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

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*Sector Report on Coastal, Offshore and  
Inland Mining & Extractives*

Presented by

**University of Nairobi Maritime  
Centre**

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## List of Abbreviations

<b>Abbreviation</b>	<b>Official Name</b>
ASCLME	Agulhas and Somali Current Large Marine Ecosystem
CEBIB	Centre for Biotech and Bioinformatics
CIDP	County Integrated Development Plan
CFSP	County Fiscal Strategy Paper
CSR	Corporate Social Responsibility
EEZ	Exclusive Economic Zone
ESIA	Environmental and Social Impact Assessment
GMO	Genetically Modified Organisms
GDP	Gross Domestic Product
ICJ	International Court of Justice
ISA	International Seabed Authority
ISAA	International Service for the Acquisition of Agri-biotech Applications
KNBS	Kenya National Bureau of Statistics
KSh	Kenyan Shilling
KUBICO	Kenyan Universities Biotechnology Consortium
KMFRI	Kenya Marine and Fisheries Research Institute
LOM	Life of Marine
MPA	Marine Protected Areas
NEMA	National Environment Management Authority
NBA	National Biosafety Authority
SACCO	Savings and Credit Cooperative Organizations
USD	United States Dollar
US / USA	United States of America
UNDP	United Nations Development Programme
UNCLOS	United Nations Convention for the Law of the Sea
WCP	Wet Concentrator Plant
	Western Indian Ocean

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## SECTION I: BACKGROUND AND CONTEXT

### 1.1 Introduction

According to UNDP policy brief of 2018, the estimated annual economic value of goods and services in the marine and coastal ecosystem of the blue economy in the Western Indian Ocean is over US\$22 billion, with Kenya's share slightly over US\$4.4 billion (20%). Kenya's real GDP in the year 2019 was 5.049 billion Kenya shillings. According to the KNBS economic survey of 2020, agriculture had the highest contribution to GDP of 34.1%, while mining was the least with 0.7%. The real Gross Domestic Product (GDP) in Kenya is estimated to have expanded by 5.4 per cent in 2019. The growth across most sectors of the economy was lower compared to the previous year. Agriculture, forestry and fishing sector accounted for a sizable proportion of the slowdown, from 6.0 per cent growth in 2018 to 3.6 per cent in 2019. The manufacturing sector grew by 3.2 per cent in 2019 compared to 4.3 per cent growth in 2018. Despite most sectors recording decelerated growths, the economy was supported by accelerated growths in the Financial and Insurance (6.6 per cent) and Real Estate activities (5.3 per cent). Table 1.1 provides summary of GDP growth for the years 2018 and 2019 by sector.

**Figure 1.1: Growth in GDP from 2018 to 2019**

Sector	Percentage growth in 2018	Percentage growth in 2019
Agriculture, Forestry and Fishing	6.0	3.6
Transportation and Storage	8.5	7.8
Construction	6.9	6.4
Manufacturing	8.5	7.8
Tax on products	5.6	4.4
Other service sectors	6.7	6.6
Mining	2.7	2.5

Source; KNBS Economic Survey 2020.

Mining currently contributes to 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 in the year 2019 (KNBS. 2020). The major minerals produced in Kenya were 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 gemstone producer with deposits of ruby, pink sapphire and tsavorite (green garnet). In the coastal region, key mining activities include Kwale heavy sands, cement manufacturing using locally available limestone, coral limestone and sand mining, both for the local and export markets. However, these activities need to be assessed further in terms of their status,

potential, values, and governance regimes. Table 1.2 is a brief summary of some of estimated Export Value for some mineral found at the Kenya Coast. The value of exports for the coastal minerals was Ksh. 0.77 billion for stone, sand and gravel; Ksh. 3.87 billion for salt; and Ksh. 13.85 billion for titanium ores and concentrates (KNBS, 2020).

**Table 1.2: Mineral at Kenya Coastal area**

<b>Mineral</b>	<b>Value of Exports Ksh Millions (2019)</b>
Stone, sand and gravel	769.6
Salt	3,870.7
Titanium ores and concentrates	13,852.5

Source; KNBS Economic Survey 2020

Although some information is available on Mineral and extractives in Kenya, information associated with mining in the inland blue economy still remains scanty and scattered. This report will therefore largely cover the coastal and offshore mining and extractives, with limited coverage on the inland blue Economy, mainly that which is associated with major Lakes and rivers in Kenya.

## **1.2 Geographical Scope for Coastal and offshore mining**

This sub-section gives an overview on the geographical scope for this analysis. This sub-section provides an overview of the size of the coastline covered, the coastal zone, and the extending towards the sea coverage. It also provides a brief overview of each of the Lakes considered in the analysis.

### **1.2.1 The Kenyan Coast**

The coastal area (zone) include the lagoons, mangrove swamps, tidal flats, embayments and fiords, barrier islands and areas bordering estuaries and deltas and offshore areas - areas at sea some distance from the shore. Coastal mining thus means extraction of materials from the coast lands, marine resources and ecosystems.

Kenya has a coastline of about 1420 Km, with five counties bordering the Indian Ocean, namely; Mombasa, Tana River, Lamu, Kilifi and Kwale. The county with the most coverage of the ocean being Lamu and the least being Tana River county. Mining in Kenya consists of mining in the 6 coastal counties of Lamu , Tana River, Kilifi , Mombasa, Taita Taveta and Kwale.

### **1.2.2 The Kenyan Offshore**

Offshore mining can either be within a country's EEZ, or in the international waters. Within a country's territorial waters, the country's law is responsible for marine activities within the area which includes 200 nautical miles from the coastline

## **Inland Water Bodies- key inland Blue Economy Resources**

### **1.2.1 Lake Elementaita**

Lake Elementaita is found approximately 20Km south-east of Nakuru city. The lake lies on the floor of the Rift Valley at 1,776 m above sea level. The lake is fed by the Kariandusi hot springs and two small streams, the Mereroni and Kariandusi, both flowing from the eastern



plateau. The surrounding landscape is characterized steep rocky faults, volcanic outcrops. The lake is also surrounded by two wildlife conservancies namely Ututu and Soysambu. The lake is verged by small scale agricultural farms.

