



# Action Plan for Coastal Protection Measures

Developed for Port Loko, Bonthe, Moyamba and Western Area Rural  
District Councils

(With technical support from the Environment Protection Agency)





2021 - 2023

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## Endorsement

On the dates given below, we, the heads of management of the four District Councils whose names are listed in the table below, endorse this Coastal Protection Action Plan, and urge the people of the districts to make every effort to ensure its effective implementation.

No	Name of District Council representatives	Name of Council	Date	Signature
1	Abdu N. Kpomge	Port Loko District Council	6/10/2020	
2	Tom L. Menseray	Moyamba District Council	8/10/2020	
3	Willie A Parker	Bonthe District Council	07/10/2020	
4	Pheyo Gendemeh	Western Area Rural District Council	9/10/2020	

## **Preface**

This document (i.e. Action Plan for coastal protection measures) is not a national policy document, but a concise and result-oriented plan that has been developed with consent and in consultations with of the Local Councils of four coastal districts. The scope has been structured and framed to meet the current coastal zone environmental risks and challenges.

The plan was exclusively prepared in consultation with four coastal district councils, namely, Port Loko District, Bonthe, Moyamba and Western Area Rural District Council. It was developed as part of the ongoing capacity building support to the Local council on climate change adaptation and coastal zone management as well as building the adaptive capacity of the coastal communities. Moreover the coastal protection plan is expected to be implemented by the Local Councils and should form part of the council's effort to mainstream climate change adaptation and sustainable coastal zone management into the council's development plans and programmes. The plan provides a general guide and framework for effective coastal protection actions and initiatives which can be reviewed regularly to meet emerging challenges of the coastal zone management.

## **Introduction**

The coastal environment is one of Sierra Leone's greatest natural capital assets and extends approximately 560 km from the North around Yeliboya (at the border with Guinea) to the South at Sulima at the border with Liberia. This zone is used extensively and increasingly for a large number of activities, especially so when the population keep soaring at the coastal areas. These multiple uses are not always compatible and may result in a wide array of problems for resource users and decision-makers. From observations over the years, large areas of lagoons and estuaries have been reclaimed (drained and/or filled) to create business centers, settlements or agricultural land. If this development is not planned and managed properly, the result can be rapid and severe degradation of the lagoon ecosystems and loss of natural resources.

Coastal habitats, such as mangroves and other wetlands, and coastal barrier islands and lagoons, are often recognized as the best defenses against sea storms and erosion. If these are destroyed or allowed to deteriorate, storm waves and surges can pound the shore without mercy.

Mining for beach sand has been an important industry in Sierra Leone as a valuable commodity for construction. Even when many may be aware that beach sand offers natural protection to the beachfront, yet beach sand mining has become a lucrative business in construction industry. Sand mining has contributed immensely to erosion and recession of the beachfront. Therefore, beach conservation and protection should start with the presumption that any removal of sand is adverse and should be controlled.

These challenges require a more proactive and comprehensive approach to protect the coastal ecosystems in order to maximize benefits including monetary and protection of lives and properties as essential elements of human wellbeing.

Even as widespread as the problems facing the coastal environment, the activities of government institutions are constrained by a number of factors, ranging from centralized management, weak policies to financial constraints. Existing policies or technical frameworks have in most part been developed by external development agencies, and in some cases do not reflect the country's realities.

Thus the rationale of the Coastal Protection Action Plan (CPAP) is to mitigate challenges leading to coastal hazards, environmental degradation and biodiversity loss in Sierra Leone. The plan is not recommending any hard coastal defense engineering technologies, rather it tries to address the human factors, and by so doing the ecosystem itself can adapt to the changing circumstances and its resistant built to respond to the pressures shocks.

## Context

In 2015 the Environment Protection Agency led the assessment of the State of the Marine Environment and in 2016 coordinated the development an Integrated Coastal Zone Management Plan (ICZMP) to enhance an integrated approach in managing the marine and coastal environment. This plan had an implementation period of five years, i.e. 2016 - 2020.

The sustainable management of the coastal and marine resources for continued development in Sierra Leone requires robust planning including spatial and strategic planning. Prior 2016, there were multiple challenges of managing the coastal areas due to gaps in the policy and legislative frameworks and the lack of synergies in development programmes of the relevant institutions in the sector.

Moreover, the limitations in the protection of the coastal environment however have been the lack of adequate coastal zone planning and management, inadequate national legislation and its effective enforcement, weak institutional structures and inadequate human resources. The problem also extends to the lack of adequate financial resources and clear political commitment to solve the existing problems. Therefore, the ICZMP was developed to support proper and efficient coordination in marine resources use, thereby reducing the burden of planning and managing the different resources in silos. The ICZMP prescribed robust measures to halt the human impacts and also identifies management measures including conservation actions, and building capacity of the sector. It identified key priority themes and actions that would be implemented for a five year period; 2016 – 2020.

Being a national document, it identified issues and challenges and provided a broad framework for sound management of the coastal zone through inter- sectoral coordination and integration of environmental considerations into socio- economic planning and implementation at all levels. The preparation of the ICZMP was guided by national priorities as contained in major policy documents including the National Development Plan. The key objectives of the plan were to assist the relevant state authorities in the marine sector to control pollution and manage coastal development in a sustainable fashion and recommend what policies would be needed to improve the ability of regulatory bodies to meet these goals.

The initiative came about as an attempt to close the gap of solitary management of the coastal environment thereby enhancing a coordinated approach where all relevant and interested parties designed a holistic strategy for the management of the coastal resources and space. The initiative was laudable, inasmuch as it tried to address the problem of duplications and overlaps of mandates of the different institutions thereby creating synergies and amongst the players in the marine sector.

Given that the Environment Protection Agency (EPA) was the coordinating institution, it held the responsibility to lead the monitoring and evaluation of the ICZMP action plan to ensure effective and efficient implementation as well as ensuring that environmental concerns are well mainstreamed into development process. The midterm review, revealed some hindrances to the successful implementation of the plan. It appeared that some institution either did not recognize the plan as a legal and official working document, or were just too negligent to implement the agreed actions. Another hindrance was the fact that the plan was not legally binding and does not have any enforcement powers.

As a result only the lead institution took the onus to coordinate and to the extent implement some of the actions agreed action plan.

Given that Climate change issues have become one of the greatest challenges in the management of the coastal and marine sectors, it has now become widely noticeable the need to move beyond coastal zone management at central level only. By the 2004 Local Government Act, the Local Councils are now required to take the onus in coastal zone management. For this reason, it is necessary to develop an all-inclusive plan that caters for and feature the roles and mandates of the council in respect of coastal zone management. The action plan for coastal protection measures mirrored but is not a substitute to the ICZMP (even as the timeframe of the ICZMP has almost elapsed), but tried to focus on certain aspects as it relate to the protection of shoreline and enhancing coastal resilience and adaptive capacity. Thus the Coastal Protection Action Plan is being developed to roll out Government's aspirations in the area of reducing vulnerabilities as enshrined in the Mid-term National Development plan of Sierra Leone. The key objectives are to:

- Ensure sustainable management of coastal and marine resources by integrating environmental considerations in development planning;
- Protect the coastal environment through the prevention of pollution from land based sources and activities;
- Protect and enhance areas/ecosystem of ecological or cultural value;
- Strengthen the coastal communities to manage the natural resources sustainably for the benefit of future generations;
- Contribute to conservation of species;

The Global Environment Facility (GEF), through the Least Developed Countries Fund (LDCF) has funded the Project entitled "Adapting to Climate Change Induced Coastal Risks Management in Sierra Leone". This project aims at strengthening the ability of coastal communities to systematically manage climate change risks and impacts on physical infrastructures and economic livelihoods, as well as strengthen Government institutions and local coastal communities' resilience to climate change impacts.

The implemented of Component II of the project is coordinated and supported by the Environment Protection Agency. Component II focuses on internalizing climate information into coastal development policy and plans. As an outcome for this component, it is expected that appropriate protection measures, policy, budgeting and legal tools and integrated coordination mechanisms would have been developed to improve and support policy design and implementation in dealing with current and long-term coastal challenges. To achieve this, an Action Plan for Coastal Protection Measures was essential to meeting these goals.

## Overview of the coastal ecosystems in Sierra Leone

Sierra Leone is a small country covering an area of approximately 72,000 square kilometres lying between Latitude 6° and 10° North and Longitude 10° 16′ W and 13° 18′ W and situated on the Atlantic coast of West Africa, with a coastline of about 560km long and a 200 nautical miles territorial sea limit and 5 to 6 nautical miles inshore exclusion zone (IEZ) (Neiland *et al.*, 2016). The Continental Shelf area is about 30,000 km<sup>2</sup> and an Exclusive Economic Zone of about 155,700 km<sup>2</sup> (Sheriff *et al.*, 2009).

The country is endowed with spectacular, complex, diverse and fragile coastal ecosystems such as mangroves, coral reefs, estuaries and sea-grass beds that are overly sensitive and unique in nature. These ecosystems perform crucial coastal protection functions, provide various ecological services such as biotic, biogeochemical, social, cultural and food provisioning services for local livelihood and are also a great source of renewable resources. Summary characteristics of the components of the Coastal Ecosystem of Sierra Leone are given as follows:

### **Mangroves**

Mangroves are characteristic vegetation present in estuarine areas or the interface between land and sea. They can also be referred to as coastal rainforests, tidal forests or coastal woodland (Spalding *et al.*, 2010; Kerry *et al.*, 2017). The mangrove ecosystem is a complex system comprising of biota similar to that found on muddy intertidal flats and include invertebrate and vertebrate fauna, micro-organisms and the interacting biotic factors such as temperature, salinity and chemical constituents of the muddy deposits.

