

## **ANALYSING THE CHALLENGES FACED BY BEACH MANAGEMENT UNITS IN MANAGING FISHERIES STOCK IN MOMBASA COUNTY, KENYA**

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## **ABSTRACT**

Fisheries Management approaches continued being managed by centralized government as intervention for some time after independence in countries in Africa. Later the approach proved inadequate to deal with the emerging issues in the management of fisheries stock. Partnerships known as co-management, now practiced in East Africa including Kenya, involve Beach Management Units (BMUs) in fisheries management. In Kenya co-management of fisheries with BMUs began in 2007 with hope that they will help the Department of Fisheries better manage fisheries stock. However, fisheries management still remains a challenge to the central government. This study aimed to determine the challenges faced by beach management units in managing fisheries stock in Mombasa County. The study was guided by the following specific objectives: to determine the roles performed by BMUs in managing fisheries stocks, to examine the challenges facing BMUs in managing fisheries stocks and to explore measures to improve the BMUs performance in managing fisheries stocks. The study adopted descriptive research design with target population consisting of 14 BMUs with 2800 members and 7 institutions working with fisher community. Three hundred (300)

respondents who were BMU members were sampled through simple random sampling. Data was collected by use of questionnaires which were pre-tested to ascertain their validity and consistency before they were used. The study found that all the BMUs exist as legal entities, having been registered by the Fisheries Department with majority having democratically elected officials with Executive Committee composed of required stakeholders' representation. Lack of commitment among the BMU assembly in playing their stipulated roles as well as lack of co-operation among the executive committee members was reported to be major reasons for dismal performance of BMUs in co-management. Majority of BMUs source funds from international and local donors as a strategy to enable them play their co-management roles such as patrolling the shores to nab illegal fishing gears. The study concludes that although majority of BMUs in Mombasa County are compliant with BMU regulations with regard to management functions and playing their intended roles effectively, this is not reflected in the recovery of fish stocks as intended and recommends institutions to channel more resources towards enhancing the capacities of BMUs to sustainably utilize fisheries stocks.

**Key Words:** *beach management units, fisheries stock, Mombasa County, Kenya*

## **INTRODUCTION**

Managing fisheries stock in an open resource such as the ocean is a global challenge. The Food and Agriculture Organization (FAO), working with institutions such as the National Marine Fisheries Service of the United States of America, estimated in 1998 that 30% of the stocks in the waters of that country for which information was available were overfished. In the waters of the

European Community, it estimated that in 1990, 57% of the stocks were 'heavily exploited' (FAO, 2000).

For third world countries that face financial and capacities to regulate fishing activities, they face an insurmountable challenge. Fisheries benefits go beyond providing food and nutrition security for the population to include economic and social development, marine and coastal tourism. However, fish production has been decreasing rapidly due to among others, overfishing, pollution from land-based sources and mangrove deforestation. There is therefore need for a paradigm shift to embrace a new, responsible and sustainable approach that is more environmentally, socially and economically effective. This comes at a crucial time when the need for food and resources from the ocean is increasing rapidly to meet the needs of the growing population (Ababouch, 2015).

From ancient times, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in the industry. The wealth of aquatic resources was assumed to be an unlimited gift of nature. However, with increased knowledge and the dynamic development of fisheries after the second world war, this myth has faded after realizing that aquatic resources although renewable, are not infinite and need to be properly managed if their contribution to the nutritional, economic and social well-being of the growing world's population is to be sustained (FAO, 1995).

Most of the world fisheries today are either overexploited or in a state of full exploitation because of greater fishing efforts and increased competition between fishers, vessels or nations over the resource. National governments, development agencies and development practitioners and scholars around the world are working hard on how best to manage the fisheries resources without compromising the biological, economic and social objectives for the benefit of present and future generations (Salehe, 2008).

Beach Management Units (BMUs) are community organizations bringing together fishers, fish traders, boat owners among other stakeholders who traditionally depend on fisheries activities as economic activities as per the fisheries policies and legislations. They are non-political institutions, formed by the Director of Fisheries, whose objectives include: strengthening the management of fish landing stations, fisheries resources and the sustainable development of the fisheries sector; building the capacity of the members for the effective management of fisheries in collaboration with other stakeholders; and ensuring the achievement of high quality standards with regards to fish and fisheries products (Fisheries Act, 2007).

The Act No. 35 of 2016 gives the Director of Fisheries- serving under the Department of Fisheries- the powers to make clear the boundaries or jurisdiction within which the Beach Management Units operate and also abolishes any activities not related to fisheries at the sites. It states that the Director shall, in consultation with the relevant agencies, prior to the establishment of a beach management unit, cause the relevant land area of a fish landing station to be surveyed and its boundaries clearly

delineated and marked. The fisheries legislation is similar to the Japanese Fisheries Law of 1901 which retained local fishers' cooperative associations the traditions to regulate fishing in the different seasons and zones, sustainable fishing gears and the sustainable fishing methods depending on the area. The law also gave the fishers rights over all coastal waters at the same time treating them as legal land holders. (Hirasawa, 1980).

The legislation benefits the fisher folks immensely: it mandates the beach management unit to provide training to its members in fishing techniques, the marketing and processing of fish, personal financial management and other areas relevant to fisheries. The Act provides clear guidelines on financing of their activities, and in making by-laws that guide the management of the fish resources. BMUs were formulated to address the challenges out of the commonly used top-down approach. Communities did not own the laws and legislations since their participation was minimal. As a result compliance also hardly came by from the fisher community. Yet empowered community organizations would easily make their own by-laws, and easily enforce them-with proper guidance from the Director of Fisheries. BMUs therefore could be key drivers to co-management- defined as a partnership between the state and the user groups under which the responsibility and roles are shared, for effective fisheries management. It is cost effective and empower fishing communities to decide on wise use of the resources which they have a stake (Odongkara, 2009).

While the Director of Fisheries and his officers play an oversight role, the fishers and boat owners too have management responsibilities that influence marine fish production. The BMU Assembly, that brings together all the registered members including fishers and boat owners meet regularly to approve management plans, adopt and amend by-laws and elect officials. The BMU Executive Committee, comprising of not more than 15 members and elected by the Assembly, is mandated with the general management of BMU, implementation of co-management plans, admission of new members, exchange information with other BMUs for fair pricing of fisheries products and inspecting sea-worthiness of vessels (Fisheries Act, 2007).

Kenya enjoys a vast coastline that stretches over 650 km from Vanga near the Tanzania border to Kiunga in Lamu County on boarder with Somalia. In addition, the Ministry of Agriculture, Livestock and Fisheries (MoLF) (2013), that a further 200 nautical miles Exclusive Economic Zone (EEZ) are within Kenya's jurisdiction. This area is approximately 230,000 km<sup>2</sup> or about 40% of the total land area (Kenya Maritime Authority, 2015). Given the vastness of the coastal space, water body however is the production or catch brought on-shore by the fishermen. The Ministry's statistics indicate that the whole Coast region accounts for less than 6% of the national annual fish production. Out of the 163,293 metric tonnes of fish captured in 2013 for example, marine fish production stood at 9,134 metric tonnes, 5.6% of the national production. Lake Victoria, which covers 4,128 km<sup>2</sup> (the Kenyan side) however, accounted for 124,643 metric tonnes: 76% of the total annual fish production in 2013. Lake Turkana, covering 7,400 km<sup>2</sup>, produced 4,338 metric

tonnes of fish (2.7%), while aquaculture (fish ponds) amounted to 23,501 metric tonnes, contributing 14.4% of the total production (Annual Statistical Bulletin, 2013).

