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**AN ASSESSMENT OF THE STATUS OF BLUE ECONOMY SECTORS IN KENYA**

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*Synthesis Report*

**University of Nairobi Maritime  
Centre**

To

**UNEP – NC**

June 2023

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## LIST OF ABBREVIATIONS AND ACRONYMS

ACCOSCA	African Confederation of Cooperative Savings and Credit Associations
AFA	Agriculture Food Authority
ASAL	Arid and Semi-Arid Land
CAADP	Comprehensive Africa Agriculture Development Programme
BMUs	Beach Management Units
COMESA	Common Market for Eastern and Southern Africa
CIDP	County Integrated Development Plan
EAC	East African Community
EAF	Ecosystem Approach to Fisheriesmanagement
EEZ	Exclusive Economic Zone
EMCA	Environment Management and Conservation Authority
FAO	Food and Agriculture Organization
GDP	Gross Domestic Production
IBAR	International Bureau for Animal Resources
ICA	International Co-operative Agriculture Organization
ICD	Inland Container Depots
ICMS	Integrated Customs Management System
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IMO	International Maritime Organization
JKP	Jumuiya ya Kaunti za Pwani
KEFRI	Kenya Forest Research Institute
KEMFSED	Kenya Marine Fisheries and Socioeconomic Development Project
KFS	Kenya Forest Service
KMFRI	Kenya Marine and Fisheries Research Institute
KNBS	Kenya National Bureau of Statistics
KNSL	Kenya National Shipping Line
KPA	Kenya Ports Authority
KWS	Kenya Wildlife Service
MALF	Ministry of Agriculture, Livestock and Fisheries
MSP	Marine Special Planning
SBEC	Sustainable Blue Economy Conference
SDG	Sustainable Development Goals
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
WRMA	Water Resource Management Authority

## **1: Introduction**

### *1.1 Background and Context*

The Nairobi Convention Contracting Parties adopted decision CP9/10.1 at the Ninth Conference of Parties (COP 9) held in Kenya in August 2018 and agreed to advance blue economy approaches in the context of Sustainable Development Goal 14 as pathways for sustained incomes and economic benefits from natural blue capital including fisheries, tourism, oil and gas development, renewable energy, and other maritime activities<sup>1</sup>. Further to COP 9, the Government of Kenya hosted the Sustainable Blue Economy Conference (SBEC) in November 2018. In the Nairobi Statement of Intent on Advancing the Global Sustainable Blue Economy, the outcome document of the SBEC, countries charted a new paradigm for an economically vibrant, socially inclusive and environmentally resilient blue economy. One of the commitments made by Kenya was the establishment, at the University of Nairobi, of an Institute for Blue Economy and Ocean Studies (IBEOS) (The Maritime Centre/Fishforce Academy). The main purpose of the Maritime Centre is to undertake research and offer technical assistance and capacity building in all matters relating to the ocean, and the sustainable use of its resources.

In this context, the Nairobi Convention Secretariat partnered with the Maritime Centre of the University of Nairobi to assess the status of sectors that contribute to the blue economy in Kenya. The objective of the assessment was to provide an overview on the contribution, values and potential of the various maritime sectors of the blue economy, and ultimately provide a baseline report and other outputs to support the development of Kenya's national blue economy strategy. Further, the overview will provide recommendations and policy options on the sectors with the highest potential, together with criteria for prioritisation both in the short and long-term, for the Government of Kenya to pursue in the development of its strategy for a blue economy. The process leading up to this assessment report has been collaborative with input from key sector experts under the overall guidance and coordination of the Maritime Centre of the University of Nairobi and the Nairobi Convention Secretariat. In addition to the expected benefits to the Government of Kenya, the process followed in this assessment will provide guidance to other countries of the Western Indian Ocean (WIO) region that wish to undertake a similar exercise. The process may also provide valuable guidance to Regional Economic Communities (RECs) that also wish to further the development of the blue economy among their member states.

## *1.2 Oceans and the Blue Economy*

The global oceans and seas cover more than seventy-two percent of the earth's surfaces and are responsible for providing food, jobs, and recreation for a large portion of the world's population, thus making them significant drivers of global gross domestic product (GDP) (World Bank, 2017). Oceans provide a substantial portion of the global population with food and livelihoods and are the means of transport for 80% of global trade (UNCTAD, 2012). Worldwide, the economies of coastal communities and their resilience highly depend on the ecosystem services that coastal zones provide. The world's oceans and seas hold the promise of immense resource wealth, and are increasingly recognized as indispensable for addressing many of the global challenges facing the planet in the decades to come, from world food security and climate change to the provision of energy, natural resources and environment<sup>2</sup>. The Kenyan coast, for example, is endowed with rich natural resources that support the local and national economy. Some of these resources include mangrove forests, coral reefs, terrestrial forests, sandy beaches and seagrass beds. Coral reefs, mangroves, salt marshes, seagrass beds and deep-sea habitats generate high biodiversity and productive waters which in turn support economies and livelihoods (Samoilys *et al.* 2015). The last few years have seen a spectacular increase in attention devoted to the need to protect the world's oceans and seas. At the same time, interest has been growing in the huge potential offered by the future development of ocean-based industries. The importance of oceans for sustainable development has been recognized from the beginning of the UNCED process, Agenda 21, the 2012 Johannesburg Plan implementation and reaffirmation of which has been documented in the Rio+20 Conference.

However, ongoing trends of exploitation and therefore degradation of marine and coastal ecosystems show that endeavours to date to ensure sustainable development of oceans have been insufficient (UN, 2014). This is because development activities have seriously taxed the resilience of the marine and coastal resource base. For example, the Western Indian Ocean (WIO) region has rich world-class ocean ecosystems which are under threat from both direct and indirect pressures through resource exploitation and human-induced habitat degradation. The mangrove coverage is diminishing in most countries in the region with Kenya and Tanzania lost about 18 per cent of their mangroves over 25 years, and Mozambique losing 27 per cent over a shorter timeframe (Bosire 2015). FAO data on fisheries, indicates that close to 90% of global fish stocks are fully or over exploited and in 2018, the total global capture fisheries production reached the highest level ever recorded at 96.4 million tonnes, an increase of 5.4 percent from the average of the previous three

years (FAO, 2020). Other challenges include increasing pollution and unsustainable coastal development which have further contributed to the loss of biodiversity, ecological functions and the decline in provision of environmental services. Climate change also threatens to compromise the very foundations of broad swathes of coastal development, whilst rising atmospheric CO<sub>2</sub> levels are undermining fundamental aspects of many marine ecosystems through ocean acidification, changing ocean chemistry at a speed faster than at any time in the last 300 million years. The potential of the oceans to meet sustainable development needs is enormous; but only if they can be maintained in and/or restored to a healthy, and productive state.

This calls for the Blue Economy (BE) approach which conceptualizes oceans as “development spaces” where spatial planning integrates conservation, sustainable use, oil and mineral wealth extraction, bioprospecting, sustainable energy production and marine transport. It sums all the economic activities of ocean-based industries, together with the assets, goods and services of marine ecosystems; and espouses the same desired outcome as the Rio +20 Green Economy initiative namely: improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2013) and endorses the same principles of low carbon, resource efficiency, and social inclusion. The Blue Economy breaks the mould of the business-as-usual “brown” development model where the oceans have been perceived as a means of free resource extraction and waste dumping; with costs externalised from economic calculations. At the core of the Blue Economy concept is the dissociating of socio-economic development from environmental degradation. To achieve this, the BE approach is founded on the assessment and incorporation of the real value of the natural (blue) capital into all aspects of economic activity. It incorporates ocean values and services into economic modelling and decision-making processes and constitutes a sustainable development framework for developing countries addressing equity in access to development of and the sharing of benefits from marine resources; offering scope for re-investment in human development, and the alleviation of crippling national debt burdens. Globally, the European Commission estimates that the Blue Economy represents over 5 million jobs and contributes €500 Billion per year (Malshini, 2019).

In Kenya, maritime sectors have long played an important role in the Kenyan economy. For example, the port of Mombasa connects the interior to international shipping routes, the country’s waters are rich in fish, and coastal tourism is an important source of foreign exchange (Benkenstein, 2018). These sectors have largely been managed as distinct economic domains, but recent years have seen a shift in approach with the renaming of the Department of Fisheries as the

Department of Fisheries and Blue Economy in June 2016 and the establishment of a Blue Economy Implementation Committee in January 2017. Further commitment has been demonstrated by the government through establishment of a Blue Economy ministry in the end of 2022. While maritime sectors feature prominently in the national debate on the development of the Blue Economy, the economic potential of inland water bodies has also received attention. This reflects an approach to the Blue Economy outlined in 2050 Africa's Integrated Maritime Strategy (2050 AIM Strategy) that includes inland lakes and waterways as an integral component of the continental Blue Economy.

Blue economy in the country was given pre-eminence in the President's speech on December of 2020 during the national launch of the New Ocean Action Agenda. The President reiterated that the ocean economy is a smart investment that can deliver social, economic, and environmental benefits to our people, and that Kenya is keen to fully realize the potential of its Exclusive Economic Zone (EEZ) to enhance development and productivity while protecting the marine resources. He also lauded the coastal County Governments through the coastal economic bloc, '*Jumuiya ya Kaunti za Pwani (JKP)*', comprising of Mombasa, Kwale, Kilifi, Tana River, Lamu and Taita Taveta for identifying the ocean and blue economy as one of three value chains to prioritize in their county development plans. Although Kenya has a relatively short coastline of about 640km, the total exclusive economic zone covers 142,400 square km, with a further 13,600 square km of inland lakes. The Lake Region Economic Bloc is also making strides in developing the inland blue economy in the region and has prioritized the blue economy as a key economic pillar. Some of the developments highlighted by the President in achieving and promoting sustainable utilization of Kenya's ocean resources include; implementation of policies aimed at tackling the challenge of ocean pollution especially from plastic waste, reconstruction of the Liwatoni Fisheries Complex, training of 1,000 fishermen, setting up of Bandari Maritime Academy, and the launch of the Kenya Coast Guard Service. In addition, the Government banned the use of polythene carrier bags and single use plastics in all protected areas including beaches and national parks. The Government is also working with communities in conservation efforts e.g. restoration of the mangrove forests and conservation of parks. Despite the significant potential for the country's Blue Economy, there are challenges related to environmental sustainability, maritime security, and inclusive development.

### ***1.3 Objective and Scope***

Given the foregoing discussion, the Maritime Centre of the University of Nairobi with support from the Nairobi Convention designed a study to:

- 1) Appraise the current contribution of different blue economy (ocean and inland) sectors to Kenya's GDP;
- 2) Assess the values of these sectors and potentials for further development and investment;
- 3) Identify the policy and governance gaps in each sector;
- 4) Make recommendations on the policy tools that can support the development of a sustainable blue economy in Kenya.

This study will cover both ocean and inland blue economy sectors. The aim is to have a comprehensive understanding on the current value of blue economy to Kenya's economy and determine what needs to be done to further develop the sector.

### ***1.4 Approach***

In developing this synthesis report, primary and secondary data were collected. Primary data were collected through key informant interviews (KIIs) and field visits. KIIs were done with several players in the different blue economy sectors considered in this study. In the marine and coastal sectors, the KIIs were mainly done through phone calls to people with information on the sectors. For the inland blue economy sectors, site or field visits were done to Lake Naivasha, Elmentaita, Nakuru, Baringo, Bogoria, and Victoria. Observations on the developments around these Lakes were beefed up with KIIs from KMFRI, Lake Bogoria National Reserve managers, and other institutions in charge of the lakes. This was supported by interviews from BMU members along the Lakes. Secondary data were collected through literature review from several past and current documents. These included research publications, conference papers, UN reports, concept papers published by various independent organizations as well as non-governmental organizations, and policy documents.

## **2: Potential for Development of Blue Economy Sectors in Kenya**

Kenya is endowed with rich ocean and inland blue economy resources that encompass a range of productive sectors including capture fisheries, freshwater aquaculture, mariculture, and non-fisheries maritime sectors such as ports, harbors, and maritime transport, coastal and marine



tourism, offshore oil and gas, coastal agriculture and forestry etc. Innovation and growth in the blue economy sectors has a great potential to contribute to higher and faster GDP growth in Kenya, and serve as a foundation for sustainable development through provision of food, energy, transport and other products and services in Kenya.

### ***2.1 Marine fisheries, aquaculture and mariculture***

Production from freshwater aquaculture and mariculture has been propelled by dwindling capture fisheries. Kenya's Gross Domestic Product at current prices in 2019 was estimated at Ksh.9.74 trillion (US\$ 97.4 billion) with the highest sectoral contribution being from Agriculture, Forestry and Fisheries sector accounting for over a third of the GDP. The fisheries sub-sector however, made a relatively low contribution of 0.05% to total GDP (KNBS, 2020). The sector has sub-sector has recorded growth in the contribution of fishing and aquaculture, which grew steadily from Ksh. 34.9 billion in 2016 to Ksh. 48.82 billion in 2019. Catches from the marine waters increased during the period resulting in corresponding increase in earnings. The per capita seafood consumption in Kenya is estimated to be 3.4 kg. Even though landing statistics under-represent the actual fish landings from the marine waters (Ochiewo et al., 2018), production from marine fisheries is much lower than production from freshwater bodies in Kenya. Marine and freshwater fisheries, aquaculture and mariculture are an important source of livelihood to the local communities that depend on it for food and income. Marine fisheries in Kenya is either artisanal, semi-industrial or industrial. Besides primary fishing, other important fisheries related economic activities include fish trading, processing and distribution of fish catches to the local markets along the coast. These activities are carried out by both men and women, with women doing most of the trading at the fish markets, where they also play the important role in the processing and distribution chain (Ochiewo, 2004). Mariculture, the cultivation of aquatic animals and plants in marine and estuarine (brackish) waters, was introduced to address the widespread poverty and livelihood needs of coastal communities and bring about development in the rural coastal areas (Ochiewo et al., 2020; Mirera and Ngugi 2009). It employs mainly women (Odhiambo et al., 2020) and therefore contributes to empowering women as owners of farms or as important actors in fisheries value chain and marketing; thus participating in societal decision making (Hetch et al., 2006; Wakibia et al., 2011). The seaweed farming in Kwale County and mud crab (*Scylla serrata*) farming at Dabaso and Che Shale in Kilifi County are classic cases of successful mariculture initiatives that provide livelihood and income to the local communities. Proceeds from seaweed farming are used to pay for their children's school fees, acquire household assets, build

houses and supplement their family's budget.