In Sierra Leone, mangroves occur along the Scarcies River, Sierra Leone River, along creeks and bays in the Western area, the Yawri Bay and along the Sherbro River. The rich mangrove forests of Sierra Leone have for long been exploited by the coastal communities whose main preoccupation is fishing. The mangroves forest and trees had been used basically for fish smoking which is an indigenous traditional way of preserving fish caught for sale, and also as important sources of fuel wood (Chong, 1987, Johnson and Johnson, 1991, 1992). The environmental role of this natural resource includes coastal barriers in storm protection, flood and erosion control, and as habitat nursery ground for fish, shrimps and other marine fauna. Mangroves can provide natural protection against extreme weather events and rising sea levels (Mant *et al.*, 2014). The ecosystem houses important carbon stocks of key importance to the “blue carbon” trade (Zakaria *et al.*, 2017). Mangrove forests can store organic carbon 3-5 times higher than terrestrial forests and with greater longevity (Zakaria *et al.*, 2017). Besides, mangrove ecosystem is among the most economically important and biologically diverse ecosystems on the planet (Zabbey *et al.*, 2010; Hamilton and Collins, 2013). The economic returns from well conserved mangrove resources can amount to billions of United States Dollars per-year (Costanza, 2000).



Early study by Chong (1987) had estimated that 47% of the coastline of Sierra Leone was covered with mangroves with a total area of 171,600 hectares. A more recent data in 2016 from Landsat image gave estimate of 152, 575 hectares (CIESIN, 2013). According to Trzaska et al. (2018), Sierra Leone has lost approximately 25% of its mangroves between 1990 and 2016, and the unscrupulous harvesting of mangrove wood for commercial gains has been the dominant threat. A recent assessment by WABICC (2019) revealed mangrove loss by 8% and a decline at the rate of 0.2% per –year in the Sherbro River Estuary. More scandalous is the fact that there are now only three species of mangroves left in the Sherbro Estuary and Yawri Bay, which excludes *Rhizophora Harissonii* and *Rhizophora mangle* (Trzaska et al., 2018). Moreover, several scholars have argued that the open access nature of mangrove exploitation, inefficient and conflicting policies and bylaws governing resources use coupled with the inadequate livelihood options have over the years heightened the unsustainable exploitation and conversions of the mangroves in the four declared Marine Protected Areas in Sierra Leone (Trzaska et al., 2018; Konoyima 2018; Konoyima 2020a, 2020b; Konoyima and Johnson, 2020) such as the River Estuaries and Bay (Sherbro River Estuary, Scarcies River Estuary, Sierra Leone River Estuary and Yawri Bay).

A growth rate of 2.4 percent is expected in the local population by 2025, which will further increase pressures on coastal ecosystems and mangrove resources in the Yawri Bay and Sherbro River Estuary. As the population continues to grow, so would the demand for mangrove resources such as wood and pressures that would further endanger the local biodiversity.

### **Estuaries and Lagoons**

Estuaries are marine water bodies close to land and the most characteristic vegetation present in the estuarine region is mangrove. Estuaries form a transition zone between river environments and ocean environments and are subject to both marine influences, such as tides, waves, and the influx of saline water; and riverine influences, such as flows of fresh water and sediment. A Lagoon is a rare system in Sierra Leone and it is a partly enclosed coastal body of water with one or more rivers or streams flowing into it, and with a restricted connection to the open sea as a result of the formation sand bars formed from siltation of sand materials into the estuary

The Sierra Leone coastline stretches for about 506 km and the continental shelf extends for about 27,500 sq. km. This considerable continental shelf, combined with the local currents, creates a substantial upwelling that places Sierra Leone within one of the world's most productive marine ecosystems (Heymans and Vakily, 2004; GCLME, 2013). The major River Estuaries in Sierra Leone of high biological productivity with colossal potential to support coastal livelihood on sustainable basis include the four declared Marine Protected Areas- the Sierra Leone River Estuary, Scarcies River Estuaries, Sherbro River Estuary and the Yawri Bay.

## The Sierra Leone River Estuary

The Sierra Leone River comprises major rivers such as the Rokel River, the Bunce River and the Port Look Creek. It is 16 km wide and 40 km long. The Queen Elizabeth II Quay, which is the major port, is situated on this river. It is a marine protected area and bordered with main fishing villages or coastal villages which include *Fernandopo, Gbonkobankala, Kirima Village, Rogberay, Kakim, Mayagba, Shylor, Robana, Kasanko, Mathamkiya, Benkia, Tumba, Kegbeli, Makainkay, Makambo, Manday, Aberdeen creek*, around *Mange, Ropolon, Tumba, Makipte, Kasuko, Mene town, Beke bana, Makambo, Manday, Kegbele, Makainkay*.

Moreover, the Sierra Leone River is the combined estuary of many smaller creeks and few major rivers, with over 110 km of mud or mud-sand foreshore, essentially backed by mangroves and 1800 ha of intertidal mud and muddy sand (Tye, A. and Tye, H. 1987). Only three areas were found to have extensive mudflats: Aberdeen Creek, Bunce Creek and mudflats south of Tasso Island. All other areas were exposed sandbanks or smaller mudflats bordering mangrove coasts. The sand flats are less extensive here than at the Scarcies River. An area of 295,000 hectares of the Sierra Leone River estuary is classified as a Wetland of International Importance (RAMSAR convention) in the west of Sierra Leone (UN EPWCMC, 2004, RAMSAR Sites, 1999).

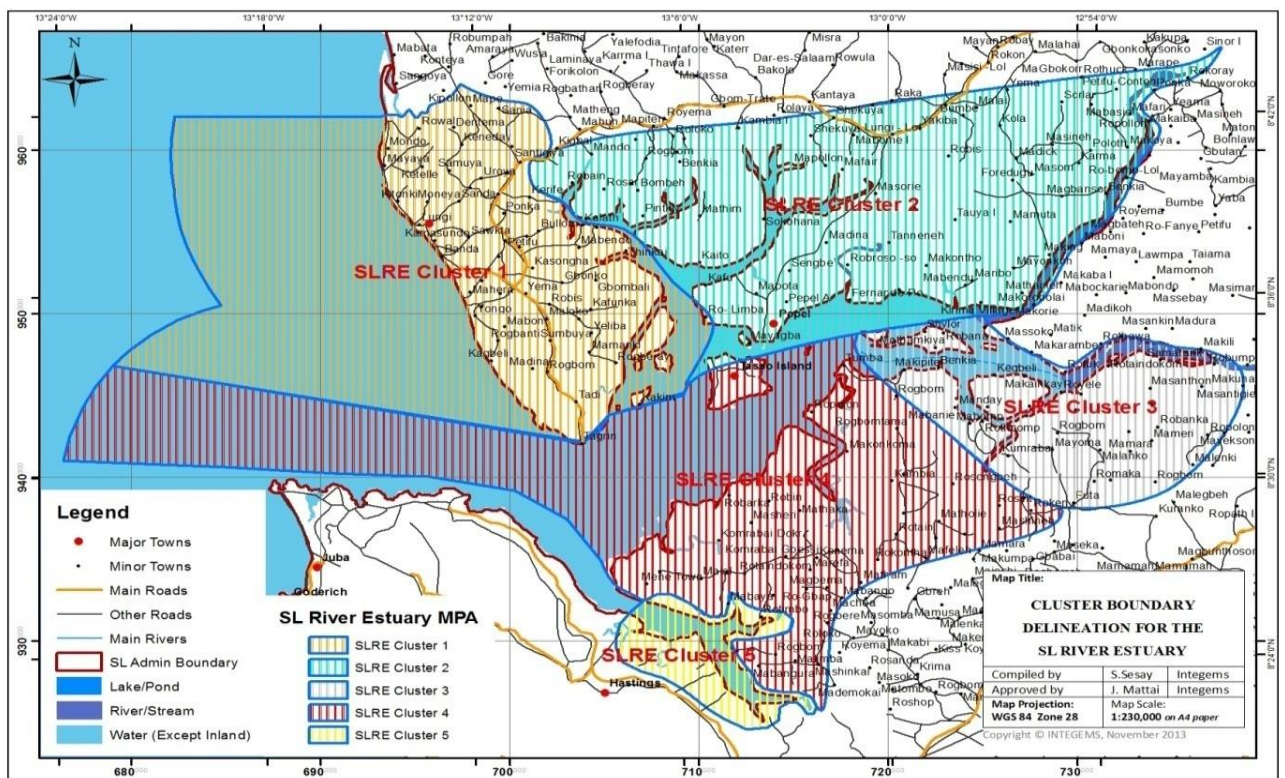


Figure 1: Map showing Cluster Boundary Delineation for the Sierra Leone River Estuary (© GoSL/WARFP-SL, 2012)

## The Scarcies River Estuary

The Scarcies Rivers constitute the great and little Scarcies, in the northern region of Sierra Leone coastline. The two rivers merge towards their mouth before emptying into the Atlantic Ocean. The area is bordered with coastal settlements that include *Kychom, Kassiri, Yeliboya Island, Mambolo, Rokupr, Balansera wharf, Kpunga, Sasiyeck, Mayoro, Makoumpan, Mawabul, Kortimaw Island, Yeli-kom, the Mahela Creek, Kakonki and Benkiya wharf.*

The Scarcies River exhibits both marine and intertidal environmental regimes. The Great Scarcies is relatively narrow and its banks are lined with mangroves. The Little Scarcies has a large mud bank at its entrance south-south-eastward of Kortimaw Island. This river is tidal and during the rainy season it rises about 2.7 m, (Ssentongo. and Ansa-Emmin, 1986). The most extensive mudflats in the area occur near the coast of Yeliboya and Kortimaw Island. Both rivers have a total catchment area of 20.230 km<sup>2</sup> with an estimated total annual discharge 750 m<sup>3</sup>yr<sup>-1</sup> (Ndomahina, 2002). The figure below gives a pictorial view of the Scarcies River Estuary. Both rivers merge and form a single discharge into the ocean.