Mombasa County has an access to 65km<sup>2</sup> of open water and 40km<sup>2</sup> of the Exclusive Economic Zone (EEZ)- a high potential fishing ground. It also has 12 BMUs managing 50 landing sites spread across Mvita, Likoni, Changamwe, Kisauni, Nyali and Jomvu Sub-Counties. (CIDP, 2013-2017). Fish production however remains one of the lowest, way below Kwale, Kilifi and Lamu Counties. As highlighted on Table 1.1, Mombasa County’s contribution to the marine fish production at the Coast is just 13%.

**Table 1: Marine Fish production in 5 Coastal Counties**

<b>Year</b>	<b>2011</b>		<b>2012</b>		<b>2013</b>	
<b>County</b>	<b>Metric Tons</b>	<b>Kshs ‘000.</b>	<b>Metric Tons</b>	<b>Kshs ‘000</b>	<b>Metric Tons</b>	<b>Kshs. ‘000</b>
Kilifi	2,152	250,305	2,061	335,820	2,136	319,831
Lamu	2,150	138,987	2,062	170,483	2,147	177,666
Kwale	1,879	174510	1,976	198,066	1,867	222,039
Mombasa	860	121.327	782	129,236	855	158,104
Tana River	704	51,735	596	43,979	698	66,158
<b>TOTAL</b>	<b>7,744</b>	<b>736,864</b>	<b>7,477</b>	<b>877,584</b>	<b>7,703</b>	<b>943,798</b>

*Source:* (Annual Fisheries Statistical Bulletin, 2013)

Fishing is an economic activity that feeds thousands of households in Mombasa County and beyond. If unregulated, it leads to overexploitation and consequently production reduces. Today, fishers have been forced to partake other casual jobs in order to beat the odds, unlike the past when their economic well-being relied solely on fishing (Waiyaki, 2004).

## **STATEMENT OF THE PROBLEM**

Beach Management Units (BMUs) were established when running the Department of Fisheries from a central point by the National Government-with little input from stakeholders at the grassroots- proved ineffective. They are the key drivers of fisheries co-management, where all the stakeholders, have a say in the management of the fish stock. Co-management has major influence in creating ownership and allowing fishers take responsibility for number of managerial functions, as a result the communities are able to develop flexible and creative management strategies that meet fishers’ needs and local condition. However, for the fisher community to comply and hence successful fisheries stocks management, the right regulatory environment must prevail. This include appropriate institutional framework for governing common property resources, clearly defined boundaries and membership, group cohesion, benefits exceeding costs, participation by those affected, management rules enforced, access rights to organize and implement, cooperation and leadership at community level, decentralization and delegation of authority and coordination

between government and community (Odongkara, 2009). All the stakeholders working under the co-management plan develop policies and pool resources towards sustainable fishing practices to increase the production. Among African countries, the lack of important tools such as modern patrols equipment, communication systems and boats limits surveillance effort resulting in illegal, unregulated and unreported fishing. (Hiribae, 2008) However, the specific and unique challenges facing the BMUs in Mombasa remain unaccounted for hence this research.

## **OBJECTIVES OF THE STUDY**

1. To examine the challenges facing BMUs Mombasa County in managing fisheries stocks.
2. To evaluate the capacities of the BMUs in Mombasa County to manage fisheries stocks
3. To explore measures to improve the BMUs performance in managing fisheries stocks in Mombasa County.

## **LITERATURE REVIEW**

### **History of Fisheries Management**

Well before federal mandates for fisheries management and fish culture were established, lay people were interested in fish culture as a way to enhance fish production. Entrepreneurial efforts in fish culture included those of Seth Green, who established a fish hatchery in Caledonia, New York, in 1870 (Bowen, 1970). Equally enthusiastic about fish culture, residents of Canada developed techniques for fish culture. In 1868 Samuel Wilmot built a fish hatchery on his farm near Newcastle, Ontario, and in 1876 he became the Superintendent of Fish Breeding for the federal government in Ottawa. Wilmot subsequently established hatcheries in Quebec, Ontario, and the maritime provinces of Canada, and a division for hatcheries was retained following his tenure (Huntsman, 1938).

Fisheries depletion and uncontrolled destruction of the coral reef began to be felt in the 1980s with rampant illegal fishing activities. The highly centralized national government of Philippines at the time was too distant to control the situation while the fishers were too fragmented to embark on any collective action to curb the dwindling fish production (Viswanathan, 1997). Through international non-governmental organizations such as Peace Corps, local community-based organizations and the fishers, a marine sanctuary and reserve was created in 1988. The joint effort gave birth to Marine Conservation Project of San Salvador (MCPSS) which sought to enhance institutional capabilities, develop and implement a marine resource management plan and establish a coral reef fish sanctuary and a marine reserve.

But it also involved a huge public campaign to involve the public in resource management practices. The consequences of harmful fisheries practices were also publicized. Laws were also drafted including the ban on fishing on sanctuaries, and a proper enforcement of banned methods

that involved a group of dedicated community members and the fishers. Enforcement to these laws was a joint effort of the coastguards, fishers and the village police. In July 1996, the San Salvador Sanctuary won a prestigious national award for its achievement in coastal resource management. Involving stakeholders in project planning and implementation, well-defined objectives, supportive leadership, strong linkages with the government and sources of technical expertise and funds and tangible benefits contributed to this success. Participatory decision-making processes, consultations, public hearings to thrash out arising issues were also attributed to the success.

### **Global Fishing Trends and Management of Fish Stocks**

Globally, available fish stocks have exhibited a decreasing trend, from 90% in 1974 to 67% in 2015, while the levels of fishing in the same period, increased from 10% in 1974 to 33% in 2015 according to research documented by the Food and Agriculture Organization (FAO, 2018). The European Union, in its bid to revise these trends, formulated the Common Fisheries Policy (CFP) whose objectives were to ensure long-term yields for all stocks by 2020; reduce or rid its waters of harmful practices and wastage and streamline its rules and regulations by focusing more on consultations and coordination. Fisheries management took the forms of input and output controls; with input controls focusing on: rules on access to waters – to control which vessels have access to which waters and areas; fishing effort controls – to limit fishing capacity and vessel usage technical measures - to regulate gear usage and where and when fishermen can fish. The output controls meanwhile focus on the total amount of fish per fisherfolk, according to the Association of National Organizations of Fishing Enterprises in the European Union.

