frame work of the fisheries in Kenya

The main fishery legal framework is contained in the Fisheries Act, Chapter 378 of the Laws of Kenya, whose Principal Law covers six areas: (1) Preliminary; and Interpretation. (2) Administration: Fisheries development measures; and Fisheries management measures. (3) Registration of local fishing vessels. (4) Licensing provisions: General licensing provisions; Fishing and entry into Kenya fishery waters by foreign fishing vessels; and foreign vessel's fishing licenses. (5) Offences and Enforcement: Prohibited methods of fishing; Powers of officers; Forfeiture; and Compounding of offences. (6) General Provisions: Conduct of prosecutions; Marine mammals; and Minister's power to make regulations [9]. The Act has provisions to make binding and enforceable Regulations through published Legal and Gazette notices.

Conclusion

The government of Kenya has tried to solve fishery industry problems by being signatory to bilateral and multilateral convections. As a result a new ministry has been recently constituted to address fisheries industry matters. The department of fisheries is also in process of formulating strategic plan to address fisheries constraints. The department is making collaboration with other government department, ministries and research institutions to mitigate the constraints exist in fisheries sector. The government is also taking necessary steps to improve surveillance of territorial waters

and exclusive economic zone waters by increasing the no of powered boats used and use of Kenya Navy machinery and personnel.

Acknowledgement

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