



MIDA CREEK MANGROVE FOREST ECOSYSTEM RESTORATION PLAN (2024-2029)



Mida Creek Restoration Plan 2024-2029



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Date:

Approval Page

Mida Creek restoration plan (2024 - 2029) is hereby approved for implementation. Any amendments to this restoration plan shall be effected only through mutual agreement between Kenya Forest Service (KFS), the Gede Community forest Association (GACOFA) and Sokoke Community Forest Association (SOCOFA)

Foreword

The Mida mangrove ecosystems are some of the most important coastal forests in Kenya. They host an exceptional array of marine species with significant biodiversity value. These ecosystems are not only ecologically important but also serve as a cherished tourist attraction, contributing to the economic well-being of the community and residents of Kilifi County. Unfortunately, these invaluable ecosystems face numerous threats due to the heavy reliance of households on fuelwood, construction materials, agricultural expansion, and other essential resources driven by population growth. This has accelerated the degradation of natural resources, including mangroves, in recent times.

The Mangrove Restoration Plan for the Mida mangrove ecosystem has been developed as a blueprint to restore the ecological components and vital processes of this ecosystem through collaborative restoration and conservation efforts. Its objectives are two fold: to benefit both mangroves and the people of Mida.

The development of this mangrove restoration plan was made possible with support from WWF-Kenya through the Triple Benefit Project-Land to Sea, funded by Danida. The project envisions a healthy natural environment that supports human well-being, enhanced climate resilience and a thriving biodiversity across the Coastal Kenya Landscape (CKL). At the core of the TBP-L2S objectives is that communities are able to protect, restore and sustainably manage coastal ecosystems in CKL and derive sustainable livelihoods from them.

Collaboration has been forged with forest-adjacent communities through the Kenya Forest Service (KFS), County Government of Kilifi, KEFRI, KWS, KMFRI, Gede and Sokoke CFA, Kwetu Training Center, COBEC, Eden People + Planet in the formulation of the Mangrove Restoration Plan. This plan aims to promote sustainable mangrove restoration practices and better coordination of restoration work in Mida. The Mangrove Restoration Plan will serve as a guiding tool for the development and sustainable restoration of mangrove ecosystems and associated resources, all in pursuit of socio-economic development.

We urge all stakeholders to join hands in supporting the Kenya Forest Service (KFS) and the forest-adjacent community members in the successful execution of this plan. In doing so, we will

collectively address the pressing environmental and livelihood challenges in Kilifi while simultaneously contributing to the broader national development agenda.

DR. ASMA AWADH

PROGRAMME MANAGER,

COASTAL KENYA LANDSCAPE, WORLD WIDE FUND FOR NATURE

(WWF)-KENYA.

Executive Summary

The development of the Mida Creek Restoration Plan (2024-2029), was initiated by Kenya Forest Service (KFS) in close collaboration with WWF-Kenya, Kenya Forestry Research Institute (KEFRI), Eden People+Planet, KWS, COBEC, County Government of Kilifi, GACOFA and SOCOFA.

Mida Creek, a large, almost land-locked expanse of saline water, mangrove (1746 ha), is in the southern sector of the IBA near Watamu town and Mida village. Mangroves of Mida Creek are part of Watamu Marine Protected Area (WMPA). The management of these forest blocks is a collaborative endeavor involving the Kenya Forest Service, Community Forest Associations (CFAs), and various partnering organizations.




The major threats of mangroves in Mida have been identified as illegal logging as well as land encroachment. Other emerging threats include bait digging by the fishermen, erosion of mangrove canals due to intense wave action and limited law enforcement that has continued to exacerbate the problem of mangrove degradation in the Mida creek. This plan has outlined elaborate measures for addressing these threats for enhanced forest conservation and livelihood improvement. The plan has proposed Four programmes;




- 1.** Awareness and sensitization
- 2.** Protection of mangrove areas
- 3.** Reforestation of degraded areas
- 4.** Livelihood and socio- economics

These programs prescribe measures for rehabilitation, conservation, and sustainable management of the Mida Creek forest block. The plan has outlined mechanisms for resource mobilization, financial management and monitoring and evaluation, and has put in place an institutional mechanism for implementation of the plan.

Acknowledgement

This restoration plan has been developed through a participatory planning process involving a cross section of mangrove forest resources stakeholders, under the coordination of a technical team with representation from key stakeholders led by KFS, KEFRI, KWS, KMFRI, County Government of Kilifi, CSOs, NGOs (WWF- KENYA, COBEC, KWETU, Eden People +Planet) and the local community through Gede and Sokoke Community Forest Associations

	<p>We thank our main partner, the Kenya Forest Service led by Mr. Elvis Fondo (County Forest Conservator) for their professional guidance and technical advice needed to develop the restoration plan. Special mention goes to Madam Truphena Njaka Forest station Manager Gede and Mr. Silas Tsuma, Forest Station Manager Sokoke. We appreciate KFS technical and coordination support and for the partnerships brought on board to support participatory development of the restoration plan.</p>
	<p>We Acknowledge and express our heartfelt Gratitude to the County Government of Kilifi for your participation and technical assistance in developing the restoration plan. We are grateful to Jimmy Kahindi Yaa (Director Environment) and Benadate Nazi Mtava (Fisheries officer) for collaboration and technical guidance throughout the entire process.</p>
	<p>WWF Kenya played a crucial role in the plan development process from the very beginning, leading the mapping of degraded areas in Mida Creek Forest Block, and providing stakeholder mobilization, financial, logistical, and technical support. We extend our special thanks to Rahma Kivugo (Marine Project Officer), Rose</p>

	<p>Machaku (Project Officer) Nickson Kirimo (Project Assistant) and the GIS and M&E teams for their tireless efforts in mapping, coordinating, and expert contributions throughout the development of the Mida Creek Restoration plan.</p>
	<p>We recognize and extend our profound gratitude to Kenya Forestry Research Institute (KEFRI) for your participation and technical support in preparing the restoration plan. We are grateful to the KEFRI Coast Regional office Gede, led by Dr. Stanley Nadir (Principal Research Scientist & Deputy Regional Director) and Henry M. Komu (Assistant Regional Director, Lamu office), for their collaboration and technical support.</p>
	<p>We are deeply grateful to COBEC for their exceptional collaboration in developing the restoration plan. We particularly want to recognise Mr. Julius Sila (GIS Analyst) and Mr. Johnson Nzai (Restoration officer) for their outstanding contribution. Your teamwork and expertise have been essential in formulating a successful plan.</p>
	<p>We extend our gratitude to the Kenya Wildlife Service for your participation and support in preparing the restoration plan. Special thanks to the KWS team led by Corporal Mohamed Namuna, for their collaboration and invaluable contribution during plan development</p>

	<p>Kenya Marine and Fisheries Research Institute’s contribution through Dr. Judith Okello, a Principal Research Scientist and chair of the National Mangrove Management Committee, is highly appreciated. The insights provided during the write up process went a long way in improving the restoration plan.</p>
	<p>We recognize the importance of stakeholders contributions towards conservation of mangroves ecosystems within Kilifi County. We express our sincere gratitude to Eden:People+Planet’s, Mr. David Erasto (Mangrove manager) and Ms. Rita Mulatya (Regional Monitoring and Evaluation Coordinator) for their invaluable contributions during the plan development.</p>
	<p>We are deeply grateful for Kwetu Training Centre’s participation in the development of the restoration plan. We especially want to acknowledge the contribution of Mr Brendan Muli (the Chief Executive Officer). Mr Muli’s involvement was instrumental and we appreciate his valuable insights.</p>
	<p>GACOFA and SOCOFA express their profound gratitude for the immense support from various partners in making the development of the Mida Creek Restoration Plan a success.</p> <p>Special thanks go to James Katama Muranga (Chairperson -SOCOFA and Donald Kittu Chairperson from GACOFA for their collaboration and active participation in</p>

	<p>identifying degraded sites, planning restoration interventions, social-economic and ecological surveys and implementing the restoration plan.</p>
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ACRONYMS and Abbreviations

BETA	Bottom-Up Economic Transformation Agenda
BMU	Beach Management Unit
CBD	Convention on Biological Diversity
CBEMR	Community Based Ecological Mangrove Restoration
CFA	Community Forest Association
CFC	County Forest Conservator
COBEC	Community Based Environmental Conservation
CMMC	County Mangrove Management Committee
CSOs	Civil Society Organizations
FLMC	Forest Level Management Committee
IGAs	Income Generating Activities
ITCZ	Inter- Tropical Convergence Zone
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
KMFRI	Kenya Marine and Fisheries Research Institute
KWS	Kenya Wildlife Service
NBSAPs	National Biodiversity Strategies and Action Plans
NDCs	Nationally Determined Contributions
NGAO	National Government Administration Officer
NGO	Non- Governmental Organizations
NMEMP	National Mangrove Ecosystem Management Plan
NMMC	National Mangrove Management Committee
SWOT	Strength Weakness Opportunities and Threats
UNFCCC	United Nations Framework Convention on Climate Change
WIO	Western Indian Ocean
WWF	World Wide Fund for Nature Kenya
UNESCO	United Nations Educational, Scientific and Cultural Organization
ASFADA	Arabuko Sokoke Forest Adjacent Dwellers Association
COBEC	Community Based Environmental Conservation
KeFS	Kenya Fishery Service
GACOFA	Gede Community Forest Association
SOCOFA	Sokoke Community Forest Association

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CHAPTER ONE:

INTRODUCTION

1.1 Background

Mangroves are distinctive ecological units and grow along the coastline, in the intertidal zone between land and sea. Mangroves of Kenya are found in tidal estuaries, creeks, and protected bays that cover approximately 61,271 ha. These forests support coastal ecosystems by providing environmental services and critical ecological functions, affecting both inland and oceanic resources. Kilifi County mangroves (GOK, 2017).