*Potential for development of Marine fisheries, aquaculture and mariculture*

1. Management of capture fisheries is expected to improve tremendously with the support of the new World Bank funded project, the Kenya Marine Fisheries and Socioeconomic Development Project (KEMFSEDP) which aims to support efforts to leverage emerging opportunities in the Blue Economy with the objective of improving management of priority fisheries and mariculture and increasing access to complementary livelihood activities in coastal communities. The project will strengthen the management of priority fisheries to secure stocks at sustainable levels of harvesting thereby enhancing coastal livelihoods.
2. Kenya has also adopted the Ecosystem Approach to Fisheries management (EAF) as move towards sustainable utilization of fish stocks and enhancing ecosystem functioning. The positive offshoots of EAF management will need to be demonstrated to stakeholders, especially in the artisanal fisheries, to encourage its acceptance and support at community level.
3. To improve capture fishery further, a number of challenges need to be addressed. These include improving infrastructure, trained manpower and scientific skills to fully assess marine resources; and provision of data to support full description of the fisheries particularly in the Exclusive Economic Zone (EEZ), although much progress has been made by the Kenya Marine and Fisheries Research Institute (KMFRI).
4. The provision of basic information on commercial fisheries species is also incomplete, and more information is required to describe their biological characteristics and reference points, distribution patterns, fishing pressure and stock status.
5. A few commercial fisheries species have effective management plans while most are at risk of overexploitation by a growing human population in the coastal areas. The pressure of environmental changes on fish stocks and ecosystem functioning are not also adequately understood, and have further been worsened by global climate change with the associated changes in temperature, pH, and sea level.
6. There is a great potential in aquaculture in Kenya due to diverse water resources ranging from brackish to fresh and marine waters which can be harnessed for aquaculture

development. Kenya is also endowed with a 640 km coastline, a territorial sea extending 12 nautical miles and an Exclusive Economic Zone that spans 350 nautical miles. The large expanses of brackish water at the Tana River delta and Athi-Sabaki River estuary, other rivers and small water bodies can also be utilized for coastal aquaculture.

7. Despite mariculture registering some growth, it has not realized its financial viability and ecological potential because of several reasons: challenges of inadequate or seasonal availability of seed and feed, inadequate extension services, ineffective monitoring and evaluation planning and execution embedded in their operations to keep project activities on track, donor syndrome that has been created among project beneficiaries by establishment of small-scale projects that do not have full ownership, impact of donor driven conservation projects, lack of capital investments, lack of or inadequate access to market and limited technological capacity, and small scale operations that do not allow economies of scale. In the year 2009, an Economic Stimulus Programme was initiated by the Government of Kenya to establish a vibrant aquaculture industry but the Programme did not support mariculture since it mainly focussed on freshwater aquaculture (Odhiambo *et al.*, 2020; Munguti *et al.*, 2014).

## ***2.2 Coastal and marine tourism***

The tourism industry is among the significant contributors to Kenya's economic development and most economies in the world, both developed and emerging. In Kenya, the sector is a crucial driver of economic growth and development, accounting for 8.2 % of total GDP in 2019 (WTTC, 2020). The sector also contributes to a total employment of about 1.1 million people (Ministry of Tourism & Wildlife, 2018), besides creating forward and backward linkages with other sectors of the economy, adding its contribution to about 1.6 million jobs, or 8.5% of total employment (WTTC, 2020). As the third-highest contributor to GDP, Kenya's tourism is being promoted by the government as a source of economic growth and poverty alleviation. It is also a cornerstone of the country's Vision 2030. Kenya's tourism offers memorable products in its three major product lines of safari, coastal, and business and conference travel. Among the subsectors of the ocean economy, coastal tourism is the largest contributor accounting for about 65% of blue economy contribution, followed by marine tourism with around 28%. Most of the other subsectors' contribution are way less than 1%.

### *Potential for development of Coastal and Marine Tourism*

1. *Cruise ship tourism*: Kenya has the edge over other countries on the Indian ocean coast and is ideal for cruise ship tourism destinations. This type of tourism attracts high net worth tourists, with industry experts pointing out that 400 cruise tourists are equivalent to 4000 air travel tourists. The development of cruise ship tourism infrastructure is vital in promoting and popularizing Kenyan coastal and marine tourism. In this regard, the construction of the cruise ship terminal at the Mombasa port has been completed but under-exploited as it is not occupied all the time. Investors can use the facility to offer trips for tourists arriving at the terminal, from Mombasa to other places like Zanzibar, Pemba etc. The proximity of the port of Mombasa to Moi international airport makes it ideal for cruise-fly services. There are also well-developed hotels and beaches of international standard. The seaport is also close to some of Kenya's iconic game reserves and national parks which also makes it possible to have cruise-safari.
2. *Water sports tourism*: The country has extensive beaches and coastal lines protected by the continental shelf, making it relatively safe for water sports tourism. Some of the activities that are taking place include Skydiving at Diani Beach, snorkeling at Malindi, windsurfing, Kite surfing, and jet skiing, among others. Although these activities exist, their potential has not been fully exploited due to a lack of equipment and skilled human resources. The coastal counties can partner with the national government and market Kenyan coast as one destination and organize annual events like sky diving. This will be quite inviting, attracting tourists from across the globe to participate or witness an annual sporting event. This could serve the hugely youthful regional and domestic population. It will also help reduce the seasonal effects of coastal and marine tourism in Kenya.
3. *Deep-sea Sport fishing, sea safari, and mountain trips*: Sport fishing is attracting more tourists, both domestic and international. Although this is existing, the current methods are unsustainable as local fishers are fishing along the shores and fish resources are slowly depleting. There is need to build capacities of local fishers through training to fish in the deep seas. Moreover, investing in right boats to enable fishers go into the deep seas is imperative as many fishers currently use canoes. With adequate investment in the right fishing equipment and training, there will be potential for sport tourism where stakeholders can organize and market fishing expeditions.
4. *Cultural Tourism /Heritage tourism*: The Kenyan coast has a long and exotic history. To promote cultural tourism, the coastal county governments can work with local communities

and organize events that allow local people to show case their cultures. Harnessing the opportunity presented by the established Beach Management Units (BMUs) will enhance achievement of this goal.

5. *Thematic Itineraries*: The Kenyan Coast is among the oldest trade ports where early explorers, missionaries, merchants, and sailors docked for supplies and rest as they continued with their missions at sea and inland. For those tourists intending to revisit these old trade routes, for example, Mombasa and Malindi's coastal town will be ideal and promote coastal tourism. This could target both domestic and international tourists. There is need to market the country as an ideal destination for such activities.
6. *Health and Spa*: Health and spa facilities are expanding along coasts, including alleged medicinal and therapeutic qualities of the sands and clays and thermal waters. Upgrading the facilities to ensure international standards could help attract more tourists to the coast. Domestic tourists also are increasingly demanding for such facilities as the growing middle class and high net worth individual's value for leisure increases.
7. *Complimentary Activities*: By expanding activities such as wine-tasting, gastronomy (food and culture), conferencing, special events, festivals, health, and well-being. Enriching and diversifying the tourism products can reduce seasonality in many coastal and marine destinations. These could prove vital for the sector's post Covid-19 recovery.
8. *Underwater hotels and sea-floor/floating resorts*: These are being developed in many parts of the world. The Kenyan tourism industry can learn from advances in construction know-how developed by other emerging ocean industries. This is an area that the country can build on to diversify and enrich coastal and marine tourism. There are no underwater hotels or sea flow resorts on the Kenyan coast and areas, and that could be exploited to target both international and domestic high net worth clients.
9. *Deep-sea tourist expeditions*: Deep-sea expeditions are not common on the Kenyan coast. With the increasing popularity of deep-sea expeditions, Kenyan coastal and marine tourism could take advantage of the rich ocean resources and design and starting offering it to attract more tourists. Locations range from shipwrecks to hydrothermal vents and other beautiful deep-ocean ecosystems.
10. *Marine Ecotourism*: Marine Parks, underwater archaeological parks, coral reefs, and other locations with archaeological, ecological, or historical value can be exploited

sustainably. Kenya is host to such resources that remain unexploited. This can be an attraction to academia, researchers, and explorers, both domestic and international.

11. *Recreational boating and Yacht Tourism*: This brings particularly high-value, low-impact tourism to coastal regions, stimulating the local hospitality, transport, construction, and supporting trades. It also offers a particularly valuable opportunity to retain or revive the economies of smaller ports and port communities at risk of being bypassed due to changes in commercial marine and fishing traffic. This could be ideal for Lamu, which now has a major new port, and other smaller islands.
12. *Capacity Building, Education and Training*: The coastal and marine tourism sector has often had difficulties attracting or maintaining enough skilled personnel to work in its various sectors due to both seasonality and lack of career opportunities. This can lead to problems in service quality and erode destination competitiveness. A better developed marine tourism sector will attract and keep staff with the requisite skills.
13. *Improved level of innovation*: Changing consumer values have increased the demand for attractive and sustainable products that provide unique and customized experiences. It is important to offer demand-driven mix of established and innovative coastal tourism products for mass, midscale and boutique segments drawing niche and special interest segments (that is, cultural heritage, adventure, etc.); but a lack of a culture of innovation constrains entrepreneurship and the creation of new product development, hindering the competitive advantage required to secure a more significant market share.
14. *Streamline licensing, regulations and taxation*: There are many different legislative instruments that regulate the tourism sector, including coastal and marine tourism; which are further complicated by the overlapping functions of many public organizations regulating the sector, associations and civil societies representing different markets. The many bureaucratic procedures and controls including policing of licenses can undermine the competitiveness of coastal and marine tourism operators in Kenya. In addition, heavy taxes on essential inputs necessary for improving their quality of service also compromises growth and profitability of the sector. This needs to be streamlined to increase competitiveness of the sector. The sector needs a one stop shop where investors can process all the licensing documents and procedures they need.
15. *Collection and management of information/data*: Reporting of marine and coastal statistics is not easy, and neither is it a standardized task (Miller, 1993 and Orams, 1999). There is

substantial uncertainty concerning the data needed for public policy formulation and private sector decision-making regarding coastal and marine tourism. Information is often incomplete, outdated, or inconsistent, which makes country comparisons challenging. There is a need to identify and address the data gaps to improve planning and destination management. In particular, tourism statistics are critical for policymakers and businesses to understand tourism sector performance and emerging trends. A lack of specific and sectorial information restricts networking opportunities in coastal and marine tourism, particularly for SMEs. An improved collection and management of coastal and marine tourism data will help in decision making.

16. *Tackling climate change*: Rising sea levels associated with climate change will cause coastal erosion, loss of beach area, higher costs to protect and maintain waterfront tourism facilities. Rises in sea surface temperature cause coral bleaching, marine resource degradation, and species extinction, reducing destination attractiveness. Changes in weather patterns will severely damage or destroy tourism attractions. The Government enacted a Climate Change Act, 2016, but more needs to be done to mitigate the impacts of climate change on coastal tourism.
17. *Reduce financial constraints*: Constraints on investment funding impede the potential growth of coastal and marine tourism (Gossling, 2006). There is limited or no access to credit to support investments and innovation. Banks often lack the knowledge required to assess business plans and make risk assessments in various tourism market segments. Greater attention must be paid to the Public-Private Partnerships (P3) to support coastal and marine tourism (UNDP, 2012).
18. *Reduce leakages and offshoring*: A key requirement for sustainable coastal and marine tourism development is for the local communities to benefit from the industry, thereby alleviating poverty, improving livelihoods, and encouraging better management and conservation practices by the local communities. However, high leakages of tourist expenditure occur through the high import content of tourists' consumption bundle as a result of a narrow production base in many coastal and marine destinations (Gossling, 2006). Measures will be required to reduce the amount of expenditure that is leaking out of the system.
19. *Manage pollution*: Water pollution is due to waste disposal practices such as oil spills, while

air pollution is mainly due to gas emissions of cruiseships (Copeland, 2008; Brida and Zapata, 2010). These cause environmental decline in the coastal and marine resources. Other sources of pollution include plastic bags and single use plastics. The Government has banned the use of plastic bags including on beaches and other areas. More will be required to control other forms of marine pollution.