Countries such as Netherlands however have national policies to complement those of the EU. The main objective of the Netherlands' Fishery Policy for example is to promote responsible fisheries and sustainable management of fisheries resources. The aim is to reach a balance between economic and ecological targets. In acknowledging ecological sustainability as the basis for a sustainable economy, the government's focus is on the maintenance of fish stocks as renewable resources, while preventing infringements on the ecosystem (FAO, 2005). The policies at National level also introduced a system of co-management, based on group systems organized in Producer Organizations (POs). Producer Organizations ensure compliance with quota regulations and encourage participation of fishermen in sector management. It also encouraged the spreading of fishing activities throughout the year.

Co-management however faced compliance issues in Netherlands. While there were restrictions on the catch per vessel to regulate stock, business people who had made huge investments with huge fleets protested the move as it would reduce their profits. Fishermen also felt their catch would plunge by between 30% and 40%. According to research carried by FAO (FAO, 2000), enforcement was carried out by taking samples of landings, which regularly resulted in fines. However, the level of enforcement was too low to cause substantial financial damage to the industry so that over-fishing practices were continued. Towards successful enforcement, the Dutch

government increased the number of monitors at every landing site, they limited the maximum power of newly-to-be build vessels, introduced rotational fishing and heavier fines for those over-fishing (Davidse, 2000).

### **Fisheries Management in Asia: The Case of San Salvador Island, Philippines**

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### **Fisheries Management in Africa: The Case of Lake Malombe in Malawi**

Fish production at Lake Malombe was at its peak in the 1980s, producing over 10,000 tonnes annually but declined to just 2,000 tonnes by the mid-90s. (International Monetary Fund, 2005). The factors behind this dramatic decline were mainly human: excess capacity, illegal activities such as use of under-mesh-sized (small holes) fishing gears, fishing during closed seasons and the introduction of new fishing techniques that were not covered by the existing regulations (Viswanathan, 2003).

Fishers were resistant to some of the regulations while financial challenges meant the Fisheries Department could not effectively enforce them. After consultations, it was agreed that self-regulations among the fishers would motivate them hence the creation of the Beach Village

Committees (BVCs) in 1993. The government's Fisheries District Office and elected representatives of the Beach Village Committees would work together to: regularly review policies and regulations, transfer property rights over specified fish resources to communities; give permission to allow plough back of some money from gear licence fees to BVCs to cater for their administrative costs and incentives. Decision-making powers would remain with the Fisheries Department but there would be consultations among the stakeholders.

But Malawi provides an example of how not to implement co-management, which has had little impact in the recovery of the fisheries sector. Problems related with donor-driven projects such as differing objectives and timeframes for implementation; fishers continued use of phased-out fishing gears on the account of economic hardships and power struggles in the management of the BVCs resulting into mistrust in the leadership proved a hurdle in co-management. There were even claims that the Department of Fisheries interfered with the fishers' choice for representatives during elections. As such, fisheries production at Lake Malombe remains low.

### **Fisheries management in East Africa**

Co-management began in Tanzania in the late 1990s under the Lake Victoria Environmental Management Project (LVEMP) where a committee of five fishers from each landing site, named Beach Management Units (BMUs), were formed around the Mwanza Gulf. This was then extended to other landing sites and by the year 2000 there were about 511 BMUs in all riparian districts (Hoza and Mahatane, 2001). However, these BMUs lacked a clear operational guidelines and institutional framework. This led to the reformation of the BMUs in 2006 during the Implementation of a Fisheries Management Plan (IFMP) project carried out from 2004-2010 (Ogwang', 2009). This saw a reduction in the number of BMUs to 433 in the Tanzanian part of the lake. The reformed BMUs were supported with the Fisheries Act No. 22 of 2003 and the principal Fisheries regulation of 2009 and have clear operational guidelines and institutional framework in the National BMU Guideline. The co-management arrangement for the lake is still consultative where setting management objectives is still the prerogative of the government with little or no consideration for local knowledge (Njaya, 2007). This new arrangement was anticipated to empower local communities in exercising their new legal rights in a responsible manner by taking care of the fisheries resources, raising productivity and their incomes and improving fisheries dependent livelihoods.

However, the increased pressure on the fishery resources, illegal fishing practices and growing concern that fisheries communities are the poorest despite the increased earnings accrued from the sector over the last decade have generated divergent opinions on the impact of co-management in fisheries management. In some studies Ogwang' et al (2009) reported that BMUs have been effective in the elimination of illegal fishing methods, collection of revenue on behalf of the local government and have actively participated in the fisheries decision making processes. They further

stated that the involvement of the resource users in the management has not only empowered them but also improved their livelihoods.

However, Nunan (2010) found that co-management has failed to control migration of fishers. Onyango and Jentoft (2007) point out that unlike the traditional or customary institutions the BMUs have not been able to tackle the challenges of overfishing and illegal fishing practices because their formation was not grounded on the socio-cultural environment in which they exist. Drawing from experience of co-management in Africa, Hara (2003) report little evidence on the effectiveness of co-management in sustainable fisheries. This is also supported by Onyango (2004) that co-management has had very little success in fisheries management.

More so Sterner and Segnestam (2001) argue that economic growth regardless of what it is based on, does not automatically solve the problem of poverty and fisheries sustainability at the same time. They argue that though that there is a close relationship between poverty, depletion of natural resources and environmental degradation, the relationship is complex and can only be understood from studying the type of management system in place, the poor people groups that are affected and how poverty is defined. On the other hand, according to Onyango (2009) poverty problem in small scale fisheries is a wicked problem that cannot be understood from the income-expenditure nexus but rather from an ecological, social and institutional context. The different views on the successes or failures of co-management are thus an important indication that it is important to look at the challenges faced by the BMUs who are the key implementers of these legislations. Their relationship with other stakeholders is also worth reviewing because co-management is a chain of many players working together.

### **Fisheries Management in Kenya**

Management of Lake Victoria began with traditional or “customary” management during the 18th century when responsibility and authority was in the hands of the traditional leadership who controlled exploitation of resources (Owino, 1999). Fishing was mainly informal without written policy and regulation but was rooted in the community’s culture and limited only to the riparian communities (Schlager and Ostrom, 1992). The catch was sufficient for own consumption and barter trade. Through this management system fishers were able to participate in making decisions on the operations and management of the fisheries (Pinkerton, 2003).

Formal management of the lake fisheries began during colonial times with enactment of Fish Ordinance which introduced licensing and boat registration and was later amended to cover regulations on gillnets, trawl nets and long lines (Kateka, 2010). These regulations aimed at generating revenue to the colonial government and it opened the fishery to non-riparian communities. After independence the central government continued to exercise full responsibility and authority in fisheries management. However, the transformation brought by Nile perch fishery in the late 1970s and structural adjustment programmes in the 1980s (Abila and Jansen, 1997) and

the failure of centralized management system led to a rethink of a new fisheries management structure where local resource users and other stakeholders have a say in management (Medard and Geheb, 2000).