Mida Creek, a large, almost land-locked expanse of saline water, mangrove and intertidal mud, is in the southern sector of the IBA near Watamu town and Mida village. Mangroves of Mida Creek which form part of Watamu Marine Protected Area (WMPA), are estimated to occupy 1,746 ha equivalent 20% of the Kilifi County mangroves with an area of 8536ha and a 14% cover (GOK, 2017). The area has a total of 7 out of the 9 mangrove tree species documented in Kenya including species including *Ceriops tagal* (*Mkandaa*), *Rhizophora mucronata* (*Mkoko*), *Bruguiera gymnorrhiza* (*Muia*), *Avicennia marina* (*Mchu*), *Sonneratia alba* (*Mlilana*), *Xylocarpus granatum* (*Mkomafi*) and *Lumnitzera racemosa* (*Kikandaa*). The average stocking rate of mangroves in Mida is 3,511 stems ha⁻¹, with a volume of 92.7 m³ ha⁻¹; of which 42% is merchantable (GOK, 2017). The major threats of mangroves in Mida have been identified as illegal logging as well as land encroachment. Other threats include bait digging by the fishermen, erosion of mangrove canals due to intense wave action and limited law enforcement that has continued to exacerbate the problem of mangrove degradation in the creek. While effective conservation approaches should be upheld, degradation trends in Mida Creek calls for a robust ecosystem restoration are thus needed to preserve their integrity. This will require a multi-stakeholder and multi-sectoral approach that is centered on science-based evidence with adequate integration of local knowledge from the communities dependent on these intricate ecosystems.

1.2 Justification and Rationale for the Plan

Mida Creek's mangroves are under threat from anthropogenic activities and natural factors. Restoration initiatives have been witnessed in the area but efforts are currently fragmented and lack coordination, leading to inefficiencies and conflicting outcomes. This restoration plan has been prepared as a complementary document to support implementation of interventions proposed in the Gede and Sokoke Participatory Forest Management plans (PFMP 2023-2027). The plan particularly addresses the acceleration of the recovery process of the otherwise degraded mangrove areas of Mida Creek.

Developing a coordinated mangrove restoration plan would harmonize these efforts, ensuring efficient resource use. It would enable sharing of best practices, standardize methodologies, and facilitate comprehensive monitoring and evaluation. Such a plan would also align with global, regional, national, and local agendas, helping to secure funding and support from stakeholders by presenting a unified commitment to environmental well-being.

1.3 Objectives of the Plan

Overall Goal

- To restore Mida Creek mangrove ecosystem for enhanced biodiversity and sustainable livelihoods support.

Specific Objectives

- To enhance biodiversity and habitat quality for mangrove-dependent species.
- To strengthen coastal protection and resilience against erosion and extreme weather events.
- To support sustainable livelihoods for local communities through mangrove-related activities.
- To establish an effective protection mechanism for the forest to guard against illegal activities.

1.4 Approach to Plan Development

A planning meeting held on October 11, 2022, addressed issues in the protection, management, and governance of the Mida Creek mangrove ecosystem. Remote sensing, ground truthing, and data collection tools were used to assess mangrove loss. The restoration plan, building on the Participatory Forest Management Plan and a mapping exercise conducted from October 12-14, 2022, identified degraded sites for natural regeneration, assisted planting, or enrichment planting. This effort involved KEFRI, KFS, KWS, Bahari Hai, COBEC, Eden Restoration, CFAs, BMUs at Uyombo and Watamu, with technical support from WWF and KFS GIS experts.

A stakeholders' writing workshop took place from June 3-8, 2024, at Kilili Baharini Kilifi, followed by a second workshop from July 31 to August 2, 2024, at Mnarani Club to develop the first draft of the restoration plan with representatives from KFS, KWS, WWF-Kenya, KEFRI, Sokoke and Mida Creek CFA representatives, COBEC, Kwetu Training Centre, Eden, Kilifi County Government (Department of fisheries and Environment) and KMFRI.

The draft was validated on August 3, 2024, at Mnarani Club, incorporating stakeholder inputs.



Figure 1: Second writeshop for restoration plan development meeting at Mnarani Beach Club in Kilifi



Figure 2: Restoration Plan validation workshop at Mnarani Beach Club in Kilifi

Title and Duration of the Plan

The plan shall be referred to as “Mida Creek Restoration Plan”, and it shall be implemented for five years 2024-2029 commencing from the date of approval.

Amendment/Revision of Plan

The plan may be amended as need arises through mutual agreement of all parties. It will be revised after five years once the planned period elapses.

1.5 Enabling Legal Frameworks, Policies and Strategies for Development and Implementation of the RP

The Mida Creek Mangrove Ecosystem Restoration Plan aligns with and contributes to various legal and policy frameworks at the global, regional, national, and county levels.

Global frameworks

At the global level, Kenya has ratified various Multilateral Environmental Agreements and Commitments relevant to restoration. For example, Kenya is one of the countries participating in the Bonn Challenge of 2011 whose aim is to restore 150 million hectares of deforested and degraded land by 2020. Kenya is also committed to the New York Declaration on Forest of 2014 which expanded the target of the Bonn Challenge to restoring 350m ha of degraded and deforested area by 2030. Other global commitments relevant to Mida Creek Mangrove Ecosystem Restoration Plan are:

- UN Convention on Biological Diversity (CBD) - Aims at restoring 15% of the degraded land by 2030
- United Nations Sustainable Development Goal (SDGs) particularly Goal 15 - Aims to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and biodiversity loss.
- United Nations Framework Convention for Climate Change (UNFCCC) - Ratified countries will provide nationally Determined Contributions (NDCs) with specific restoration and mitigation targets.
- United Nations Decade on Ecosystem Restoration (2021-2030) - Promotes global participation to scale up restoration efforts for degraded ecosystems, in order to meet the 2030 Agenda for Sustainable Development.
- Ramsar Convention on Wetlands - This is an intergovernmental treaty outlining a framework for national action and international cooperation for the conservation and sustainable use of wetlands.

Regional Frameworks

At the regional level Kenya has made a commitment to The African Forest Landscape Restoration Initiative (AFR100) which is a country-led effort to bring 100 million hectares of deforested and degraded landscapes across Africa into restoration by 2030. Under this initiative, Kenya has pledged to restore 5.1m ha of degraded and deforested areas by 2030.

National Frameworks

The Mida Creek Mangrove Forest Ecosystem Restoration Plan is supported and aligns to various national policies, frameworks and laws. These include;

- *Constitution of Kenya, 2010* - Chapter Five, article 69 mandates the state to ensure sustainable use and conservation of natural resources, equitable benefit sharing, and encourages public participation in environmental management and protection.
- *National Mangrove Ecosystem Management Plan 2017-2027* - Under the mangrove forest conservation and utilization program, the plan aims to conserve and protect mangrove forests for sustained ecosystem integrity and climate change mitigation, with restoration of degraded sites being emphasized
- *National Mangrove Ecosystem Restoration Guideline* - aims to streamline restoration activities in Kenya by providing best practice approaches that are applicable at both community and institutional levels
- *Environmental Management and Coordination (Amendment) Act of 2015* - Addresses environmental management issues and safeguards against degradation in Kenya. It provides the legal framework for implementing the National Environment Action Plan (NEAP) to ensure healthy living environments.
- *Forest Conservation and Management Act, CAP 385* - Ensures the establishment, development, and sustainable management of forest resources for Kenya's socio-economic development. It mandates that all public forests, nature reserves, and provisional forests be managed according to a management plan (Section 47(1)) and encourages community participation through Community Forest Associations (CFA).
- *Wildlife Conservation and Management Act of 2013* - This plan covers an area that is rich in both flora and fauna, hence the relevance of the provisions of the Wildlife Conservation and Management Act. The Act provides for protection, conservation, sustainable use and management of wildlife resources in the country. The restoration plan is aimed at promoting protection, conservation, sustainable use and management of wildlife resources within Mida forest.
- *Agriculture, Fisheries and Food Authority (AFFA) Act No. 13 of 2013* - The Act acknowledges agriculture and forestry as key productive sub sectors for generating

wealth, creating jobs, ensuring food security, and reducing poverty. This will relieve pressure and over reliance on Mida Creek mangroves