### **1.2.2 Lake Nakuru**

Lake Nakuru is approximately 60Km from Naivasha town, at the edge of the city of Nakuru. The lake lies on the floor of the Rift Valley at between 1760 and 2080 m above sea level. The shallow, (approximately 3m deep) alkaline lake is fed by five seasonal rivers namely; Njoro, Makalia, Nderit, Naishi and Larmudiak which flow from either the Mau Escarpment or the Aberdares. Lake is surrounded by the Mau ranges to the West, Eburru to the South, Bahati Escarpment to the North-East and Menengai crater to the North. The lake is within a protected area, which is the Nakuru National Park.

### **1.2.3 Lake Bogoria**

Lake Bogoria is approximately 85Km by road from the city of Nakuru. The lake is situated at an altitude approximately 990 m above sea level. With a depth of about 14 metres, the Lake Bogoria, the alkaline lake on the Great Rift Valley floor is approximately 17 km long, with a maximum width of 4 km. The lake is fed by the Sandai-Waseges, Lobo, Emsos River, minor perennial springs, and hot springs and geysers found on the shores of the lake. The lake is bounded by the Siracho escarpment. To the flat western shore is a series of hot springs and geysers.

### **1.2.4 Lake Baringo**

Lake Baringo is approximately 120Km from Nakuru city by road. The Lake covers an area of 130km<sup>2</sup> and is approximately 970m above the sea level. The estimated maximum depth for Lake Baringo is 3.5 metres. It covers a surface area of approximately 100 km<sup>2</sup>. The lake is fed by many seasonal rivers which include Ol Arabel, Makutan, Tangelbei, Endao, Chemeron, Perkerra and Molo. The lake has fresh water although it has no known outlets.

### **1.2.5 Lake Turkana**

Lake Turkana is approximately 56 Km from Lodwar town by road. The Lake is 290Km long, 32Km wide and 109m deep, making it the largest Lake in Kenya and the largest alkaline lake in the world. Lake Turkana is fed by three rivers namely; River Turkwel, River Kerio and River Omo, with no outlet, which explains its high levels of alkalinity.

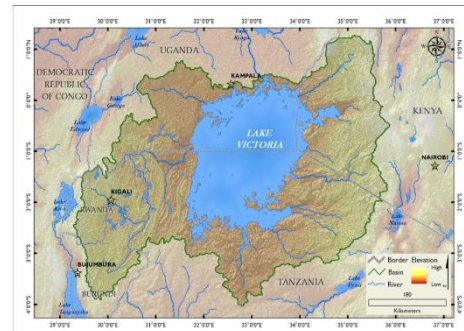
### **1.2.6 Lake Magadi**

Lake Magadi lies within Kenya, slightly to the north of Lake Natron and at the bottom of a steep-sided valley, which is the lowest point in the eastern or Gregory Rift Valley. The lake extends roughly 20 km N-S and is up to 6 km wide. Both lakes lie at an altitude of some 600 m above sea level and are surrounded by plateaus and active natrocarbonatite volcanoes, reaching to more than 3,000 m asl. With an area of only 90 km<sup>2</sup>,

There is no perennial stream flow into Lake Magadi. The lake is recharged mainly by saline hot springs (temperatures up to 86 °C) feeding into alkaline "lagoons" or "moat facies" around the lake margins. Most of the hot springs crop out along the northwestern and southern shorelines of the lake.

### 1.2.7 Lake Victoria

The largest in the African great lakes Region, Lake Victoria is the world's largest tropical lake and supports the largest freshwater fishery in the world. The lake occupies approximately 68,800 km<sup>2</sup>, with an average depth of 40 m, and a maximum depth of 80 m. The Lake Victoria shoreline is shared by three countries, namely Tanzania, Uganda and Kenya with approximate area percentages of 51%, 43% and 6% respectively. In Kenya, the Lake is fed by among other rivers, the Yala, Nyando, Sondu Miriu, Migori and Mara rivers. The Map on the right is a representation of the Lake Victoria basin.



## 1.3 Inland, Coastal and Offshore Mining and Extractives in Kenya

### 1.3.1 Introduction

Mining generally involves digging a pit, progressively deeper as the ore, technical considerations, consents and economics allow, then extracting the required minerals. In the case of mining on land, after mining, the pit is left as a lake for community use, or modified as agreed in the consent conditions. Mineral mining on land has been ongoing for centuries, however offshore mining has started recently. This has been driven by the rising price of minerals extracted from land, high demand and high level of exploitation on land, which has caused depletion for some minerals. There is now growing research on the economic potential of the blue economy in mining as a result of recent exploitation of the seabeds which has led to discovery of the rich deposits of polymetallic nodules, cobalt crusts and massive sulphide deposit among others. This section provides a summary for some of the minerals and extractives found in Kenya's Coastal areas, Offshore and in and in the catchment areas defined for the lakes covered.

### 1.3.2 Minerals with Great potential

**Salt:** The earliest minerals obtained at coastal Kenya were salt and sand. Salt was mined in Lamu as early as the 14th and 15th century using salt bowls. Some of the most extensive salt was from around Gongoni, north of Malindi, and traders came from considerable distances for the salt. In October and November 1917, an estimated 472,305 pounds of salt were exported from Gongoni to Mombasa for 3 rupees per Mkanda (105 pounds). The average collector could manage two mikandas a day (Sutton, 1994). This shows that the people at the coast of Kenya have been making a living from mining for a very long time. Salt at the coast of Kenya is extracted by solar evaporation. In this process, the sun evaporated most of the water leaving the concentrated brine which is collected by harvesting machines. The harvested salt is then transported to factories where it is washed, iodised, sorted and packed. The earliest salt works was Mombasa salt works which was established by the Germans in the 1920's. This was later acquired by Kaysalt. Other salt companies include Kensalt Ltd, Kurawa Industries Ltd, Malindi Salt Works, Krystalline Salt Ltd (Kaysalt) and Kemu Salt Packers Production Ltd. Kaysalt

(Krystalline Salt Ltd), one of the largest producers of salt in East Africa. Kaysalt (Krystalline Salt Ltd) was established in 1984.

Within the context of the inland blue Economy, the most obvious sources of salt are associated with the alkaline lakes of the Rift Valley, with substantial deposits around lake Victoria. The Lake Magadi salt pans, present one of the best examples. The climate of the Lake Magadi area makes this process very suitable.