20. *Improve safety and security*: Tourism development depends on safety and security. Tourists avoid insecure destinations (Sharifina, 2014). In the past, Kenya's tourism sector suffered from incidents of insecurity. Some of the major sources of this insecurity are terrorism, political instability in the region, and crime which led to increasing cross-border traffic in small arms. Other sources of insecurity include cattle rustling, income inequalities, and unemployment. This calls for strengthening of the Tourist Police Unit (TPU).
21. *Strengthen tourism marketing*: Promotional and marketing weaknesses undermine tourism development. Having numerous international promotional campaigns and marketing representatives would attract more tourists and improve their perception of the tourist destination. There is also need for integrated and coordinated campaigns to inform potential tourists about Kenya's attractions and facilities, including those in the coastal zone. Several efforts have been made by the Government but more needs to be done to market the country.
22. *Reduce language barriers*: The shortage of tourist guides who speak a foreign language is a significant problem as many tourists expect assistance during travel. Therefore, to influence tourist experience, good communication skills could significantly enhance tourist development. Training on languages needs to be included in the curricula of students taking tourism courses.
23. *Reduce coastal land alteration*: Resource extraction such as hydrocarbon and energy infrastructure (pipelines) cause increased environmental impacts and pressures to the coastal and marine ecosystem. The potential for offshore and other forms of mining in the coastal zone is likely to create environmental pressures on the different coastal and marine ecosystems supporting tourism. Marine spatial planning is critical in ensuring that specific areas for certain economic activities are demarcated to reduce excessive coastal land degradation.



24. *Manage global communicable diseases:* Covid-19 is one of the greatest challenges facing the world today. Among the measures economies put forward was to ban international travel hence threatening the achievements made in the travel and tourism industry. The tourism industry is the hardest hit by Covid-19. Lessons learnt from Covid-19 could be used by the country to prepare for potential future pandemic which might impact the sector.
25. *Improve coastal infrastructure:* The government has continually improved infrastructure in the coastal areas by constructing new roads and bridges to improve connectivity. Electricity supply has also improved although hotels are supplementing this with solar generated power. Telephone connectivity has also improved over the years. The main challenge is in marine tourism because of limited port infrastructure, which restricts cruise tourism by limiting the number and size of vessels that can visit. Other gaps include lack of a clear cruise homeport in the region; poor roads leading from ports to crucial tourism attractions, limited opportunities for local businesses to offer services to cruise passengers; inadequate visa and immigration processing services in port areas; and a lack of environmental regulations for cruise ships (UNWTO, 2013). Gaps in any of the cruise destinations hinder the entire region's ability to attract more cruise ships. These are areas of potential improvement in building a stronger coastal and marine tourism sector for the future.
26. *Upgrade water and sanitation services:* Hotels and lodges in coastal Kenya and elsewhere in the country have historically suffered from poor drinking water service and most hoteliers and lodge operators have developed backup sources, knowing the generally poor quality of public service. On sanitation, remote lodges and camps certainly do not have access to sewerage but can provide adequate sanitation services through septic tanks (such as Imhoff tanks). Thorough and proper sewage treatment continues to be a challenge especially along the coast with immediate to long-term negative consequences if not addressed. The issue of safe drinking water and sanitation especially in the coast are to be addressed in coastal and marine tourism to thrive.
27. *Improve hospitality and other related services:* The hospitality and other related services include accommodation, food, and beverages, entertainment, etc. The unavailability of accommodation facilities and few luxury hotels (less than 20% being 4-5 star) distort tourist expectations. To increase competitiveness, there is need to expand product choice

and improve on quality of facilities and services. There is also need to address the unexploited and underdeveloped products. With the increase in visitor arrivals, the bed occupancy levels during the peak season are close to full capacity and the reverse occurs during the low season. As a result, the country has to grapple with the rapid growth in demand, principally due to limited investment in tourist accommodation. It would be imperative to substantially increase investment in accommodation in order to meet the ever-increasing demand for the Kenyan products.

28. *Reduce pressures on resources*: The coastal population is growing at a rate of 3.7% annually and exerts significant pressure on fisheries resources. High dependence on natural resources is an essential factor that increases the demand for fisheries resources as well. The use of destructive fishing gears in artisanal fisheries amplifies the pressure exerted on these resources. The prohibited fishing gears such as beach seines and monofilament gill nets result in capturing of large quantities of immature and small-sized individuals in this fishery (Fondo *et al.* 2014; Munga *et al.* 2014b; Osuka *et al.* 2016). Incentives e.g. command and control or market based can be instituted to control fish overexploitation.
29. *Inadequate implementation of the National Oceans and Fisheries Policy, Prawn Fisheries Management Plan, and the Integrated Coastal Zone Management policy* (GOK 2008, 2010, 2013), artisanal fisheries resources along the entire Kenyan coast will still experience much exploitation and various management issues. The responses are characterized by a lack of commitment in implementation and enforcement (Ruwa 2006; Hoof and Steins 2017). Besides, the fisheries policies are developed with no consideration regarding economic, social, biological, and environmental sustainability, thus encouraging conflicts among and between fishing communities (Ruwa 2006). Implementation of existing policies, guidelines and regulations need to be taken up by the relevant authorities.
30. *Improve marine ecosystem health*: The Ocean Health Index measures the ability of oceans to sustainably provide food, artisanal fishing opportunity, natural products, carbon storage, coastal protection, tourism & recreation, livelihoods & economies, sense of place, clean waters, biodiversity. This measure for the marine ecosystems in Kenya is on the decline due to overexploitation of marine ecosystem services. This needs to be slowed down if the benefits of the blue economy have to be fully realized in the country.
31. *Open sky policy*: Such a policy will encourage many airlines to land in Mombasa without

having to transit through Nairobi. This will be a motivation to tourists since many visiting the Coast usually have no business in Nairobi. Currently, there are 38 destinations worldwide mainly in the Caribbean and Asia that have an Open Sky Policy and are beating Kenya in coastal and marine tourism just because of this policy.

32. *Joint collaborations:* Currently, many counties have dormant tourism ministries. There is therefore need for coastal counties to collaborate with National government and market the destination (Kenyan Coast) as one, instead of each county marketing separately. This will be more inviting to tourists since there will be diverse activities marketed in one destination. There is also need for partnerships between communities, public institutions like KWS and private investors. Such collaborations will reap more benefits and conserve the ecosystems.

33. *Provide investors with land:* Currently, there are opportunistic landowners within the Kenyan coast who are not utilizing lands and who sell land at exaggerated prices. This is a turn-off to many investors. The government should devise a way to provide investors with land for investment so that their money goes directly to investing instead of to buy land. This can be achieved through land banking<sup>7</sup>. Such a measure will attract more investors and thus boost local economies.

### ***2.3 Ports, harbors and maritime transport***

According to the Economic Survey (2020), Africa remained the leading destination of the Kenya's exports in 2019, accounting for 37.6 percent of the total exports at Kshs 224.2 billion, with exports to EAC partner states accounting for 62.6 per cent of the total exports to Africa. The percentage share of total revenue from this subsector to overall GDP is about 1%. Port revenues have reported a remarkable performance in total revenues which have been growing at average 8% per annum in recent year on average. Operating revenues have also reported similar trend. The laudable increment is attributed to increase in throughput and investments in hard and soft port infrastructure including improvements in modal transport. These two results are significant and call for measures geared towards promotion of exports and imports on the one hand, and port development, efficiency and logistics enhancement on the other. Hinterland multimodal infrastructural development coupled with stakeholder integration in port and port-related activities will go a long way into increasing port revenues.

*Potential for development of Ports, harbors and maritime transport*

1. *Improved export and import Trade:* With improved performance, there is room for improved Kenya exports to EAC, Africa and the European Union (EU) region; and imports Asia i.e. China, India, United Arab Emirates (UAE), Japan and Saudi Arabia
2. *Political-socio-economic regional linkages:* Regional Economic Communities have promoted trans shipment and hinterland multimodal infrastructural development have been enhanced through East African Community (EAC). The EAC boasts a total population of more than 150M and a combined GDP of about \$150bn. These linkages were further enhanced by Kenya's membership to the COMESA. Recently, Kenya has ratified the AfCFTA agreement. Integration will allow easier access for effective market demand which will in turn ensure sustained economic growth and improved economic efficiency. A larger regional market will lead to economies of scale, lower transaction costs, increased competition and greater attractiveness as a destination for foreign direct investments.
3. *Goods Transportation, Connectivity, and Market Capture:* The number of vessels visiting a port is dependent on several things among them port connectivity as well as market capture. The average port days, given by the ratio of port days divided by the number of vessels, was 3.7 days. These indicators are important for port efficiency performance. It is important to note that Kenya is a member of the Northern Corridor member states and it has been shown that these countries are poorly interconnected with trade transportation regionally and internationally. This negatively affects vessels calls and contributes to poor port performance.
4. *Improve cargo throughput:* General cargo traffic is dominated by imports which accounted for more than 80% of total cargo handled at Mombasa Port over the 2016-2020 period. This trend has been maintained in the last few decades. Out of total import cargo, about 30% is transit cargo destined to hinterland countries, which has shown a gradual steady increase over time. The overall cargo traffic at Mombasa Port has been increasing due to growth of the Kenyan economy as well as those of the landlocked countries. The large share of imports in total throughput is attributed to the general nature of the East African economies who are net importers. Port of Dar-es-salaam which is the main competitor to Mombasa Port is attracting cargo to these destinations. This calls for improved port performance in Kenya.
5. *Cargo Traffic in Inland Container Depots:* The Port of Mombasa also operates the

inland container depots (ICDs) in Nairobi, Kisumu, Eldoret and most recently Naivasha with the Nairobi ICD being the busiest. As already pointed out in other analysis on cargo traffic, import cargo dominates ICDs operations. There are minimal operations at the Kisumu, Eldoret and Naivasha ICDs but this is envisaged to change in the not-too-distant future.

6. *Environmental Management:* The ports, harbours and maritime transport activities have significant negative environmental impacts which if not addressed can curtail the socio-economic benefits of the blue economy. As such, KPA manages the marine and terrestrial environment in accordance with the IMO Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and Environmental Management and Coordination Act No. 8 of 1999 (EMCA). The above is achieved through the implementation of Mombasa Port Resilient Infrastructure Program (MRIP), under the Green/Eco- Port Policy. There is room for improved environmental management in the Port/
7. *Increased berth performance:* There is a high average berth occupancy rate across all the terminals; an indication of congestion at the port which in turn leads to higher vessel delay surcharges, higher cargo handling charges and higher other KPA related charges. This has a detrimental effect on freight charges which in turn tend to increase overall transportation costs. This also has a negative spillover effect on the time spent at the One Stop Centre (OSC) and also at the Document Processing Centre (DPC) thereby increasing logistics costs. A high berth occupancy rate also increases berth dwell time. In addition to increasing transportation costs, these negative effects of high berth occupancy rates tend to increase the cost of doing business which makes production uncompetitive. The causes of the high berth occupancy rates include: insufficient berths; few or unreliable gantry cranes, and insufficient, inadequate or unreliable container yard equipment etc. which need improvement.
8. *Ships waiting time:* The average waiting time per ship is predominantly high, at 2.5 days per ship, but this trend is also characterized by large variations. This indicates that the cargo handling process is not only inefficient but also unreliable and unpredictable. Available evidence indicates that erratic waiting times are seasonal and are worse during the rainy seasons possibly an indication of the poor quality of the road infrastructure. This in turn leads to congestion at the port due to the slow off-take of cargo. This has implications

for vessel turnaround time.

9. *Ship turnaround time:* The ship turn-around time is a summation of two-time limits starting from the time the ship arrives at the berth and time spent as it is served up to the time it departs the port. Ship turnaround is an important indicator of overall port efficiency and is influenced mainly by arrival rates, waiting times and cargo off-take. From an institutional point of view, the situation was brought about by a multitude of factors that included inadequate and aged facilities, poor hinterland transport connectivity, inefficient document and cargo clearance procedures and slow cargo loading/unloading.
10. *Address congestion:* From a management point of view, port operations are hampered by bureaucratic tendencies, political interference, and insistence on increases in labour force productivity and port throughput with little attention being given to internal capacity improvements. A comparison with other ports in the world indicates that the Mombasa Port needs to address this issue in order to operate competitively.
11. *Berth length for calling vessels:* Most of the ships visiting the port are longer than the designed Berth Length Overall (LOA). This is true across most of the berths. This implies that the berths cannot be efficiently and productively used due to the inadequate length. New and the construction of the 2nd Container terminal is set to increase throughput by a further 1 million TEU, while dredging of the lead channel will allow bigger vessels of capacities exceeding 20,000 TEUs to call at the port. In addition, the implementation of activities envisaged in the Mombasa Port Master Plan including Dongo Kundu as well as those under the LAPSET Project will enhance port performance. The development of small ports and ICDs will go a long way into reducing pressure on KPA.
12. *Shortage of Equipment:* This slows down quay and yard operations, sometimes even hampering delivery operations, especially for ICD bound cargo. The port needs a major audit of its quay equipment, such as ship-to-shore (STS) gantry cranes, transfer equipment such as tug masters and straddle carriers, and yard/stacking equipment, such as reach stackers, forklifts and rail mounted gantry cranes (RMGs). The audit should be carried out with the sole purpose of identifying equipment suitability, availability and if equipment is adequate to meet the demands of the projected traffic. Forecasting will be of utmost importance in procurement of such equipment, to ensure man-hours or moves are

adequate to keep up with the operations at the port, and that equipment will not breakdown frequently, causing delays in operations.

