

A review of lobster fishery management in Kenya: a case study on the development of the rights-based fisheries management system (co-management)

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Abstract

This review uses the lobster fishery in Kenya as a case study for the development of a rights-based fisheries management system. It discusses the fishery's characteristics, production trends, management systems, socio-economic dynamics, input and output controls, and challenges and opportunities. The paper highlights the achievements of co-management and recommends measures necessary to achieve effective management of the fishery. The lobster fishery is one of the most important resources in Kenya. The fishery is based on five spiny lobster species: *Panulirus ornatus* (ornate spiny lobster), *P. longipes* (long-legged spiny lobster), *P. penicillatus* (pronghorn spiny lobster), *P. versicolor* (painted spiny lobster), *P. homarus* (scaloped spiny lobster). Small-scale fishers harvest lobsters along the entire Kenyan coastline. Average annual landing in 2009-2013 was estimated at 84 metric tons (mt). In 2016, 389 mt was landed. Fishers employ different gears to catch lobsters. Communities have practised lobster fishing for centuries under traditional systems of lobster fishery management. Collaborative fisheries management was introduced in 2006 with the establishment of Beach Management Units (BMUs). BMUs have legitimate jurisdiction over their fisheries, access, user and management rights. The management of the fishery is by limitation on fishing gears, sizes (weight) landed, protection of breeding stock, and authorized entry. Market-based tools (Marine Stewardship Council certification) and spatial management (co-management areas) are being pursued. Harvest control rules and strategy have been proposed in the draft lobster management plan. A well-defined use, access, management and ownership rights system that is complemented by biological controls and technological interventions can help drive the fishery to sustainability, and improve socio-economic returns.

Keywords: Lobster, management, rights-based, Coast, Kenya

1. INTRODUCTION

1.1 Description of the fishery

Kenya has a coastline of over 640 kilometres (km) and 880 km including inlets and bays (Ministry of Agriculture, Livestock and Fisheries, 2016), extending from Somalia to the North and Tanzania to the South. The country has an expansive Exclusive Economic Zone (EEZ) of 200 nautical miles. Kenya has vast and diverse coastal and marine ecosystems, including estuarine, seagrass beds, coral reefs, nearshore and offshore waters. These ecosystems provide important habitats, breeding and feeding grounds for marine life, including fisheries resources (Government of Kenya, 2017).

Fishing is one of the most important economic activities for local communities on the Kenyan coast. Fisheries are important sources of local income, food and nutritional security. The lobster fishery is one of the most important crustacean fisheries resources in Kenya. The fishery is multi-species with harvesting activities confined within the coastal areas less than 3 nautical miles from shore. The spiny lobster is the most valuable one, although the lobster fishery in Kenya is based on five shallow water spiny lobster species, namely, *Panulirus ornatus*, *P. longipes*, *P. penicillatus*, *P. versicolor*, *P. homarus* (Mueni et al.,

2016). Over 75 percent of the lobster landings in Kenya is comprised of two species, *P. ornatus* and *P. longipes*. *P. homarus* is also abundant, especially on the North Coast. Other spiny lobsters include *P. versicolor*, *P. penicillatus*, though their catches are extremely low.

Lamu Archipelago, Kipini-Kiwaiyu Islands, and the Mambrui, Kilifi, Msambweni and Shimoni areas are highly productive lobster fishing grounds. Lamu-Manda-Pate Archipelago accounts for about 50 percent of all the lobster landings in Kenya (Mutagyera, 1978; Church & Obura, 2003). These high catches are attributed to the wide continental shelf with a large cover of shallow reefs. The harvesting of lobster is done throughout the year, and peak season is reported in the months of November to March. This coincides with the North-East Monsoon (NEM) winds (McClanahan, 1998).