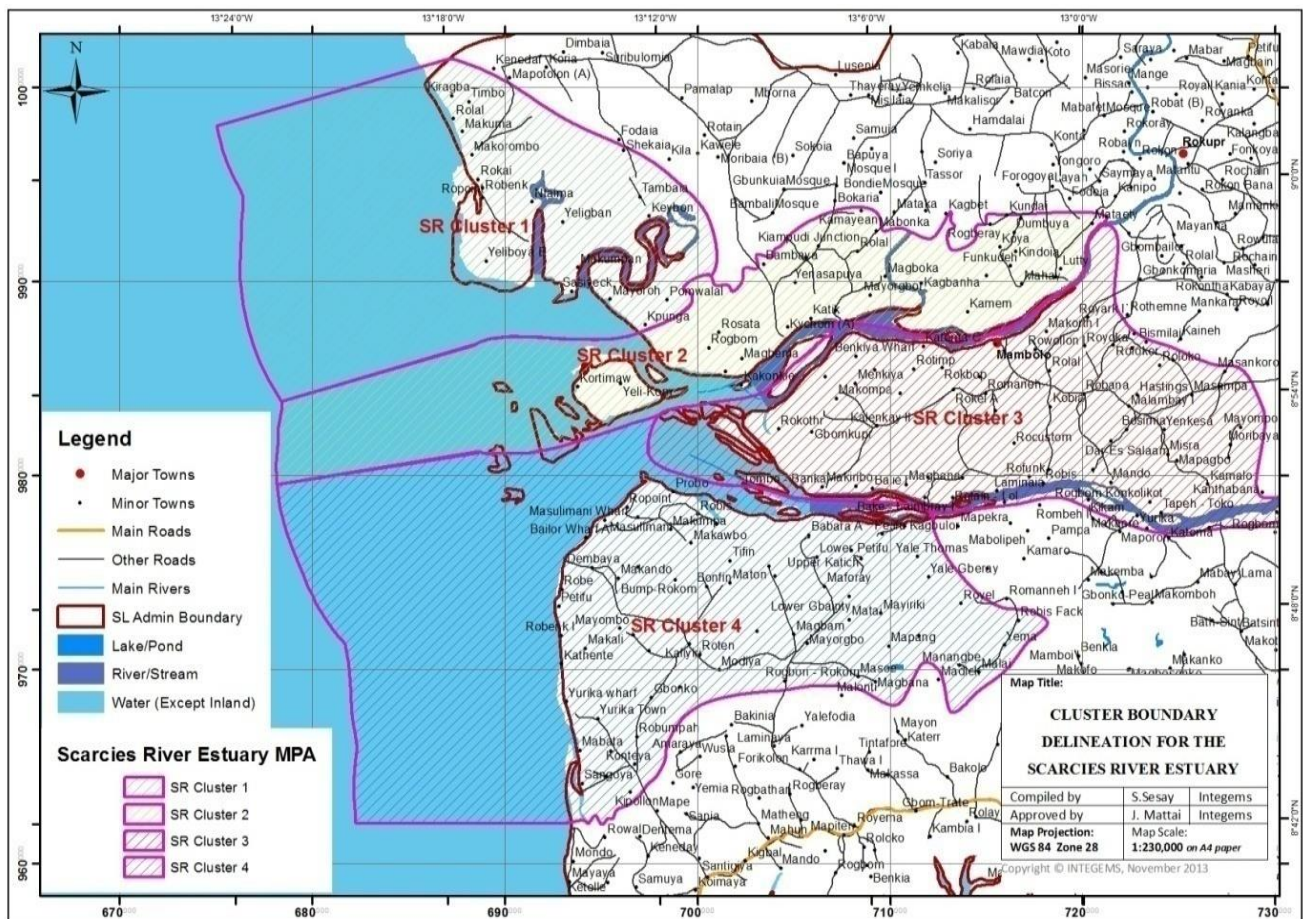


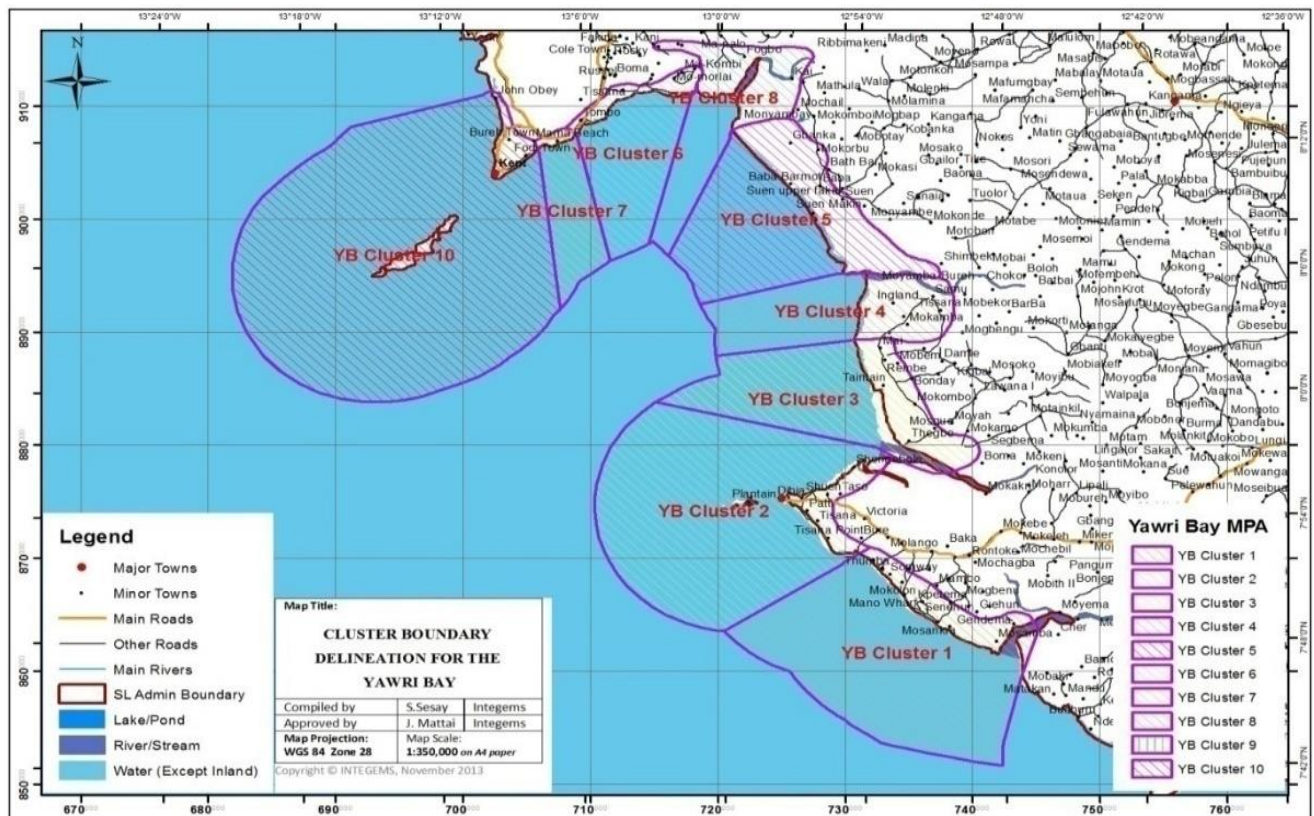
Figure 2: Map showing Cluster Boundary Delineation for the Scarcies River Estuary (Source: (© GoSL/WARFP-SL, 2012)

## The Yawri Bay and Kargboro Creek

Yawri Bay is situated south of the western area. Three rivers empty their banks into the Bay these are *Ribi*, *Kukuli* and *Kargboro*. Their total area is estimated 29,505 ha. The Yawri Bay is bordered by coastal fishing villages that include Kent, Mama beach, *Tombo*, *Tissana*, *Kpango*, *Mosseh*, *Baba Barmot*, *Mokoni*, *Seaport*, and around the *Kargboro* Creek the villages include *Taintain*, *Thengbeh*, *Shengebole*, *Shuen Shenge* and Plantain Island. Yawri Bay is a huge shallow inlet with few creeks entering it. It is categorized as Marine/Coastal wetland with permanent shallow water that is less than 6 m deep at low tide. Several small creeks such as *Calmont*, *Batbana* etc are linked to the sea and river systems.

The bay is subjected to intertidal movements and fluctuations in volume of inflow according to the season. During the wet season, the tidal influence will rise up to 10 km inland at the time of high flow. The banks have extensive mangrove forests with about 60 km of mudflats bordering it. The bay is shallow; creating exceptionally wide intertidal flats of approximately 9100 ha in area (Tye and Tye, 1987). The Bay is about 56 km long from Tombo to Shenge (Chong, 1987). The mudflats consist of soft clay sediments. The coastal area of the mouth of the Kargboro Creek has a band of sand flat which continues 20 km to the Sherbro River mouth. The figure below shows the area of the Yawri Bay site.

Figure 3: Map showing Cluster Boundary Delineation for Yawri Bay (Source: © GoSL/WARFP-SL, 2012)



### **Sherbro River Estuary (Bonthe District)**

Sherbro Island shelters a broad waterway about 60 km long and 3 to 7.5km wide known as the Sherbro River into which the *Bagru*, *Jong* and *Kittam* Rivers discharge together with a number of minor streams. Both banks of this waterway are cloaked by mangroves up to 10 km deep, and in total there are about 39 000 ha of tidal forest in the locality.

Sherbro Island is at the end of a long sand spit, the Turner's Peninsula which has being built up by the powerful north-westward flowing longshore drift. The island exists because the waters of the *Jong* and *Kittam* Rivers have breached southeast to the mouth of the Moa River (6° 58'N/11° 35'W) and behind it the *Sewa* and *Wanje* Rivers unite to form the *Kittam* River which has been diverted north-westwards alongshore. This river is separated from the sea by dune ridges in the swales of which towards Sherbro Island, swamp grasslands and swampy forests occur, the latter rich in *Pandanus* and *Raphia* spp. Inland the entire area between the *Jong* and *Sewa* Rivers is swampy, with great patches of herb, palm or tree swamps covering a total of 71 000 ha in a mosaic with dry land. Southeast of the *Sewa* River behind the sandspit, mangrove swamps, palm swamps, grass swamps, lagoons and dry are interspersed in a belt 60 km long and 25 km deep, as far as the right bank of the Moa River. Wetlands occupy most of the 150 000 ha territory of low lying sandy land.