13. *ICT infrastructure:* ICT plays a key role in improving communications and needs to be enhanced, especially because of the push for paperless trading and introduction of systems to improve processes and service delivery at the port. Such systems include Kilindini Waterfront Automated Terminal Operations System (KWATOS), Simba System, KenTrade and the newly introduced Integrated Customs Management System (ICMS) system. All clearance takes place online and should there be downtime in any of the above-mentioned systems, then operations are negatively affected, leading to slowing down of service delivery, increasing cargo dwell time at the port.
14. *Automation of port operations:* In a bid to improve service delivery, ports across the globe are adapting to automation. KPA should follow suit, albeit in phases. Automated ports are utilizing artificial intelligence (AI) to control operations, optimization of operations are done by the use of big data and advanced analytics, and employment of dynamic scheduling. Equipment manufacturers, such as Kalmar, have introduced technologically advanced equipment, and respective transport layer security (TLS) and terminal operating system (TOS) software, which make full use of interconnectivity through internet of things (IoT), realized because of the current 4<sup>th</sup> industrial revolution, termed Port 4.0. This concept minimizes reliance on human dependence and interaction, thereby reducing human error and labour costs.
15. *Adequate port staffing:* KPA needs to maintain optimum levels of staffing to ensure that all critical areas are manned adequately and avoid instances where they may be short of staff, hampering service delivery. The port being a complex system, some duties need staff to be present in person, hence the need to ensure that staff are always present, as and when needed.
16. *Migrate from service Port to landlord Port:* At present, KPA owns the entire port infrastructure and undertakes all port operations. There is no separation between public and private sector roles. Consequently, it becomes quite difficult to strategically plan port management and development. The way out of this institutional dilemma is to undertake an administrative reform that ensures that the port is migrated from a Service Port to a Landlord Port. The new port management model will require, if and when

adopted, the acquisition of new project management, implementation supervision and coordination skills including procurement, contract management and transaction advisory skills, inter alia. Stakeholder integration, corporate and development communication including monitoring and development for results need to be integrated urgently and in a systematic and programmatic way.

17. *Development of port infrastructure, equipment, multimodal transport, ICT and others:* This will improve the sub-sector connectedness with other sectors such as agriculture, aquaculture and forestry, tourism, manufacturing, mining, energy, and water and environment, inter alia. It will also increase port productivity levels, reduce berth occupancy, waiting and turnaround times and other logistical bottle necks. The government should also invest more in the infrastructural developments of the hinterland to provide more connectivity between the ports, local population and the neighbouring countries. This will lead to creation of employment opportunities, reduced overload of the port of Mombasa and improvement in efficiency in cargo transportation corridors.
18. *Develop new international port:* There is need for implementation of a new international port development study in order to cope with the existing and forecasted demand for port and maritime transport services. Whereas the Port of Mombasa will be improved both structurally and capacity wise, nevertheless the advantages for the development of a state-of-the-art international port, possibly in Malindi cannot be gainsaid. In addition, spatial rationalization, based on the preparation of spatial utilization plans needs to be undertaken in order to improve capacity, efficiency and productivity.
19. *Security and safety:* There is to need to guarantee security and safety of both persons and goods within the maritime transport, harbours and ports system to encourage more investments and utility of the maritime transport system and its hinterland connections. Studies have shown that cargo owners prefer road transport as opposed to railway, hence road access development to the ports should be given priority.

#### ***2.4 Offshore oil and gas and Renewable energy***

The potential is estimated at several billion barrels of oil and trillions cubic feet of gas on a gross, un-risked, best-estimate basis. The offshore potential has attracted considerable investment from companies looking to survey and explore the Lamu basin for oil and gas (NOCK, 2012). A study of the Lamu basin was initiated by National Oil Corporation of Kenya (NOCK) in 1991 as



part of a long-term strategy to re-examine the existing geological, geophysical and geochemical data relating to the sedimentary basin. The study was completed in 1995 and its results were used to sub-divide the Lamu basin into smaller exploration blocks with each block having its unique characteristics. Thereafter, there were enhanced exploration efforts that generated fresh interests in the offshore Lamu basin and resulted in the signing of seven (7) production sharing agreements between 2000 and 2002. All the offshore exploration blocks have been defined by their longitudes and latitudes, their sizes and block maps. Offshore oil and gas exploration has been on-going with mixed results. A recent exploration well which was drilled offshore, close to the Exclusive Economic Zone border with Tanzania has met an oil column; the first ever oil discovered off the East African coast, with high prospects for finding commercial quantities of oil in the area particularly in the Lamu Basin (UNEP and WIOMSA, 2015). If the identified oil and gas reserves continue to yield even a small portion of the expected outcome, then Kenya will gain from income earnings and savings on fuel imports that will significantly change the national economy and contribute to poverty alleviation among the local residents.

Renewable energy has the potential to contribute to the economy and wellbeing of communities in coastal Kenya. The main sources of renewable energy in the region are solar, wind, tidal and wave energy. The tidal energy potential exists along the Kenyan coast due to an approximate 4 metres spring tidal range, which creates the necessary water velocities for operation of submerged turbines that require water currents of 1.0 to 2.5m/s (UNEP and WIOMSA, 2015). This energy has so far not been tapped. Wave energy has also not been tapped but there is potential for it in Kenya. Solar power is increasingly becoming important along the coast of Kenya. Kenya has an average of 5-7 peak sunshine hours, part of which is convertible into electricity due to the dispersion and conversion efficiency of photovoltaic (PV) modules. The total potential for photovoltaic installations is estimated at 23,046 TWh/year. Solar power is a viable option for rural electrification and decentralized applications. The government has for some time subsidized the photovoltaic stand-alone systems for households and public institutions. As part of the medium to long term plan to tap on this potential, the government aims to install 500 MW and 300,000 domestic solar systems by the year 2030. Already, the use of solar power has been taken up by a number of households in the coast of Kenya and it is also increasingly becoming important in the commercial and industrial establishments. Kenya also has promising wind power potential. The Kenyan coast, however, has lower but promising wind speeds of about 5-7m/s at 50 metres with a few installations in the Tana Delta and Lamu.

*Potential for development of offshore oil and gas and renewable energy*

1. Inadequate financial resources and technical capacity to undertake coastal and offshore oil and gas exploration on its own. The inadequacy in technical capacity is mainly in the areas of marine geology, petro-chemical fields and technological sphere. Further, there are limited capabilities in engineering, construction, logistics, and supplies, health and safety. The country can also improve budgetary allocations to promote the small-scale miners who dominate the mining industry and promoting offshore mining. There is an opportunity for higher education institutions, scholars and researchers to venture into the sector for data collection, mapping and even career building in the sector and inform the policy for sustainable development as well as equip the youth with the necessary skills to venture into the sector
2. The Government agencies that are charged with management of environment and ensuring compliance of mitigation measures and monitoring procedures associated with large projects such as offshore exploration are often lacking the technical capacity. Therefore, engaging incapacity building is fundamental for buy-in and participation, which is crucial to confidence building, transparency, and maintaining long term sustainability.
3. Existing good examples of world standard for sustainable mining such as the towards sustainable mining (TSM) initiative by the Mining Association of Canada (MAC) of 2004 which Kenya as a country can learn from and use to advance the sector. The Canada TSM has so far been adopted by Finland, Argentina, Botswana, the Philippines and Spain and can be adopted in Kenya too.
4. Efforts should be put in advancing understanding the oil and gas resources sub sector, the associated environment and the social aspects in order to address the pressures and opportunities created by oil and gas exploration activities. It is also critical to put in place an effective regulatory framework for oil and gas exploration to avoid occupational hazards that may occur if the exploration of the newly discovered oil and gas reserves is carried out with inadequate regulation.
5. The geo-political nature of offshore oil and gas is affected by the maritime boundary dispute with Somalia. Kenya's maritime sovereignty is being challenged by Somalia which instituted proceedings against Kenya at the International Court of Justice (ICJ) in 2014 (Hasan *et al.*, 2019).

6. There is need to develop and promote renewable energy alternatives for coastal Kenya. The development of renewable energy alternatives including marine based alternatives are weighed down by several constraints namely: inadequate long-term hydrological and meteorological data; inadequate transport infrastructure, the need to include local participation in order to develop acceptance; lack of locally available spare parts; insufficient electricity grid coverage; high dependence of rural communities on ecosystem services. These constraints should be mitigated if alternative renewable energy alternatives are to be realised.

### ***2.5 Coastal Agriculture***

The coastal region is unable to produce enough food to feed its population and has to import food from upcountry, thus poverty levels in the coastal counties are way above the Kenyan average poverty level. Agricultural activities along the Kenyan coast produce both food and non-food products for subsistence and commerce. According to Waaijenberg (2000), 25% of the coastal land is non-agricultural, 50% is suitable for ranching and 25% is suitable for crop farming. Irrigation farming contributes a high percentage of the coastal agriculture with main cash crops being sugarcane and rice. Most of the farming is rainfed implying that crop production is seasonal and characterized by abundance of food during the rainy season and scarcity during the dry season. Livestock production is mainly concentrated on the marginal lands of the coastal region, which accounts for some 69 percent of the total coastal area. The main food crops grown on the Kenyan coast include cassava, sweet potatoes, maize, coconut, cowpeas and rice, which are grown in irrigated areas, marshes and floodplains. Vegetables and tropical fruits such as citrus, mangoes, bananas, pineapples and watermelons are grown for both subsistence and export. Other crops grown mainly for export include cashews, bixa and sisal. The average farm size on the Kenyan coast is between 6 and 8 ha, and tree crops (cashews, coconuts, citrus and mangoes) occupy about 50 percent of the coastal arable land.

#### *Potential for development of Coastal Agriculture*

1. Identification of agriculture under the Kenya Vision 2030 to drive the economic pillar has put agriculture in focus as a centre of research and development and increased the allocated budget by the government. The coastal counties can take advantage of this and promote agriculture in the counties.
2. All the 6 counties in the coastal area have huge unoccupied lands especially in the rural

areas as people in the coastal areas are segregated in villages, towns, around the beaches and urban areas. These could be exploited for improved agricultural production especially for production of tropical fruits such as citrus, mangoes, bananas, pineapples and watermelons are grown for both subsistence and export, and cashews, bixa and sisal which are mainly grown for export.

3. There is availability of a large source of water, the Indian Ocean. Desalinization of this water would be key in solving the largest problem of water scarcity. This coupled with high adoption of water harvesting technologies for surface runoff through excavation of water pans, construction of earth dams, negarims, shallow wells, zai pits among others would provide the needed water for irrigated agriculture and livestock. According to AFA (2017) irrigation alone has the potential of employing 15 persons per acre. There is potential for expansion in irrigation in the coastal counties, which will lead to increased number of direct employments, and indirect employment.
4. There are many emerging agricultural innovations and approaches ranging from hydroponics to metal silos and use of technology such as mobile phone systems and TV and radio-based farmers training which could be exploited by coastal farmers for improved production. In addition, merging focus on value addition which could lead to diversifying of agricultural products in the market as well as reducing post-harvest losses.
5. Existence of collaborating institutions such as learning institutions, research organizations, UN and other international bodies could be harnessed for improved research, awareness creation, funds facilitation and training of agricultural professionals.
6. There is a large market and demand for agricultural produce that is ever-increasing due to increased population. According to the World Bank, globally, millions of people are either not eating enough or eating the wrong types of food, resulting in a double burden of malnutrition that can lead to illnesses and health crises.
7. The regional markets that have resulted from regional integration, e.g. the East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA), and trade liberalization are yet to be exploited to a significant level. Kenya has accreditation and membership to various regional and international bodies e.g. IFAD, FAO and many others. This allows the country to get accreditation and standardization for various agricultural

products alongside establishing partnerships to trade and negotiate produce.

8. Increased supportive incentives and favourable political climate in the last few years e.g., the ongoing allocation of title deeds to the land occupants in all the six coastal counties through the county governments and traditional leadership system can help promote investment in agriculture.
9. Improvement in education, health, security and infrastructure such as roads and communication in the coastal region especially in the interior areas being undertaken by the government will lead to more agriculture awareness and knowledge dispersal to the communities and easy access to the markets for sale of agricultural products. The county governments, NGOs and Community Based Organizations can conduct extensive awareness creation among the locals on improved, modern agricultural methods, which includes post-harvest management.
10. The country has an active and innovative system that has a history of offering micro-loans in remote rural areas coupled with mobile banking. These can enhance finance for agriculture from different sources for farm inputs, production and investment in value addition activities.
11. Coastal county governments should consider providing farmers with quality farm inputs at subsidized prices. Such farm inputs include fertilizer and the right seeds varieties which adapt well with coastal weather conditions.
12. The county governments in collaboration with the Ministry of Agriculture should set up collection points with efficient storage facilities like granaries for farm production so as to buy directly from the locals at a fair price to eliminate the middlemen who hoard farm products at the expense of the farmers. Additional storage spaces will be critical in managing surplus production and reducing postharvest losses.
13. Stakeholders in the agricultural sector should set up manufacturing factories in order to add value to agricultural produce since value added products fetch higher returns for the farmers and will create jobs for coastal communities.
14. There is need to improve research, especially demand-driven research, coupled with effective extension and delivery system of research findings.

15. Improve agricultural practices: There is siltation, pollution and eutrophication correlated to an excessive use of pesticides, fertilizers, and poor farming methods and farming e.g. poor agricultural land use practices for example in the Athi-Sabaki River Basin for instance, has resulted in the increased discharge of huge volume of sediments in Malindi Bay with far-reaching ecological consequences.
16. Address climate change: the varying temperatures and rainfall are affecting the traditional farming patterns but also leading to increased flooding, erosion, drought periods, inundation, sea water intrusion, rising salinity, storm surges which affect the farms located near the different water bodies. An example is the flooding during the year 2020 which flooded the aquaculture ponds leading to losses of the fish and mixing of water and loss of farm crops.
17. Invest in inputs quality control and inspection personnel to discourage unscrupulous businessmen from selling and stocking substandard and low-quality seeds and other farm inputs which causes low productivity to the farms discouraging the farmers.
18. Reduce transportation costs: majority of the population living next to the ocean depend largely on the ocean for their daily source of livelihood. This leads to the community depending on agricultural products from inland farming, and few coastal farmers that engage in agriculture provide agricultural produce e.g. eggs and cabbage fresh vegetables to the coastal communities at high prices, partly due to high transportation costs. Therefore, reduced prices would avail more food and reduce the high food poverty in the coast of Kenya.
19. Increase coastal agriculture for reduced pressure on the coastal fisheries and wetlands: The largest natural resource available in the coastal area of Kenya is the fisheries. However, there is high pressure on the ocean as source of fish leading to seasonal over exploitation. However, agriculture and aquaculture can reduce the pressure on capture fisheries and also provide fish during the low fishing season as fish is one of the staple foods for coastal communities.
20. Capitalize on increased demand for agricultural inputs and services and consumption goods and services: a variety of products are available in the market thus creating demand for provision of services such as veterinary services and even construction of roads to allow

transport of farm products to the market.