- *Farm Forestry Rules, 2009* - Aims at promoting and maintaining farm forest cover of at least 10 percent of every agricultural land holding. This restoration plan outlines measures for sustainable management of forest resources including rehabilitation of degraded areas, and promotion of on-farm forestry and agroforestry practices.
- *Tourism Act, No. 28 of 2011* - Outlines guidelines for sustainable tourism, regulating activities and services nationwide according to the national tourism strategy. All tourism activities in the restoration plan will comply with the provisions of this Act.
- *National Energy Policy and Energy Act, 2019* - The broad objective of the energy policy is to ensure adequate, quality, cost effective and affordable supply of energy to meet development needs, while protecting and conserving the environment. This Act provides guidelines for sustainable supply of fuel wood to the local communities.
- *Physical Planning Act of 2012* - Sections 4 and 5 of the Act provide for protection of the environment and that development should be in harmony with environmental considerations. The provisions of this act will be adhered to in the development projects outlined in the restoration plan.
- *The Climate Change Act, 2016* - The Act is a comprehensive law designed to enhance resilience to climate change and promote low carbon development. It enforces constitutional rights to a clean and healthy environment and outlines the State's environmental obligations.
- *National Forest Programme 2016* - The strategic objectives of the National Forest Programme are to increase forest and tree cover and reverse forest degradation.
- *Bottom-up Economic Transformation Agenda* - The government is committed to protecting public forests and reversing degraded landscapes under this plan. A key intervention is the National Tree Growing and Restoration Campaign, which aims to grow 15 billion trees. This initiative seeks to increase tree cover from 12.13% to 30% by 2032 which the plan will contribute to.

County frameworks

At the county level, this restoration plan is aligned to:

- *Kilifi County Integrated Development Plan (CIDP)- 2019-2022* - This is a development master plan for Kilifi County which articulates environmental, social and economic development within the County. It offers a roadmap towards ensuring sustainable development of all sectors in the County.

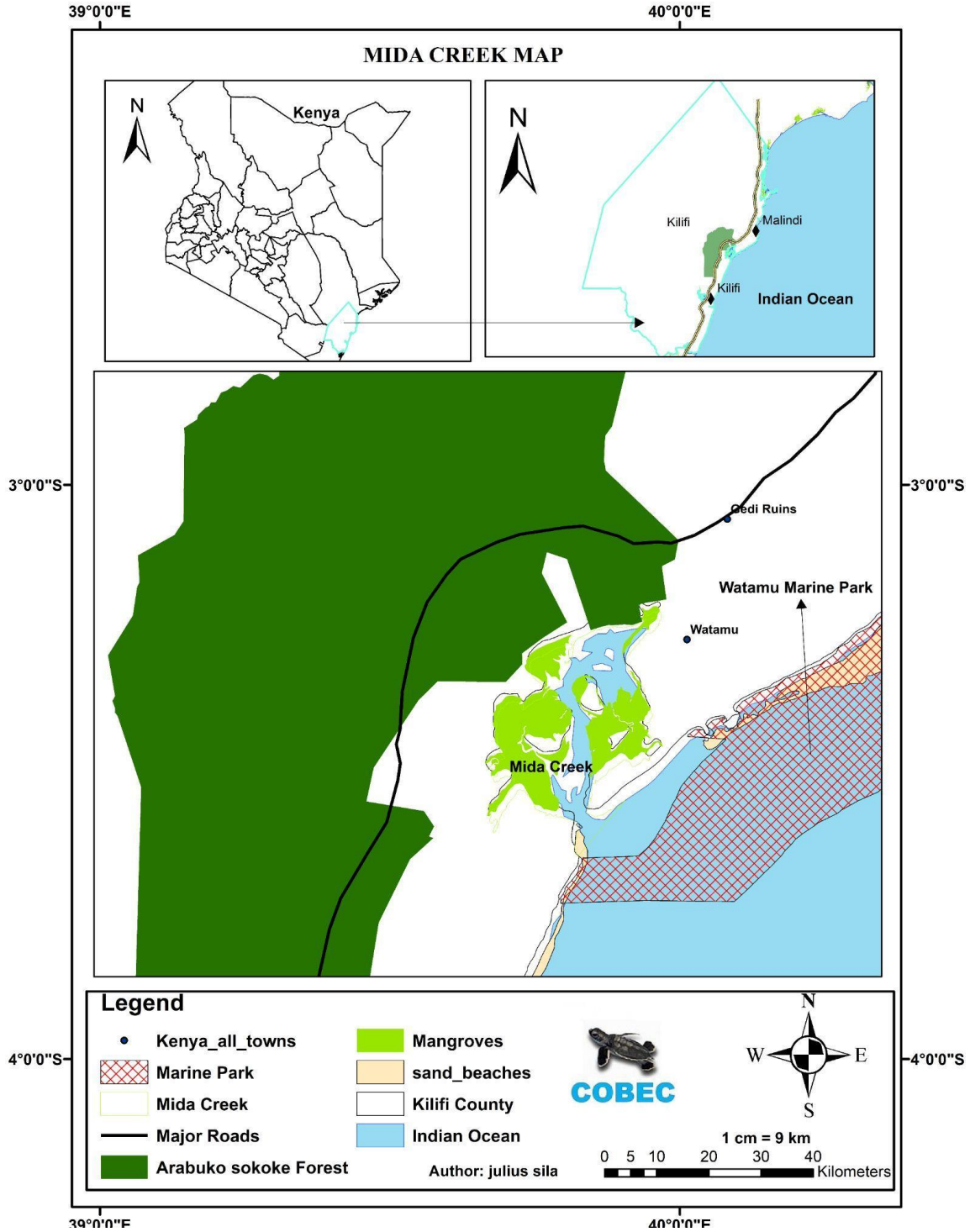
- *Transition Implementation Plan (TIPS) for Kilifi County* - The County functions, previously implemented by KFS, align with the fourth schedule of the Constitution of Kenya, 2010. TIPS provide a framework for County governments to collaborate with the National government to achieve 10% forest cover.
- *Sokoke and Gede Participatory Forest Management Plans (PFMP)* - Offer guidance in conservation, protection, and sustainable management of forests for the benefit of community members living adjacent to the forest. PFMP harmonizes forest conservation with community well-being, encouraging communities to take responsibility for management of the forests.

CHAPTER TWO:

DESCRIPTION OF MIDA MANGROVE ECOSYSTEM

2.1 Geographic Location

Mida Creek is a tidal inlet in Arabuko-Sokoke Forest and forms part of Watamu Marine National Reserve (3°20'S, 40°00'E) situated 100 km north of Mombasa in Kilifi County. The reserve was established in 1968, contains natural resources such as mangroves, coral reefs, and mud flats and is a sanctuary for shorebird populations. Seven (7) of the nine (9) mangrove species present in Kenya are found in Mida Creek with *Rhizophora mucronata*, *Ceriops tagal* and *Avicennia marina* being dominant. Mida Creek has several Islands including Sudi (58.2 ha), Kadzifitseni 4.64 ha, Kirepwe (72.5 ha), Kisiwani (31.5 ha), Kadaina (17.7 ha). Other smaller Islands cover an area of about 5.17 ha, all constituting (189.71 ha) 5.9% proportion of the entire Mida Creek system.



Map 1: Mida Creek mangrove distribution within the administrative units (Map credits: Julius Sila, COBEC)

2.2 Legal and administrative status

The Mida Creek mangrove reserve lies within the land between high water and low water marks (ordinary spring tides) which is described as public land by the Constitution of Kenya, 2010 (Article 62: sub-article (1) (I). It is also classified as a forest area as described by the Forest Conservation and Management Act, CAP 385 (Section 30: subsection (2)(b). The Mida Creek Mangrove Forest was originally declared as crown forest in 1897 and gazetted as a forest reserve in 1932 through Proclamation No. 34 of 30th April 1932 and The Legal Notice No. 174 of 20th May 1964. It was also gazetted as Watamu Marine Park reserve on 26th March 1968, gazette notice no. 99.

The management responsibility of mangroves occurring in the Mida Forest Block is therefore under the Kenya Forest Service, Coast Region Forest Conservancy and represented at the county level by the County Forest Conservator (CFC). Two Forest Station Managers from Gede and Sokoke Forest Stations support the forest management at their respective station levels; working very closely with the Sokoke and Gede CFAs.