***Titanium:*** Though the presence of titaniferous sands in the coastal areas of the Western Indian Ocean has been present, the mining of Titanium in Kenya was initially done by Tiomin, a Canadian company, in Kwale County which was later acquired by Base Titanium in 2010. Currently the Kwale operation has depleted most of the titanium reserves making the operation to end in the year 2023 (Base Titanium). The Kwale Operation's original mine life was 13 years, running up until 2025. However, the mine life was later reduced to 2023 due to higher mining rates and the Wet Concentrator Plant (WCP) expansion. To address the reduced mine life, Base commenced an exploration programme in the area outside of the existing mining lease area, including around the North Dune, to identify additional resources that could be economically mined. This area has a reasonably sized resource, with potential for large scale mining. It is expected that mining in the North Dune will increase the Life of Mine (LOM) a further 4 to 4.5 years; and Base titanium has currently applied for the extension of their exploration license by NEMA for a period of 4 years. Base Titanium, employs a hydraulic mining method which has proven cost effective and well suited to the Kwale deposit and involves blasting the mining face directly with high pressure jets of water to create an ore slurry. The ore slurry is then pumped to the wet concentrator plant where slimes are removed before a number of gravity separation steps reject most of the non-valuable, lighter gangue minerals to produce a heavy mineral concentrate. The heavy mineral concentrate is then processed in the mineral separation plant which cleans and separates the rutile, ilmenite and zircon minerals into finished products for sale.

***Limestone:*** Exploitation of the limestone is widespread and is governed by local variation in the limestone texture, composition and demand for the material. In the Bamburi area north of Mombasa, limestone is used for cement manufacturing and in Tiwi for lime manufacturing. In addition, all along the coast limestone is being exploited for building stone. Limestones are extracted by opencast mining through blasting before crushing, grinding and shipping.

***Sand:*** Sand is the most mined commodity on the planet and is mainly mined along river beds, inland dunes, sand pits and on beaches. Sand is mostly used for construction. It is a commodity whose demand is almost insatiable due to the increasing population that demands construction. Sand mining in Kenya has been of high contribution to construction for urbanisation in the coastal towns of Malindi, Lamu, and Mombasa among others. Sand is harvested by loaders who scoop the sand using shovels into lorries used to transport the sand to various destinations. The Tana River county sand harvesting bill 2016, clearly stipulates the conditions to be met to ensure sustainable sand harvesting in Tana River county. These conditions include; the hours

of sand harvesting and transportation, the sale of sand and licensing provisions. Sand harvesting in Tana River is only allowed on river beds as harvesting sand on riverbanks is prohibited.

All the inland lakes have huge potential for sand harvesting.

**Gemstones:** Mining of gemstones is mostly done small-scale by artisanal miners since it is usually scarce and widely spread out. Gemstones at the coast of Kenya are mostly mined through opencast mining which is a method that involves digging minerals from the ground. The miners track the gemstone vein from which the mineral is extracted. The dug soil containing the gemstones can also be sieved to separate the gemstones from other stones. After mining, the gemstones are valued and sold.

**Gypsum:** Gypsum is mined using an open cast method after accessing the gypsum ore. The extractions are then dried, separated, crushed to desired sizes and then transported to cement factories. According to the Kenya Mining Investment handbook of 2016, Gypsum in Kenya's coastal areas, is found in Kilifi and Tana river.

### 1.3.3 Minerals and Extractives within the Kenyan Lakes

Kenya has vast mineral deposits that remain largely unexploited as data gaps keep the country's undiscovered underground wealth out of the economic system. A report released by the Ministry of mining on the country's potential mineral resources show that Kenya has billions below its surface worth of minerals yet to be mapped and quantified for mining. These minerals include soda ash, fluorspar, titanium, niobium and rare earth elements, gold, coal, iron ore, limestone, manganese, diatomite, gemstones, gypsum and natural carbon dioxide.

This section is a quick overview of some potential minerals and extractives to be found in various lakes in Kenya.

#### 1.3.3.1 Lake Bogoria

Some preliminary studies have established that lake Bogoria contains an unusual array of microbes and micro-organisms from which enzymes have been produced for use in antibiotics and cleaning products. The Lake Bogoria community strongly believe that these tiny organisms are the basis of the multi-million dollar global biotech industry.

#### 1.3.3.2 Lake Elementaita

According to an evaluation report by IUCN in May 2021, artisanal extraction of soda and sand exists in Lake Elementaita. The report further identified diatomite extraction site outside the buffer zone, east of the sanctuary.

#### 1.3.3.3 Lake Magadi

In Lake Magadi, trona, a naturally occurring mineral that contains sodium carbonate compounds, is to be found at the surface. The high temperatures and long sunny days in this area cause the solution to concentrate by evaporation eventually giving rise to more trona. Thus, the trona deposit in Lake Magadi is constantly renewing itself by natural means. After the United States of America and Turkey, Kenya is the third largest producer of soda ash in the world, with an annual production of about 360,000 metric tonnes.

#### ***1.3.3.4 Lake Nakuru***

Lake Nakuru is within the Lake Nakuru National park. This area is protected and reserved solely for tourist activities. Scanty information is available regarding the mineral potential for the lake. However, given its location and alkaline nature of the lake, lake Nakuru is rich in bicarbonates and carbonates. In partnership with the Kenya Wildlife Service which is the management authority for the lake and its ecosystem, it is possible for research scientists to estimate the economic potential of minerals and extractives in the Lake Nakuru.

#### ***1.3.3.5 Lake Baringo***

Besides small scale sand harvesting, there is no known mining activity carried out in or around Lake Baringo.

#### ***1.3.3.6 Lake Turkana***

Little is known about mining in and around Lake Turkana. Some sand harvesting takes place in a few areas. Stone harvesting for construction also takes place around Lake Turkana. Wind farms for energy and Geothermal power generation are probably the major activities related to mining and extractives from Lake Turkana.

During a rapid field visit to the Lakes in Kenya, there are strong indications that each of the major Lakes present an opportunity for mining and extractives.