### **Rationale for Community-Based Fisheries Management through BMUs**

Under community-managed fisheries production, the fishers are the managers therefore make conscious decisions on the best methods of fishing that are not exhaustive to the stock. Management of fish which includes regulations in harvesting was transferred to BMUs, where they are allowed to incorporate indigenous management practices and their social, cultural and economic concerns into modern fisheries management strategies. Modern regulatory frameworks that would enforce restrictions in some areas at certain seasons; prohibit use of illegal gears; and quality controls on the catch would complement the traditional mechanisms. While the fishers have a major say and exclusive use rights, the government, scientists and other stakeholders would provide technical assistance and advice (Chakallal, 1991).

Involving communities in making by-laws that can be modified to suit their needs is more acceptable as it resonates with their practises hence owned and implementable. Fishers get creative when harmonious interlinkages between the modern and traditional methods are created. They also come with programmes that will not leave either behind hence equal economic benefits. Beach Management Units create wealth for the artisanal fishers as it protects them from the huge fishing vessels that are technologically advanced. These vessels tend to lock out small-scale fishers from the market as they are also contribute to the depletion of the stock. It is becoming common for the artisanal fishers to rely on other means of survival as the fishing sector becomes more technological intensive- way beyond their means. At the Coast of Kenya for example, it would make life difficult for artisanal fishes who account for 80% of the catch from the ocean while larger vessels, mostly foreign-owned, account for the remaining 20% (Fisheries Annual Statistical Bulletin, 2013). Finally, communities' traditional practices of managing stock-so long as they are not prohibitive must be recognized and complement the modern strategies of managing stock. This justifies the use of community organizations such as the BMUs (Chakallal, 1991).

### **The Roles of Stakeholders in Management of BMUs**

Co-management means a shift to more integrated management where the locals are the focal point and stems from the fact that owning the process of developing fish stock management rules and guidelines gives them the incentive to comply and implement them. It is cheaper, but it can only succeed if the players play their mandated roles. The Department of Fisheries, headed by the Director of Fisheries forms and registers the BMUs. While it plays its oversight role, it also deploys the Fisheries Officers at designated landing sites to monitor the progress and challenges faced by the Beach Management Units, as well as supporting them in data collection. The success or failure of the operations of the BMUs however lies with the Director of Fisheries who is responsible for

supporting their establishment, their capacity to formulate as well as implement their by-laws and their financial base to support their operations. The Director links the BMUs with all the relevant government and Non-State Actors for a successful co-management plan (Fisheries Act, 2007).

Fisheries are now a devolved function under Schedule 4 of the Constitution, 2010. County governments can therefore regulate fishing activities as well as fund the operations of the BMUs through the county ministers of agriculture or fisheries within their jurisdiction. However, this is in consultation with the national government's Fisheries Department (Fisheries Management and Development Act, 2016). The County of Mombasa, under the County Director of Fisheries outlined some projects towards supporting BMUs and the fisheries sector in general between 2013 and 2017. These included acquisition of the gazetted and ungazetted fish landing sites, acquisition of fishing vessels and capacity-building of BMU members, approximated to cost Kshs. 500 million (Mombasa County CIDP, 2013).

The Ministry of Land is mandated by the law to ensure that fish landing sites, which are categorized as community land, are registered and protected from grabbing or unrelated use. The Land Registration Act stipulates that the Registrar shall maintain a community register, with all its members therein, recognize the land with a special lease issued to the registered members. He will also prohibit any activities that will deny fishers rights to ownership of that landing area (Land Registration Act, 2012). NEMA, operating under the Environmental Management and Coordination Act (Act No.8 of 1999), plays an oversight role in managing fish stock and other marine resources. Section 42 (2) of the Act gives power to the Minister of Environment to impose restrictions on the activities that may result into degradation of the coastal line. This includes protection of the mangrove forests which are breeding grounds for fish species, and hence play a direct role in the management of fish stock. While imposing these restrictions or formulating policies that conserve the marine life, the Minister also ensures that they are in tandem with the interests of the community at the said geographic area. This means therefore interests of the fishers- if they do not contribute to the degradation of the marine environment should be catered for.

KMFRI is governed by the Science and Technology Act and is charged with the responsibility of conducting research and making management recommendations essential for the national use or consumption of resources within marine and fresh waters. It has an aquaculture (fresh water) and marine research sectors. The main objectives of the marine sector situated at Mombasa are to collect and consolidate all available marine fishery resources data, which provide information for development. In addition, Mombasa Laboratory aims at undertaking research programs which lead to the understanding of most of the economically important species which help in the biological monitoring of the of their stock characteristics for proper management, and conservation (KMFRI, 2016).

The Kenya Wildlife Service's operations are guided by the Wildlife Conservation and Management Act, 2013. The Act gives the institution the mandate to identify and declare marine

conservation areas so long as it consults the county leadership where it operates in. These are areas which harbour endangered marine species or are breeding and nesting zones hence the need for a zoning system. Rules and regulations on the management of these areas should be developed in consultations with communities or local resource users (Wildlife Conservation and Management Act, 2013).

The BMU Assembly comprises of all registered members including fishers and boat owners. Members meet regularly to approve management plans, adopt and amend by-laws and elect officials. The BMU Executive Committee, comprised of 9 to 15 persons is mandated with the general management of BMU, implementation of co-management plans, admission of new members, exchange information with other BMUs for fair pricing of fisheries products and inspecting sea-worthiness of vessels (Fisheries Act, 2007). They mainly play the role of donors in building the capacity of BMU members as well as supporting infrastructure development. For example, by 2013, 68% of the BMUs along the Coast had received substantial support from non-governmental organizations (NGOs) (Kanyange, 2013).

### **Operations and Capacities of BMUs along the Coast of Kenya**

How BMUs operate and their capacities to bring its stakeholders together has a direct impact on the production of fish in the region. For example, while marine and coastal resources such as mangrove forests and coral reefs with rich fisheries resources play an important role in sustaining livelihoods, they are threatened by factors such as overexploitation, pollution and illegal fishing practices. This has drastically depleted fish stocks and destroyed their habitats (KCDP, 2013). Only BMUs with committed membership and empowered with the technical and capital resources can play their co-management roles to prevent these challenges.

However, since the enactment of the BMU legislation in 2007, over 73 BMUs have been formed but a majority remain unregistered with the Department of Fisheries due to slow and ambiguous requirements. Initially, they would be registered as Community Based Organizations (CBOs) under the Ministry of Gender, Children and Social Services. But this could not give them their legal mandate to run their co-management functions because they operate under the Ministry of Fisheries. Their certificates therefore could not be recognized by banks or microfinance institutions hence could not open bank accounts or access loans. The unresolved authenticity of their certificates stalled their operations (Kanyange, 2014).