The extensive Sherbro Island is fringed by mudflats and sandbanks. Extensive mudflats dominated by clay soils occur mainly at the northern border of the peninsula (*Delken-Baoma* area). In the vicinity of Bonthe and its surroundings, smaller mudflats occur mostly mixed with sandy soils. The abundant islands near Bonthe hold mostly at one side some mudflats and are bordered by small strips around and rest of the island. The Turtle Islands are at the western outskirt of the Sherbro River Estuary. In this area sandbanks and sandy areas dominate with clear shallow water. Along the edges of the islands some small mudflats occur with a relative sandy structure.

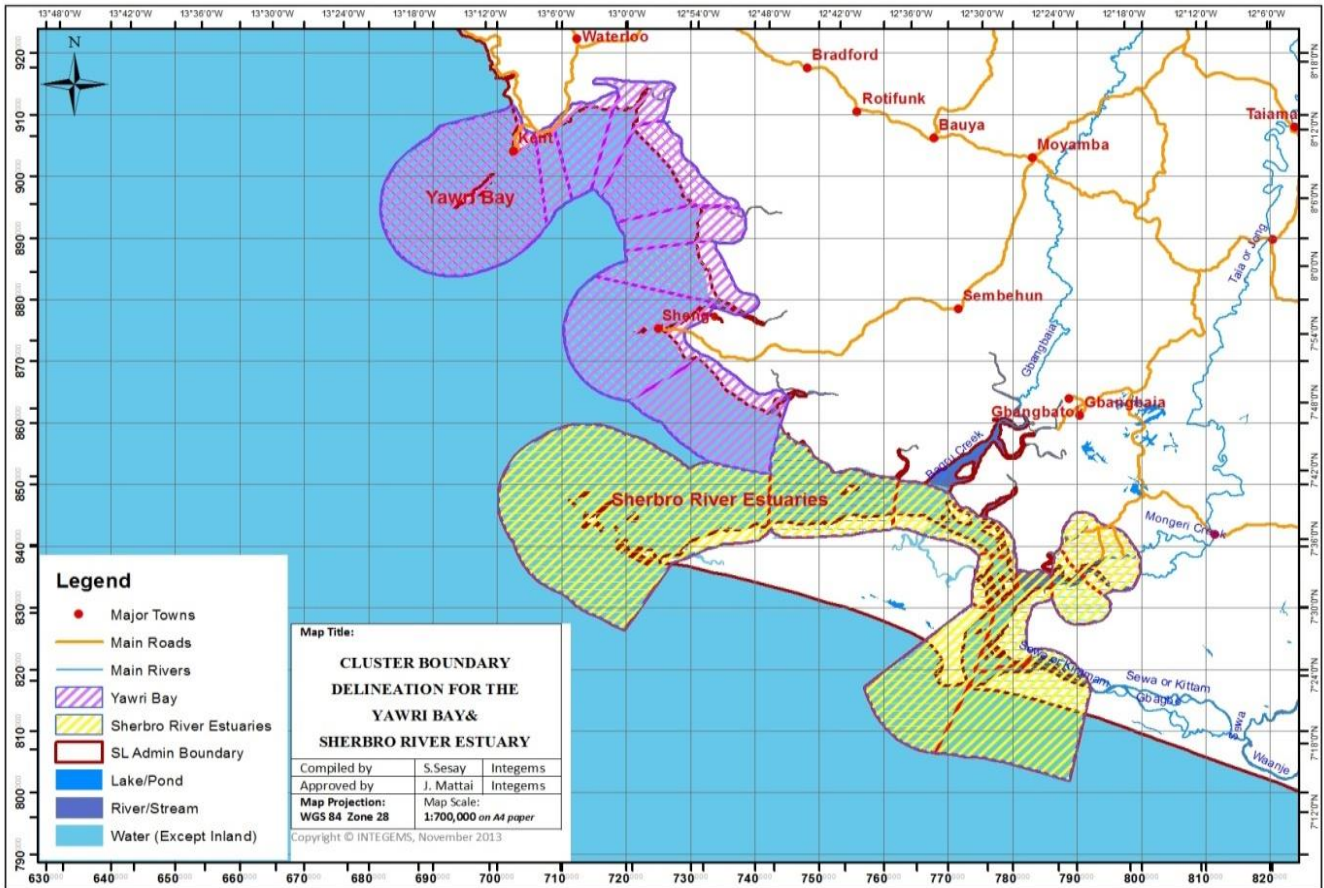


Figure 4: Cluster Boundary Delineation for Yawribay and the Sherbro River Estuary (Source: © GoSL/WARFP-SL, 2012)

## Threats to the coastal zone of Sierra Leone

### Human-induced factors

The coastal zone of Sierra Leone, extending for nearly 560 km, along Atlantic Ocean forms one of the main socioeconomic areas of the country. The zone has been subjected to severe and increasing pressure resulting from multiple human uses such as rapid urbanization, tourism development, mining and other coastal activities. As a matter of fact, the natural processes that sustain these ecosystems have been interfered with through human activities with irreversible consequences. These have led to significant negative impact to both the coastal and marine ecosystem and the living marine and coastal resources.

Meanwhile, these diverse human activities have added yet another dimension to coastal change by modifying and disturbing, both directly and indirectly, the coastal environments and the natural processes of change resulting to unforeseen degradation of coasts. As detailed in *Table 1* below, the livelihood activities by coastal settlers have led to the destruction and disturbance of coastal landforms leading to increased erosion and destruction coastal infrastructures. It is unfortunate that, Sierra Leone does not have a comprehensive coastal zone protection law to regulate human activities and to enhance the protection and conservation of vulnerable marine areas. The activities of government institutions are constrained by a number of factors, ranging from centralized management, weak policies, to financial constraints.

### Natural Factors

Climate change is one of the greatest global threats to human well-being (Hewitt et al., 2014). According to IPCC, (2014) Climate change threatens biodiversity and ecosystem integrity all over the globe and is already triggering pronounced shifts of species and ecosystems (Chen et al., 2012). Accelerated Sea Level Rise (SLR) is usually regarded as the most certain consequence of global climate change effects. It has serious physical impacts on coastal areas, mainly characterized by inundation risk and displacement of lowlands and wetlands (Ghaleb et al. 2013). A study by IPCC (1996) had revealed that the main challenges likely to face African populations will emanate from the effects of extreme events such as tropical storms, floods, landslides, wind, cold, waves, droughts and abnormal sea-level rises that are expected as a result of climate change; and that coastal nations of West and Central Africa (e.g., Senegal, The Gambia, Sierra Leone, Nigeria, Cameroon, Gabon and Angola) with low-lying coasts are susceptible are most vulnerable.

In Sierra Leone, studies by Lamin *et al.* (2018; 2019) have revealed that climate change is overwhelming marine and coastal ecosystems in Sierra Leone, revealing in increasing air and water temperatures, increasing storm intensity/frequency and rise in sea level. The gravity of climate change impacts may be exacerbated by the human-induced influences on the coast such as the unscrupulous sand extraction from beaches, unsustainable clearing of coastal vegetation for income and infrastructural development.

*Table 1: Some aspects of coastal resources use*

No	Sector	Resource uses	Major issues
1	Energy sector	Mangroves used for fish smoking and construction materials.	Loss of mangrove forests due to rate of exploitation above that which would sustain the resource.
2	Infrastructure	Construction of housing, roads, bridges, other coastal installations and laying of communication cables.	Degradation leading to irreversible impacts. This also exacerbate climate change risks
3	Fisheries	Artisanal and industrial fishing	Use of illegal and destructive fishing gears leads to reduced yield of fish species, depletion of wild life and loss of valuable ecosystems needed for spawning and nursery.
4	Settlements	Embankment of coastal wetlands and reclamation for housing constructions.	Vegetation removal and improper waste management leading to pollution, siltation and ecosystem modification and also reduces fish spawning and nursery habitat and ultimately reduces fisheries yields.
5	Transport	Navigation and construction of jetties and harbours	Dredging of shipping channels leads to ecological disturbances. Oil spills, bilge discharges, indiscriminate dumping leading to marine pollution
6	Agriculture	Cultivation of coastal wetlands	Run-off for the application of pesticides and fertilizers
7	Mining	Removal of sand and aggregate for the purpose of construction and other minerals	Beach and coastline erosion
8	Manufacturing and industrial activities	Release of effluents into the sea	Discharge of untreated effluent leads to pollution and imbalance of chemical levels of coastal waters.

## General pressures and threats to the coastal and marine environment

Sierra Leone has six districts located on the coastline with distinct ecological characteristics. The environmental threats to the coastal environment of these coastal districts often come from



human interactions with the environment sometime leaving an indelible legacy of environmental challenge. Some of the key environmental issues are explained here:

**Land and mangrove forest degradation:** Coastal habitats, such as mangroves and other wetlands, and coastal barrier islands and lagoons, are often recognized as the best defenses against sea storms and erosion. If these are destroyed or allowed to deteriorate, storm waves and surges can pound the shore without mercy.

Clearing for subsistence agriculture especially in the north (Kambia District), poorly managed logging and mining operations (in the South-west) contribute to loss of coastal vegetation cover and wetland degradation. Subsequent soil erosion slows recovery of the mangrove forest ecosystems, reduces water quality with potential negative effects on coastal fisheries.

**Threats to freshwater resources:** Watershed and catchment degradation, together with contamination of water resources has contributed to a significant decline in freshwater biodiversity.

**Degradation of coastal and marine environments:** Mining for beach sand has been an important industry in Sierra Leone as a valuable commodity for construction. Even when many may be aware that beach sand offers natural protection to the beachfront, yet beach sand mining has become a lucrative business in construction industry.