Fishing for lobster in Kenya by the coastal communities has been a practice for centuries, with commercial exploitation reported only in the 1950s. The growth of the tourism industry in Kenya and the demand for lobster on the international market have been the key drivers behind the commercial exploitation of the lobster fishery. Lobster is one of the most pricey and highly valued seafood products, both on the domestic and export markets (Olendo & Weru, 2009). The catches for lobster, including the size, are declining. This can be attributed to increasing fishing efforts and changing environment and recruitment cycles (Church & Obura, 2003). The use of illegal fishing gears such as Beach seine (“juya”) is also on the increase, consequently contributing to increased fishing pressure.

The number of artisanal fishers, including those targeting lobster, has gradually increased over the years. There are 13 426 artisanal fishers at the Kenyan coast, of which 98 percent are male, and only 2 percent are female (Ministry of Agriculture, Livestock and Fisheries, 2016). The Marine Frame Survey Report (2014) gives an estimate of 690 lobster fishers along the Kenyan Coastline. Lamu County has the highest number of lobster fishers with 511, which represents 74 percent of the total. Other counties are Kilifi (119, 17%), Kwale (29, 4%), Tana River (24, 4%) and Mombasa (7, 1%).

Most of the fishers are from the local coastal communities, and they have a right to access the fishery by paying for a fishing permit. This is obtained at the Kenya Fisheries Service for a modest fee. Individuals, owners of fishing boats, family members of fisherfolk, fish processors and/or fish buyers - as well as local fishing communities once granted permit - carry legally recognized rights to access the lobster fishery without any prejudice. There are 197 fish landing sites at the coast, of which 175 are served by the Kenya Fisheries Staff (Ministry of Agriculture, Livestock and Fisheries, 2016). Lobster fishers land their catch at designated landing sites in their respective Beach Management Units (BMU) sites.

Conflicts over fishing grounds by different players in the same space usually arise. Sometimes, artisanal fishers complain of their fishing gears being destroyed by semi-industrial (prawn trawlers) and deep-water fishers. Conservationists accuse fishers and tourists (that snorkel) of breaking and destroying coral reefs. Artisanal fishers, on the other hand, usually come into conflict with the marine park management authorities for illegal fishing in marine protected areas. Large-scale infrastructural development, such as the Lamu Port, is also a source of conflict. Recently, artisanal fishers sued the government of Kenya over compensation for the loss of their fishing grounds, which occurred due to the construction of the Lamu Port (Kenya Business Daily, 2 May 2018). Oils spills have also been reported, causing the death of mangroves and the degradation of fishing grounds.