In the absence of loans, BMUs source of funds or technical support remains the government and the Non-State Actors. Funding from the government however is indirect. By 2013, about 73% of the BMUs across the coastline had received outboard boat engines, the rationale being they would use them to construct boats to facilitate patrols. However, in the absence of monitoring mechanisms from the Department of Fisheries, the engines were not effectively used and some were rented out to the fishers. In addition, about 68% of BMUs received direct and indirect support from local as

well as international donors. This funding was however mainly directed towards improvement of infrastructure such as BMU offices, landing stations and purchase of fishing boats and gears (Kanyange, 2014).

Technical support has been mainly in the form of training of BMU officials in management, finances, conflict resolution and leadership. However, with the frequent change in leadership through elections, new officials remain untrained. The fishers meanwhile are totally left out of training on the best practices of fisheries management due to lack of funding. Kanyange summarises the operations and capacities of the BMUs in the SWOT analysis below.

**Table 2: BMUs SWOT Analysis**

<b>Strength</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
-Enabling legal framework (Act, regulations, by-laws) -Ability to bring stakeholders together	-poor financial base -mismanagement of meagre resources -lack/inadequate infrastructure -poor leadership -low technical capacity -low empowerment of the members -poor commitment and motivation of the members -poor cohesion -lack/poor sense of ownership -perceived lack of tangible benefits by stakeholders- poor selling and marketing structures	-financing of BMU activities and infrastructure -capacity building -cohesion building -establishment of BMU-managed conservation areas -conferment of user rights -improvement of stakeholder income and livelihood -enhancing selling and marketing of fish and fishery products	-land tenure insecurity -legitimacy, not always popular -political interference -unclear definition of user rights -lack of partnership arrangement with other stakeholders -high illiteracy levels within the community -deteriorating trust between BMU and Fisheries Department

*Source:* (Modified from Kanyange, 2014)

One of the management functions of the BMUs is to monitor and regulate the use of fisheries resources for sustainability and regulate fish stock. The chairs of the BMUs for example can seize fish, fishing gears, vessels, or other items which they have reason to believe they have been used in the commission of an offence. The BMU Executive Committee also has the powers to vet old fishers as well as register new ones (Fisheries Act, 2007). This is intended to regulate the numbers of fishers to minimize overfishing.

However, little investment in the BMUs, as well as lack of enforcement of the legislation means the influx of the fishers remain unregulated. There has been a rapid increase in the fishing effort by 220%, and an increase in the number of boats from 1,230 in 2000 to 3,947 boats in 2012.

Notably, the catch per unit drops at an equally alarming rate of 42% (Annual Statistical Bulletin, 2013).

### **Roles of BMUs in Implementing Fisheries Policies**

Beach Management Units were formed to address management challenges that were posed by the top-bottom approach but declining fish stocks have led to questions on their capabilities to enforce the same policies they formulate to manage fisheries resources. Findings from BMUs in Lake Victoria, Tanzania, reveal that BMUs have formulated regulatory measures to manage the fisheries resources but have been ineffective in implementing some of the measures. On the other hand, BMUs have no poverty eradication schemes and lack skills and expertise to tackle the challenges posed by poverty. (Luomba, 2013). The findings in Lake Victoria are not different to those in Mombasa. Fisheries cooperatives that were meant to provide financial support to the fishers, so that they could purchase modern fishing vessels, and the required mesh-sized fishing nets are no longer operational. The County Government of Mombasa, in its first County Integrated Development Plan (2013-2017), promised to revive fishers cooperatives but this is yet to be realized, five years later.

BMU profile depended on a laid down structure outlined in the BMU regulations, captured in the Fisheries Act. Adherence to this structure was challenging, given the hindrances such as unclear registration procedures and unlimited membership. Nevertheless, despite adherence to the structures, not all were fully functional, implying that presence of a structural framework, though a good starting point, may not guarantee good results (Kanyange, 2014). The County Government of Mombasa, in a bid to increase BMUs efficiency created a different layer of leadership, the BMUs Executive Committee of Chairs, where the 14 BMUs chairs would select four representatives to engage directly with the county Minister for Agriculture, Livestock and Fisheries in 2015. This created another challenge as fishers saw it as a model of excluding them from participating in county projects. The researcher found out that the fishers for example were irked by the county's move to launch a fish farming project in containers, instead of improving their equipment in the ocean. According to the project, the county would purchase containers and give them to over 1,500 youths to grow catfish.

Kanyange outlines the factors affecting BMU performance to include leadership, inclusivity, conflict resolution, costs-benefits sharing, monitoring, mutual trust and jurisdiction. In the midst of these factors were inadequate resources and infrastructure that further hindered the BMUs to achieve their objectives. Achievement of the objectives was well below expectations, except for few such as conflict resolution, collaborations and local networks. Stakeholder livelihood had not improved and poverty was still thriving. Consequently, as long as the BMUs remained relevant to the co-management concept of fisheries governance, the impending factors need to be addressed in order to enable them function fully.

However, the biggest factor affecting their performance is that they are viewed as a hindrance and not complementary when it comes to policy formulation. This is witnessed by legislations that are generated at the national level with their little participation. In the expansion of the port, oil exploration and construction of roads for example, which immensely leads to clearing of mangrove and destruction of other resources, the fishers are involved at the valuation towards compensation. While the Land Act 2012 gives the government to compulsorily acquire land, consultations, it also states, should follow a bottom-up approach.

Since BMUs are a management tool, their achievements in fisheries management and improving resource based issues directly affecting the stakeholders were minimal. For instance, the state of the stock had not improved, there was no increase in sizes and catches of fish associated with improvement in stocks and use of illegal and destructive gears was not eliminated. While such issues cannot be blamed on the BMUs alone, there was a great potential for them to improve the state of the fisheries within their jurisdiction through various means. One of them not evidently used is creation of conservation areas. This role was left to other players while BMUs struggled to get on foot. It is however important to mention that there were relatively good examples of functional BMUs that utilized their little resources and managed to overcome majority of obstacles faced by majority of BMUS (Kanyange, 2014).

## **THEORETICAL FRAMEWORK**

This study used the economic theory of a common property resource by Gordon (1954) which states that the open-access nature of natural resources such as fisheries means communities through the oceans leading to both economic and biological over exploitation of the resource. It becomes extremely difficult to enforce laws and policies that govern a resource that is easily accessible- from forests to the ocean- when there is no sense of ownership. This is why for example, the fishers are not wealthy, despite the fact that the fishery resources of the sea are the richest and most indestructible available to man. By and large, the only fisher who becomes rich is one who makes a lucky catch or one who participates in a fishery that is put under a form of social control that turns the open resource into property rights (Gordon, 1954).

One of the biggest challenges the Department of Fisheries faces in data collection is shortage of staff to be deployed in every landing site where fish is offloaded. But in the few that it has managed to access and collect data, it has observed a rapid increase in the fishing effort by 220%, and an increase in the number of boats from 1,230 in 2000 to 3,947 boats in 2012. Notably, the catch per unit drops at an equally alarming rate of 42% (Annual Statistical Bulletin, 2013).