Sand mining has contributed immensely to erosion and recession of the beachfront. Therefore, beach conservation and protection should start with the presumption that any removal of sand is adverse and should be controlled.

Inshore artisanal fisheries account for about 40% of the coastal district population. However, important fisheries habitat, such as mangroves, have been affected by land clearing, sedimentation, poorly planned coastal development, destructive fishing practices and over-exploitation.

**Invasive species:** for some years now, the coastal waters have been affected by invasive marine algae (Sargassum) with severe consequences on tourism, fisheries and transport. Apart from the Sargassum seaweed, there are no official records of other invasive marine species.

**Climate change and sea level rise:** In Sierra Leone, sea level rise presents a dire threat to low-lying coastal communities and islands such as Yeliboya, Plantain, Banana, Bonthe and Turtle Island. Human activities such as beach sand mining present another threats and has exacerbated the sea level rise.

**Waste and pollution:** Waste management is a major issue for coastal communities. Where there are no Regulations on plastic use, marine plastic litter pose enormous threat to the ocean.

**Natural disasters:** Degradation of coastal ecosystems, particularly mangroves has increased vulnerability of the coastal area to natural disasters.

As part on the ongoing effort by Government to effectively manage the coastal environment and its resources, the Environment Protection Agency (EPA) together with the Ministry of the Environment is formulating a comprehensive Coastal and marine Protection regulations for Sierra Leone.

The Regulations is expected to address the following pressures and threats:

1. Excavation or removal of materials from sea-shore (Beach Sand/Zircon mineral);
2. Use of explosives in fishing activities;
3. Introduction of alien species through ships' ballast water;
4. Wastes handling and management onboard vessels (mineral ore export vessels, fishing vessels, exploration or drilling vessels);
5. Human interactions with vulnerable coastal or marine ecosystems including disaster prone areas, wetlands, deltas, bays etc.;
6. Coastal infrastructural development (Oil refineries, jetties, hotels, bridges, roads, ports, homes, industrial or processing plants, shipyards, mariners etc.);
7. Unsustainable exploitation of mangroves;
8. Pollution from oil drilling or exploration activities;
9. Discharges or dumping of harmful substances at sea (all forms or materials, e.g. toxic substances);
10. Industrial effluents discharges;
11. Marine dredging (for the purpose of maintaining or increasing the depth of navigation channels, anchorages, or berthing areas to ensure the safe passage of boats and ships);
12. Pollution (From ships and land based sources);
13. Pollution damage to the marine environment by coastal construction projects
14. Shore land reclamation;
15. Physical alterations and destruction of habitats for infrastructural development in coastal areas;
16. Inappropriate or over-exploitation of living and non-living resources.

## **Climate change risks to the coastal environment**

By now, it is undoubtedly clear that Sierra Leone is among the most vulnerable countries to climate change impact. The fact is, the vulnerability comes as a result of the countries inability to manage and mitigate climate change impacts. Even though the impacts has not been regarded as grave as other countries, yet many sectors are already been adversely affected. Where the country relies mainly on natural resources, it becomes very critical if climate change present serious risks to existing economic sectors of the country.

In 2011, huge volumes of brown seaweed invaded the entire coastline of Sierra Leone. The situation became worrisome due to the quantum of the seaweed that washed on the beaches and the yearly reoccurrence of this phenomenon. According the research findings (Showers, 2014), it suggested that climate change was one of the factors leading to the bloom and transport of the seaweed.

## **Major coastal hazards**

Urbanization and the quest for sustainable livelihood is rapidly increasing pressures on coastal environment and causing accelerating exposure or vulnerability of the environments and residents to the increasingly frequent and intense natural and man-made hazards that are notorious of coastal areas in Sierra Leone. Major hazards in coastal areas resulting from increasing air and water temperature, storm and rise in sea level have been documented by Lamin et al. (2018; 2019) and included:

- a. Heat waves and increased water temperature
- b. Degradation of Coastal Ecosystems and the goods and services they provide
- c. Decline in quality of coastal water
- d. Destruction and damage to coastal property and infrastructure
- e. Economic losses through disruption of fishing activities and fishing gears
- f. Coastal inundation
- g. Erosion and Flooding
- h. Saltwater intrusion and salinization of potable well water
- i. Loss of beach access

According to Ghaleb et al. (2013), the increasing coastal inundation vulnerability may lead to substantial socio-economic losses such as the loss of coastal structures, damage to buildings and settlements, dislocation of the population and the loss of the agricultural production. Roberts et al. (2015) concur that increase in coastal erosion can lead to increased risk for habitat loss, property loss and infrastructure damage, and can consequently disrupt a person's sense of well-being. Chen *et al.* (2012) have argued that Climate Change impacts could cause a pronounce shifts of species and coastal and marine ecosystems integrity and pose threats to human well-being (Hewitt et al., 2014). McLean (2018) has also shown that the rising seas cause direct risk (flooding of unprotected coastal infrastructures) and indirect threats of increased storm surges. Other studies had proven that inundation of coastal areas could be a significant concern from sea level rise and storm surge (Awosika et al., 1992; Jallow et al., 1996).

Further, Lamin *et al.* (2018; 2019) revealed scandalous waste disposal feedback from colossal deposition of marine debris and garbage on shoreline by wave actions in coastal settlements of Sierra Leone. These materials were being carried further inland at points much closer to dwelling houses largely at the non-tourist settlements such as Tombo, Shenge, Conakri-Dee and Turtle Islands, which could be hazardous to the health of residents. Deposition of garbage on shore by the tide also altered the beauty of the shoreline and renders the beach unfit for recreation and littoral species diversity.

Coastal vegetation that hosted intertidal organisms, regulated input of pollutants and stabilized sediments were either lost to erosion effect or had poor sediment quality as a result of eroded sand accumulation.

However, Sehgal (2008) had postulated that coastal vulnerability to various hazards depended on complex interplay of several factors, *viz.*, (1) population density, (2) developed urban centers and settlements, (3) livelihood dependence on sea resources, (4) status of infrastructure, (5) social-economic profile of coastal communities and (6) awareness and education of communities about hazards and risk management.

## **Coastal Protection Approach**

Where a coastal zone is faced with enormous problems arising largely from human interactions, managing the zone will require an integrated approach. This approach involves the application of an ecosystem-based model, where the ecosystem is also given due consideration. According to Long et. al. (2015) and Environmental Law Institute (2009), Ecosystem-based management (EBM) is an integrated environmental management approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation.

According to Clarke and Jupiter (2010), Ecosystem-based management (EBM) differs from a single species or single sector approach to management by considering complex interactions between humans and the living and non-living environment over multiples scales in space and time. Confirming this, McLeod and Leslie (2009) state that it is important to note that EBM is focused on management of human activities within ecosystems and not the ecosystems themselves.

The reason why this plan utilized an EBM model is because of the connectivity within and between systems, such as between land and sea. Thus the plan focuses on the consequences of human actions within the coastal zone and identifies protection and restoration mechanisms. Clarke and Jupiter (2010), note that the management/coastal protection measures should contain 'best practice' recommendations, which go beyond the agreed actions. Thus the coastal protection Action plan focuses on protecting and restoring the natural structure of ecosystems to maintain ecosystem services and incorporate social dimensions of resource use and ecosystem values into management. Such dimensions always incorporate community and resource user support and participation.

Eventhough there are evidences of some form of community participation in managing the coastal environment, yet there is no strong tradition of community based natural resource management. Like many other African Countries, degradation of coastal ecosystems directly threatens the livelihoods of local communities and increases their vulnerability to natural disasters and climate change.

Therefore the idea of engaging and involving the local council in the preparation of this plan is to foster ownership and ensure that coastal and marine governance takes a decentralized and effective approach in addressing the issues facing the coastal and marine environment. Often community rules are not enforceable in the courts, and use of traditional enforcement methods is limited by the criminal law. Traditional penalties (fines adopted in by-laws) for breaching customary law are sometimes not commensurate to the act of misconduct or illegal activity.

On another note, consideration is given to ensure community-by-law laws are enforced in a manner that does not breach national laws.

This current plan sets out a range of management actions for marine, estuarine, coastal ecosystems. These actions are explicitly linked to particular threats or contributing factors. Clarke and Jupiter (2010), note that the management/coastal protection measures should contain 'best practice' recommendations, which go beyond the agreed actions. Responsibilities and timeframes for implementation were defined in a series of stakeholder engagement meetings held in the selected district headquarter towns which in itself shows ownership.

An example of such model was a pilot project for sustainable coastal zone management in Sierra Leone which was implemented by Wetlands International in close collaboration with Conservation Society of Sierra Leone in 2013.

The project focused on the establishment of Marine Protected Areas and demonstration of small scale pilot activities, supported by communications and capacity building components. The lessons learned and best practices in at least one MPA were promoted around the country for the improvement of coastal and marine resources management. The project also engaged local and national stakeholders, through their participation, capacity building improved knowledge and biodiversity conservation issues.

## **The Scope and objectives of the Coastal protection Action Plan**

As indicated above, the action plan for coastal protection measures is a practical working document which took advantage of an integrated approach of EBM model to effectively address the prevailing environmental risks, vulnerabilities and human induced impacts to the coastal and marine environment. The plan is developed to serve as a working tool for coastal district and communities. Given that Local Councils have a stake in coastal environmental management, the plan will guide intervention areas in the protection and co-management efforts of coastal and marine resources. The objectives are as follows:

- To ensure sustainable management of marine and coastal resources and to integrate environmental management in development plans and programs;
- To build capacity and awareness on coastal protection
- To enhance resilience to climate change and disasters in coastal communities and enhance coastal landscape ecological value.
- To improve awareness on restoring and sustaining the health and productivity of coastal resources.

## **Consultation**

The process of developing this plan involved consultations and engagement with relevant stakeholders and local communities as well as resource users (see pictures and list of attendance in Annex). The consultations aimed at:

- Introducing Coastal Protection Action Plan (CPAP) concept
- Securing inputs from stakeholders, and
- Engaging partners on the roll out of the plan.