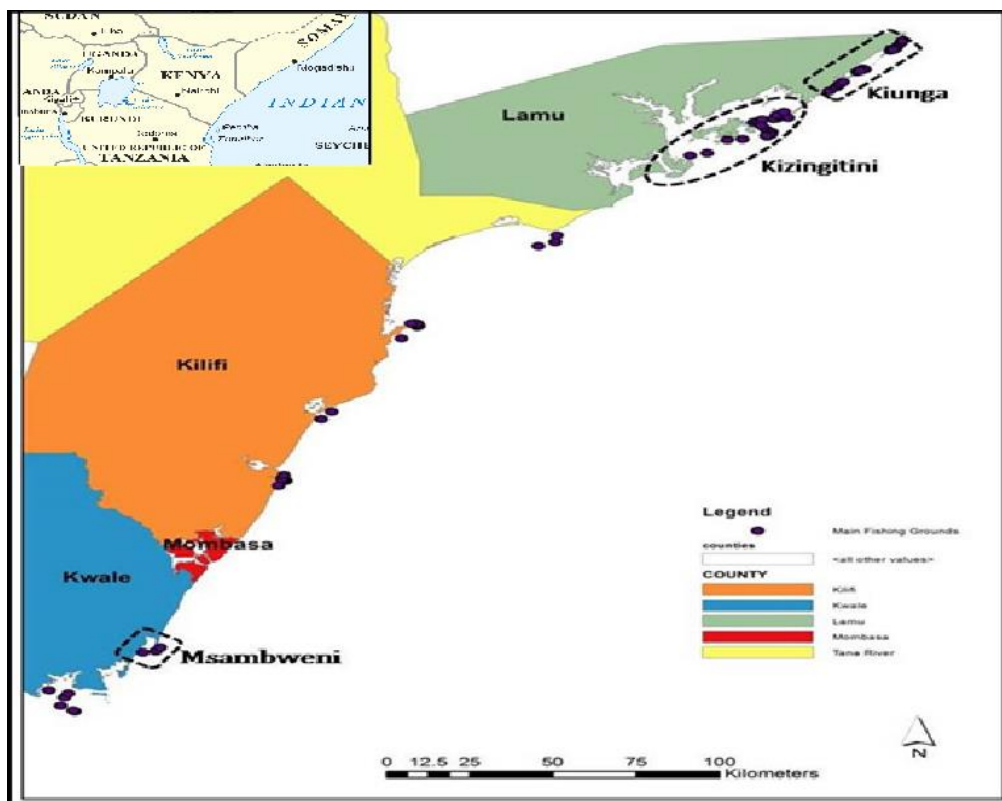


Figure 1. Lobster Fishing Grounds in Kenya.
 Source: <https://www.un.org/Depts/Cartographic/english/htmain.htm>, Mueni et al., 2014. Stock assessment of Kenya commercial spiny lobster species (*Panulirus* spp., Palinuridae) Kenya. Technical Report NEPAD Project 2014.

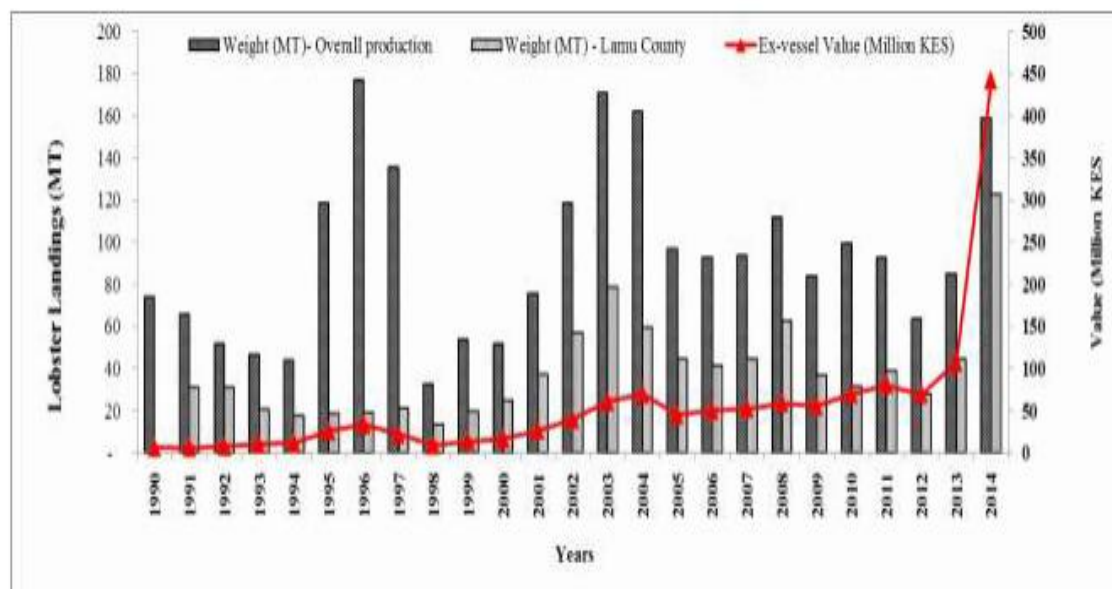


Figure 2. National and Lamu County Lobster fishery production trends and value between 1990 and 2014.
 Source: Mueni et al., 2016.