The other documented worrying trend is that most of the fishing vessels are the traditional dugout canoes with a small population owning boat engines. This means that most fishers can only fish on the shallow waters as their vessels are unsafe. They therefore keep off fishing during the South East monsoon season when winds are strong. Fishing is also about individual survival than pooling

resources together to manage the stock effectively. By purchasing larger vessels for example, it would be possible to capture only the mature species at the deep waters. This is however possible through partnerships and coordination among the players (KCPD-MCS Interagency Team, 2013).

Some of the controls that can be employed include periodic restrictions to replenish the dwindling stocks, ban of gears that prove destructive and constantly monitoring the catch to ensure it is of the mature size. Enforcing such measures however is difficult since the coastline is too extensive. Fishing also seems to be a shortcut for survival for the majority unemployed hence politicians would be required to offer alternatives if they were to introduce stringent measures (Chakallal, 1991). While the Department of Fisheries issues the Distant Water Fishing (DWF) permits, there is little accountability due to limited patrol vessels. Patrols and monitoring fisheries resources is a function of the BMUs but Mombasa, Kilifi, Tana River and Kwale have one patrol vessel each while Lamu has 3. (KCPD-MCS Interagency Team, 2013). This lack of monitoring means that Distant Water Fishing vessels have no obligation to land, trans-ship, or declare catches in the country. This arrangement limit the country's benefits from its EEZ fisher especially from value added activities associated with trans-shipment, landings, for processing or even trade by-catch (Kenya Fisheries Policy, 2005).

A study by Sea Around Us, a research initiative at University of British Colombia reveal that 30% of global fish, or 32 million metric tons of fish go unreported as most countries focus their data collection efforts on industrial fishing and largely exclude difficult-to-track categories such as artisanal, subsistence, and illegal fishing, as well as discarded fish. Registered vessels underreport the actual catch which policy makers fail to track due to limited resources and capacity to collect data and monitor fishing activities (Pauly D, & Zeller D, 2015). This theory justifies the need for community-owned process of fisheries management. The BMUs, which are the key drivers of the co-management concept, can develop policies that: (1) link traditional methods of regulating stock and capturing quality fish and modern technologies to remain relevant in the growing sector; (2) address the problems associated with intense competition in marine fisheries leading to lower production of fish; (3) reverse the overexploitation and establishment of sustainable management of fisheries products that the fishers rely upon; reduce conflict and enhancing cooperation among stakeholders (Viswanathan, 1997).

Pomeroy and Berkes (1997) define fisheries co-management as a partnership arrangement in which government agencies, the community of local resource users (fishers), external agents (non-governmental organisations, academic and research institutions), and other stakeholders share responsibility and authority for decision making over the management of a fishery. Co-management is intended to be a dynamic partnership using the capacities and interest of local fishers and complimented by the ability of the state to provide enabling legislation, enforcement and other assistance (Jentoft, 1989).

Pomeroy's definition entails that co-management should be not be viewed as a single management strategy and there is no single model of co-management. Co-management is not a regulatory technique but should be seen as a flexible management structure in which action in participation, rule-making, conflict management, power-sharing, dialogue, decision-making and development among resource users, stakeholders and government is provided and maintained. Based on the variation in roles and the level of power sharing between partners, Sen and Nielsen (1996) distinguish five major types of co-management; instructive-minimal exchange of information between government and fishers, consultative- consultation between the partners, but the government makes final decision, cooperative-government and fishers cooperate as equal partners in decision making processes, advisory- fishers advise the government and seek government's approval of their own decisions and informative-government has delegated authority to make decisions to fishers committees that are responsible for informing the government of these decisions.

Kenya's territorial water and fishing grounds can easily be accessed by foreign vessels hence excessively exploited. Fishermen from Pemba, Tanzania for example are fishing all over the Kenyan Coast, from Vanga-Lungalunga to Kiunga in Lamu. Kenya is not coping well with the Wapemba invasion due to lack of surveillance and patrol vessels. Further, even though these foreigners are issued with fishing licences by the Fisheries Department, the operators disregard the conditions of these licences and encroach on local fishing grounds (Hiribae, 2008).

The lack of collaborative policies among the stakeholders in the co-management plan is also hurting the production of fisheries. The National Environment Management Authority, a government institution mandated with the protection of the marine ecosystem; the Ministry of Land which is mandated to protect and title the landing sites, the Director of Fisheries and the fishers are important stakeholders in the co-management plan. Approximately 80% of Kenya's total marine production comes from shallow coastal waters and reefs (Fondo, 2004). But human activities such as investments on fish landing sites, or illegal constructions too near the ocean interfere with the fish breeding grounds which further limit production.

## **RESEARCH METHODOLOGY**

### **Research Design**

A research design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data (Kothari, 2004). This study employed the descriptive research design where the characteristics of the key players such as the fisher community as well as their institutions were highlighted in details. What was measured in this study is the degree of influence the BMUs have on the levels of fish production in Mombasa County. It was best suited for this study not only because the researcher had no control over the applied variables but also because the researcher described events at their current state.

## **Area of Study**

Mombasa County covers a land area of 229.9 km<sup>2</sup> and 65 km<sup>2</sup> of water mass-200 miles into the Indian Ocean. It lies between latitudes 3056' and 4010' South of the Equator and between longitudes 39034' and 39046' east of Greenwich Meridian. It borders Kilifi to the North, Kwale to the South, the Indian Ocean to the East and again both Kilifi and Kwale Counties to the West (Mombasa County Integrated Development Plan, 2013-2017). Mombasa has a population of 939,370 persons according to the 2009 national census. The county has 14 BMUs managing 50 distinct landing sites-spread across the six sub-counties namely Mvita, Changamwe, Jomvu, Likoni, Kisauni and Nyali. The BMUs include Nyali, Bamburi, Kidongo, Mtongwe, Tudor, Kitanga Juu, Old Town, Likoni, Mkupe, Mshomoroni, Timbwani, Jomvu, Marina and Mwangala. The current fishers' population is 2,800 (Department of Fisheries, 2015). The County also hosts the Kenya Marine and Fisheries Research Institute (KMFRI) whose mandate is to undertake research in marine and freshwater fisheries and provide scientific data; the regional Kenya Wildlife Services (KWS) and the National Environmental Management Authority which are key partners in the co-management of marine fisheries. Their accessibility provided a reliable source of data.

## **Study Population**

The study targeted fishers selected from Bamburi BMU, one of the 14 BMUs as well as officials from the institutions that are part of the co-management plan. These officials include representatives of the Mombasa County Department of Agriculture, Livestock and Fisheries, the Department of Fisheries and the Kenya Marine and Fisheries Research Institute (KMFRI). The study population comprises a sample of the 14 Beach Management Units which accommodate a total of 2,800 fishers, boat owners and traders. The co-management plan however requires BMUs to work closely with institutions such as KWS, KMFRI, Ministry of Land and the County Government in the management of fisheries resources. Key informants in these institutions identified the weaknesses in the co-management plan that could be affecting the marine fish stock. They were therefore submitted with questionnaires.