## ***2.6 Coastal and marine forestry***

The Kenyan coast is endowed with rich coastal and marine forestry resources that support the local and national economy. Coastal forests in Kenya are composed of mangrove forests, eastern arc mountain forests, and the lowlands terrestrial forests. The forests cover the coastal counties, including Lamu, Kilifi, Athi River, Kwale and parts of Taita Taveta and Garissa. Forestry and logging industry contributed about US\$ 1.2 million to Kenya's GDP in 2019. While recent figures on economic valuations on coastal forests are lacking, as of 2008, the 660 square kilometres of coastal forests were valued at US\$ 133 million while the 500 square kilometers of mangroves were valued at US\$ 500 million (UNEP, 2009). It is estimated that the formal forest sector in the country employs 18,000-50,000 people directly and 300,000-600,000 people indirectly making it a major source of employment particularly in the rural areas (MENR, 2016). However, the contribution of coastal forests to Kenya's GDP remains under-reported due to the omission of value addition of forest products by the manufacturing sector, the omission of the provision of wood and non-wood forest products to the subsistence economy as well as the omission of the provision of ecosystem services.

Mangrove forests in Kenya provide timber products for construction, furniture and boat building. Many communities living adjacent to the forests also depend on coastal forests for fuelwood, either as firewood or charcoal. It is estimated that up to 90% of rural household energy requirements are met by coastal forests (Githitho, 2004). The forests also provide opportunities for wood carving that generates between US\$ 20-25 million annually in export revenues. Mangrove forests are also critical ecosystems because these ecosystems are capable of storing 10 times as much carbon as their terrestrial forests. Consequently, the degradation and conversions of these habitats has the potential of large-scale carbon emissions.

The coastal forests are important tourist destination areas, with Shimba hills and Arabuko-Sokoke being famous for nature trails and camping. The boardwalks at Gazi, Wasini and Mida Creek mangrove forests generate incomes for the local communities, with the Wasini boardwalk generating more than US\$ 25,000 annually through mangrove tourism. The mangrove forests along the coast also offer excellent opportunities for bird-watching such as those of Mida Creek, Ramisi and Kipini. Local communities in Shimba hills have earned incomes from tourism through the development of lodges within the Mwaluganje elephant conservancy. Coastal forests are also key research fronts

for international researchers. In addition to this, the coastal forests of Kenya have unique biodiversity values with more than 554 endemic plants (40% of the total endemic plants in the forests of Kenya) and 53 endemic animals. These Kaya forests are essentially residual forest patches (average 0.1- 2km<sup>2</sup>) of lowland forests that were once broad and wide-ranging. In Kenya, Kaya forests usually occur in the plains and hilly coastal regions. These Kayas are highly diverse, harbouring more than half of the rare plants in the Kenyan coast (Younge, 2002).

Coastal forests indirectly contribute to the country's GDP through regulating services such as coastal protection and carbon sequestration, as well as supporting other activities such as fisheries and tourism. Coastal tourism in Kenya contributes about \$1.5 billion annually which is about 4% contribution to the country's GDP (GoK, 2020). The indirect economic contributions of coastal forests may, in some cases, exceed the direct contributions to GDP. For instance, the mangroves in the South coast of Kenya are valued at US\$ 6.5 million with 59% of the value on average derived from regulating services (Huxham *et al.*, 2015). Coastal forests also play an important role in the context of climate change, by acting as carbon sinks. Despite the importance of coastal forest resources, the richness of the region's world-class ocean ecosystems is under threat from both direct and indirect pressures through resource exploitation and human-induced habitat degradation. For example, mangrove coverage is diminishing in most countries in the WIO region. For instance, Kenya and Tanzania lost about 18 per cent of their mangroves over 25 years, and Mozambique lost 27 per cent over a shorter timeframe (Bosire 2015).

#### *Potential for development of coastal and marine forestry*

1. Improved conservation efforts: Government and non-governmental organizations, private entities and local stakeholders have increased efforts over the past and present decade to promote programs that enhance ecological integrity, social and economic development around coastal and marine forest resource. A number of externally funded projects have been developed and implemented in Kenya's coastal and mangrove forests over the past decades on top of government budget and forest management agencies. The selected forest areas and types have been the focus of most of external investments. These areas include mangrove forests, Arabuko Sokoke, Shimba hills, and the sacred Mijikenda Kaya forests.
2. Mangrove Ecosystem Management Plan (2017-2027) is likely to open new frontiers to enhance ecosystem integrity and its contribution to the local and national economy through



sustainable management and rational utilization of mangrove resources. Additionally, mangroves' efficiency to capture and store huge stocks of carbon, support to fisheries and biodiversity and high productivity has attracted external support of several programs along the Kenyan coast. In particular, Payment for Ecosystem Services (PES) in compensation for the conservation of mangrove forests aims to improve the health and productivity of these ecosystems while at the same time improving community livelihoods. For example, Mikoko Pamoja is the world's first community type project to restore and protect mangrove forests through the sale of carbon credit. The project is now achieving its climate and community conservation benefits. Activities of Mikoko Pamoja have been replicated in Vanga Blue Forests (VBF) in Vanga, Kwale. replicated in Vanga Blue Forests (VBF) in Vanga (UNEP 2020).

3. Inclusion of indigenous knowledge in conservation and management: Traditionally, the local communities had knowledge on the conservation and management of their coastal forests. While some of this indigenous knowledge has been incorporated into current conservation and management plans such as the development of harvest plans for coastal forests, a lot of indigenous knowledge is yet to be incorporated into conservation programs. This information can provide cheaper or easier alternatives to the conservation and the management of coastal forests.
4. Potential for the development of pharmaceutical and industrial products: The high degree of endemism witnessed in the coastal forests of Kenya presents an opportunity for research activities. There are over 550 endemic plants in the forests, and high botanical diversity, which present huge potential for the development of pharmaceutical and industrial products from the area.
5. Involvement of institutions and stakeholders as partners: The devolution of government provides an opportunity for institutions and other stakeholders to be involved as partners, managers and co-managers of forests and forest resources especially at the local level. This together with the Forest Conservation and Management Act of 2016 enhances the role of the county governments in adopting and implementing policies on forest activities. The Forest Conservation and Management Act, 2016 also opens up a more decentralised way of managing forest resources through the formation of rules and regulations governing the exportation and trade of forest produce as well as rules for

incentive and benefit sharing.

6. Establish REDD+ to reduce deforestation in coastal forests through the conservation: It is likely that moving forward into the future, REDD+ payments will be a significant source of forest-based revenue. Such programs have already been implemented for the dryland woodland of Taita Taveta (Kill, 2016) as well as the mangrove forests of Gazi and Vanga.

### ***2.7 Inland, coastal and offshore mining and extractives***

Mining currently contributes slightly less than 1% of Kenya's GDP. It is the aim of the government to push this contribution to at least 10% contribution by the year 2030. Despite the low contribution to GDP, mining and quarrying were estimated to employ more than 296,700 Kenyans in the private sector and 700 in the public sector (KNBS, 2020). The major minerals produced in Kenya are fluorspar and soda ash. Gold is produced in small quantities by artisanal mining although gold exploration by mining companies indicates that there is great potential in this mineral. Cement is produced in large quantities, although it does not meet the current demand in the construction industry. Kenya is also a gemstone producer with deposits of ruby, pink sapphire, and tsavorite (green garnet).

Coastal mining activities include quarrying of coral rock and limestone for cement manufacturing and coarse aggregates for concrete and road building; artisanal sand mining from the catchment, floodplains, riverbanks, estuaries and lagoons; informal removal of sand from beaches and foredunes; formal mining of minerals from titaniferous sands; and, production of sea salt from salt pans typically located on estuary flood plains. Mining and coastal areas mining in depths of less than 50m has been happening for many years in the world. Through exploration or exploitation of minerals and extractives, coastal communities have immensely benefited from infrastructural development especially the electricity, road and rail transport and telecommunication, particularly in the areas adjacent to the mining areas. Increased coastal mining has also significantly contributed to the increase in the manufacturing sector in Kenya. Mining and extractives has also led to formation of community support initiatives, which include SACCOs such as Nyumba Sacco limited which financially empowers employees of Mombasa Cement Company located in Vipingo, Kilifi County among other companies. There have also been community and environmental programs. For instance, Base Titanium corporate social responsibility (CSR) fund has partnered with other organizations such as 'Cotton on Group' from Australia and 'Business for development' to promote the agricultural sector in the community.

Another notable contribution by Base Titanium is the contribution towards county health infrastructure through construction of a blood bank centre in Msambweni in 2018 (Kwale County Fiscal Paper 2019). Kensalt Company also provides education scholarships to local students.

In the recent decades, offshore mining or deep-sea mining, which is the sourcing of rare earth minerals on the ocean floor has proceeded into the deep waters and led to an increased surge of interest by marine scientists and the mining industry as the oceans have high future potential as they are relatively unexplored. The types of mineral occurring in the deep sea are; polymetallic sulphides, cobalt rich ferromanganese crusts and polymetallic nodules. According to Murton report of 2000, the continental shelf area of Kenya has 1,039,100 tonnes of manganese, 41,564 of copper, 10,391 of Nickel and tonnes of cobalt all unexploited to date.

Offshore mining can either be within a country's EEZ, or in the international waters. Within a country's territorial waterline, the country's law is applicable for marine activities within the area which includes 200 nautical miles from the coastline. The technologies for extracting resources off the seafloor, e.g., iron sands, rock phosphate, precious and base metal sulphides, are very different to that deployed on land, with the added challenges of working at depth and often by remote control. Materials have to be scooped off the seafloor and pumped via a pipe to the surface via purpose-built vessels. Separation of ore from waste rock is carried out on board, and the waste rock is then returned to the seafloor via a pipe to minimise sediment dispersion. There are three types of deep seabed mineral resources that are of interest to mining companies: seafloor massive sulphides, cobalt-rich ferromanganese crusts, and polymetallic nodules. Extracting sulphides and crusts entails cutting into the seabed surface. By contrast, polymetallic nodules are rock-like accretions that lie unattached on the surface of the ocean floor and can be collected without cutting or drilling. Kenya has, however, not yet tapped into offshore mining.

Kenya has a coastline of about 640Km, with five counties bordering the Indian Ocean, namely; Mombasa, Tana River, Lamu, Kilifi and Kwale. Coastal and offshore mining in Kenya consists of mining in the 6 coastal counties (Lamu, Tana River, Kilifi, Mombasa, Taita Taveta, and Kwale; and direct mining in and off the ocean coastline of Kenya areas extending from the shoreline of Kenya to the exclusive economic zone (EEZ) that is 200 nautical miles (nm). Minerals are distributed in all the 6 counties but not all minerals are currently being mined despite their identification and exploration in certain areas.

*Potential for development of coastal and offshore mining and extractives*

1. Kenya can tap into the valuable resources in the deep sea like cobalt-rich ferromanganese crusts, polymetallic manganese nodules and polymetallic sulphides. Deep-seabed mining is capital intensive requiring complex infrastructure, appropriate technology and skills. This will be possible if Kenya partners with private sector investors and developed countries having the skills and financial muscle to be able to exploit this resource.
2. *Dispute resolution mechanism:* There are frequent land disputes between formal mining companies and local Kenyan communities. In the case of Tiomin, the challenges could not be resolved on timely basis leading to closure of operations at the Coast by Tiomin, a Canadian mining company.
3. *Tackle environmental concerns on mining along the coast and even inside the Indian Ocean.* In the case of salt mining, many grievances have been raised regarding the establishment and operation of salt works in Gongoni, Marereni and Kurawa areas within the greater Magarini division. Field survey results indicated that the ongoing salt works contributed to several environmental impacts including; corrosion of iron sheets, rise in temperatures, deforestation, loss of pasture, salinity of freshwater, air pollution, reduction of rainfall in the area, land degradation and increased dustiness in the area (Ocholla *et al.*, 2013).
4. *Improve infrastructure in mining areas:* Much of the areas where locals undertake mining have poor or lack infrastructural facilities. This has led to high cost of transportation, unregulated, uncontrolled and unmonitored mining activities by the mining authorities. This also makes the areas unattractive to investors.
5. *Increase support to promote small scale artisanal miners who dominate the mining industry and promoting offshore mining.* This will also reduce the use of rudimentary techniques such as hazardous substances, blasting and mining which undermines the health of the miners as they get exposed to materials such as mercury, zinc vapor, cyanide, dust and fine particles, large amounts of noise, leading to a high number of accidents and possible pollution of the natural resources such as water bodies.
6. *Invest in technical personnel and institutions offering technical and vocational education in the mining extractive sectors especially the offshore mining.* Personnel who undertake and explore minerals mostly are foreigners making the activity of exploring and mining more expensive and denying the country people jobs. The country needs to invest in technological

development to promote the exploration of offshore mining.