1.2 Economic contribution and social implications of the fishing activity

The lobster fishery is an important source of livelihood and income for the local fishing communities, as well as a source of revenue and foreign exchange to the country. There are approximately 639 individual lobster fishers, all of whom are men (Frame Survey Report, 2014). Lobster fishing, on average, contributes to 26-50 percent of the fisher's total income. Lobster fishing is seasonal - depending on the monsoon season - with peak season ranging from November to March. During the low season, fishers engage themselves other non-fishing livelihoods such as transport, tourism, farming, forestry, and fishery-related services such as boat and net repairs.

Lobster fishery products in Kenya are sold as whole, live animals or frozen to domestic and export markets. Lobster catches are mainly sold through dealers who then transport to local hotels or the export market. The domestic market is becoming increasingly popular. Lobster is on the menu of high-end hotels in Nairobi and Mombasa, namely the Tamarind Group, Nyalı Beach Hotel, and Hotel White Sands. The demand for lobster is high during the high tourist season. The average price offered by the hotels to the suppliers is 1 200 Kenyan shilling (Ksh.) per kilogram (kg) of lobster.

Most lobster from Kenya to the export market is in frozen form, though many dealers and processors are also involved in the export of live lobsters. There is a general decline in the amount of lobster exported, in particular, frozen lobster. The European Union is the main export market with 97 percent, with Italy, in particular, importing a lot. Ninety-five percent of the live lobsters are exported to China. There are three lobster processing and exporting companies in Kenya, all of which are based in Mombasa. Crustacean Processors is the leading exporter, accounting for 73 percent of the exports. The other two companies are Trans Africa and Sea Harvest.

The lobster price per kg varies depending on the size, season and the prevailing fluctuations in supply and demand. In some cases, the trader, who has financed the fishing operations, determines the price. In this situation, the traders are assured of a steady supply of lobster at a determined price. Prices for lobster are usually high during the low fishing and high tourist seasons. The price ranges from Ksh 500 to Ksh 1 500 per kg. Lobster exports increased from 38 mt valued at Ksh 33 Million in 2001. In 2004, some 208 Mt of lobster valued at Ksh 141 Million was exported. In 2016, an estimated 79 mt of lobster valued at Ksh 78 Million was exported (Ministry of Agriculture, Livestock and Fisheries, 2016).

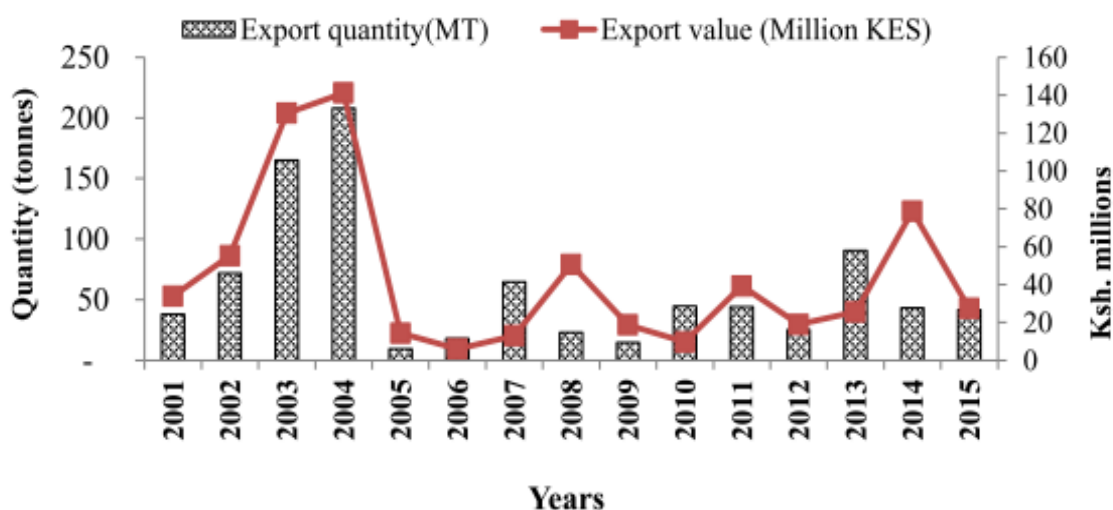


Figure 3. Trends in Lobster Exports 2001-2015.