## **Sample Size and Sampling Technique**

A simple random sampling technique was used to select Bamburi BMU for the study. The BMU had total of 300 members, which is 10% representative sample and includes traders and boat owners. 60 questionnaires were submitted to the fishers, while 5 officials of the other BMUs were also interviewed. A combination of snowball and purposive sampling technique were used to select the key informants. These were the County Directors of Fisheries, County Executive Committee Member for Agriculture, Livestock and Fisheries and the County Director of Survey.

## **Data Collection**

The study first sought approval from the Kenyatta University Graduate School, and then the National Commission for Science, Technology and Innovation (Nacosti) for research permit before engaging the following three tools to collect the data: (1) Questionnaires with both open and closed-ended questions were self-administered across key informants as they proved flexible and could be varied per institution or respondent. They were also designed to be completed by the respondent without the intervention of the researcher giving the respondent ample time to respond to questions; (2) Personal or face-to-face interviews were an important tool for key-informants with limited time, and for BMU members with difficulties in filling in questionnaires. By use of interview schedules, key informants had structured questions that were prepared, for example, the influence they exert in the process of fish production under the BMUs. The researcher employed both structured and non-structured interviews so as to be able to control and focus on the areas of interest hence making it brief and accurate. The benefits of this method include the fact that more information, and that too in greater depth was obtained, and there was greater flexibility as questionnaires could be restructured depending on the interviewee (Kothari, 2004); (3) Observation of the fishers' activities in the sampled BMU- their officials and other activities that directly affect the running of the BMUs were key in providing accurate information. The researcher took part in their meetings among other activities to fill in missing data and verify what was collected. This method was applied because in some cases, some respondents were not available for interviews, neither were they available to fill in the questionnaires.

## **Data Analysis**

Data analysis is the conceptual interpretation of the data set as a whole, using specific analytic strategies to convert raw data into logical interpretation. (Kothari, 2004) Data was qualitatively and quantitatively analysed as per the research objectives. It was condensed into manageable categories through editing, coding and tabulations-in addition to continuous comparative method where newly collected data was compared with previously compared data. The data for example was compared to previous research *Performance Assessment of Beach Management Units along the Coastline of Kenya* (Kanyange, 2014) and *Role of Beach Management Units in Implementing Fisheries Policy: A case study of two BMUs in Lake Victoria, Tanzania*, (Luomba, 2013). It was then presented in tables, graphs and charts in an organized manner for easier interpretation.

## **RESEARCH RESULTS**

### **Management Challenges Facing Beach Management Units**

Table 3 illustrates summary of challenges, impact on fish stock and available enforcements or interventions. In addition, BMUs were formed, under the leadership of the Director of Fisheries, to bring together fishers, fish traders, boat owners among other stakeholders who traditionally

depend on fisheries activities as economic activities as per the fisheries policies and legislations. But the leading arm, the Department of Fisheries as per the Fisheries Act (cap 278), has been cash-starved, as revealed by the current leadership. The Department does not have modern patrol boats or communication gadgets that would enhance their response to destructive fishing.

**Table 3: Summary of BMU Management Challenges**

<b>BMU Functions</b>	<b>Challenge</b>	<b>Impact on Fish Stock</b>	<b>Enforcement mechanisms</b>
Management of fish landing sites	Lack of documentation, unclear boundaries have exposed them to grabbing	Increased human activities leads to destruction of breeding sites and pollution into the ocean; lowering the catch	×
Training and Capacity building members	Donor-dependent and not policy driven. BMUs last trained in 2016 before the World Bank funded Kenya Coastal Development Project (KCDP) ended	Continued use of banned fishing methods such as mosquito nets scoop out the eggs hence fish species not replenished	×
BMU Membership regulation and vetting	The expansive nature of the ocean means membership cannot be regulated; they lack capacity to vet all members	Fishing activities have increased by 220% in the last 10 years (Annual Statistical Bulletin, 2013), depleting fisheries stocks	×
Data collection	Difficulty in stationing data collectors at all the landing stations	Policy makers base their statistics on catch per BMU on approximations. When MV Mtafiti, a research vessel is finally delivered, it will remedy the challenge	√
Offer Credit facilities to BMU Members	BMUs are cash-starved; funding goes directly to Government institutions not BMUs weakening their cooperatives	Fishers have to hire boats increasing the production costs, they also suffer post-harvests losses. County Government and Kenya Commercial Bank have replenished BMU financial kitty.	√

×=Indicates absence of enforcement mechanisms √=Indicates presence of enforcement mechanisms

The lack of monitoring also exposes Kenyan fishers to external unregulated competition. 46% of respondents said they had encountered fishers from Pemba and Chinese fishing vessels in the domestic waters. Although licences for foreign fishers are issued by the Department of Fisheries, they have been known to disregard the conditions imposed on the licences and at times in conflict with local fishers.

The Ministry of Land, National Land Commission (NLC) and the National Environmental Management Authority (NEMA) have failed to put in safeguards to protect the beach buffer zone from encroachment by private developers. English Point Marina, one of the five-star resorts in Mombasa for example sits on the former Mkomani Landing Site, right before the Kenya Marine Fisheries and Research Institute. Continued destruction of marine ecosystem by investors has diminished the fish stock, fishers have to increase their efforts and expenses for their little catch.

The fishing Dos and Don'ts have thus been ignored due to failures by stakeholders to provide the fishers with the modern equipment as promised. Illegal gears such as ring nets and mosquito nets are widely used in Jomvu, Mshomoroni and Kidongo BMUs. Fishers ensure they use these gears at night to evade their bylaws. These gears do not give the small fish time to mature, and are also destructive to the coral reef. Coral reefs take up less than 1% of the ocean but are home to 25% of its creatures, hence the urgent need to protect them (Marine Conservation Institute, 2018).

### **Interventions to improve BMUs Performance in Managing Fisheries Stocks**

International institutions such as the International Development Research Centre (IDRC), the World Bank and the Coastal Ocean Research and Development-Indian Ocean (CORDIO) have been funding marine fisheries projects towards strengthening policies for BMUs to effectively manage stocks. The projects include training workshops for both policymakers and beneficiaries, purchase of legally approved gears and post-harvesting cold storage facilities.

The International Union for Conservation of Nature (IUCN) for example critic the fisheries legislative framework which applies blanket regulations across all marine habitats and fishing areas rather than managing them as per the ecology, biology and appropriate gear for each species or groups (Hiribae, 2008). The fishers need to be supported to formulate by-laws and regulations that appreciates its ecosystem. This is one of the reasons for co-management.

Seasonal fishing or zoning marine protected areas has been a practice also employed by the Bamburi BMU to give the ocean time to replenish some fish stocks. It also allows the young fish to grow to their maturity. This has been implemented with the help of the Kenya Wildlife Society (KWS), the custodian of the Marine Parks in Kenya. Organizations such as the Swedish Society for Nature Organization have also supported this initiative to identify and protect more marine conservation areas.