### **1.4 Coastal and offshore mining in Kenya**

Coastal mining refers to mining undertaken in the coastal areas, shorelines and ocean/seas deep waters. Coastal areas refers to integrated coastal management plan areas (administration blocks defined as coastal areas), the shorelines extending towards the sea through surf area and landward to the highest process of wave alteration and tide influenced areas. The coastal area (zone) include the lagoons, mangrove swamps, tidal flats, embayments and fiords, barrier islands and areas bordering estuaries and deltas and offshore areas - areas at sea some distance from the shore. Coastal mining thus means extraction of materials from the coast lands, marine resources and ecosystems.

Kenya has a coastline of about 1420 Km, with five counties bordering the Indian Ocean, namely; Mombasa, Tana River, Lamu, Kilifi and Kwale. The county with the most coverage of the ocean being Lamu and the least being Tana River county. Coastal and offshore mining in Kenya consists of mining in the 6 coastal counties (Lamu County, Tana River County, Kilifi County, Mombasa County, Taita Taveta County and Kwale County and direct mining in 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 (See Appendix 2 and 3).

Offshore mining or deep-sea mining is the sourcing of rare earth minerals on the ocean floor. 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 responsible for marine activities within the area which includes 200 nautical miles from the coastline.

Locations	Resource	Quantity	Revenue	Employment	References
European Union, United Kingdom, Japan, United States (minor)	Aggregate	~50-150+ million m <sup>3</sup> / year (can vary strongly year to year depending on demand)	1-3+ billion US dollars	5,000-15,000 (estimate)	Ifremer, 2014 Herbich, 2000 Marinet, 2012 Newell and Woodcock, 2013
South Africa, Namibia, Australia (Inactive)	Diamond Placers	1.1 million carats (2012).	3.5 billion US dollars	~1,600	NAMDEB, 2010 NAMDEB, 2014
Indonesia, Malaysia, Thailand;  Australia (Inactive)	Tin	19,000 tons /yr tin	Indonesia 500 million US dollars	Indonesia ~3,500  Malaysia & Thailand N/A	Timah, 2012
New Zealand (inactive)	Iron Sands	0	0	0	
United States, South America, Australia, New Zealand, Africa, Portugal, India (all inactive)	Phosphates	0	0	N/A	

Mexico (inactive)	Phosphates	Total of 327.2 million ore tons at 18.5% P <sub>2</sub> O <sub>5</sub>	0	N/A	Don Deigo (2015)
United States (now inactive)	Sulphur	0	0	0	

Terrestrial areas mining and coastal areas mining in depths of less than 50m has been happening for millions of years in the world. However, in the recent decades, mining has proceeded into the deep waters and lead to an increased surge of interest by the marine scientists and the mining industry as the oceans have high future potential as they cover 70% of the planet and areas are relatively unexplored. For instance, 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 10 tonnes of cobalt all unexploited to date. The minerals and extractives from the coastal and offshore areas include those showed in Table 2.

Table 2: Estimates of Marine Aggregates and Mineral

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, river banks, estuaries and lagoons; informal removal of sand from beaches and foredunes; formal mining of minerals from titaniferous sands; and, production of sea salt from saltpans typically located on estuary flood plains. The types of mineral occurrence in the deep sea are; Polymetallic Sulphides, Cobalt Rich Ferromanganese Crusts and Polymetallic nodules.

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 to a purpose-built vessel. 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.

### 1.5 Coastal mining and Extractives: Country Examples for benchmarking

The economic benefits from near-shore mining are difficult to estimate. Marine aggregates are often sourced locally and reporting is scattered, but the marine sector is often distinguished from the land sector, so the value of the resource can be estimated. In contrast,

commodities like tin and diamonds are part of a global market, which does not distinguish between land-derived and marine-derived materials. Table 3 gives estimated values where reported.

Table 3: Coastal and offshore minerals in Kenyan coast

Location of minerals	Types	
Subsurface soluble minerals and fluids	Petroleum (oil and gas) Frasch sulphur Salt	Potash Geothermal energy Freshwater springs
Surficial deposits	Sand and gravel Lime shells Gold Platinum Tin Manganese nodules	Titanium sands, zircon, and monazite Iron sands Diamonds Precious coral Barite Phosphorite
Subsurface bedrock deposits	Coal Iron ore	
Extracted from sea water	Salt Magnesium Magnesium compounds Bromine Fresh water	Heavy water Potassium salts Calcium salts Sodium sulphate Uranium



## Section II

### Contribution of Inland, Coastal and Offshore Mining and Extractives

This section covers some of the direct and indirect benefits of coastal and offshore mining and extractive to the local people in Kenya's six coastal counties.

#### 2.1 Direct Contributions

**Exports:** Mining is a good contributor of Kenya's Exports. The following value was derived from mining of some minerals found at the coast of Kenya in KSH millions as of the year 2019. An example of exports from the coast of Kenya include products from Kaysalt, a salt manufacturing company which exports to Tanzania, Uganda, Rwanda, Burundi, DR Congo, North Malawi and South Sudan.

**Employment creation:** According to the Malindi Public inquiry Audit report of 2006, Local communities have received direct employment from companies and organisations involved in this sub-sector. Being a key sector to Kilifi's economy, the Salt industry employs over 1,100 workers directly from the community thereby reducing the levels of unemployment among the locals. Increased employment implies increased cash flow as well as improved purchasing power of products in the mining locality.

**Revenue to Coastal Counties:** Mining companies also generate revenue to their counties. An example is Tana River county which collected revenue from gypsum related operations amounting to Ksh. 3.607 million, in the year 2016 (Tana River CFSP, 2016). Through licensing and other forms of taxation, the National government has also benefited from this additional source of National revenue.

**Infrastructure development:** 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.

**Tax contribution:** Mining companies are taxed at 30% unless they are a branch of a foreign company in which case the tax rate is 37.5% (Deloitte, 2018). This means that foreign mining companies at the coast like Base titanium are taxed more compared to local mining companies therefore contributing more to Kenya's tax revenue. Gemstones and other precious metals (such as gold and silver) are subject to royalties at 5%. (Stevens, 2017).

**Increased manufacturing in the Country:** Increase in Coastal mining has significantly contributed to the increase in the manufacturing sector in Kenya. Most of the salt manufacturing companies are situated in the Kenyan north coast namely: Kensalt Ltd, Kurawa Industries Ltd, Malindi Salt Works, Krystalline Salt Ltd and Kemu Salt Packers Production Ltd. The country's production meets domestic demand with the excess being exported to neighboring countries (Rasowo et al., 2020).