Source: Kenya Fisheries Annual Statistical Bulletin, 2016.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

The management of fisheries resources in Kenya is under the jurisdiction of the Kenya Fisheries Service (KeFS), as provided for in the Fisheries Management and Development Act 2016. The Kenya Marine and Fisheries Research Institute (KMFRI) established under the Science and Technology Act (CAP 250) has the mandate for fisheries research. In the marine reserves, including the Kiunga National Marine Reserve (KMNR), fishing is regulated by the Kenya Wildlife Services (KWS) in close collaboration with the Kenya Fisheries Service and the County Governments. The Kenya Wildlife Conservation and Management Act (2013) prohibits any form of fishing in the Marine Protected Areas (MPAs) while allowing controlled fishing in marine reserves with the active involvement of the local communities. The County Governments, the local fishing communities, Beach Management Units (BMUs), the industry, the Civil Society Organizations (CSOs), Universities and Non-Governmental Organizations (NGOs) are also involved in the formulation of rules and implementation of fisheries management measures.

The Fisheries Management and Development Act 2016 makes provisions for fisheries management measures, including prohibitions on the catching of berried females, fishing gear restrictions (use of beach seines, speargun, scuba gear), and minimum size and maturity restrictions (e.g. landing of lobster of less than 250 grams (gm) is outlawed). Trawling activities are restricted in the five nautical miles and beyond; this may as well apply to lobster fishing. The role and active involvement of local communities in the management of fisheries resources, including lobster, is provided for in the Act. Compliance is achieved voluntarily through the implementation of BMU internal rules (by-laws).

This is part of the co-management strategy, though its implementation is faced with a number of challenges, including inadequate enforcement mechanisms. Currently, there are over 80 BMUs established in the Coast Region. Fifteen co-management areas (CMAs) have been established, though at varying stages. Three joint co-management areas have been set up, too, namely the Pate Island in Lamu County, the Malindi–Ungwana Bay (covering part of Kilifi Tana-River and Lamu Counties) and the Shimoni-Vanga in Kwale County. The Kenya Fisheries Service licenses access to the fisheries resources. The BMUs and County Government are responsible for vetting those applying for a fishing license. Fishing without a license is illegal, and anyone found infringing on these provisions is reprimanded and charged in a court of law.

The Kenya Fisheries Service, in partnership with other key stakeholders, the industry and the local fishing communities, has developed a comprehensive lobster fishery management plan. The plan which is yet to be gazetted provides for the introduction of closed areas/seasons, harvest control rules and strategy, limiting of fishing effort through licensing of lobster fishers, and setting of Total Allowable Catch (TAC) and size restrictions (Carapace length (CL)). This is in addition to weight restrictions that are to be adjusted upwards from 250 to 300 grams. The Lobster management plan provides for prohibition of retention and landing of lobsters of the minimum carapace (MCL) of 70 millimetres (mm) CL for *P. ornatus*; 65 mm CL for *P. versicolor*, *P. homarus* and *P. penicilatus*; and 60 mm for *P. longipes*.

The Kenya Fisheries Service, in partnership with other agencies including KWS, county governments and local fishing communities, is responsible for the enforcement and monitoring of lobster fishing activities. However, there is limited capacity, especially on the part of the BMUs. As part of the Monitoring and enforcement of the fisheries law, a vessel has to be cleared by a relevant national entity before it is licensed for any fishing operations. There are also surveillance and patrol vessels, while the relevant government staff and BMUs undertake land-based beach patrols. The Kenya Navy and the recently created Kenya Coast Guard Service have pushed a notch higher towards enforcement of the fisheries law.