## **Thematic actions**

To meet the overall objectives of the action plan, the following thematic areas have been identified and validated by stakeholders:

1. Conservation of mangrove forests
2. Prevention of marine pollution from land based sources and activities
3. Promoting best and responsible fishing practices
4. Prevention and control of coastal erosion through regulating beach mining
5. Prevention and mitigation of flooding disasters
6. Promote conservation by protecting fragile coastal and marine ecosystems
7. Strengthen capacity and public awareness

## **Implementation Arrangement and Implementation Matrix**

As emphasized above, the coastal protection action plan was developed through participatory process which involved identifying specific actions to maintain or restore the health of the coastal and marine environment. These actions are related to management targets, and seek to address the direct threats or contributing factors. Responsibilities and timeframes for implementation were agreed and clearly defined by district level participants. The participants in the planning process considered whether additional resources would be required to implement the actions and, if so, potential sources of financial or in-kind support were identified.

The development of the implementation matrix first took into considerations what thematic areas the plan could feature. Secondly, these thematic areas were analyzed and strategic objectives were then constructed on the various identified and selected themes. Basically the motive was to ensure all relevant institutions or organizations or individuals have a role to play and contribute to the overall goal of the plan.

The model adopted for the implementation of this plan was the consideration that all parties take full responsibility to implement those aspects of the plan that are consistent with their various institutional mandates. In carrying out the tasks coastal districts, MDAs and NGOS will receive supports from each other through guidance and collaboration. It is therefore anticipated that the Local Councils will make it a priority to integrate the coastal protection measures into their district development plans and programmes. So the implementation is entrusted to the coastal district councils with capacity building support from the EPA and other partners. Whilst such implementation arrangement is framed in this manner, it is intended to harness the best possible outcome.

## **Institutional arrangements**

Delineating the roles and responsibilities of the different institutions whose mandates are relevant to coastal zone management is crucial to the successful implementation of the plan. Where coastal and marine issues cut across various sectors such as the transport industries, the fisheries sector, the extractive and trade, it is important to bring everyone on board and to make the process very inclusive. Activities are assigned according to the functions of the various institutions. Below are some of the existing policies and programmes adopted by the various institutions.

Table 2: Relevant policies, laws, and plans

Legislation/plan	Year	Purpose
The National Environmental Policy	1994	Encourage and facilitate local participation in environmental governance practices; secure an environment that is adequate for the health and wellbeing of communities and ecosystems; and foster learning and knowledge exchange through public education campaigns and programmes.
National Land Policy	2015	Reform land policies in the country to incorporate good practices related to land rights and land registration.
Draft Wetland Conservation Act	2015	Improve the sustainable management of priority wetland ecosystems by restoring, maintaining, and enhancing the ecological processes essential for their effective functioning.
Fisheries Act	2007	Manage, develop and conserve all fisheries and marine resources. It seeks, among other things, to enhance the sustainable use of fisheries resources; increase co-management through committed, informed and involved stakeholders; diversity and increase international trade of fish and fishery; deliver cost-effective and efficient management tools; and promote sustainable aquaculture development.
Draft Conservation and Wildlife Policy and Act	2011	Sets out five principles for wildlife management (sustainable management, rights-based governance, economic and social benefits, integrated wildlife conservation and culturally sensitive, knowledge-based conservation) and recommends action in five areas (species management, conservation areas, research and monitoring, education and awareness, and capacity building).
Draft Forestry Policy and Act	2011	Set-out according to similar guiding principles as the draft Conservation and Wildlife Policy and establishes a set of policy objectives around forestry land management, forest-based industry and practices, ecosystem conservation, education and awareness, research and monitoring, and capacity building.
Sierra Leone Meteorological Agency Act	2017	Establishes the Sierra Leone Meteorological Agency (previously known as Meteorological Department) with the authority to advise government on all aspects of meteorology, climatology, climate change, and related issues, including: developing policy; undertaking relevant research; issuing weather information and forecasts; promoting the use of meteorology in agriculture, food monitoring and environmental monitoring; serving as the focal agency for all climate change matters etc
National Biodiversity and Strategic Action Plan	2017 to 2026	Seeks to protect marine and coastal biodiversity by strengthening technical research, developing and applying landscapes, establish Marine Protected Areas (MPAs), foster broad stakeholder participation, facilitate learning and knowledge exchange, and promote positive attitudes through communications and education
Integrated Coastal Zone Management Plan	2015	Lays out four pathways for improving coastal ecosystems management in Sierra Leone, including: increase knowledge generation and conversion into effective management actions; adopt an adaptive collaborative management approach for design and delivery of coastal management institutions and interventions; follow thorough procedures to manage for results, thus improving monitoring, ownership, and accountability.
National Climate Change Strategy and Action Plan	2015	Proposes mechanism and frameworks for climate adaptation and resilience building at the national, district and community levels
National Adaptation Plan Framework	2019	Identifies medium and long-term priorities for adaptation including ensuring that the NAP is aligned with existing policies, plans and strategies

National Reforestation and Timber Governance Policy	2020	Shows high-level political support for ‘legal timber’ and improved governance as routes to increased stakeholder participation, economic returns, and reforestation.
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## Coastal Resources Management Matrix

In line with the scope of the Coastal Protection Action Plan, the following human use coastal and marine resources have been identified, for which the plan seeks to identify potential actions or strategies to address and respond to the risks associated with their exploitation. This aspect also tries to define what management roles the different stakeholders hold in respect to managing marine and coastal resources. Below is the list of the major sectors:

1. Marine Fisheries
2. Coastal settlements planning and administration
3. Infrastructural development (jetties, harbours)
4. Waste management
5. Small scale industries (boat building, workshops, fishing net)
6. Sea transports
7. Freshwater source catchment protection
8. Coastal forests management
9. Coastal agriculture
10. Mining/Extractives
11. Tourism and recreation
12. Conservation of critical habitats and species

In the matrix below (table 2), stakeholders that were consulted during the development of this plan were engaged to elaborate the specific roles of the stakeholders at different levels. This helped in assigning roles and responsibilities in the roll out of the coastal protection action plan. Among the twelve sectors listed above, the fisheries sector was selected and presented in the matrix below to serve as an example and a representation of the other sectors.



Table 3: Coastal Resources Management Matrix

Marine Fisheries	Frameworks	Ministry of Foreign Affairs	Ministry of Fisheries & Marine resources	District/Local council	Paramount Chief	MFMR Fisheries outstation officer	Consortium of artisanal fishermen association
<b>National</b>	Political/Diplomatic	Negotiates treaties and codes of conduct at FAO. Participate in UN General Assembly Resolution on sustainable fisheries	Provide technical support/guidance at global/regional fishery treat negotiations.				
	Legal/Policy		Formulate policies and legislations				
	Institutional/Operational						Coordinate member and support government in roll-out of development plans on fisheries.
<b>District</b>	Political/Diplomatic						
	Legal/Policy						
<b>Chiefdom</b>	Institutional/Operational			Issue artisanal fishing licenses		Lead and coordinate the implementation of fisheries programs at district level	
	Political/Diplomatic				Institute community bi-laws		
	Legal/Policy						
<b>Community</b>	Institutional/Operational						
	Political/Diplomatic						
	Legal/Policy						Sensitize fishermen on best fishing practice

## Strategic objectives of the Coastal protection Action Plan

The Coastal Protection Action Plan identified and prioritized the following strategic objectives:

1. Promoting best and responsible fishing practices to sustain livelihoods and ensure food security
2. Prevention and control of coastal erosion through regulating beach mining
3. Prevention of marine pollution from land based sources and activities
4. Enhance resilience of coastal communities to climate change and natural disasters
5. Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources
6. Strengthen and enhance capacity building and public awareness in coastal protection

*Table 4: Aligning the major sectors with the strategic objectives of the action Plan*

No	Major socio-economic sectors	Strategic Objectives
1	Marine Fisheries and Coastal agriculture	<ul style="list-style-type: none"> <li>➤ Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</li> <li>➤ Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</li> <li>➤ Strengthen and enhance capacity building and public awareness in coastal protection</li> </ul>
2	Coastal settlements planning, waste management, and infrastructural development (road, jetties, harbours)	<ul style="list-style-type: none"> <li>➤ Prevention of marine pollution from land based sources and activities</li> <li>➤ Enhance resilience of coastal communities to climate change and natural disasters</li> <li>➤ Strengthen and enhance capacity building and public awareness in coastal protection</li> </ul>
3	Small scale industries (boat building, workshops, fishing net)	<ul style="list-style-type: none"> <li>➤ Prevention of marine pollution from land based sources and activities</li> </ul>
4	Sea transports, mining, recreation and tourism	<ul style="list-style-type: none"> <li>➤ Prevention of marine pollution from land based sources and activities</li> <li>➤ Prevention and control of coastal erosion through regulating beach mining</li> </ul>
5	Catchment protection of freshwater sources, coastal forest management and conservation of critical habitats and species	<ul style="list-style-type: none"> <li>➤ Promote conservation of mangrove forests</li> <li>➤ Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</li> <li>➤ Enhance resilience of coastal communities to climate change and natural disasters</li> <li>➤ Strengthen and enhance capacity building and public awareness in coastal protection</li> </ul>