**Royalties:** According to the ministry of mining and petroleum, the royalties made by the government for some of the minerals mined at the coast of Kenya were based on the following 2013 rates ; Titanium – 10%, Gemstones – 5%, Industrial minerals – 1%, Cement mineral levy 140/= per tonne.

**Foreign direct investments:** Some of the companies that are involved in mining at the coast are of foreign nationalities, one big example being Base titanium which is of Australian nationality, resulting in foreign exchange to the economy.

**Other Benefits:** Other benefits include the fact that Minerals and extractives have become an alternative to the overexploited terrestrial mining resources. Equally, related programs have promoted environmental awareness through rehabilitation programs.

## **2.2 Indirect contributions**

**Formation of Community Support Initiatives:** Community support initiatives include SACCOs such as Nyumba Sacco limited which is a SACCO society that financially empowers employees of the Mombasa Cement Limited company located in Vipingo, Kilifi County among other companies. Financial empowerment has the capacity to offer credit to employees for entrepreneurship, investments and their further development which indirectly contributes to the GDP.

**Community and Environmental Programs:** With their Corporate Social Responsibility (CSR) fund, Base Titanium for instance, has partnered with other organizations like 'Cotton on Group' from Australia and 'Business for development' in order to promote the agricultural sector in the community. The platform formed as a result is the 'Business Partnerships Platform' whose aim is to promote cotton and potato growing in Kwale by equipping farmers with skills and training for cotton farming. This has enabled farmers to transition from subsistence cotton farming to more sustainable cotton growing practices. According to Cotton on Group, the program involved over 2,500 farmers in 2018 which saw roughly 1,600 tonnes of raw cotton harvested and assisted many of those farmers in doubling their income, indirectly contributing to the GDP. Another notable contribution by Base titanium is the contribution towards county health infrastructure is through construction of the blood bank building in Msambweni which was launched in December 2018. The Blood Bank Center was constructed at a cost of Sh 32 million, of which Sh15 million was from Base Titanium Company (Kwale County Fiscal Paper 2019). Kensalt Company provides education scholarships to local

students. Such a project breeds empowered locals who later in life are educated and financially empowered.

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## **Section III: Blue Economy Initiatives**

### **3.1 Blue Economy Initiatives in Coastal and Offshore Mining and Extractives**

There are various initiatives globally, regionally and by the government of Kenya and key stakeholders to tap into the blue economy of mining and extractives. In order to provide guidelines on the exploitation and management of international waters, the United Nations Conference established the United Nations Convention on the Law of the sea (UNCLOS); a set of laws that govern the marine activities in waters beyond a country's national jurisdiction. According to UNCLOS, the international waters and its resources belong to mankind. As a result of UNCLOS, the International Seabed Authority (ISA) was established. This is an authority to process applications, monitor activities as well as offer licences for the exploitation of resources in the international waters.

Recognizing that the threats to the productivity and integrity of the coastal and marine environment due to pollution and habitat degradation are not confined to national boundaries, the governments of the Western Indian Ocean region signed the Nairobi Convention in 1985. This Convention offers a vital regional platform for the protection, management and development of the marine and coastal environment in the Eastern and Southern African region (Nairobi Convention Secretariat, 2009). In November 2018, the first Blue Economy conference on the sustainable Blue Economy, was held in Nairobi, Kenya. The conference facilitated discussions on sustainable extraction of Coastal and offshore minerals.

### **3.2 Biotechnology Initiatives**

The Kenya government has also made attempts to promote biotechnology through various initiatives such as approving the national policy on biotechnology development in 2006 which ensures the safe application and commercialization of biotechnology in Kenya. The Kenya government also 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 in Kenya 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).

## Section IV: Opportunities and Challenges

According to the Conference on Sustainable Blue Economy held in Nairobi, Kenya in 2018, little is still known about deep-sea habitats and their recovery potential, and little is also known about the impact that mining operations are likely to have on ecosystems and the wider functioning of oceans. That notwithstanding, there are a number of known opportunities and challenges facing Kenya's blue economy.

### 4.1 Opportunities

Table 1: Opportunities classified as either short term, mid-term or long-term

<b>Opportunities in the Coastal and Offshore Mining and Extractives sector</b>	<b>Short term</b>	<b>Mid-term</b>	<b>Long-term</b>
(i). 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.			✓
(ii). 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.		✓	✓
(iii). Advanced research should be done on the potential of commercialization of sustainable marine biotechnology in Kenya.		✓	
(iv). Well managed and marketed mineral mining in the coastal region has the potential to generate a reliable streams of income for the coastal communities. The income from sector would intern help in countering the cyclical relationship documented between poverty and natural resource exploitation.	✓		
(v). 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 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.			
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## 4.2 Challenges

One of the major challenges facing Coastal and offshore mining is the frequency of 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.

There are many 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. A 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). Lack of adequate infrastructure has also been cited as a Major challenge. Much of the areas where locals undertake mining have poor or lack infrastructural. 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.

Other common challenges facing Coastal and offshore mining are:

- i. Low budgetary allocations to promote the small scale miners who dominate the mining industry and promoting offshore mining.
- ii. Low technological development in the country which limits the exploration of offshore mining.
- iii. Inadequate research work. There is lack of institutes specializing in minerals research work in the coast region especially the offshore mining.
- iv. Lack of technical personnel due to lack of 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.
- v. The largest mining in the coastal area is informal, small scale and considered illegal. This causes damaging socioeconomic, health and environmental impacts, which has trapped majority of small scale miners and communities the cycles of poverty and exclude them from legal protection and support.
- vi. Low price 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.
- vii. Use of rudimentary techniques such as use of hazardous substances blasting and mining which undermines the health of the miners as they get exposed to materials mercury, zinc vapour, cyanide, dust and fine particles, large amounts of noise, lead to high

number of accidents and possible pollution of the natural resources such as water bodies.