There is catch monitoring at the different landing sites, although some fishers have been reported to avoid the designated landing sites in order to perpetrate illegal activities elsewhere. Post landing monitoring focuses on market and sales, exports, and roadblocks on transport/ transit routes.

Failure to comply with the relevant provisions for lobster fishing usually result in the arrest of the offender, who is charged in a court of law. The fishing vessel and/or equipment are confiscated, criminal charges are preferred, and the offender is required to pay a fine and or serve a prison sentence. Resource use conflicts usually arise from time to time. This is because there are competing interests over the use of the same space by different maritime sector players. There are various conflict resolution mechanisms in place whenever they arise, namely the legal redress in a court of law, as well as local administration (Chiefs, Sub-chiefs and village elders) and the Beach Management Units (BMUs). Lead government agencies in the different sector including fisheries officers, park management authorities and the county governments would always intervene, whenever there is a conflict between the different players in the lobster fishing grounds. To some extent, these mechanisms have been moderately effective but more needs to be done to strengthen them. More powers, for instance, should be given to the BMU leadership to reprimand offenders and be actively involved in the prosecution. Customary mechanisms seem to work very well, and they need to be embraced and strengthened in order to complement the court and judicial process.

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

3.1 Sustainable use of the resources

Kenya is endowed with rich marine resources, including fisheries. Previous studies have estimated that the potential Kenya marine fisheries resources are in the range of 150 000 – 300 000 mt per year. There is limited knowledge about the status of stocks in Kenya marine waters, including lobster fisheries. The KeFS with the support of WWF and collaboration from other partners, including KMFRI, developed and initiated the lobster fishery improvement project (FIPs) as part of the Marine Stewardship Council (MSC) standards certification. The implementation of the lobster FIP, which has been ongoing since 2012, has seen the fishery moving towards sustainability. In June 2018, the application of the Marine Stewardship Council (MSC) Benchmarking and Tracking (BMT) tool gave a score of 0.89 out of the possible 1. This is a remarkable improvement to the fishery, compared to its 0.54 index in 2014. Plans are underway to subject the lobster fishery to full assessment.

The lobster stock assessment was undertaken in 2016 by KMFRI in collaboration with KeFS, WWF, Pwani University and other partners. The assessment was supported by the Kenya Coast Development Project (KCDP) with funding from the World Bank. The results from the current stock assessment indicate that the Kenya lobster fishery is not overexploited as previously thought (Mueni et al., 2016). In Lamu, for instance, *P. ornatus* was the most abundant species contributing 55% of the catch sampled. This was closely followed by *P. longipes*, which accounted for 26% of the catch composition. *P. homarus* contributed 13%, while *P. vesicolor* and *P. penicillatus* contributed 4% and 2% respectively. *P. ornatus* and *P. longipes* combined accounted for over 81% of the lobsters catches.

The legal size for the lobster to be landed is 250 gm and above. The study revealed that based on length at first capture and length at first maturity, most of the species attain maturity at sizes above the Minimum Legal Weight (MLW) of 250 gm. This implies that juveniles of *P. ornatus*, *P. penicillatus* and *P. homarus* are still being captured with the exception of *P. longipes*, which matures below the MLW. Further study is yet required.

The information and data generated by the lobster FIP and stock assessment have been used to inform the development of the lobster fishery management plan. The plan proposes the management of the lobster fishery based on limiting fishing effort by licensing fishers, introduces closed season, 'no-take zones' as well as total allowable catch (TAC). The plan though, is not yet gazetted. The co-management areas have been established, at Pate Island (Lamu), Malindi-Ungwana Bay (Kilifi –Tana River) and the Shimoni-Vanga (Kwale). There are several co-management areas managed by the Beach Management Units (BMUs) where the no-take zones have been established. The zones are important breeding and foraging grounds for different marine life, including the lobster fishery.