## Implementation matrix

Table 5: Implementation Matrix - Port Loko District council

Strategic objectives	Expected output	Activities	Responsible institution/Organization	Timeframe	Cost
<b>Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</b>	1. Artisanal Fishing regulated	<ol style="list-style-type: none"> <li>1. Formulate and enforce bi laws to prohibit use of destructive fishing gears including small-meshed nets</li> <li>2. Conduct monitoring of artisanal fishing to enforce the bi laws</li> <li>3. Conduct community surveillance to protect artisanal fishing zone</li> <li>4. Councils to conduct artisanal fishing vessel survey and issue fishing licenses</li> <li>5. Establish fish ponds at coastal village level</li> <li>6. Establish District Coastal Coalition for the management of coastal areas</li> </ol>	<ol style="list-style-type: none"> <li>1. PC and Local authorities</li> <li>2. Council</li> <li>3. District Council (DC)</li> <li>4. ONS</li> <li>5. NGOs</li> <li>6. CBOs</li> <li>7. Local Authorities</li> </ol>	2020 - 2023	Le 500,000,000
<b>Prevention and control of coastal erosion through regulating beach mining</b>	Coastal erosion minimized	<ol style="list-style-type: none"> <li>1. Regulate sand mining by imposing periodic closures and permanent ban in certain locations</li> <li>2. Institute and regularize fees/tax regimes for sand mining</li> <li>3. Establish taskforce to undertake monitoring exercises.</li> <li>4.</li> </ol>	<ol style="list-style-type: none"> <li>1. District council</li> <li>2. MFMR</li> <li>3. Naval</li> <li>4. MAF</li> <li>5. PC</li> <li>6. Chiefdom committee</li> <li>7. District Office</li> <li>8. CSO</li> <li>9. United Protection Human Right</li> <li>10. Collective initiative for development</li> <li>11. District Health Management Team</li> <li>12. Women's forum</li> <li>13. Ministry of water Resources</li> </ol>	2020 - 2023	Le 150,000,000
<b>Prevention of marine pollution from land based sources and activities</b>	sanitation &	<ol style="list-style-type: none"> <li>1. Identify and designate solid waste dumpsite in all coastal communities</li> <li>2. Purchase/rent of waste dump trucks</li> <li>3. Construct public toilets at fish landings sites</li> </ol>	Same as above	2020 – 2023`	Le 600,000,000

	marine pollution is minimized				
<b>Enhance resilience of coastal communities to climate change and natural disasters</b>	Adapt to prevention and control hazards Mitigation of coastal hazards.	<ol style="list-style-type: none"> <li>1. Create a systems to manage funds from recreational/entertainment activities</li> <li>2. Council to support shoreline protection and stabilization work</li> <li>3. Training on disaster Management</li> <li>4. Replant trees in coastal areas</li> </ol>	Same as above	2020 – 2023`	Le 600,000,000
<b>Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</b>		<ol style="list-style-type: none"> <li>1. Restore degraded mangrove forests by planting</li> <li>2. Devise innovative way by use of alternative biomass as energy sources for smoking to fish to reduce</li> <li>3. Improve Fish Smoke Houses</li> <li>4.</li> </ol>	<ol style="list-style-type: none"> <li>1. DC</li> <li>2. ONS</li> <li>3. NGOs</li> <li>4. CBOs</li> <li>5. Local Authorities</li> </ol>	2021 - 2023	Le 500,000,000
<b>Strengthen and enhance capacity building and public awareness in coastal protection</b>		<ol style="list-style-type: none"> <li>1. Conduct community engagements on the formulation of bi-laws in coastal protection</li> <li>2. Conduct public sensitization on proper waste management</li> <li>3. Training on Coastal Protection</li> <li>4. Engage coastal communities to construct toilet as part of dwelling houses in coastal communities</li> </ol>	<ol style="list-style-type: none"> <li>6. Community planning and development drive</li> <li>7. Local council</li> <li>8. Livelihood concern Organism</li> </ol>	2020 - 2023	Le 600,000,000

Table 6: Implementation Matrix - Bonthe District council

Strategic objectives	Expected output	Activities	Responsible institution/Organization	Timeframe	Cost
<b>Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</b>	Increased awareness and sustainable fishing practices;	<ol style="list-style-type: none"> <li>1. Train fishermen on responsible fishing practices and supply them with approved fishing nets</li> <li>2. Formation and implementation of bylaws on best fishing practices</li> <li>3. Support/establish coastal management committees</li> <li>4. Carry out pilot fish farming project</li> <li>5. Establish monitoring committee to enforce the bi laws</li> </ol>	<ol style="list-style-type: none"> <li>1. Local Councils;</li> <li>2. Fisheries</li> <li>3. ONS</li> <li>4. Local authorities</li> <li>5. SL Police</li> <li>6. Development partners</li> <li>7. Maritime</li> <li>8. MAF</li> <li>9. Water Resources</li> <li>10. NGOs</li> <li>11. CBOs</li> </ol>	2021 - 2022	Le 450,000,000
<b>Prevention and control of coastal erosion through regulating beach mining</b>	Responsible sand mining is achieved	<ol style="list-style-type: none"> <li>1. Support communities on IVS and fish farming (fish pond) as alternative livelihood</li> <li>2. Conduct afforestation of coastland</li> <li>3. Institute bylaws on beach sand mining</li> <li>4. Monitoring and evaluation of beach mining activities</li> </ol>	<ol style="list-style-type: none"> <li>1. MAF;</li> <li>2. Council ESO;</li> <li>3. Gender Officers;</li> <li>4. Fisheries;</li> <li>5. Media;</li> <li>6. DDMC;</li> <li>7. Development partners</li> <li>8. EPA-SL</li> <li>9. Min. of Lands</li> <li>10. NGOs</li> <li>11. CBOs</li> </ol>	2021 – 2023	Le 500,000,000
<b>Prevention of marine pollution from land based sources and activities</b>	Marine pollution reduced	<ol style="list-style-type: none"> <li>1. Construct (Community Led Total Sanitation) Latrines in every coastal village</li> <li>2. Construction of community dumpsite in all coastal communities</li> <li>3. Provision of community wastes disposal site</li> </ol>	<ol style="list-style-type: none"> <li>1. Local council;</li> <li>2. Local Authorities;</li> <li>3. Development partners</li> <li>4. Water Resources</li> <li>5. EPA-SL</li> <li>6. NGOs</li> </ol>	2021 - 2023	Le 3 Billion

		<ol style="list-style-type: none"> <li>4. Bylaws on appropriate wastes disposal</li> <li>5. Monitoring and evaluation of community wastes disposal activities</li> <li>6. Monitoring of the activities of Mining Companies relating to coastal areas.</li> </ol>	<ol style="list-style-type: none"> <li>7. CBOs</li> </ol>		
<b>Enhance resilience of coastal communities to climate change and natural disasters</b>	Resilience of coastal communities to climate change and natural disasters enhanced	<ol style="list-style-type: none"> <li>1. Conduct monitoring and enforcement of rehabilitation of mined out land</li> <li>2. Carry out tree Planting</li> <li>3. Bylaws enacted to discourage communities from indiscriminate cutting of mangrove trees</li> <li>4. Identify disaster prone areas and advise on timely relocation</li> </ol>	<ol style="list-style-type: none"> <li>1. DC/Authorities</li> <li>2. ESO – council</li> <li>3. Local Councils;</li> <li>4. Fisheries</li> <li>5. ONS</li> <li>6. Local authorities</li> <li>7. SL Police</li> <li>8. DDMC;</li> <li>9. Development partners</li> <li>10. NGOS</li> <li>11. CBOs</li> </ol>	2021 - 2023	Le 250,000,000
<b>Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</b>	Improvement in conservation and restoration of coastal ecosystems	<ol style="list-style-type: none"> <li>1. Plant mangroves to restore degraded areas</li> <li>2. Establish customary governance structures (bi laws) on use of mangroves</li> </ol>	<ol style="list-style-type: none"> <li>1. Local Councils;</li> <li>2. Fisheries</li> <li>3. ONS</li> <li>4. Development partners</li> <li>5. Local authorities</li> <li>6. SL Police;</li> <li>7. DDMC</li> <li>8. Any other partners</li> </ol>	2021 -2023	Le 300,000,000
<b>Strengthen and enhance capacity building and public awareness in coastal protection</b>	Improvement in awareness and capacity of coastal communities.	<ol style="list-style-type: none"> <li>1. Conduct Sensitization in all fishing communities on best fishing practices</li> <li>2. Joint monitoring on environmental issues and disasters</li> <li>3. Conduct training and awareness on waste handling and best hygiene and sanitation practices</li> <li>4. Awareness/ Sensitization of coastal inhabitants on the hazards of marine pollution and negative impacts on marine resources</li> <li>5. Awareness/ Sensitization on benefits of conserved coastal ecosystems</li> </ol>	<ol style="list-style-type: none"> <li>1. Local Councils;</li> <li>2. Fisheries</li> <li>3. ONS</li> <li>4. Local authorities</li> <li>5. CSO;</li> <li>6. SL Police</li> <li>7. Development partners</li> </ol>	2021 - 2023	Le 700,000,000

		6. Training on livelihood diversification			
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*Table 7: Implementation Matrix - Moyamba District council*

Strategic objectives	Expected output	Activities	Responsible institution/Organization	Timeframe	Cost
<b>Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</b>	Improvement in fishing methods/best practices	<ol style="list-style-type: none"> <li>1. Training on best and responsible fishing Methods</li> <li>2. Sensitization on best and responsible fishing practices</li> <li>3. Formation and implementation of bylaws on best fishing practices</li> <li>8. Support Coastal Management Committees</li> <li>9. Encourage fish farming and animal husbandry</li> </ol>	<ol style="list-style-type: none"> <li>1. MFMR</li> <li>2. EPA-SL</li> <li>3. DC/Local Administration</li> <li>4. MAF</li> <li>5. Water Resources</li> <li>6. NGOs</li> <li>7. CBOs</li> </ol>	2021 - 2023	Le200,000, 000