The CFAs work closely with Kenya Forest Service, local communities, other government agencies, non-governmental organizations (NGOs), and other stakeholders to implement conservation measures, promote community participation, and address various challenges facing the mangrove ecosystems. Through their collaborative efforts, these CFAs aim to safeguard the ecological integrity, biodiversity, and socio-economic benefits provided by the Mida mangrove forest for present and future generations.

History of CFAs and current status

This restoration plan covers mangrove areas under the Sokoke and Gede Community Forest Associations (CFAs). Sokoke CFA was established in 2008 and registered in 2014. The CFA signed its first forest management agreement and the second agreement in September 2023. Sokoke CFA has a membership of 1,404, with 654 females, 516 males, and 334 youths. The CFA's area of jurisdiction covers 19,000 hectares of terrestrial forest and 800 hectares of mangrove ecosystem. The CFA includes approximately 200 villages clustered into 10 areas within a 5 km radius from the forest edge.

Gede CFA was established in 2007 and registered in November 2021. It has a membership of 1,200, with 300 males, 650 females, and 250 youths. The Gede CFA area of jurisdiction includes Dabaso wards and some parts of Watamu wards, covering eight villages. Gede CFA covers 13,000 hectares of forest, including 10,200 hectares of natural forest, 300 hectares of plantation forest, and 2,400 hectares of mangroves. Gede CFA signed a forest management agreement in September 2023.

2.3 Biophysical description of the forest

Mida Creek is situated along the coastal margins, this mangrove forest occupies a vital coastal zone, marked by its unique topography and hydrological patterns. The terrain is typified by a network of water channels and estuarine environments, where freshwater from inland sources meets the saline waters of the ocean. This convergence fosters a dynamic and productive habitat for numerous flora and fauna species.

Topography

Mida Creek mangrove forest region is characterized by a diverse range of landforms and elevations, influenced by both natural processes and human activities. Situated along the coastal zone, the topography is predominantly low-lying, with elevations generally below 30 meters above sea level. The coastal plain, which forms a narrow belt along the shoreline, varies in width from 3 km to 20km. This plain is relatively flat, with gentle slopes leading towards the sea.

Distinctive features along the Creeks include a semi-continuous fringing reef system, sandy beaches, protected bays, estuaries and tidal creeks that support the natural growth of mangrove forests. The region is crisscrossed by water channels, which meander through the landscape, creating intricate networks of estuarine environments and wetlands. These waterways play a crucial role in shaping the topography, facilitating sediment transport, and influencing the distribution of mangrove forests and other coastal habitats.

Climate

The monthly temperature is between 23°C and 27°C. During the hottest times, maximum temperature is 34°C, while the minimum temperature is 20 centigrade. Total annual precipitation varies between 1000 and 1600 mm. The long rains fall from April to June while the short rains fall between November and December. The area is normally hot and humid with an average annual air temperature of about 28 C with little seasonal variation. Relative humidity is about 95% due to the close proximity to the sea.

Geology

The creeks are situated within a coastal area characterized by diverse geological formations. This includes sedimentary rocks such as sandstone, limestone, and shale, which are prevalent along the coastline. Coral reefs are also prominent geological features, forming submerged structures that provide habitats for marine life and contribute to coastal protection. Additionally, coral rocks may be present in some areas, adding to the geological diversity of the region.

Soils

The soils in the creek areas are influenced by both marine and terrestrial processes. Sediments deposited by tidal action and riverine inputs contribute to the formation of various soil types. Mangrove forests typically grow in muddy, waterlogged soils rich in organic matter. These soils are often saline and have low oxygen levels, creating unique conditions suitable for mangrove growth. Along the creek banks and adjacent wetlands, soils may vary from sandy to silty, depending on factors such as tidal inundation, sedimentation rates, and vegetation cover. Inland areas adjacent to the creeks are always laden with soils driven from weathered sedimentary rocks, characterized by a mix of clay, silt, and sand particles.

Hydrology

The Arabuko sokoke has underground rivers/channels that feed fresh water into the Mida creek. These water channels, with their varying lengths and hydrological characteristics, create diverse habitats within the mangrove forest, fostering a rich array of flora and fauna. It also plays a crucial role in regulating water quality, sediment transport, and nutrient cycling, contributing significantly to the overall health and resilience of the coastal ecosystem.

2.4 Biodiversity description

The mangrove block of Mida Creek contains natural elements such as mangroves, seagrass beds, coral reefs, and mud flats and is a sanctuary for shorebird populations, it forms part of the Kilifi County's mangrove ecosystem, which comprises a total of four blocks, namely: Mtwapa, Kilifi-Takaungu, Mida and Ngomeni.

Flora

Seven (7) species are found in the Mida Creek mangrove block that covers approximately 1746 Ha. The forest is dominated by pure stands of *Ceriops tagal* and *Rhizophora mucronata* with other forest formations occurring as mixed stands of *Avicennia marina* and *Ceriops tagal* on the landward side with freshwater inflows and in the mid-zone of the forest. The rare species are *Xylocarpus granatum* which exhibit localized distribution occurring in areas with very low salinity. These salt-tolerant trees play a vital ecological role in stabilizing the shoreline, trapping sediments, and providing essential habitat for various marine species. The table below describes the various mangrove species and their utilization;

Table 1: Mangrove species and utilization

	Mangrove species	Local name	Community uses
1	<i>Rhizophora mucronata</i>	Mkoko	Construction/fencing poles, dyes firewood
2	<i>Ceriops tagal</i>	Mkandaa	Construction/fencing poles, fuelwood
3	<i>Avicennia marina</i>	Mchu	Construction poles, fuelwood
4	<i>Sonneratia alba</i>	Mlilana	Boat ribs, construction poles, fuelwood
5	<i>Bruguiera gymnorrhiza</i>	Muia	Construction poles, fuelwood
6	<i>Lumnitzera racemosa</i>	Kikandaa	Fencing poles, fuelwood
7	<i>Xylocarpus granatum</i>	Mkomafi	Construction/furniture poles, medicinal value, fuelwood

Fauna

The Mida Creek Mangrove ecosystem is also highly productive and complex, endowed with fauna exhibiting a range of specialized adaptations to cope with the challenging conditions of brackish water, variable salinity, and fluctuating tides. The faunal species plays specific roles, contributing to the health and stability of this vital coastal ecosystem. The mangroves provide vital breeding and nursery grounds for various fish species including snappers and groupers. They also provide a habitat for molluscs and numerous crustaceans including crabs and shrimps with their muddy, intricate root systems. The creek also hosts a diverse avian population of birds, mammals, reptiles and insects.