3.2 Economic viability of the fishery

The number of artisanal fishers, including those targeting lobster, has gradually increased over the years. There are 13 426 artisanal fishers on the Kenyan coast (Ministry of Agriculture, Livestock and Fisheries, 2016). The Marine Frame Survey Report (2014) gives an estimate of 690 lobster fishers along the Kenyan Coastline. The lobster fishery is experiencing declining catches. Fishers targeting lobster must now venture further offshore. Hence the distance travelled has increased to reach fishing grounds. The duration for an average fishing trip for lobster has also increased. This has driven upward the cost of lobster over time.

The introduction of co-management in the artisanal fishery has resulted in changes in the type of gears used in the lobster fishery. The use of the speargun was outlawed, and the number of fishers using this gear illegally has reduced. The use of gillnets to catch lobster is on the increase, too. More fishers are now using vessels with outboard engines, however, the average length and gross tonnage of the fishing crafts have remained unchanged. Lobster fishers do not use Fish Aggregating Devices (FADs) in their fishing operations.

Vessels are owned by individuals who sometimes lease out to fishers. In many cases, artisanal fishing is a mutual partnership that brings together the owner of the boat, owner of fishing gear and the fishing crew. The proceeds from the fishing operations are shared based on the agreed proportions amongst these three individuals/ categories of the partnership after every fishing trip.

3.3 Social equality

Fishing rights are owned by individuals who have access by paying a fishing permit. The fishing permit is issued by the Kenya Fisheries Service to the individual fisher. The cost of the permit is Ksh 200 (equivalent to USD 2) per annum; once purchased, it is not transferable. Over the years, there haven't been changes in the legal requirements and cost of the fishing permit. However, the lobster fisheries management plan (once gazetted) will oversee the introduction of fishing permits specifically for fishers targeting lobster. The allocation of fishing rights for lobster and other artisanal marine fisheries via permit takes into consideration the ability of the poor and vulnerable communities to access their basic livelihoods needs, in particular food and nutritional security. The economic viability of the fishery, stock sustainability and the rights of the local communities are also important criteria for distributing fishing opportunities in the artisanal fishery.

In the event of an emergency such as a hazardous event, it is not possible to identify individual lobster fishers in order to deliver targeted support or reallocate fishing rights. As earlier mentioned in the previous section, there are no fishery-specific fishing permits.

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

The lobster fishery in Kenya is faced with a number of challenges and constraints relating to governance, production, processing and marketing:

- Many of the lobster fishers do not have their own fishing equipment and capital to venture into lobster fishing. Some of the dealers and fish processing plants provide credit, nets and fishing gears to lobster fishers through their agents. Therefore, they play a big role in determining the prices at the landing sites and collections points. This erodes the power of the individual lobster fishers to negotiate for their fair share, whilst also constraining their growth in the subsector.
- Most of the fish processors and lobster dealers complain of high transport and freight charges. Subsequently, this requires higher amounts of working capital. This has resulted in a shift where some lobster processing and exporting companies are now targeting the domestic market. They supply their products to hotels when supplies are low.
- The results of the Frame Survey Report (2008) show that there were some 12 077 marine artisanal fishers in 2008, up from 7 500 in 1990. The Frame Survey Report (2016) shows the number of artisanal fishers increased to over 13 000. Olendo and Weru (2009) reported that there were over 5 000 fishermen in Lamu, with approximately 50 percent of them fishing in the Kiunga Marine National Reserve. Consequently, this has put undue pressure on the lobster stock, which is now on the decline. The lobster fishers have to invest more in terms of fishing efforts and have to fish in more distant places, compared to previous years.
- Shrimp trawlers catch significant amounts of lobster as by-catch. The exact quantities of the lobster caught are not known due to non-submission of catch data by these vessels. The volume and value of the lobster supplied to the domestic market is not clearly defined. This is because there is no comprehensive data collection system targeting the local market, in particular, the hotels and restaurants.
- Artisanal fishers, as well as the key players in the domestic market, acknowledge that there is a great potential for marketing their catch to larger national and international markets. However, the high sanitary and phytosanitary (SPS) measures and strict standards imposed by the EU present challenges. There are also other marketing constraints, including inadequate cold storage facilities along the supply chain, poor road infrastructure, and seasonality of the lobster landings.
- The EU illegal, unregulated and unrecorded fishing (IUU) regulation came into effect on 1 January 2010 to prevent IUU products from being sold on the EU market. Compliance with the EU regulations has some cost implication to the government and to the fish processing and exporting establishments.
- The Kenya Fisheries Service (the then Fisheries Department), with the support of other partners including WWF, Cordio-East Africa, NEPAD, local fishing communities and the industry, initiated the process of formulating the lobster fishery management plan in 2009. The plan is yet to be gazetted by the Kenya Government.