7. *Enhance and standardize the mineral supply chain:* There are low prices for the minerals due to lack of a concrete supply chain and or standardized market. This has created a loophole for the scrupulous middlemen to take advantage of the small-scale miners.
8. *Ensure rehabilitation of mine areas:* The coast region has numerous abandoned quarries with no rehabilitation actions taking place. The current mining areas equally lack rehabilitation measures in place. This is due to the fact that most mining is unregulated and illegal thus no sense of responsibility is put in place. These abandoned mines are a source of accidents especially the abandoned pits and also environmental degradation and hazards such as breeding grounds for mosquitoes when the holes fill up with water during the rains, soil erosion of arable land, and even landslides.
9. On marine biotechnology, more research should be done on the potential of commercialization of marine biotechnology in Kenya. The Government of Kenya launched the National Biosafety Authority in May 2010 whose aim was to regulate research and commercial activities involving GMOs with a view to ensuring safety of human and animal health and provision of an adequate level of protection of the environment (NBA). According to NBA, GMOs are products of modern biotechnology that involve the manipulation of the genetic material of organisms through genetic engineering procedures. Data on marine biotechnology however remains scanty. Kenya mostly produces its marine bio resources for food. They include marine fish, crustaceans and molluscs among others. The value of the three bio resources for food had an estimated value of Ksh. 4748 million in 2019 (KNBS Economic Survey 2020). The Government of Kenya however, is encouraging biotechnology research using various institutions such as Kenya University Biotechnology Consortium (KUBICO), Centre for Biotech and Informatics (CEBIB), National Biosafety Authority, and KMFRI.

### **3. Inland Blue Economy**

In recent years, several sectoral initiatives have been launched and new institutional structures established for the integrated governance of the Blue Economy. However, the major focus has been on promoting the coastal or maritime blue economy, with less attention paid to inland blue economy opportunities (rivers and lakes), especially for the tourism sector. It should however be appreciated that apart from the popular coastal landscapes and seascapes, Kenya is blessed with inland blue

economy resources whose potential has not fully been tapped for economic growth through economic activities such as fishing, mining, tourism and others. The country has over eight major lakes, including Victoria, Turkana, Nakuru, Naivasha, Elementaita, Baringo, Bogoria, Magadi, and over seven major rivers, including Tana River, Athi river, Nzoia, Yala, Sondu-Miriu, and the Mara.

*Potential for Development of inland blue economy*

1. Several river tourist activities exist in the country. They include water rafting, sport fishing, site seeing, animal and bird watching, and cultural sites. Other include scenic landscapes such as waterfalls, rapids, and magnificent wildlife, and hold a great potential to contribute to the country's tourism activities, and revenues at both county and national levels. Nonetheless, the focus has been on coastal tourism, while the inland area is famous for the national parks, game reserves, and the lakes to some extent. There is need to treat rivers as a priority tourism contributor, or indeed important for other socio-economic activities such as fishing.
2. Lakes are important fishing areas in Kenya hence the need for increased surveillance and monitoring of the fishery due to the illegal, unregulated and unreported fishing activities.
3. Devise strategies for monitoring water levels and quality, regulating wastewater and effluents from farms to fully utilize the cage fishing culture and water sports and industries, enacting harmonized laws, and Lake surveillance.
4. Outlaw destructive fishing gears such as monofilament nets, beach seines and boat seines in all Lakes and rivers due to their perceived negative impacts on aquatic habitats.
5. Due to high alkalinity and other unfavorable conditions in the Lake Bogoria, there are no fish or other fauna in the lake, thus no economic activity takes place in the Lake. Tourism, and perhaps mining of enzymes from thermophiles are most suited economic activities for the lake. To fully utilize it therefore, there is need for specialized boats made from materials that can withstand the adverse conditions in the lake, and enable visitors to explore parts of the Lake, especially the steep shoreline on the opposite side of the LBNR main gate which has not been explored at all.
6. The relevant government ministries or state agencies should draw management plans for wildlife and fisheries in Lakes and rivers.
7. Continued exploration of the potential for wind energy in Lake Turkana and oil and gas in the

Lake's basin also ought to be further investigated.

#### **4. Governance frameworks and gaps for coastal and marine blue economy sectors**

Governance of the blue economy is undertaken through various legal, policy and institutional frameworks. These capture international and regional agreements that Kenya has ratified and are then domesticated at the national level. The Constitution at Article 2(5) provides that, "the general rules of international law shall form part of the laws of Kenya." Article 2(6) of the Constitution then stipulates that "any treaty or convention ratified by Kenya shall form part of the laws of Kenya under this Constitution." These articles make international Conventions ratified by Kenya to be part of relevant laws of Kenya.

##### *4.1 Governance gaps in Coastal and deep-sea fisheries, mariculture and aquaculture*

There are gaps, omissions and loopholes in the current legal and policy framework governing the fisheries industry, which if improved could improve the sector.

- i. One of the key challenges facing the fisheries regulatory framework is the overlap in various laws. For example, different statutes create different criminal offences and penalties over the fisheries resources. There is also an overlap in the requirements on the issuance of permits and licences. These problems lead to confusion in implementation or lack of it. For example, prosecution may not be undertaken since none of the agencies involved take a lead role. This is exacerbated by lack of co-ordination between the relevant agencies.
- ii. The fish feed certification and mechanisms to monitor compliance to fish feed production are outdated and are not in line with international requirements, the constitution, and other relevant laws and policies (Munguti *et al*, 2014).
- iii. Gaps are also created by taking too long to develop regulations required to support specific laws. This leads to loopholes/gaps which can be exploited since the relevant guidelines are lacking. The problem is aggravated by the ineffective enforcement of fisheries laws and regulations. This is caused by lack of sufficient number of staff to ensure enforcement, lack of involvement of the stakeholders who are expected to play a role in implementation (JICA, 2018). Accordingly, there is a need to bring together all the relevant stakeholders in order to ensure effective implementation.

- iv. There are omissions in terms of laws and regulations these include an integrated national ocean law and ocean fisheries and mariculture policy and law (Ruwa et al, 2011; Rasowo et al, 2020). Additionally, the laws, policies addressing the utilisation of ocean resources are contained in various fragmented pieces of legislation. There is need to develop an integrated national ocean law that also addresses mariculture issues. Since development of the blue economy is now gaining momentum, it is necessary to review the existing policy and regulatory frameworks then work towards their integration. The regulatory review can be preceded by a blue economy survey this will provide data that can assist in drafting of a comprehensive regulatory framework that captures relevant aspects.
- v. Generally, the institutions mandated to implement the fisheries regulatory framework are faced with the challenge of inadequate resources. This is in form of insufficient skilled manpower and lack of resources to facilitate capacity development among the staff (Rasowo *et al*, 2020; JICA, 2018). The institutions are, therefore, unable to consistently improve the skills of its staff or train new manpower. Ultimately this has an effect on implementation as the institutions will be unable to reliably, efficiently and effectively implement their mandates. To ensure effective and efficient implementation, it is necessary to update the institutional structure of some of the existing fisheries' agencies to align them with the current realities facing the sector.
- vi. There has been a lack of consistency in the institutional governance of aquaculture. For a long time there has been no reliable/consistent institutional governance, as the managing this sector has been undertaken by twelve different ministries since independence. This interferes with developing of the regulatory framework and following up on its implementation (Obwanga & Lewa, 2017).
- vii. There are mandate overlaps in regulation of the maritime environment. This leads to Institutional conflicts, lack of co-ordination and inefficiency in implementation (Saeed, 2020). It also creates a wait and see approach as one institution decides not to take action leaving it to another institution. It could also lead to institutions blaming each other for inaction. This creates loopholes in implementation and weak enforcement of the regulatory framework. Exploitation and conservation of the marine environment requires co-ordination and collaboration since the resources are not confined to one jurisdiction in certain instances. It is also necessary to have a regional institutional framework for collaboration in some of the trans-boundary water bodies.



- viii. There is also need to have a comprehensive Integrated Ocean Policy and Law to address living and non-living resources management including the ocean waters and environment for sustainable exploitation and conservation in an ecosystem based approach. The geographic Information System (GIS) could be used to map coastal resources and identifying overlapping uses hence assist planning to avoid conflict of interests.
- ix. Fisheries resources are directly and indirectly interlinked with the use of land, water, environment, wildlife and forestry and therefore interlinked with laws or Acts that manage these sectors and their institutions. It is thus clear that the institutional mandates provided by the different Acts cause various degrees of overlaps in their mandates and therefore weaken enforcement besides causing inefficiency. The gaps in this area include:
- x. The Fisheries Act which requires to be fully reviewed to empower the coordination role which has been weakened by various overlaps in institutional mandates of institutions that directly or indirectly interlink with fisheries resources and its environment. The draft Fisheries bill does not address this observation as well. There is further need to review the Fisheries Act to domesticate the regional and international conventions, and agreements into Kenyan law for their efficient implementation.
- xi. The country needs a specific Ocean Fisheries and Mariculture Policy and Law to coordinate and implement fisheries activities. This legislation should take into consideration the necessary elements identified in the existing National Oceans and Fisheries Policy which covers also inland freshwater resources and other sectors such as tourism necessary for an integrated economy. The law and policy should be detailed enough to address Marine and Coastal Fisheries issues in the context of ecosystem-based management and ecosystem approach to fisheries. It should further support management of economically sustainable industrial or commercial fisheries by legislating issues of total allowable catches (TAC), port state issues, Rules of origin, and Sanitary and Phytosanitary (SPS) issues which are important especially in Economic Partnership Negotiations and Trade Agreements. Mariculture production is gaining a significant role in enhancing marine fisheries production. There is therefore a need for the Oceans Fisheries and Mariculture Policy and Law to address this activity including Environmental Impact Assessment (EIA) for mariculture production and provide management guidelines that are in harmony with other maritime activities in the context of ecosystem-based management.

- xii. The policy and legal gaps need to be bridged, capacity and skill fissures need to be addressed, the infrastructural development ought to be sped up, provision of adequate and powerful equipment such as deep-sea boats also need to be addressed as some of the opportunities lie deep in the sea.
- xiii. It will also be important to develop and implement robust marine spatial planning to control the extent of coastal and marine tourism and to protect the delicate and fragile ecosystems. The realization of the coastal and marine potential is foreseeable and achievable. However, some limiting factors like the Covid-19 pandemic restrictions on travel and human interactions slowdown the speed. Kenya has made notable milestones towards increased cruise ship tourism via the construction of a 2000 passenger capacity terminal fitted with all essential facilities. The achievement of tapping this frontier of marine and coastal tourism is well on course to be fully achieved by 2030.
- xiv. Deep-sea sportfishing is already happening in Mombasa, Kilifi, and Watamu. However, there is a need to tap into the domestic market as most of the deep-sea sportfishing tourists are international making the subsector susceptible to seasonality. Promotion of domestic tourism will reduce the effect of the seasonality problem and ensure continued revenue generation to the sector. Rigorous marketing of the Kenyan coast as an ideal destination for deep-sea sport fishing is therefore paramount.

#### *4.2 Governance gaps in Coastal and marine tourism*

- i. To explore the full potential of coastal and marine tourism will require strengthening the existing support instruments. The framework for exploiting, developing and managing natural resources for sustainable development must include consideration for economic, social and environmental objectives while taking into account stakeholders diverse needs.
- ii. Marine ecotourism is frontier with potential to simultaneously contribute to the sector's growth and conservation of marine resources. With robust marine spatial planning in place, marine ecotourism potential could be realized. This is easily achievable as the marine ecosystem is already protected, and more efforts are underway to limit certain human activities that could compromise these essential ecosystems.
- iii. Heritage and cultural tourism, gastronomy, among other exciting activities, do not require much investment to actualize. The tourism sector players must, however, create a

conducive environment for such activities. Policy and legal framework and incentives to the private sector investors need to be aligned with these activities.

- iv. The social responsibility of the tourism industry to local communities is weak and not commensurate with the level of revenue generation derived from the ecological areas and cultural zones where they operate. This is probably because of a gap in the tourism Act existing that are blind to the social responsibility for wellbeing of communities around tourism areas.

#### *4.3 Governance gaps in ports, harbours and marine transport*

- i. Ministerial Realignment: The blue economy has been placed under the ministry of mining, blue economy and maritime affairs. It is expected that the new will introduce multi-sectoral approach in the sector. Other related administrative, policy, legal and institutional coordination issues need urgent attention in order to optimize the contribution of ports, harbours and maritime Transport to Kenya's GDP and to Kenya's BE.
- ii. There is need to support the Kenya national Shipping Line (KNSL) which had almost reached an insolvent status due to lack of business, despite reported attempts to revive it. The KNSL website identifies a number of challenges and latent opportunities which affect the institution's contribution to of Ports, Harbours and Maritime Transport sector to Kenya's GDP and blue economy. The current shipping industry, for instance, requires KNSL to expand its competence to meet its goals through enhanced services. It also demands that KNSL develop capacity in new areas related to public policy, communications, and collaboration in order to address the changing environment in the region. Success and relevance of KNSL in capacity expansion and effectiveness requires a significant infusion of resources and intellectual capital.
- iii. There is need to enhance KMA and KPA roles as environmental leaders. This is in the areas of monitoring, evaluation and management of offshore and onshore environment and implement proactive measures against potential concerns of pollution control, waste management, global warming prevention, and occupational health and safety in coordination with the relevant authorities. Pollution mitigation measures contained in the Green Port Policy will need to be implemented.
- iv. An administrative reform is needed to ensure that the port is migrated from a Service Port

to a Landlord Port. In addition, other related administrative, policy, legal and institutional coordination issues need urgent attention in order to optimize the contribution of Ports, Harbours and Maritime Transport to Kenya's GDP and to Kenya's blue economy.