2.5 Socio-Economic Status

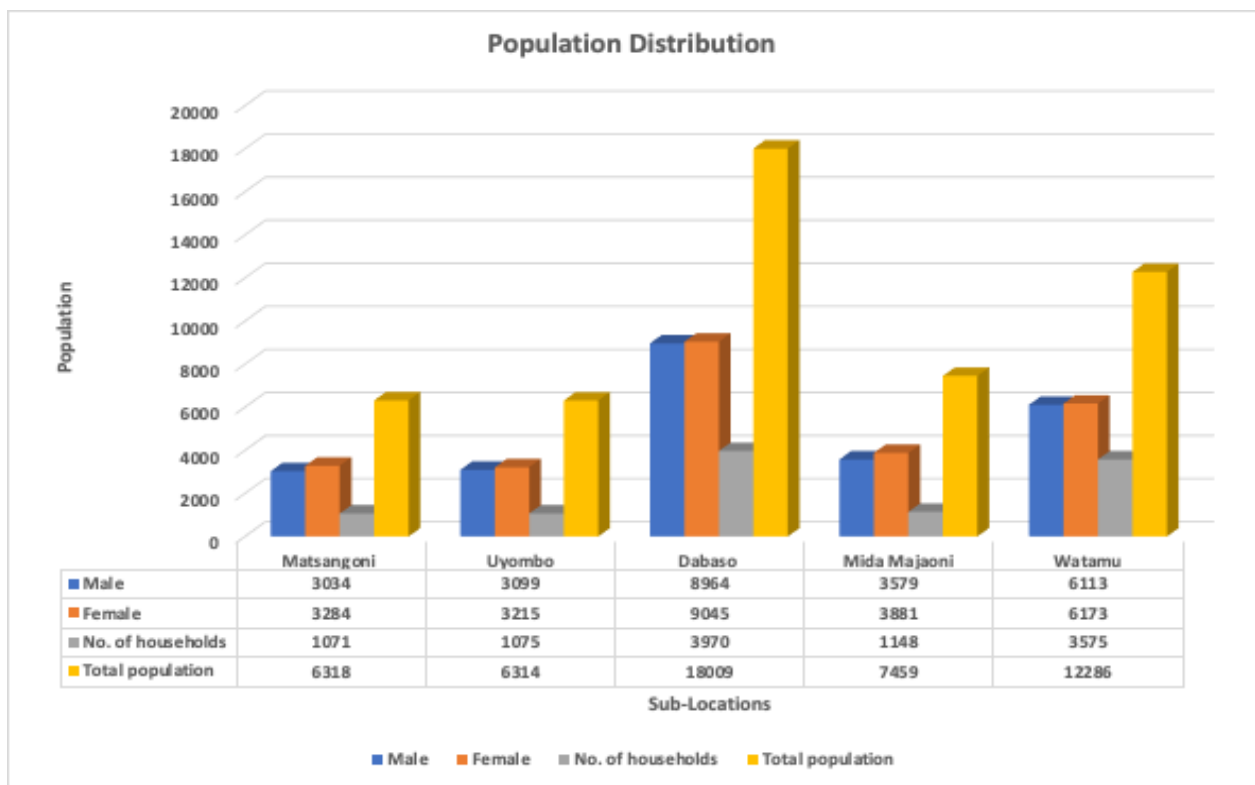
Introduction

This chapter aims at assessing the demography and livelihoods of the Mida community that is key in understanding the interaction between the community and the forest. The community exhibits a unique socio-economic profile influenced by its

proximity to the mangrove ecosystem. A baseline survey conducted by WWF-Kenya in Mida Creek in 2022 unveiled several critical findings:

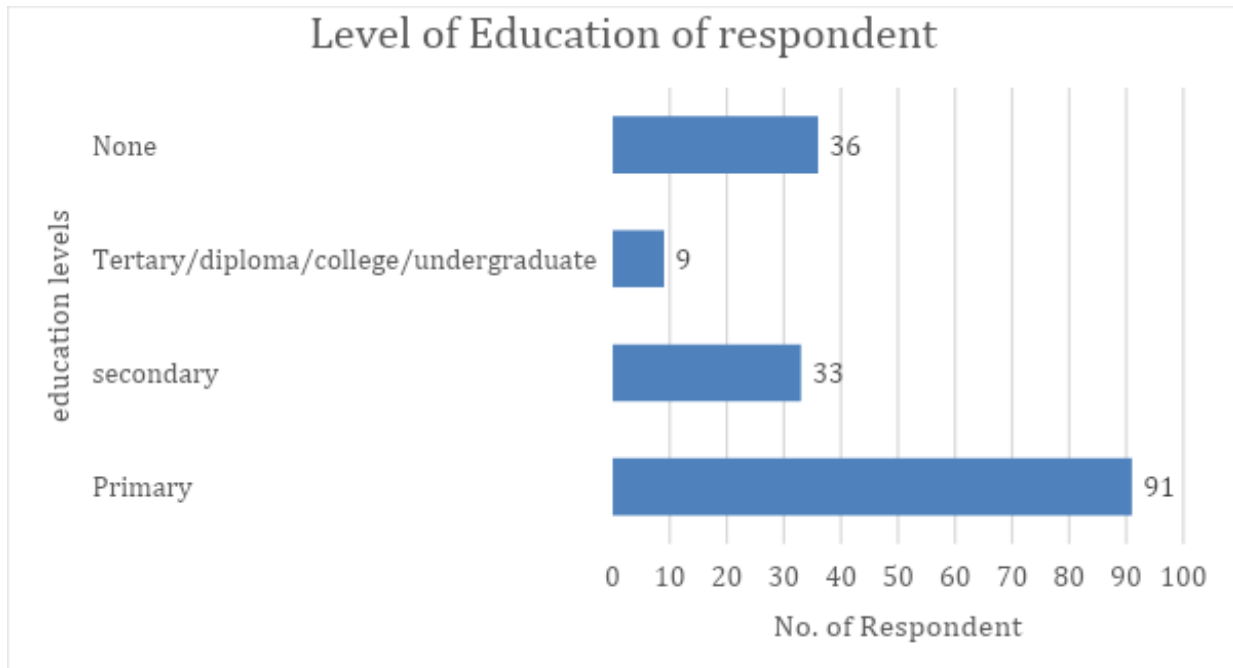
Population dynamics and Education levels

The population of the adjacent Mida Creek mangrove forest ecosystem is 50,386. The area encompasses Uyombo, Matsangoni, Mida Majaoni, Mkongani, Dabaso and Watamu sub -locations. Males entail 24,789 while females are 25,597 (KNBS,2019). The entire area has 10,839 households with the local population mainly consisting of the Mijikenda subtribes, mainly Giriama community, the Watha and a few other tribes from up-country.



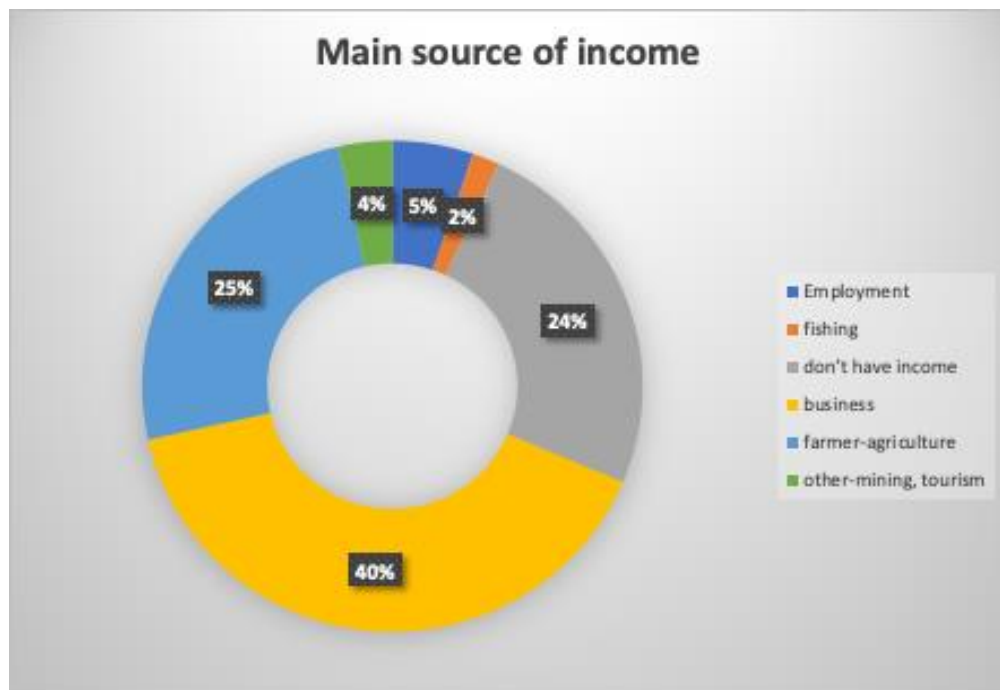
Level of Education

Majority of residents have formal education, with the majority having attained primary level as compared to secondary and tertiary. The decline is attributed to poverty levels with less people having the ability to access education past primary levels.

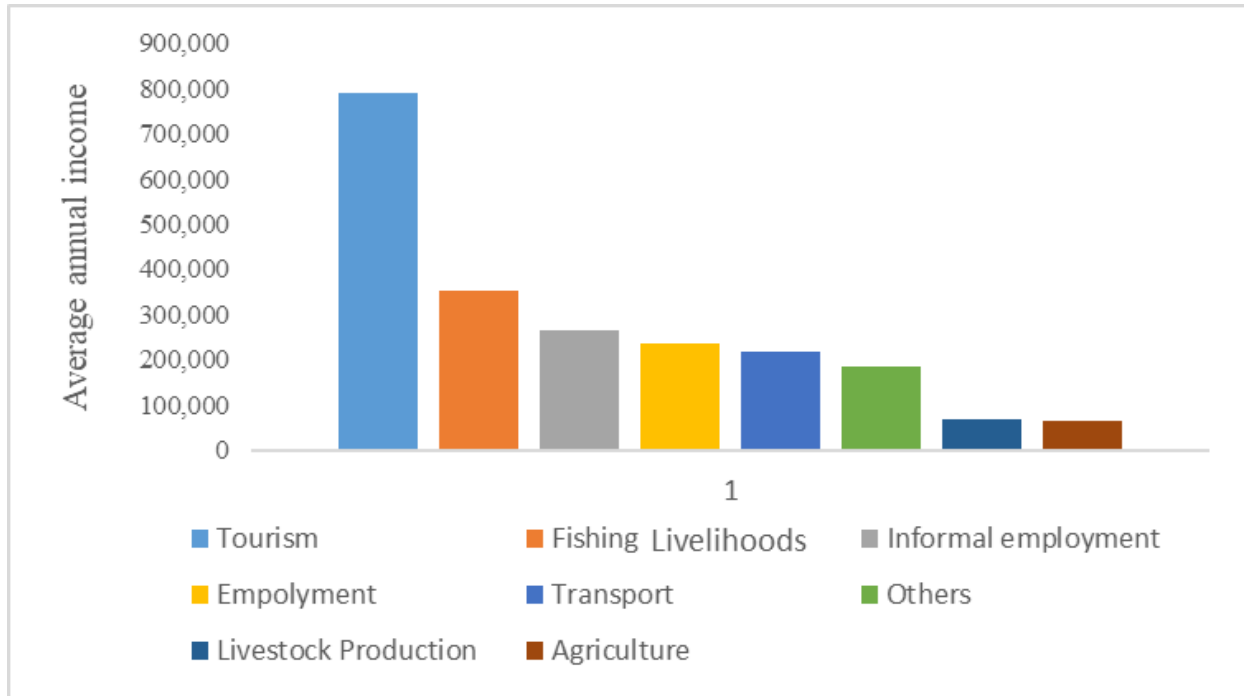


Economic activities

Small and medium sized enterprises are the main economic activities carried out by the population adjacent to the Mida Creek mangrove forest ecosystem. In as much as farming, fishing, ecotourism and informal employment are common economic activities, some community members lack a form of income generating activity.