4.2 Improving fishery sustainability in the future

The contribution of the lobster fishery to the national economy and livelihoods of the local fishing communities in Kenya must not be overemphasized. The challenges the fishery is facing, unless addressed, can drive the lobster stocks to depletion. This would eliminate socio-economic benefits to the country and the people that depend on lobster fishery for their livelihood.

In this paper, we propose a number of technical solutions, management measures and market-based approaches that would help improve the governance of the lobster fishery and move it towards sustainability. This would ensure long-term sustainable use of the lobster fishery, its economic viability and social equitability. We make the following recommendations:

- Strengthen enforcement and surveillance of the fishing operations to ensure compliance with policy and legal provisions for lobster harvesting. This would greatly reduce, among other things, the use of illegal fishing gears, unlicensed access to the fishery and landing of undersized individuals.
- Local communities play an important role in natural resources management. Efforts should be directed towards capacity-building in local fishing communities in participatory monitoring, management and development of the lobster fishery.
- Data on fish stocks is helpful to inform decision making and management of the fishery. The data and information on the biology of the lobster fishery in Kenya are limited. Further research on the lobster fishery in Kenya is desirable, in particular, the biological aspects including lobster migration and impacts of fishing operations on the ecosystem. In the event that data and information on the fishery are inadequate, a precautionary approach should be applied to help reduce the risks of the fishery from collapsing.
- Time and area closures have been reported elsewhere to contribute to sustainable use and management of the lobster, prawns, octopus and Sardine fisheries. These closures should be introduced by KeFS in consultations with the respective county governments, the private sector and local fishing communities.
- Currently, there are restrictions at the lobster fishery on the size of the lobster to be landed, prohibitions in the catching of berried females, and outlaws the use of beach seines, spear guns and scuba gear. Trawling is confined to the five nautical miles. Kenya Fisheries Service and the key stakeholders, including fishers, should, in addition to the weight restrictions, introduce carapace length restrictions. This will take into consideration mature individuals that weigh less than 250 gm.
- With the increasing demand for lobster on both the domestic and export markets, fishing pressure on the fishery will continue to increase. Efforts should be directed to introduce fishing effort control, total allowable catch (TAC) and a rights-based approach.
- Lobster is high-value seafood, and with increasing demand, dealers and fishers are likely to under-report and not record the sources of their lobsters. The government, the industry and fisherfolk should implement a transparent traceability system.

As these challenges persist, more consumers in the export market - particularly in Europe, USA and South Africa - are now demanding environmental credentials for the seafood products that access their markets. The local fishing communities, the Kenyan government, NGOs, development partners and the industry are implementing the lobster fishery improvement project (FIP) with the support of WWF and other partners. This is part of the lobster fishery certification and creates a market-based incentive to drive the fishery to sustainability, while at the same time ensuring market access and fair price of the products. The recent results of the Marine Stewardship Council (MSC) Benchmarking and Tracking Tool (BMT) has shown that the lobster fishery is moving towards sustainability with a BMT index of 89 percent (WWF, 2018).

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