- viii. Inadequate comprehensive and clear mining policies and guidelines coupled with poor law enforcement in the mining sector.
- ix. 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 received. There is elevated risk if they bring children in terms of security and health.
- x. Inadequate rehabilitation actions in the mining 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. This abandoned mines are a source of accidents especially the abandoned pits and also environment 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.
- xi. The high cost of exploration: The cost of exploring especially offshore is very expensive. Kenya has thus done very little exploitation offshore has the country is straining financially.
- xii. Displacement of people: Due to lack of legal title deeds by most coastal communities, mining companies lease the land from the government causing the communities to be evicted from the land they have occupied for many generations without prior consultation, meaningful compensation or adequate settlement elsewhere.
- xiii. Lack of nearby health facilities and first aid or emergency response by the government from the mining sites in-case of accidents which has been happening a lot in the small mining sites.
- xiv. The geo-political nature is the maritime boundary dispute with Somalia. Kenya's maritime sovereignty is being challenged by Somalia which instituted proceedings against her at the International Court of Justice (ICJ) in 2014 (Hasan et al., 2019).
- xv. Kenya's marine flora and fauna has not been exploited for biotechnology in the pharmaceutical and cosmetic industry. The government of Kenya however, is encouraging the research in that area using various institutions such as Kenya University Biotechnology Consortium (KUBICO), Centre for Biotech and Informatics (CEBIB), National Biosafety Authority, Kenya Marine and Fisheries Research Institute (KMFRI).
- xvi. Some of the extractables are mined informally therefore making the data on such resources scanty available. They include informal mining of sand, gemstones
- xvii. Claims of land grabbing by citizens especially in the salt extracting zones.
- xviii. The possible environmental harm caused by deep sea mining on the marine ecosystem.

## **Section IV: Governance Framework Inland, Coastal and Offshore Mining and Extractives**

### **5.1 Policy framework**

The mining and minerals sessional paper number 7 of 2016 was formulated to provide for frameworks, principles, and strategies for exploration and exploitation of minerals in Kenya for socio-economic development of the country. The policy provided for; regulations of the mining sector, concession management and mineral rights allocation, enhanced collection of geological data and information, development of legislation for access to land for mining activities, health, safety and environmental regulation in mining, the fiscal regime, mineral promotion and value addition, maximising benefits from mining, mineral benefit sharing, local equity participation, artisanal and small-scale mining, and gender, youth and inclusiveness in mining. The policy also realized the role of a clear and well-coordinated institutions for the achievement of the mining industry potential thus providing for creation of appropriate institutional arrangements to formulate policies and create an enabling environment for investments, provide the comprehensive primary geo-data and information to reduce exploration risks for investors, automation of licensing and commissioning, management, governance, coordination and regulation of the mining industry, monitor minerals production and earnings, promoting of mineral value addition and beneficiation, and provision of an accredited certified laboratory services.

According to the policy, the industry shall be governed, regulated, managed and operated through the following directorates and specialized agencies; Directorate of Geological Surveys; Directorate of Mines; Directorate of Mineral Promotion and Value Addition; Internationally accredited Mineral Certification Laboratory and Geo-Data Bank; Mineral Audit Agency; National Mining Corporation; National Mining Institute; Mineral and Metals Commodity Exchange; Minerals Rights Board; and, Directorate of Resource Surveys and Remote Sensing.

The mandates for overseeing the implementation of this policy is under the ministry of mining. Resources required to operationalize the policy are human, financial and material and are to be funded through the annual Medium Term Expenditure Framework (MTEF) budgeting process. Additional resources will be mobilized from the private sector through Public-Private Partnership (PPP) arrangement and through government and Development Partners negotiations particularly in areas which require massive resources such as carrying out nationwide airborne geophysical surveys. The policy also provides for continuous monitoring and periodic evaluation of policy goal and objectives.

### **5.2 Legal framework**

The Mining Act 2016 which is came into force on 27<sup>th</sup> May 2016 is a major revision of the Mining Act 1940. The act brought into effect the Articles 60, 62 (1)(f), 66 (2), 69 and 71 of the Constitution as far as they apply to minerals and repeals the Mining Act Cap. 306, the Trading in Unwrought Precious Metals Act Cap. 309 and the Diamond Industry Protection Act Cap.



310. The act comprises of 16 parts (I to XVI) and has 225 sections supported by two schedules (Classification of Minerals and Criteria for Determining Small Scale Prospecting and Mining Operations) (GOK, 2016a; KPMG, 2016). The act outlines that all minerals in the Kenya territorial areas including the exclusive economic zone and areas covered by the territorial sea or continental shelf, are the property of the Republic of Kenya and their ownership are vested in the national government of Kenya in trust for the people of Kenya. The act however does not apply to petroleum and the hydrocarbons which are regulated by a separate legislation.

The Act outlines that the Cabinet Secretary (CS) is in charge of mining and is responsible for the administration of the Mining Act and is required to establish the Mineral Rights Board, which will assist the CS with aspects such as rejection, retention, renewal, suspension, revocation, variation, assignment, trading, tendering, or transfer of Mineral Rights. The Board also supports the CS in drafting Agreement to designate areas for certain mining operations such as small scale and artisanal mining operations and excluding certain areas from mining activity. The Act also establishes two directorates to assist with the administration which are the Directorate of Mines and the Directorate of Geological Survey (GOK, 2016a; KPMG, 2016).

The Act further outlines three operations (i) large scale operations; (ii) small scale operations; and (iii) artisanal mining operations. Different licenses and permits exist under each type of operations for mineral rights, where by licences are to be given to large scale operations, while a mining permit will be given to small scale and artisanal operations. The Act also outlines the payment of royalties by the mineral rights holder to the state. The royalties will be determined by the Cabinet Secretary as per the gross sale of the sales of the minerals. The royalties will be divided as follows; 70% to national government, 20% to county government and 10% to the community where mining operations are carried out (GOK, 2016b).

The Act further provides for conflict resolutions by the Cabinet secretary through mediation and mediation or arbitration process or through a court of competent jurisdiction. It also provides for health, safety and environment issues, where by the persons conferred with the mineral rights are expected to comply with the laws of water rights, land use permits and licences, and Occupational Health and Safety (GOK, 2016b).