#### *4.4 Governance gaps in offshore oil and gas mining and renewable energy*

- i. Offshore oil and gas exploration and renewable energy are governed by a robust legal, policy and institutional frameworks that support sound environmental management procedures to ensure that exploration for oil and gas, and development of renewable energy is optimally done for sustainable development in the country. These frameworks provide for mitigation of likely pollution from offshore oil exploration or eventual drilling and should therefore be implemented as outlined.
- ii. The Government does not have adequate financial resources and technical capacity to undertake coastal and offshore oil and gas exploration on its own. The inadequacy in technical capacity is mainly in the areas of marine geology, petro-chemical fields and technological sphere. Further, there are limited capabilities in engineering, construction, logistics, and supplies, health and safety.
- iii. The Government agencies that are charged with management of environment and ensuring compliance of mitigation measures and monitoring procedures associated with large projects such as offshore exploration are often lacking the technical capacity. Therefore, engaging incapacity building is fundamental for buy-in and participation, which is crucial to confidence building, transparency, and maintaining long term sustainability.
- iv. The development of renewable energy alternatives including marine based alternatives are weighed down by a number of constraints namely: inadequate long-term hydrological and meteorological data; inadequate transport infrastructure, the need to include local participation in order to develop acceptance; lack of locally available spare parts; insufficient electricity grid coverage; high dependence of rural communities on ecosystem services.

- i. The country needs to sign and ratify all International Maritime Organization (IMO) Conventions relevant to oil and gas exploration, adhere to the conditions of the Nairobi Convention, promote regional coordination on planning of transboundary issues such as oil spill contingency measures, piracy and security.
- ii. There is need to promote effective management and governance of the oil and gas resources, and promote participation of the civil society organizations
- iii. The government should also ensure that bilateral agreements made with prospecting companies are designed to provide direct and indirect benefits to the local people and the country as a whole.

#### *4.5 Governance gaps in coastal agriculture*

- i. There are rather many policies and laws governing the agriculture sector in the country which, by extension, cover coastal agriculture. The multiplicity of policies and laws creates potential for many areas of overlaps which increases areas of conflict. Duplication in some areas essentially means that resources are not optimally utilized. There is need to harmonize policies and laws governing this sector.
- ii. There is a lack of a comprehensive Land Use Policy: the country lacks a clearly articulated land policy implying that issues like land use, management, tenure reforms and environmental protection are inadequately addressed through the existing systems.
- iii. Low public expenditure in agriculture: Kenya's allocation to the agriculture sector has been less than two percent of agricultural total expenditure, well below the average for sub-Saharan Africa of 4.5 percent (World Bank, 2018), and well below the Malabo commitment of 10% of total agriculture GDP.
- iv. The sector is characterized by weak vertical integration, made worse by weak institutions and support services for agricultural exports.
- v. Ban of certain traditional farming practices: In the coast of Kenya most farmers still practice shifting cultivation, and slash and burn method is used before planting is undertaken. The method was practised in the traditional societies because parcels of land were large. However, currently especially in the coast of Kenya, the same piece of land is burnt regularly and several times per year. This is of concern as fire has on several times ran

out of control burning other farm crops or reaching the forests. This could lead to destabilization of the coastal soils structures suchas bluffs and dunes.

#### *4.6 Governance gaps in coastal forestry*

- i. There still exists some gaps and failures in policies regarding coastal forests in Kenya. For instance, the Shimba Hills forest is gazetted both as a forest reserve and a national reserve. This creates conflict in terms of the prosecution of offenders and even the development of new programs and activities within the forest. There is also poor coordination among law enforcement agencies such as the Kenya Forest Service, the Kenya Wildlife Service and the Kenya Police. This leads to uncoordinated efforts that result in low compliance.
- ii. The Forest Policy does not give much recognition to farm forestry but to redeeming and protection of natural forests, while sustainable use of biodiversity in forests is largely ignored. It should be emphasized that without a firm agriculture foundation based on successful practices on the basis of which emerging issues can be tackled, the challenges will continue to be overwhelming hence the need of firmness in executing the food policy.
- iii. EMCA (2015) provides for a broad crosscutting framework for environmental issues. To ensure successful implementation, there is need to provide a specific legislation to provide a legal framework for integration and coordination of the sectors that directly or indirectly have stake in use of coastal and marine resources.
- iv. In wildlife management, there are legal gaps that lead to land use conflicts resulting to encroachment into the wildlife protected areas which arise from poor local and national land use planning. There is also need for innovative approaches e.g. devolved participatory wildlife management to enlist support from private sector, NGOs and CBOs.

#### *4.7 Governance gaps in coastal and offshore mining and extractives*

- i. Inadequate comprehensive, clear and harmonized mining policies and guidelines coupled with poor law enforcement in the mining sector has led to smuggling of mineral across the region and thus affecting the entire mining sector.
- ii. Gender discrimination: very few miners participating in the rampant artisanal mining activities are women. This is due to gender discrimination in terms of access to resources and ownership and tenure, the work undertaken, and the pay differentials. There is need to devise ways of incorporating women participation in artisanal mining.

- iii. There is a general lack of appropriate policy frameworks and strategies to drive the industrialization, value addition and benefaction agenda in the sector.
- iv. There is inadequacy in regulations to govern the activities of artisanal miners leading to conflicts over the mineral resources.
- v. The definition of who consists the community is ambiguous. This needs to be clarified especially in matters of public participation and benefit sharing
- vi. There is lack of clear, streamlined procedures, imprecise methods for offshore mining that put into consideration ecological and social impacts.
- vii. There are institutional overlaps and conflicting mandates which need to be ironed out for improved performance of the subsector.
- viii. There is inadequate national legislation on offshore mining that is coherent with the regional laws and policies thus resulting to use of international law. This lack of legal clarity leads to uncertainties which discourage companies from committing capital. This calls for national laws which would be interpreted and understood locally and capable of implementation by stakeholders.

#### *4.8 Gaps in Governance of Inland Blue Economy*

- i. Apart from the various sector specific governance gaps that have been highlighted above for the various blue economy sectors, there are some generic gaps that are relevant to the inland blue economy resources.
- ii. Constitutionally, water bodies including lakes and rivers are included as part of the definition of land under Article 260 of the Constitution of Kenya 2010. These water bodies are placed under the jurisdiction of the National Government. However, since the rivers and lakes often traverse various counties, which are devolved units under the Constitution, the role of the riparian counties is not very clear. Ideally, the riparian devolved units should have a direct stake in the governance of rivers and lakes, and legal and policy frameworks should clearly define these roles. They should also invariably be involved in the governance of fisheries and aquaculture, ports, shipping and maritime transport, agriculture and forestry, off shore oil and gas and renewable energy, and mining and extractives, among other sectors of the blue economy.



- iii. One important area of convergence would be environmental and natural resource conservation, including the requirement under the Environmental Management and Conservation Act (EMCA) for environmental and social impact assessments which relate to rivers and lakes and other waterbodies or activities or programmes relating thereto. Counties, in their mandates for development control and zoning, among others, have to deal with areas adjacent to or riparian to water bodies. These areas are also often highly populated, thus requiring local communities to be mobilized and involved.
- iv. By law, counties are required to develop their respective County Integrated Development Plans (CIDP). The counties that host or are riparian to major lakes, such as Nakuru, Baringo, Turkana, Kajiado, Kisumu, Homa Bay, Migori, Siaya and Busia have attempted in various ways to address inland blue economy issues in their respective CIDP (2018-2022). However, a great deal more needs to be done to enable the lakes as key inland blue economy resources play a more central role in the development plans of those counties. This should also apply to the counties traversed by major rivers including the Mara, Tana, Athi-Sabaki, Nzoia, Yala, Sondu Miriu, among others.
- v. Also, there ought to be better involvement of regional economic blocks which bring together counties that are riparian to key blue economy resources such as lakes and rivers. Some of these blocks include the Lake (Victoria) Region Economic Block, the North Rift Economic Block (for Lake Turkana, Lake Baringo and Lake Bogoria), Mt Kenya and Aberdare Region Economic Block (for Lakes Nakuru, Naivasha), and the *Jumuia Ya Kaunti za Pwani (JKP)*. The economic blocks provide a fine opportunity to discuss collectively the riparian and shared interests and cross cutting issues and concerns in inland blue economy resources.

## **5. Conclusion and recommendations: towards a sustainable BE in Kenya**

Besides the improvement of the blue economy governance framework, the sector needs macro interventions from the national and county government to accelerate and sustain its growth. These include:

### *5.1 Integration of marine spatial planning*

Marine spatial planning (MSP) is a tool to plan, manage, and improve marine environments. It contains at least three qualities: first, it is multi-objective as it includes ecological, social, economic, and governance objectives, but the overriding objective should be increased sustainability; second,

it is spatially oriented. The ocean area must be clearly defined at the ecosystem level- incorporating all relevant ecosystem processes and third, it is integrated addressing many different issues and activities. The roles of the Marine Spatial Planning will include: a) management of the marine environment; b) mapping: MSP conducts coastal and marine study and develop spatial development maps in respect with the area covered; c) monitoring and Evaluation; d) weighing trade-offs between multiple and conflicting uses e) integrating MSP and land use policies and Programs; f) creation of new institutional structures as it spans several political boundaries, including states and countries; and g) stakeholder Involvement: people living or working near the ocean observe changes over their lifetime and hence accumulate knowledge regarding previous marine resources. Indigenous peoples' wisdom and practices are passed down through generations, for example in form of Indigenous laws, and traditions thereby paramount in informing MSP goals and objectives. Introducing MSP principles in the blue economy discussion will help plan better any investments and increase acceptability of projects, especially by local communities. This will help promote benefits accruing from the blue economy.

### *5.2 Financing the blue economy*

Financing will be required if Kenya's blue economy is to achieve the intended goals. It is important to identify potential sources of financing the blue economy if the benefits are to be improved. These sources of finance include: a) governments i.e. domestic sources, official development assistance agencies, and sovereign wealth funds; b) philanthropy and non-governmental organizations; c) international financial institutions; d) other multilateral agencies including the UN's programs and organizations; e) private finance; e) other financial instruments e.g. blended finance, green bonds, results-based lending, debt financing etc. These funding will be critical in development of different blue economy subsectors and help promote the expected benefits.

### *5.3 Involvement of the private sector*

Majority of the coastal and marine tourism businesses are owned and operated by private investors. However, to exploit the potential of the "sleeping" subsectors sustainably, the state must play its role to help attract investment in the conservation of the blue economy and create policies that establish a business case for the sector. Some strategies that can be used to achieve an effective and efficient sector that is attractive to the private sector include; a) de-risking the investments to the amount of exposure to risk for investments in coastal and marine tourism e.g. index based insurance; b) favourable policy and legal framework to incentivize the private sector;

currently, the public private partnerships in the activities of the blue economy is limited; c) blended financing to improve investor confidence e.g. up-front low-interest or grant-based investments; d) integrated projects that combine activities to make projects more risk diverse and attractive to more diverse investors; e) infrastructure development for easy access and cut down the cost of operation/investment; building capacity and closing the ocean skill gap; and, f) offering fiscal incentives e.g. tax breaks or financial assistance for those private companies investing in certain areas of the blue economy sustainably.

#### *5.4 Ecosystem management tools*

According to the Mombasa Master Plan, the planned port infrastructural developments will lead to the clearing of 36 ha of mangrove in the Dongo Kundu area which is a significant loss of biodiversity and associated ecological services such as provision of fuel wood, construction materials and fishing and breeding ground for offshore organisms. Fisheries and related activities will be destroyed leading to a reduction on fish catch and incomes. The mangrove forest also acts as a natural buffer against ocean related disasters, tidal waves and provides carbon storage, with the latter assisting in mitigating climate change. In addition, land reclamation, bank protection and dredging will disturb the aquatic and tidal flora and fauna, lead to changes in water quality and increase sediment load. To mitigate against these negative cumulative impacts, an Environmental Strategic Impact Assessment needs to be undertaken and should include a community driven Ecosystem Management Plan geared towards the restoration of the original ecosystem functions. For purposes of sustainability, such a plan should include a portfolio of bankable community livelihood projects. Given the high level of vulnerability and poverty, the PAPs should be compensated adequately and in a timely manner, BMUs will have to be built, new fishing gear procured and technical training suitable for the transformation to deep sea fishing undertaken. The affected sacred Kaya forests will need to be restored in accordance with the Archeological Impact Assessment which will be apart of the ESIA.

#### *5.5 Integrated coastal zone management scheme (ICZM) plan*

This has been developed to promote the protection of these coastal resources while ensuring the economic empowerment of the local coastal communities. The scheme encourages the provision of alternative income-generating activities that have the potential to reduce the over-exploitation plaguing the sector. However, full implementation of the scheme remains a challenge due to insufficient human and financial resources. In addition to the ICZM scheme, other reforms have taken

place in the coastal forest sector such as the development of the National Mangrove Ecosystem Management Plan (2010), the National Forests Program (2016-2030) and the Forest Conservation and Management Act, 2016.

#### *5.6 Blue Economy Strategy*

There is need to develop an all-inclusive blue economy strategy that brings on board all the relevant stakeholders. Currently, there are ongoing efforts in government geared towards the development of a national blue economy strategy. The anticipated strategy ought to be anchored in key maritime sectors as described in this report. It should also borrow lessons from other blue economy strategies and frameworks including the regional (African) and sub-regional (East Africa) frameworks. This report includes an annotated outline of a national blue economy strategy for Kenya.

#### *5.7 Establish better equipped Institutes for Blue Economy and Oceans Studies*

Generally, there is inadequate technical capacity and research in blue economy development. Targeted development and improvement of existing coastal and marine studies and research institutions. This will assist to undertake research and offer technical assistance and capacity building in all matters relating to the ocean, and the sustainable use of its resources.