		10. Support women in vegetable cultivation			
		11. Monitoring of compliance as regards best fishing practices			
<b>Prevention and control of coastal erosion through regulating beach mining</b>	Responsible sand mining is achieved	1. Sensitization on hazards of coastal erosion through beach mining as well as values of other construction materials 2. Support alternative livelihoods through loan schemes. 3. Bylaws on beach sand mining 4. Monitoring and evaluation of beach mining activities	1. DC/Local Administration 2. EPA-SL 3. Min. of Lands 4. MAF 5. NGOs 6. CBOs 7. Banks	2021 -2023	Le500, 000, 000
<b>Prevention of marine pollution from land based sources and activities</b>	Marine pollution will be reduced	1. Sensitization of coastal inhabitants on the hazards of marine pollution and negative impacts on marine resources 2. Train farmers on the use of organic fertilizers 3. Provide public toilets for communities 4. Provide wastes collection points 5. Bylaws on appropriate wastes disposal 6. Monitoring and evaluation of community wastes disposal activities	1. DC/Local Administration 2. MoHS 3. MAF 4. EPA-SL 5. NGOs 6. CBOs	2021 - 2023	Le450, 000, 000
<b>Enhance resilience of coastal communities to climate change and natural disasters</b>	1. Disaster prone areas identified and mapped 2. 7 Committees established 3. Compulsory use of life jackets and transport vessels maintained their capacity	1. Conduct assessment of disaster prone areas along the coast areas 2. Hold stakeholder meeting to setup disaster management committee at community level 3. Engage Maritime Officers, harbour Master and Boat owners to enforce compliance by Prohibiting overloading of transport vessels and enforce use of life jacket for very passenger	1. Local Council (Lead) 2. MAF 3. Water resources 4. Fisheries 5. Navy 6. CSO 7. Ministry of Social Welfare 8. Development partners 9. ONS 10. Media	2021 - 2023	Le 500,000,000



	4. Disaster funds set up	4. Set-up district disaster management funds to respond swiftly to emergencies	11. DDMC		
<b>Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</b>	1. Community laws and guidelines adopted in all chiefdoms 2. 1000 mangroves and other trees planted	1. Develop and adopt community laws and guidelines on mangrove cutting, sand mining and bad fishing methods pursuant to the Coastal protection Regulations 2. Teach and Plant mangroves and other trees in degraded coastal areas.	1.Local Council (Lead) 2.MAF 3.Water resources 4.Fisheries 5.Navy 6.CSO 7.Ministry of Social Welfare 8.Development partners 9.ONS 10.Media 11.DDMC (co lead)	2020 - 2023	Le. 1.5 Billion
<b>Strengthen and enhance capacity building and public awareness in coastal protection</b>	1. 20 Community-led Sensitizations conducted in coastal communities every year 2. Training conducted in all coastal chiefdoms on livelihood diversification	1. Carry out community participatory theatre on disaster management 2. Conduct training for communities on livelihood diversification	1.Local Council (Lead) 2.MAF 3.Water resources 4.Fisheries 5.Navy 6.CSO 7.Ministry of Social Welfare 8.Development partners 9.ONS 10.Media 11.DDMC	2020 - 2023	Le 1 Billion

Table 8: Western Area Rural District council

Strategic objectives	Expected output	Activities	Responsible institution/Organization	Timeframe	Cost
<b>Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</b>	<ol style="list-style-type: none"> <li>Improvement in knowledge about best fishing practices</li> <li>Quality fish and improved local livelihood.</li> </ol>	<ol style="list-style-type: none"> <li>Sensitization on best and responsible fishing practices</li> <li>Community Watch for irresponsible fishing activities</li> <li>Formation of bylaws on best and responsible fishing</li> <li>Monitoring of compliance as regards best fishing practices</li> </ol>	<ol style="list-style-type: none"> <li>MFMR</li> <li>DC/Local Administration</li> <li>NGOs</li> <li>CBOs</li> </ol>	2021 - 2020	Le500,000, 000
<b>Prevention and control of coastal erosion through regulating beach mining</b>	Responsible sand mining is achieved	<ol style="list-style-type: none"> <li>Sensitization on hazards of coastal erosion through beach mining</li> <li>Training on livelihood diversification and support through loan schemes.</li> <li>Enforce bylaws on beach sand mining</li> <li>Monitoring of beach mining activities</li> </ol>	<ol style="list-style-type: none"> <li>DC/Local Authorities</li> <li>NGOs</li> <li>CBOs</li> </ol>	2021 - 2023	Le 400, 000, 000
<b>Prevention of marine pollution from land based sources and activities</b>	Sanitary condition is enhanced	<ol style="list-style-type: none"> <li>Sensitization of coastal inhabitants on the hazards of marine pollution and negative impacts on marine resources</li> <li>Provide public toilet for communities</li> <li>Provide wastes collection points</li> <li>Bylaws on appropriate wastes disposal</li> <li>Monitoring and evaluation of community wastes disposal activities</li> </ol>	<ol style="list-style-type: none"> <li>DC/Local Authorities</li> <li>MoHS</li> <li>NGOs</li> <li>CBOs</li> </ol>	2021 - 2023	Le 800, 000, 000

<b>Enhance resilience of coastal communities to climate change and natural disasters</b>	<ol style="list-style-type: none"> <li>1. 10 catchments areas demarcated</li> <li>2. 50 Forested guards contracted and deployed</li> </ol>	<ol style="list-style-type: none"> <li>1. Demarcate catchment areas along the coastal areas</li> <li>2. Deploy forest guards in those catchment to prevent encroachment</li> </ol>	<ol style="list-style-type: none"> <li>1. EPA,</li> <li>2. Min of Land</li> <li>3. Local council</li> <li>4. Community stakeholder,</li> <li>5. NPAA</li> <li>6. Min of Forestry,</li> <li>7. CSO,</li> <li>8. Police</li> <li>9. ONS,</li> <li>10. Media</li> </ol>	2021 - 2023	Le 600,000,000
<b>Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</b>	<ol style="list-style-type: none"> <li>1. A number of areas designated and guideline developed for sand mining</li> <li>2. Bi laws approved in all coastal communities</li> <li>3. 5000 mangroves and other seedlings planted</li> </ol>	<ol style="list-style-type: none"> <li>1. Regulate sand mining through identifying and mapping approved areas for sand mining</li> <li>2. Enact community bi laws to prohibit bad fishing practices by imposing strict fines</li> <li>3. Plant mangroves and other trees in degraded areas;</li> </ol>	<ol style="list-style-type: none"> <li>1. EPA,</li> <li>2. Min of Land</li> <li>3. Local council</li> <li>4. Community stakeholder,</li> <li>5. NPAA</li> <li>6. Min of Forestry,</li> <li>7. CSO,</li> <li>8. Police</li> <li>9. ONS,</li> <li>10. Media</li> </ol>	2021 - 2023	Le 500,000,000
<b>Strengthen and enhance capacity building and public awareness in coastal protection</b>	<ol style="list-style-type: none"> <li>1. 10 communities engaged and bi laws formulated</li> <li>2. 500 Youths (including women) trained on sustainable livelihoods</li> <li>3. 20 sensitization meetings held</li> </ol>	<ol style="list-style-type: none"> <li>1. Conduct Community engagements in all coastal settlements on the formulation of bye-laws</li> <li>2. Conduct capacity building on improved and sustainable livelihoods</li> <li>3. Conduct Sensitization and awareness raising program</li> </ol>	<ol style="list-style-type: none"> <li>1. EPA,</li> <li>2. Min of Land</li> <li>3. Local council</li> <li>4. Community stakeholder,</li> <li>5. NPAA</li> <li>6. Min of Forestry,</li> <li>7. CSO,</li> <li>8. Police</li> <li>9. ONS,</li> <li>10. Media</li> </ol>	2021 - 2023	Le 400,000,000

## Monitoring and evaluation

One key component of the Action plan is the monitoring and evaluation aspect. This is to measure the effectiveness of management strategies by establishing a plan for ongoing monitoring of key indicators. Based on experience, this particular model for monitoring and evaluation expresses the need to make the monitoring program to be explicitly linked to management targets and threats and cover a range of biological and socioeconomic indicators across all ecosystem types within the coastal area.

Monitoring and evaluation will be on the broad areas including the ecological and environmental state of the coastal area, socio-economic benefits of the CPAP process and Monitoring and evaluation of the CPAP implementation itself. The table below describes the roles of the various players in the monitoring

## MONITORING PLAN

*Table 9: Monitoring plan*

No	Plan objective	Responsibility	Time frame
1	Promoting best and responsible fishing practices to sustain livelihoods and ensure food security	Local Council, EPA	2021 - 2023
2	Prevention and control of coastal erosion through regulating beach mining	Local Council, EPA	2021 - 2023
3	Prevention of marine pollution from land based sources and activities	Local Council, EPA	2021 - 2023
4	Enhance resilience of coastal communities to climate change and natural disasters	Local Council, EPA	2021 - 2023
5	Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources	Local Council, EPA	2021 - 2023
6	Strengthen and enhance capacity building and public awareness in coastal protection	Local Council, EPA	2021 - 2023

## Evaluation of implementation progress

The table below outlines the key indicators that the evaluation will look at. This is important to be able to measure the achievement of the set targets.

*Table 10: Evaluation matrix*

Strategic objectives objective	Output indicator	Outcome indicator
<b>Promoting best and responsible fishing practices to sustain livelihoods and ensure food security</b>	Number of fishermen abandoning bad fishing methods.	Sustainable fishing and livelihoods enhanced
<b>Prevention and control of coastal erosion through regulating beach mining</b>	Reduction in beach sand mining activities by 50%	Shoreline stability maintained within predicted levels of changes  Efficiency and effectiveness of coastal protection measures improved.
<b>Prevention of marine pollution from land based sources and activities</b>	Marine pollution from waste dumping and improper sanitation reduced by 50%.	Marine and coastal environmental health quality improved.
<b>Enhance resilience of coastal communities to climate change and natural disasters</b>	Reduction in loss of coastal land and livelihoods due to climate change hazards by 30%.	Socio-economic benefits of coastal resources and systems enhanced.
<b>Promote conservation and restoration of fragile coastal and marine ecosystems to sustain the health and productivity of coastal and marine resources</b>	40% of degraded coastal environment restored.	Ecological and environmental state of the coastal area improved
<b>Strengthen and enhance capacity building and public awareness in coastal protection</b>	Improved knowledge and skills of about 50% of coastal community populations.	Opportunities for local residents and visitors to learn about and be involved in the protection and management of the coast are provided.

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