Besides the Mining Act, 2016, the following are the other pieces of that touch on mining and extractives: Water Act, No. 43 of 2016; Occupational Safety and Health Act 2007; Mining (Local Equity Participation) Regulations, 2012; Radiation protection Act, Cap 243, (Revision 2012); and, Local Content Bill, 2016; add the Environmental Management and Co-Ordination Act (EMCA, 1999 – revised 2016) to help in the environmental aspects of mining as well as the Forest Management and Conservation Act, 2016.

Internationally, Kenya has signed the UNCLOS which has regulations that govern coastal mining and offshore mining and extractives

***Deep Sea Mining Regulation and Management:*** According to the legal framework governing the oceans, distance from Land is the major determinant of what activities can take place on and in the ocean waters. According to the 1982 United Nations Convention on the Law of the Sea (UNCLOS), a coastal state's territorial sea, extends to 12 nautical miles from its coastline and includes the air space, the water body to the seabed and the subsoil. Within their 200-nautical miles exclusive economic zone (EEZ), Coastal states have exclusive rights and jurisdiction over the resources within. Some states have an extended continental shelf beyond the EEZ within which they have sovereign rights over the seabed and any mineral resources, though not over the water column (Figure 6.1). Further out to sea is the area beyond national jurisdiction (ABNJ), which is a term used to describe both the seabed “Area” and the high seas water column above. UNCLOS designates the “Area” as the common heritage of mankind. The legal framework for the Area is provided by UNCLOS. The responsibility for the regulation and control of mineral-related activities in the Area is with the International Seabed Authority (ISA), comprised of the States Parties to UNCLOS. Three sections in UNCLOS are particularly relevant to deep-sea mining: Article 136, Article 137.2, and Article 145, which respectively cover the common heritage of mankind, resources and the protection of the marine environment.

***UNCLOS Article 136—Common Heritage of Mankind:*** The Article states that: “The Area and its resources are the common heritage of mankind.” Jaeckel *et al.* (2017) note that the principle of the common heritage of mankind in relation to the marine environment needs to be developed by the ISA. As well as sharing the benefits of marine resources for current and future generations, the common heritage of mankind principle also includes environmental conservation and preservation of the Area. As interest in commercial seabed minerals mining escalates, exploitation regulations will need to be refined and agreed upon by all interested parties. Setting conservation targets that incorporate research will help to determine the necessary measures to provide effective environmental protection.

***UNCLOS Article 137.2—Legal Status of the Area and Its Resources:*** The Article states that: “All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority.”

***UNCLOS Article 145—Protection of the Marine Environment:*** The Article states that: “Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for *inter alia*: (a) The prevention, reduction, and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging,

excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities; (b) The protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.” With reference to part (a) of Article 145, control of pollution and other hazards in the marine environment also includes protection of the coastline, indicating that the regulations are not limited to protecting only the Area. In relation to (b), there is currently discussion among the scientific community, specialists in maritime law and other interested parties to define the measurement or threshold of harmful effects and what might constitute “acceptable harm” to an ecosystem from seabed mining. Levin et al., (2016) stress that it is crucial to understand marine biodiversity and define what effects would be harmful to the deep-sea environment to enable effective regulation of mining activities.

### **5.3 Institutional framework**

Nationally and locally, the following is a list of institutions with different mandates are involved in the mining and extractives sector:

- i. Ministry of Mining
- ii. Directorate of Mines
- iii. Directorate of Mineral Management and Regulations
- iv. Directorate of Geological Surveys
- v. Directorate of Mineral Promotion and Value Addition
- vi. Directorate of Mine Health, Safety and Environment
- vii. Directorate of Resource Surveys and Remote Sensing
- viii. Directorate of Corporate Affairs, Geo-data Centre and Minerals Certification Laboratory
- ix. Internationally accredited Mineral Certification Laboratory and Geo-Data Bank
- x. National Mining Corporation, Mineral Audit Agency
- xi. Mineral Audit
- xii. National Mining Corporation
- xiii. National Mining Institute
- xiv. Mineral Rights Board
- xv. Ministry of Energy
- xvi. Ministry of Environment and Natural Resources (MENR)
- xvii. National Environment Management Authority (NEMA)
- xviii. Directorate of Occupational Safety and Health Services (DOSHS)
- xix. Kenya National Commission on Human Rights (KNCHR)
- xx. County Governments
- xxi. The Kenya Chamber of Mines (KCM)
- xxii. Association of Artisanal and Small-Scale Miners (ASSM)
- xxiii. National Land Commission
- xxiv. Kenya Chamber of Mines
- xxv. State Department of Environment and Natural Resources

**Internationally, there is the International Seabed Authority (ISA).** This was established in 1982 by UNCLOS and is an autonomous intergovernmental body with 167 members. The ISA is responsible for the mineral resources and the marine environment in the Area. The ISA considers applications for exploration and exploitation of deep-sea resources from contractors, assesses environmental impact assessments and supervises mining activities in the Area.

#### **5.4 Gaps in the Legal, institutional and policy framework**

To improve the contribution of coastal and offshore mining and extractives a number of gaps in Kenya's legal, institutional and policy framework will need to be fixed. These are:

- i. Lack of harmonization of different legislation on Mining in the region leading to smuggling of mineral across the region and thus affecting the entire mining sector.
- ii. A general lack of appropriate policy frameworks and strategies to drive the industrialization, value addition and benefaction agenda.
- iii. Lack of regulations to govern the activities of artisanal Miners leading to conflicts
- iv. Ambiguous definition of Community
- v. Lack of clear, streamlined procedures, imprecise methods for offshore mining that put into consideration ecological and social impacts.
- vi. Institutional overlaps
- vii. Lack of clear national legislation on offshore mining coherent with the regional laws and policies thus the laws used are the international laws - National laws would be interpreted and understood locally and capable of implementation by stakeholders. Unclear laws lead to uncertainties which discourage companies from committing capital.

## Section VI : Conclusions and recommendations

This chapter lays out a few recommendations to improve the sector.

- i. The mining policy takes a holistic approach to the mining sector ensuring that all major issues are addressed. The Mining Act of 2016 on the other hand represents a modern, well laid out legislative structure. However, there are many missed opportunities given the slow implementation of the policy and the mining law.
- ii. There also exists some ambiguities in the mining Act 2016, which require urgent attention. These include eligibility and restrictions within license class provisions; taxation is not expressly addressed except to note that mineral rights holders are under obligation to pay taxes.
- iii. One of the key challenges in offshore mining is the lack of proven technology to operate in five kilometre depths on the seafloor. Kenya, in partnership with other interested partners needs to invest in finding functional technological options.
- iv. Although mining has taken place in Kenya for a very long time, its contribution to GDP is still very small, accounting to less than 0.5% of GDP. There is need to carry out more exploration and exploitation particularly in the blue Economy.