Generally, the average annual income from the livelihood activities in Mida Creek ranges from KES 67,000 to 800,000 annually with tourism providing the highest income compared to fishing, informal employment, livestock production, agriculture and transport.



Gendered occupations

Compared to men, women are more involved in agriculture and livestock production in Mida Creek. In addition, women have made greater investments in the transportation industry, primarily in motorcycles. On the other hand, men predominate in tourism, fishing, and informal jobs. Women involvement in the fisheries sector is restricted to the fish trade and fish processing subsectors.

Opportunities for Value addition

Value addition in the fisheries and agricultural value chains presents an opportunity to stem losses and increase income. In Mida Creek fishermen and fish traders carry out scaling, gutting, drying, and salting of fish. Value addition in agricultural production includes storage, drying, packaging and milling. Generally, value addition plays a key role in restoration efforts by increasing the income earned at community level, some which could also be ploughed back to restore the same ecosystem.

Food security

The population adjacent to the Mida creek mangrove forest ecosystem is food insecure. Low-income levels, prolonged drought, unemployment and unsustainable household sizes have contributed to food insecurity. Food insecurity in this area has significantly impacted the health and sustainability of the Mida Creek mangrove forest ecosystem. Illegal logging, bait harvesting and increased pressure on fisheries is rampant around Mida to beat the food insecurity issue.

CHAPTER THREE:

SITUATIONAL ANALYSIS

3.0 Introduction: History of the forest

During the 1970s and 1980s, the government, through the Forest Department, restricted community use of forest resources and enhanced restoration efforts, resulting in disputes with local communities. In 2005, the government established Kenya Forest Service and Community Forest Associations (CFAs) to promote sustainable forest resource use. Subsequently, NGOs have created awareness among communities on resource management, conducted capacity building, and encouraged the formation of community conservation groups. Just like other forest areas in Kenya, mangrove degradation has evolved through many causes, with the earliest recorded forms being the extensive exportation of mangrove wood products to Arab countries, in excess of 483,000 poles per year between 1941 and 1956. This resulted in a presidential ban on the exportation of mangrove poles in 1982, and subsequently, a national ban on harvesting was placed in 1997.

3.1 Degradation status of Mida Creek Mangrove Forest Ecosystem

The mangroves of Mida Creek face varying degrees of degradation due to several factors. These are mainly due to overexploitation of mangrove forest for wood products and encroachment by developers. Other threats include mortality due to uncontrolled bait harvesting that occurs on the seaward periphery of the mangroves, foraging particularly on the *Avicennia marina*, sedimentation, as well as insect pest infestation. On rare occasions, boat anchoring in community landing sites, Pollution from boatyards, oil spills and social issues further exacerbates the degradation. Limited livelihood options and high poverty rates continue to exert pressure on mangroves with the long-term notion that mangroves are an inexhaustible resource, hence the tendency for overexploitation. Based on the data gathered from the ground truthing mapping exercise conducted on degraded mangrove sites in Mida Creek, the ecosystem exhibited little disturbance with 276.5 ha registering moderate and high levels of degradation. Mida Creek mangrove covers 1746 ha (GOK, 2017), other sources showed that Mida Creek mangrove covers 1786.3 ha based on recent 2023 vegetation index analysis. Mida Creek area is among the 46% (24,924 ha) of all mangroves in Kenya that are within protected areas hence protection and enforcement largely through patrols in the area might play a part in the intact state of the mangroves.

A significant indicator of mangrove degradation in Mida Creek is the predominance of stumps due to natural factors and human disturbances nearer to human settlements where accessibility is easy. Other indicators could include reduced fish stocks, regeneration potential, biodiversity status, soil sedimentation, mangrove die backs, barnacles and reduced canopy cover.

The mapping exercise was done with collaborative efforts from KFS, COBEC, Eden, WWF-Kenya, KEFRI, and CFA members.

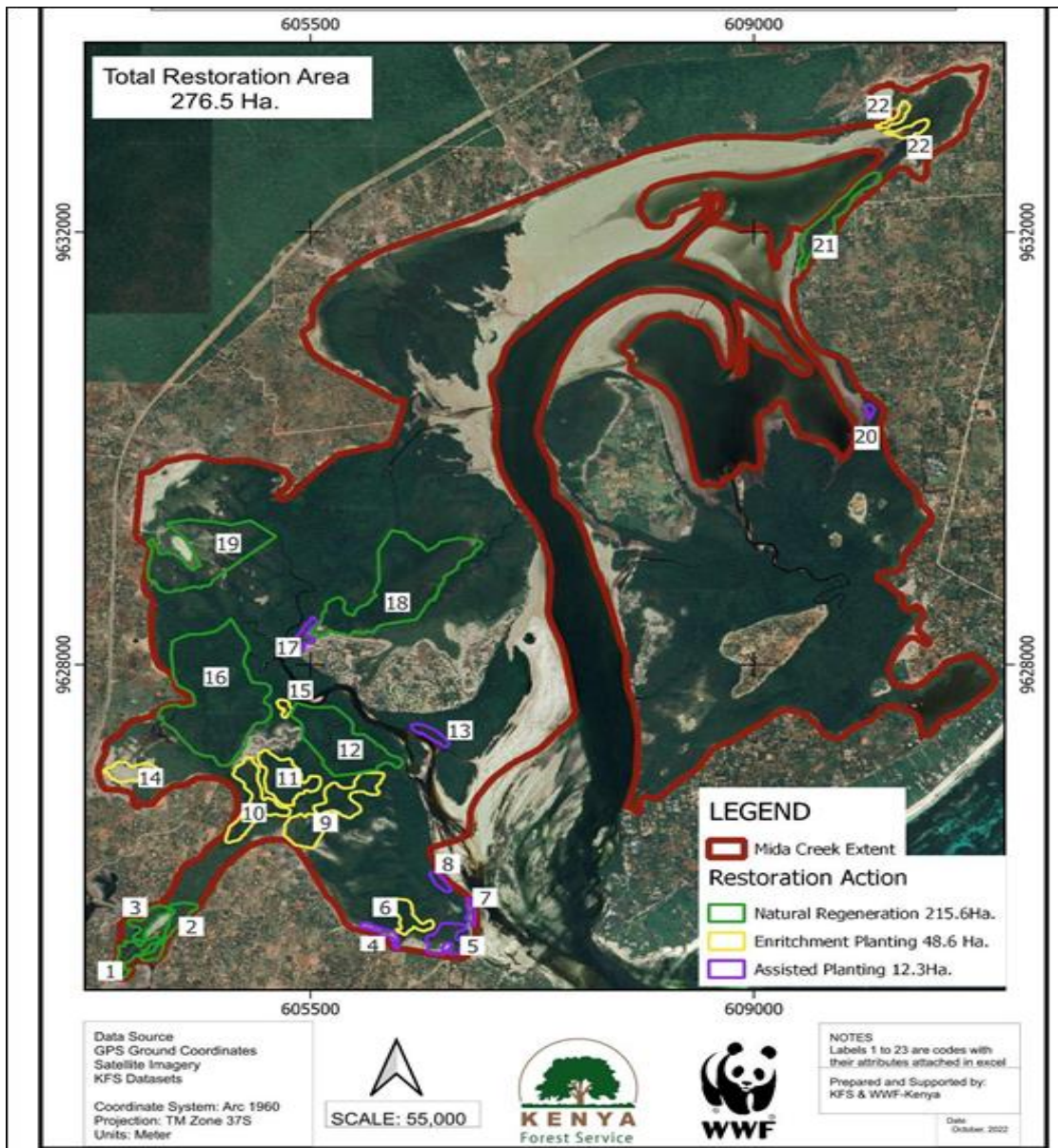


Figure 3: The site specific restoration recommendations for the mapped sites

Table 2: Site recommendations

No.	Site Recommendation	Area (Hectare)
1	Assisted planting	12.3
2	Enrichment Planting	48.6
3	Natural Regeneration	215.6
	Total	276.5