## Bibliography

1. Abuodha, J. O. Z. (2002). Environmental impact assessment of the proposed titanium mining project in Kwale District, Kenya. *Marine Geo-resources and Geotechnology*, 20, 199-207.
2. AUC-NEPAD (2014). The Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa. AUC-NEPAD.
3. Barbier, E. B., Hacker, S. D., Kennedy, C., Koch, E. W., Stier, A. C., & Silliman, B. R. (2011). The value of estuarine and coastal ecosystem services. *Ecological Monographs*, 81(2), 169—193. doi:10.1890/10-1510.1
4. Benkenstein A. (2018). Prospects for the Kenyan Blue Economy. SAIIA Policy insights 62. South Africa Institute of International Affairs, Johannesburg, South Africa.
5. Blue Economy Concept Paper (2014). Sustainable Development Knowledge Platform, United Nations(UN), January 2014.
6. Brummett, R. E., Williams, M.J. The evolution of aquaculture in African rural and economic development.
7. *Ecological Economics*, 33(2000)193-203.
8. Burgess, N. D., & Clarke, G. P. (2000). *Coastal forests of eastern Africa*. IUCN-The World Conservation Union, Publications Services Unit.
9. County Government of Kilifi (2017). County Integrated Development Plan 2018-2022. Theme: Sustainable energy, mineral resources and innovative industries.
10. County Government of Lamu (2018). Lamu County integrated development plan (CIDP) 2018 – 2022.
11. EACF (2011). Final Assessment Report of Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya January 2011- May 2015.
12. Ehler, Charles N., and Douvere Fanny. 2010. “An International Perspective on Marine Spatial Planning Initiatives.” *Environments Journal* 37 (3): 9–20
13. FAO (2014). FAO Country Programming Framework for Kenya 2014-2017
14. FAO (2015) AQUASTAT Country Profile – Kenya. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy
15. FAO (2018). The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. Licence: CC BY-NC-SA 3.0 IGO, Rome: FAO.
16. FAO (2020): The state of world fisheries and aquaculture 2020. FAO, Rome.
17. Githitho, A. (2004). The Coastal Terrestrial Forests of Kenya. A report on resources,

threats and investments. WWF.

18. GoK (2010). Agricultural Sector Development Strategy 2010—2020.
19. GoK (2016). Kenya mining investment handbook 2016. Ministry of Mining, Government of the Republic of Kenya,
20. GoK (2017). Lamu County 2016 short rains food security assessment report. A Joint Report by the Kenya Food Security Steering Group (KFSSG) and Lamu County Steering Group (CSG).
21. KFS (2017). National Mangrove Ecosystem Management Plan. Kenya Forest Service. Nairobi, Kenya Huxham, M., Emerton, L., Kairo, J., Munyi, F., Abdirizak, H., Muriuki, T., & Briers, R. A. (2015). Applying climate compatible development and economic valuation to coastal management: a case study of Kenya's mangrove forests. *Journal of environmental management*, 157, 168-181.
22. JICA (2018). Data Collection Survey on Blue Economy in the Republic of Kenya. Japan International Cooperation Agency <https://openjicareport.jica.go.jp/pdf/12320339.pdf> (accessed on 27/03/21).
23. Kill, J. (2016). The Kasigau Corridor REDD+ Project in Kenya: A crash dive for Althelia Climate Fund.
24. Kimani, E.N., Aura, M.C., Okemwa, G.M., (eds.) (2018). The Status of Kenya Fisheries: Towards the sustainable exploitation of fisheries resources for food security and economic development. Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa. 135 pp.
25. Kiogora T.M., Raini, J.A, Edebe J., Waithaka E., (2020). Assessment of the fish species diversity and water quality in Lake Nakuru, Kenya: Ecotoxicological study of the potential role of heavy metals in fish die-offs.
26. Kirui, K. B., Kairo, J. G., Bosire, J., Viergever, K. M., Rudra, S., Huxham, M., & Briers, R. A. (2013). Mapping of mangrove forest land cover change along the Kenya coastline using Landsat imagery. *Ocean & Coastal Management*, 83, 19-24.
27. KMFRI (2017). Kenya's Aquaculture Brief 2017: Status, Trends, Challenges and Future, Kenya Marine and Fisheries Research Institute, Mombasa.
28. KNBS (2020). Economic Survey 2020. Kenya National Bureau of Statistics. Nairobi, <https://www.theelephant.info/documents/kenya-national-bureau-of-statistics-economic-survey-2020/>
29. Matiku, P. (2004). The Coastal Forests of Kenya. Forest data, socio-economic issues, values, stakeholders, challenges, strategies, investment and enabling environment. A national synthesis report for the development of the WWF-EARPO Eastern Africa Coastal Forests

Ecoregion Programme.

30. Ministry of Environment, Water and Natural Resources (2014), *Integrated Coastal Zone Management policy 2014-2023, Sessional Paper No. 13 of 2014*. <http://www.environment.go.ke/wp-content/uploads/2014/01/Final-Draft-ICZM-Policy-revised-December-2013.pdf>
31. Mirera, O.D. (2009). Mud crab (*Scylla serrata*) culture, understanding the technology in a silvofisheries perspective. *Western Indian Ocean Journal of Marine Science*, 8(1)(2009)127-137.
32. Munguti, J. M., Kim, J-D, Ogelo, E. O. (2014). An overview of Kenyan aquaculture: Current status, challenges, and opportunities for future development. *Fisheries and Aquatic Sciences*, 17(1) 1-11.
33. Muthiga, N., Ochiewo, J., Kawaka, J., (2010). Strengthening capacity to sustainably manage seacucumber fisheries in the Western Indian Ocean. SPC Beche-de-Mer Information Bulletin Number 30.
34. Mwaluma, J (2002). Pen culture of the mud crab *Scylla serrata* in Mtwapa mangrove system, Kenya. *Western Indian Ocean Journal of Marine Science*, 1:127-133.
35. Ndegwa, S., Goehan, J. (2017). Evaluation of the Kenyan Catch Assessment Survey. IOTC-2017-WPDCS13-36 Rev. 1. 11 pp.
36. NEMA (2017). State of the Coast Report II: Enhancing Integrated Management of Coastal and Marine Resources in Kenya. National Environment Management Authority (NEMA), Nairobi.
37. Ojwang WO, Abila R, Malala J, Ojuok JE, Owili M, R Omondi (2011). Critical transboundary resource: assessment of ecological and socio-economic importance of River Omo Wetland. Project Technical report submitted to the National Council of Research and Technology, Kenya..
38. Ochiewo, J. (2004). Changing fisheries practices and their socioeconomic implications in South Coast Kenya. *Ocean & Coastal Management* 47:389-408.
39. Ochiewo, J. O., Owiti, H., Swaneerain, S., Munyi, F., Waiyaki, E., Njiru, J.N., Okemwa, G., Aura, M.C., Oketch, R., & Olela, P. (2018). Economic and Financial Impact Assessment (EFIA) of Marine Fisheries, Kenya. Mombasa: Kenya Marine and Fisheries Research Institute (KMFRI), 42 pp.
40. Ochiewo, J., de la-Torre Castro M., Muthama C., Munyi F., Nthuta J.M. (2010). Socio-economic Features of the Sea Cucumber Fishery in Southern Coast of Kenya. *Ocean and Coastal*

41. Odhiambo Ochiewo, J., Wakibia, J., Sakwa, M.M. (2020). Effects of monitoring and evaluation planning on implementation of poverty alleviation mariculture projects in the coast of Kenya. *Marine Policy*, 119:104050; <https://doi.org/10.1016/j.marpol.2020.104050>.
42. OECD (2020). Sustainable Ocean for All: Harnessing the Benefits of Sustainable Ocean Economies for Developing Countries, The Development Dimension, OECD Publishing, Paris, <https://doi.org/10.1787/bede6513-en>
43. OECD (2016). The Ocean Economy in 2030. OECD Publishing, Paris, Retrieved from <https://doi.org/10.1787/9789264251724-en>
44. Okemwa, G.M., Kaunda-Arara, B., Kimani, E.N., Ogutu, B. (2016). Catch composition and sustainability of the marine ornamental fishery in Kenya. *Fisheries Research*, 183:19-31.
45. Onyando J. O. (2002) Land Cover Resource Maps of Lake Baringo Drainage Basin. Consultancy report submitted to the United Nations Office for Project Services, Nairobi, Kenya. (Unpubl.).
46. Pauly, D., Christensen, V., Gu nette, S., Pitcher, T., Sumaila, U.R., Walters, C.J., Watson, R., Zeller, D. (2002). Towards sustainability in world's fisheries. *Nature*, 418:689-695.
47. Phillips, M. (2019) Mariculture overview. *Encyclopedia of ocean science (Third Edition)* 2:414-421 doi.org/10.1016/B978-012374473-9.00752-9.
48. Primavera, J. H., Garcia, L. M. B., Castanos, M. T., Surtida, M. B. Mangrove-friendly aquaculture. In: Proceedings of the workshop on mangrove-friendly aquaculture organized by SEAFDEC Aquaculture Department, January 11-15, 1999. Iloilo, 2000.
49. Raini, J.A. (2009) Impact of Land Use Changes on Water Resources and Biodiversity of Lake Nakuru Catchment Basin, Kenya. *African Journal of Ecology*, 47, 39-45.
50. Rasowo, J. O., Orina, P., Nyonje, B., Awuor, S., Olendi, R. (2020). Harnessing Kenya's Blue Economy: prospects and challenges. *Journal of the Indian Ocean Region*, 1-25.
51. Rees, Sian E., Martin J. Attrill, Melanie C. Austen, Steven C. Mangi, Jo P. Richards, and Lynda D. Rodwell. 2010. Is There a Win-win Scenario for Marine Nature Conservation? A Case Study of Lyme Bay, England. *Ocean and Coastal Management* 53:135—45.
52. Ruwa, R. K. (2011). Policy and Governance Assessment of Coastal and Marine Resource Sectors In Kenya In The Framework Of Large Marine Ecosystems'. Report to the ASCLME policy and governance coordinator, ASCLME Project.



53. Saeed, S. K. and Saeed, K. (2020). 'Challenges and prospects of interagency coordination in promoting and sustaining Africa's blue economy: case study of Kenya 2010-2018' (Masters Dissertation, University of Nairobi).
54. Samoilys, M., Pabari, M., Andrew, T., Maina, G.W., Church, J., Momanyi, A., Mibei, B., Monjane, M., Shah, A., Menomussangab, M., Muttad, D. (2015). Resilience of coastal systems and their human partners: Ecological and social profile of coastal systems in Kenya, Mozambique and Tanzania. IUCN ESARO.
55. Samoilys, M.A., Osuka, K., Maina, G.W., Obura, D. (2016). Artisanal fisheries on Kenya's coral reefs: Decadal trends reveal management needs. *Fisheries Research*, 186:177-191.
56. SDL, 2018. Strategic Plan 2018 – 2022. State department of Livestock
57. Sindiga, I. (2000). Tourism development in Kenya. *The political economy of tourism development in Africa*, 129-153.
58. Sutton, I. (1994). Salt in Kenya: a survey of literature. *Journal of Eastern African Research & Development*, 24, 163-182. Retrieved April 15, 2021, from <http://www.jstor.org/stable/24326319>.
59. Taita Taveta, 2017. Kenya County Climate Risks Profiles Series: Climate Risk Profile Taita Taveta County. Tana River County Fiscal Strategy Paper (CFSP) 2016.
60. UNCTAD, (2019) Maritime Profile for Kenya.
61. UNCTD. (2018). Review of Maritime Transport 2018. Available at: [https://unctad.org/en/PublicationsLibrary/rmt2018\\_en.pdf](https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf).
62. UNEP (2008). Kenya State of the Coast Report: Towards the Integrated Management of Kenya's Coastal and Marine Resources. National Environment Management Authority, Nairobi
63. UNEP (2009). Transboundary Diagnostic Analysis of Land-based Sources and Activities in the Western Indian Ocean Region.
64. UNEP (2015). Blue Economy: Sharing Success Stories to Inspire Change. Nairobi: United Nations Environmental Programme Regional Seas Report and Studies, 195.
65. UNEP-Nairobi Convention (2009). Strategic Action Programme for the Protection of the Coastal and Marine Environment of the Western Indian Ocean from Land-based Sources and Activities, Nairobi, Kenya, 140 pp.
66. UNEP-Nairobi Convention and WIOMSA (2015). The Regional State of the Coast Report: Western Indian Ocean. UNEP and WIOMSA, Nairobi, Kenya, 546 pp.
67. UNEP-Nairobi Convention/USAID/WIOMSA (2020). Guidelines on Mangrove Ecosystem

Restoration for the Western Indian Ocean Region. UNEP, Nairobi, 71 pp. A digital copy of this report is available at: [www.nairobiconvention.org/](http://www.nairobiconvention.org/); [www.wiomn.org](http://www.wiomn.org); [www.wiomsa.org](http://www.wiomsa.org)

68. Waaijenberg H. (2000). Agriculture. In Hoorweg J., Foeken D. & Obudho R. eds. *Kenya Coast Handbook: Culture, resources and development in the East African littoral*. (pp.175-195). Hamburg: LIT Verlag.
69. Wakibia, J. G., Ochiwo, J., Bolton, J. J. (2011). Economic analysis of *Eucaemoid* algae farming in Kenya. *Western Indian Ocean Journal of Marine Sciences*, 10(1) 195-212.
70. WB (2010). Kenya's Tourism: Polishing the Jewel: Finance and Private Sector Development Africa Region Final Report 2010. The World Bank.
71. WTTC (2020). Kenya, 2020 Annual Research: Key Highlights. World travel and Tourism Council.
72. Wylie, L., Sutton-Grier, A. E., & Moore, A. (2016). Keys to successful blue carbon projects: lessons learned from global case studies. *Marine Policy*, 65, 76-84.