These recommendations can be classified as short-term, mid-term and long-term.

Recommendation number (i) can be implemented immediately with minimal resource requirements. Some advocacy by actors in this sector may be required. In the medium term, the mining Act can be reviewed to address recommendation number (ii) as a medium term measure. Finally, recommendations (iii) and (iv) are more long term in nature.

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**Appendix 1: Contribution to Kenya's GDP by Sectors**

<b>Sector</b>	<b>Contribution in Ksh million (2009 constant prices)</b>	<b>Percentage contribution to GDP 2019</b>
<b>Agriculture, Forestry and Fishing</b>	1,050,758.2	34.1
<b>Transportation and Storage</b>	366,814.3	8.5
<b>Construction</b>	286,232.2	5.6
<b>Manufacturing</b>	478,390.6	7.5
<b>Tax on products</b>	570,383.5	8.5
<b>Other service sectors</b>	35,545.3	0.6
<b>Mining and quarrying</b>	50,325.3	0.7

Source; KNBS Economic Survey 2020.

**Appendix 2: Major mineral deposits found in the coastal areas of Kenya**

<b>Mineral/ Extractives</b>	<b>Location</b>	<b>Mining status</b>
<b>Coral limestone for cement</b>	Bamburi area, Mombasa	Ongoing
<b>Limestone for lime</b>	Waa and Tiwi, Kwale County	Ongoing
<b>Shale</b>	Nguu Tatu, Bamburi, Mombasa	Ongoing
<b>Pozzolana and gypsum</b>	Kilifi County	Ongoing
<b>Coral blocks shaped coral rocks</b>	Manda Island, Lamu County Roka, Bofa and Mtondia in Kilifi County	Ongoing
<b>Titanium (rutile, ilmenite, zircon)</b>	Nguluku and Mrima, Kwale County Shimba Hills, Kwale County	Ongoing Not started
<b>Gemstones</b>	Kuranze Kwale County	Not started
<b>Baryte</b>	Lunga-lunga, Kwale County Vitengeni, Lamu County	Not started Not started
<b>Galena</b>	Kinangoni, Lamu County	Not started
<b>Coal</b>	Maji ya Chumvi, Kwale County	Not started
<b>Sandstones</b>	Mariakani Kwale County	Ongoing
<b>Gypsum</b>	Roka, Kilifi County	Ongoing
<b>Zinc, Lead and copper</b>	Mkang'ombe, Mwache, Dumbule and Dzitenge, Kwale County	
<b>Sand</b>	Tiwi, Kwale County Mazeras and Junda on the Kisauni side of Tudor creek, Mombasa County Ngomeni, Kilifi County	Ongoing
<b>Silica sands</b>	Arabuko Sokoke, Kilifi County Waa, Ramisi and Msambweni, Kwale County	Ongoing
<b>Clay</b>	Port Reitz, Mombasa County	Ongoing



<b>Ballast</b>	Kokotoni (Mombasa–Nairobi road) Kilifi County	Ongoing
<b>Salt</b>	Gongoni-Kurawa, Malindi, Kilifi County Mkunumbi, Mpeketoni, Lamu County	Ongoing Not started
<b>Niobium and iron ore</b>	Mrima Hills, Kwale County Jaribuni, Kilifi County	Not started Ongoing
<b>Lead, copper and zinc</b>	Mkangombe, Kwale County	Not started
<b>Mangroves</b>	Lamu County Kilifi County Mombasa County Kwale County	Been ongoing for centuries but currently there is a ban in all Counties except Lamu County

Source: State of Coast Report for Kenya (NEMA, 2017).

### Appendix 3: List of large scale mining activities in the Coastal region

<b>Name</b>	<b>Location</b>	<b>Minerals</b>	<b>Status</b>
<b>Cortec Mining Kenya Ltd</b>	Mrima Hill	Niobium rare earth minerals	Prospecting company
<b>Geo-Exploration Mining Co. Ltd Sapphire</b>	Kuranze, Taita Taveta	mining Sapphire, Green Garnet & Tourmaline	Ongoing
<b>Wanjala Mining Company</b>	Kishushe, Taita Taveta	Iron ore, magnetite and haemetite	Ongoing
<b>Kenya Calcium Products Ltd</b>	Waa, Kwale County	Hydrated lime and other limestone products	Ongoing
<b>Geofirm East Africa Ltd</b>	Mkang'ombe. Maji ya Chumvi, Kwale County	Coal, Zinc and Lead	Prospecting company
<b>Base Titanium Ltd</b>	Maumba, Shimbahills Ukunda, Kwale County	Titanium Rutile, ilmetite, zircon	Ongoing
<b>Harisson Dodi &amp; Sons</b>	Kuranze, Kwale County	Kyanite, Sapphire, Tourmaline, Amethyst, Topaz	Ongoing
<b>Coastal Quarry</b>	Jaribuni, Kilifi County	Coral blocks, Ballast	Ongoing
<b>Duma Crushers Ltd</b>	Jaribuni, Ganze, Kilifi County	Coral blocks, Ballast	Ongoing
<b>Harji Patel Kilifi Jaribu Quarry</b>	Bahari, Kilifi County	Coral blocks, Ballast	Ongoing

<b>Krystalline Salt Limited</b>	Gogoni in Malindi, Kilifi County	Salt	Ongoing
<b>Magarini Tegemeo project</b>	Magarini, Kilifi County	Coral rock quarrying	Ongoing
<b>Mazeras quarries</b>	Mtwapa/ Mwapula, Kilifi County	Ballast Quarrying	Ongoing
<b>Stout Mineral Resources Ltd</b>	Mwangundo Area, Kilifi	Manganese ore	Ongoing
<b>Bamburi cement by Lafarge</b>	Mombasa	Coral limestone	Ongoing

Source: Kenya mining investment handbook 2016 (GOK, 2016).

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