Table 3: Mida Creek Mapping results

S/No	Forest beat	Village	Site name	Ha	Species	Degradation status	Partners involved
Sokoke Forest Block							
1	Kararacha	Uyombo	P12b	29.2	<i>Ceriops tagal</i> & <i>Avicennia marina</i> report	Moderate	CFA, KFS
2		Matsangoni	P81	0.3	<i>Avicennia marina</i>	high	CFA, COBEC
3		Matsangoni	P8		<i>Avicennia marina</i> , <i>Ceriops tagal</i>	intact	
4		Matsangoni	p5		<i>Ceriops tagal</i>	intact	
5		Matsangani	p6	12.7	<i>Avicennia marina</i>	intact	
6		Matsangani	p61	12,6	<i>Avicennia marina</i> ,	high	
7		Matsangoni	p7	0.1	<i>Rhizophora mucronata</i> ,	moderate	

					<i>Ceriops tagal</i> , <i>Bruguiera gymnorrhiza</i>		
8		Matsangoni	p4	18.4	<i>Avicennia marina</i>	moderate	
9		Uyombo	c7	4	<i>Ceriops tagal</i>	moderate	
10		Uyombo	c71	1.8	<i>Avicennia marina</i> ,	moderate	COBEC
11		Uyombo	c7	6.4	<i>Ceriops tagal</i>	moderate	
12		Uyombo	c9	1,3	<i>Bruguiera gymnorrhiza</i>	moderate	Uyombo BMU
13		Uyombo	c8	0.2	<i>Rhizophora mucronata</i> , <i>Sonneratia alba</i>	high	
14		Kadaina	p14A	0.1	<i>Rhizophora mucronata</i>	high	
15		Kadaina	c11	2,5	<i>Avicennia marina</i>	moderate	
16		Kadaina	c10	53,5	<i>Avicennia marina</i>	moderate	
17		Matsangoni	p2	3.6	<i>Avicennia marina</i> ,	moderate	
18		Matsangoni	p3		<i>Avicennia marina</i> .	moderate	
19		Sabasaba	c16	37.7	<i>Ceriops tagal</i> , <i>rhizophora mucronata</i>	intact	
20		Sabasaba	p16		<i>Ceriops tagal</i> , <i>Avicennia marina</i> ,	moderate	
21		Sabasaba	p15		<i>Ceriops tagal</i>	intact	

22		Kadaina	p14-1	70.9	<i>Ceriops tagal</i>	moderate	
Gede Forest Block							
23	Station	Magagani	p24	0.5	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	moderate	
24		Magagani	p25		<i>Ceriops tagal</i>	intact	
25		Magagani	p25b	0.1	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	moderate	
26		Kirepwe	c5-1		<i>Sonneratia alba</i>	high	Rotary club of Kenya. CFA
27		Sita	c2-1	10.6	<i>Avicennia marina</i>	moderate	
28		Dabaso	c1-1		<i>Rhizophora mucronata</i>	moderate	

Table 4: Degradation status

No	Village	Site	Degradation status	Drivers	Species Observed	Area(Ha)
1	Uyombo	P12	intact		<i>Rhizophora mucronata</i> , <i>avicennia marina</i>	
2	Uyombo	P12b	moderate	Cutting of poles and withies by locals for construction	<i>Ceriops tagal</i>	29.2
3	Matsangoni	P81	high	Foraging, Over harvesting for firewood	<i>Avicennia marina</i>	0.3

4	Matsangoni	P8	intact	No degradation	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	
5	Matsangoni	P5	intact	No degradation, dwarfs	<i>Ceriops tagal</i>	
6	Matsangoni	P6	intact		<i>Avicennia marina</i>	12.7
7	Matsangoni	P61	high	over_harvest, Firewood harvesting	<i>Avicennia marina</i> ,	12.6
8	Matsangoni	P7	moderate	Landing site	<i>Rhizophora mucronata</i> , <i>Ceriops tagal</i> , <i>Bruguiera gymnorrhiza</i>	0.1
9	Matsangoni	P4	moderate	Over-harvesting, Large degraded areas in portions	<i>Avicennia marina</i>	18.4
10	Uyombo	C7	moderate	Clear cuts	<i>Ceriops tagal</i>	4
11	Uyombo	C7-1	moderate	Foraging, Harvesting for firewood	<i>Avicennia marina</i> ,	1.8
12	Matsangoni	Chambuko (ziwani) P1	moderate	Chemical Pollution can suffocate breathing system and diebacks	<i>Avicennia marina</i> ,	4.9
13	Matsangoni	Chambuko (ziwani) P2	moderate	Chemical Pollution can	<i>Avicennia marina</i> ,	3.6

				suffocate breathing system and diebacks		
14	Matsangoni	P3	moderate	foraging, clear cuts	<i>Avicennia marina</i> ,	
15	Sabasaba	C16	intact		<i>Ceriops tagal</i> , <i>rhizophora mucronata</i>	37.7
16	Sabasaba	P16	moderate	Clear cuts, Illegal harvesting	<i>Ceriops tagal</i> , <i>Avicennia marina</i> ,	
17	Sabasaba	P15	intact		<i>Ceriops tagal</i>	
18	Kadaina	P14-1	moderate	Clear cuts, charcoal kiln site	<i>Ceriops tagal</i>	70.9
19	Magangani	P24	moderate	foraging	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	0.5
20	Magangani	P25	intact		<i>Ceriops tagal</i>	
21	Magangani	P25b	moderate	Fisherman, Bait harvesting, Presence of barnacles.	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	0.1
22	Kirepwe	C5-1	high	Natural sand flat	<i>Sonerratia alba</i>	
23	Sita	C2-1	moderate	Foraging, Harvesting for firewood	<i>Avicennia marina</i>	10.6

24	Dabaso	C1-1	moderate	No degradation. Boat anchoring area	<i>Rhizophora mucronata</i>	0
25	Uyombo	C7	moderate	Foraging, clear cuts	<i>Avicennia marina</i> , <i>Ceriops tagal</i>	6.4
26	Uyombo	C9	moderate	Heavy current, Siltation, bait digging	<i>Bruguiera gymnorrhiza</i>	1.3
27	Uyombo	C8	high	Bait digging	<i>Rhizophora mucronata</i> , <i>Sonneratia alba</i>	0.2
28	Kadaina	P14 A	high	Over harvesting, clear cuts, bait harvesting	<i>Rhizophora mucronata</i>	0.1
29	Kadaina	C11	moderate	Foraging	<i>Avicennia marina</i>	2.5
30	Kadaina	C10	moderate	Foraging	<i>Avicennia marina</i>	53.5

3.2 Barriers to natural regeneration and restoration initiatives

Several barriers exist that negatively affect the progress made in restoration. These barriers can be specific to the two main approaches in mangrove ecosystem restoration, i.e., natural and assisted restoration, or they can affect both approaches simultaneously, with the root causal factors majorly influencing the latter mentioned.

Poverty - High poverty levels among the local communities living adjacent to the mangrove ecosystems have for the most part put a lot of exploitation pressure on the resource. The need to meet their daily needs coupled with inadequate knowledge in sustainable resource management can be demonstrated in activities such as unsustainable harvesting of poles for construction, firewood, charcoal burning i.e. one specific site (P14 in Kadaina village) was identified as an old clear cut area that was used

as a charcoal kiln as well as fishing. This creates the need to promote alternative livelihood practices that will aid in reducing the pressure on mangrove ecosystem goods and services.

Low literacy levels - Low literacy in restoration science affects the survival rate of planted seedlings. Concepts such as site and species matching, planting periods, seed propagation, and planting approaches are but a few examples of the complex nature of these ecosystems. Despite acknowledging the importance of existing local knowledge in restoration, integration with evidence-based knowledge is critical to increasing the seedling survival rate. Capacity building on Community Based Ecological Models of Restoration is a good example of the latter mentioned

Finance - Mangrove conservation has been known to be expensive. Adequate financing is needed from seed bed preparation, seedling transportation to the actual planting. Labour is required in all these phases, not forgetting the digging of waterways when undertaking hydrological modification of a degraded site. Capacity building of the local communities also requires financing. To protect a mangrove ecosystem, one may need to fence off an area to deter foraging by livestock or hire local scouts to even hire local scouts that will help in forest surveillance. That said, good financial planning is essential for mangrove restoration and protection, as this is a gradual process that may take years to completely achieve.