Recent efforts by the County Government of Mombasa to provide modern equipment, and the efforts of the Department of Fisheries to procure Mv. Utafiti will go a long way in ensuring fishers access the unexploited Exclusive Economic Zones (EEZ) which benefitted the developed nations. Monitoring the expansive sea will also be possible, with the lack of enforcement having been the biggest threat to effective management of fisheries resources. The current Mombasa County Executive County Member for Agriculture, Livestock and Fisheries also outline the plans to purchase two deep sea vessels for each Beach Management Unit between the years 2018 and 2022.

Effective management however requires ownership of the fisheries legislations which BMU Members said there are little consultations when the National Assembly passes them. There were efforts by the Mombasa County Government to domesticate some of these laws in 2016 but respondents said there were no follow ups to the grassroots. If empowered, BMUs can develop policies that link traditional methods of regulating stock and capturing quality fish and modern technologies to remain relevant in the growing sector; address the problems associated with intense competition in marine fisheries leading to lower production of fish; reverse the overexploitation and establishment of sustainable management of fisheries products that the fishers rely upon; reduce conflict and enhancing cooperation among stakeholders (Viswanathan, 1997).

## **CONCLUSION**

BMUs are the most important drivers of co-management in as far as management of fisheries is concerned, under the guidance of the Department of Fisheries, under the Ministry of Agriculture, Livestock and Fisheries. The Constitution of Kenya (2010) devolved some of the functions to the counties, further bringing policymakers and beneficiaries in the fisheries sector closer. There are 14 BMUs in Mombasa managing over 50 landing sites used by over 1,800 fishers among boat owners, fish traders and others who rely on the ocean for their economic survival. This study sought to analyse their management challenges that have a direct impact on their catch or their stock. In this regards, the study makes its conclusions based on its three objectives.

**Objective 1:** To examine the challenges facing BMUs in Mombasa County in managing their fisheries stocks. From the findings, it can be concluded that the challenges emanate from the ocean being an open resource and the fact that the fisheries sector is not a priority at both the county and national level. It is difficult collect data, regulate the numbers of fishers, formulate and enforce the by-laws, and monitor the use of illegal vessels and gears largely due to the extensive nature of the ocean and the limited resources within the BMUs. The fisheries sector is lumped together with other agricultural sectors with crop farming and the livestock sectors taking a huge percentage of the budget. The information flow between research institutions such as the Kenya Marine and Fisheries Research Institute (KMFRI) is also weak with numerous researches undertaken but the findings yet to be shared with them.

**Objective 2:** To evaluate the capacities of BMUs in Mombasa County to manage fisheries stock. According to the findings summarized in Chapter Four and also summarized in Chapter 5, it can be concluded weaknesses in financial, co-management and monitoring structures have stifled BMUs towards effective management of fisheries stock. The operations of the BMUs are donor-driven rather than owned by the BMU members and their leadership. This conclusion is supported by the fact that there is an international organization behind all their marine conservation efforts including international organizations such as World Bank and the Coastal Ocean Research, Development-Indian Ocean (CORDIO), European Union and through local organizations such as Haki Yetu and Mombasa-Kilindini Forest Association (MOKIFA). These organizations bail out the Fisheries Department and the County Government of Mombasa. The Marine Protected Areas programme, which is geared towards increasing fish yields through increasing fish breeding areas is implemented by the Kenya Wildlife Society with funding from the Swedish Society for Nature Conservation. Meanwhile, the local institutions, the National Environment Management Authority (NEMA), Ministry of Land and the National Land Commission, all mandated with protecting public land and wetlands, have failed to stop encroachment into the ocean and eminently destruction of the breeding sites.

**Objective 3:** To explore measures to improve the BMUs performance in managing fisheries stocks in Mombasa County. From the research findings, it can be concluded that BMUs are too weak to formulate their own policies, and equally weak to enforce them. It is also exacerbated by the fact that fisheries legislations employ the top-down approach when the foundation of the BMUs is the bottom-up approach. BMUs are so cash strapped that some of them do not have operational bank accounts. Expecting them to purchase vessels to monitor fisheries activities along the vast shores is expecting too much of them. The members are also without blemish as they also flout the bylaws at night by using banned gears. Gazetting fish breeding grounds so that they are protected from human activities, capacity building the fisher community to professionalize fishing and strengthening BMUs financial and human resources base are some of the required interventions.

## **RECOMMENDATIONS**

Based on the research findings presented in Chapter Four and also summarized in Chapter Five, the researcher recommends the following:

1. Institutions mandated with the registration, safeguarding and developing the fish landing sites should enforce the laws that guide their mandate. The National Environmental Management Authority is responsible for the protection of wetlands under the Environmental Management and Coordination Act (Act No.8 of 1999). The National Land Commission (NLC) and the Ministry of Lands are also guided by the NLC Act, 2012 and the Land Registration Act, 2012 respectively. These laws are clear enough to give these institutions the power to create and reclaim the beach buffer zones that protects the marine ecosystem and fisheries breeding sites.

2. The researcher recommends speedy acquisition of the *MV Utafiti*, the marine vessel that will complement research and monitoring of the high seas. Research is underfunded, largely depending on donor funding, while unaccountability at the high seas, after Distant Water vessels are issued fisheries licences has led to overexploitation of fisheries resources in the Kenyan waters. Moreover, the BMUs should be facilitated with vessels so that they can monitor the low seas where most of the destruction is taking place. From mangrove destruction to investors encroaching the beach buffer zones to grab even their landing sites, fish breeding sites are not safe. Monitoring led by the BMU members themselves will also curb the use of illegal fishing gears, commonly taking place at the creeks which are not accessible to the bigger monitoring vessels.
3. Policy formulation should employ the bottom up approach for easier integration and implementation. BMUs were established when the top-bottom approach of managing fisheries resources proved ineffective, but fishers today are barely consulted when the National Assembly formulates laws that govern marine resources. Capacity building of BMUs towards formulation of their bylaws is equally recommended. These bylaws should then inform county and national legislations. Fishers do not feel obliged to follow the laws because they are formulated in their environment.
4. The researcher recommends a civic education campaign and trainings on modern fishing methods for all the BMU members in cognisant to their education standards. 64% of the respondents were primary school dropouts, and their use of banned gears could be linked to lack of awareness or trainings. Use of ring nets, beach seines and mosquito nets known to be destructive to the marine ecosystem but fishers do not seem to know the dangers. Trainings should cover both pre and post-harvest of their catch.
5. Marine fisheries contributes only a 6% of the total fish production in the country despite the unexploited Exclusive Economic Zone. 80% of the fishing takes place at the shallow waters, largely by dugout canoes and small motorized boats. County and national governments should recognize the potential of marine fisheries in achieving food security. This requires facilitating BMUs with modern fishing gears, reviving their cooperative societies and increasing the general budgetary allocations.
6. Fish farming is through cage farming for has been successful in developed countries such as China and Japan where Kenya imports its fish from. A joint venture with such nations is key where farmers are capacity built into modern fish farming rather than relying on the traditional open fishing. This could also be part of tough conditions imposed on international marine vessels that they must pass their skills to the local fishers.

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