Livestock foraging - Openly grazing livestock owned by the locals often graze on the *Avicennia Marina* species, commonly found further landward. Strategies such as fencing and capacity building on the ecosystems' importance as well as capacity building on the ecosystems' importance can serve to address this.

Coastal development - Infrastructure such as hotels, restaurants, port harbors, industries, and channels dredging extensively degrade these ecosystems. Some of these developments may be government-initiated making it difficult to go against. The compensation which is sometimes offered hardly makes up for the damages, leaving local communities as well as biodiversity more vulnerable to climate change impacts.

Pollution - Poor waste management practices among locals and enterprises cause a lot of pollution to the mangrove ecosystems. Industrial and agricultural pollution, as well as plastic and other debris, can harm mangroves and the organisms that depend on them. Potential chemical pollution was identified in Matsangoni village at Chambuko (Ziwani site) where adjacent subsistence farming could be a cause of mangroves die back, backed up by the presence of algae growth in pneumatophores of *Avicennia marina* trees.

Climate change - Rising sea levels, increased temperatures, and extreme weather events can significantly impact mangrove ecosystems, including changes in water quality, erosion, and saltwater intrusion. Natural calamities such as the 1997-98 El Nino resulted in extensive death of mangroves in some parts of Mida Creek. Rising sea levels, increased temperatures, and extreme weather events can have significant impacts on mangrove ecosystems, including changes in water quality, erosion, and saltwater intrusion.

Pest, disease and desiccation - Several pathogens such as *Ceriospora rhizophorae*, *Colletotrichum sp* have been reported to attack mangroves in Kenya. pest-species preferences have been observed with varying severity of infestation affecting *S.alba*, *A. marina*, *R. mucronata*, *B. gymnorrhiza* and *C. tagal*. Extreme damage caused by pests and diseases affects plant processes including gaseous exchange, transpiration, photosynthesis and reproduction.

Stakeholder interests - Multiple stakeholders and/or partners exist in Kilifi County with conservation interest in the Mida Creek ecosystem. These are sometimes conflicting and competing in nature causing more harm than good to both the social and ecological context. Good coordination of proposed interventions should be promoted by the relevant administration to promote efficiency in management particularly KFS and the CFA. The respective County Mangrove Management Committees (CMMC) with correspondence from the National Mangrove Management Committee (NMMC) have been formulated to provide a coordination and oversight role to all proposed and active conservation and management interventions related to the mangrove ecosystem.

3.3 Existing opportunities that support the development of restoration plan

- **Data and information** - Data and information on degraded sites is available where partners can leverage when undertaking restoration of degraded mangrove sites. This supports and promotes coordination efficiency in the implementation of the plan, further guided by the development of National Mangrove Restoration Guidelines nationalized WIO Mangrove Restoration Guidelines.
- **Community engagement** - Local communities have been put at the forefront of conservation through their formal recognition in the national legislations such as the Forest Management Act, 2016. The communities are aware of the benefits derived from the ecosystems and are keen to sustainably conserve and manage them. Various local CSOs have also come up and are championing mangrove conservation in relevant platforms through advocacy.

- **Global interest** - Blue carbon ecosystems have fetched a lot of interest from the global community due to their crucial role in carbon sequestration. Known to sequester CO₂ more than terrestrial ecosystems, their conservation is emphasized in climate change adaptation and mitigation. Mangroves have shaped different agendas in the UNFCCC, CBD, Sendai Framework conferences among others, and just recently for many countries including Kenya, have been included in the Nationally Determined Contributions (NDCs). It is expected that they will also shape policy discussions in the NBSAPs within the GBF under the CBD. This sets a needed structure in mangrove conservation, availing essential means of implementation such as finance, technology and legislative frameworks.
- **Climate** - Mangroves are commonly found in the tropics and warm temperate latitudes across the world. Climatic conditions such as temperature and precipitation largely influence mangrove development and occurrence in Kenya. The coast of Kenya is characterized by a hot and humid tropical climate and experiences a bimodal rainfall pattern influenced by monsoon winds. With correspondence to existing oceanographic and geomorphological settings, the latter mentioned climatic conditions promote favorable conditions for mangroves to thrive along the Kenyan Coast.
- **Stakeholder interest** - Stakeholders and partners can serve to provide the financing needed for mangrove conservation and their sustainable management. Besides financing, other resources such as technical capacity, technology and policy advocacy can be availed for a more collective approach to ecosystem management.

3.4 Implementation of the proposed restoration intervention

To evaluate the impact of mangrove restoration initiatives, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is essential. The success of restoration efforts in Kenya can be understood by examining governance, regulation of human activities, resource mobilization, and conservation incentives. This is elucidated in Table below

3.4.1 Strengths and weaknesses

Table 5: Summary of Strengths and Weaknesses

Factors	Strength	Weaknesses
Governance and Administrative Structures	<ul style="list-style-type: none"> • Strong working relationship between National government agencies, County Governments, NGOs, collaborators and communities. • Organizational structure with clear functions of each unit • Implementation of PFMP has increased ownership of forest resources <p>Supporting legal frameworks eg national mangrove management committee/plan</p> <p>The County Government has mainstreamed forest activities into their CIDPs (over 50%)</p> <p>Available sites for mangrove planting</p> <p>Conducive environment for mangroves growth</p>	<ul style="list-style-type: none"> • Dilapidated infrastructure
Internal Business Processes	<ul style="list-style-type: none"> • Improved public image • Adoption of E-service e.g E- payment of seedlings. 	

<p>Resource and Capabilities</p>	<ul style="list-style-type: none"> • Skilled and competent personnel available <p>Availability of willing partners/collaborators to support restoration activities</p> <ul style="list-style-type: none"> • Modern technology for forest conservation and management (drones, GIS) 	<ul style="list-style-type: none"> • Slow adoption of new technology • Grounded fleet of motor vehicle • inadequate staff housing • Inadequate capacity building of staff for sustained capacity in forest conservation and management • Inadequate security gears
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3.4.2 Summary of Opportunities and Threats

The table below is a summary of the opportunities and threats analysis.

Factors	Opportunities	Threats
<p>Political</p>	<ul style="list-style-type: none"> • Political and public good will 	<p>Political uncertainty</p> <ul style="list-style-type: none"> • Perception that national forests should be devolved • Moratorium on timber harvesting

<p>Economic</p>	<ul style="list-style-type: none"> • Readily available market for Non wood forest products and services • Several revenue streams that can be harnessed to generate adequate income for forest conservation and management • Opportunity for expansion for tourist attraction. <p>Carbon and biodiversity market</p>	<ul style="list-style-type: none"> • Low budgetary provisions/ allocations • Poaching of forest products • Lack of clear mechanism for cost and benefit sharing of forest resource generated
<p>Social</p>	<ul style="list-style-type: none"> • Job opportunity for trained and untrained workforce • There is international goodwill on conservation and sustainable management. • Strong partnership and support from development partners 	<ul style="list-style-type: none"> • Rise in resource conflicts as a result of over dependency by the community on forest resources • Reliance on donor funding for certain development activities
<p>Technological</p>	<ul style="list-style-type: none"> • Knowledge on the role of forestry in climate change both within and outside the country. 	<ul style="list-style-type: none"> • The advanced technology poses a threat to misinformation spying compromise surveillance tampering on forest jurisdiction areas.

<p>Legal</p>	<ul style="list-style-type: none"> • Adequate laws and policies to protect hectares of gazetted Mangrove forests 	<ul style="list-style-type: none"> • Uncertain government and conflicting policies • Significant pressure interested to amend laws to convert forest land to other land uses • Conflicts over institutional mandate (multiple gazettelement)
<p>Ecological</p>	<ul style="list-style-type: none"> • Potential resource generation through carbon sequestration. <p>Animal habitat</p> <p>Rainfall catchment</p>	<ul style="list-style-type: none"> • Forest damage through fires, natural calamities pests, diseases and animals

CHAPTER FOUR:

RESTORATION INTERVENTIONS AND ACTIONS

4.1 Restoration Intervention and Actions in Mangrove Ecosystems

Decreasing mangrove coverage and growing public awareness have spurred interest in conserving, rehabilitating, and sustainably managing these crucial ecosystems in Kenya. This increased awareness of the importance and threats to mangroves led to the creation of the National Mangrove Ecosystem Management Plan (2017-2027). The plan aims to encourage sustainable resource management and foster stakeholder involvement and collaboration by emphasizing strategies that maintain ecosystem health.

Effective restoration leads to the creation of large, diverse, functional, and self-sustaining mangrove forests that provide significant benefits for both nature and people. By reinstating the necessary biophysical and socio-economic conditions and applying Ecological Mangrove Restoration principles, nature can take over.

To effectively manage the natural resources, there is a need to come up with restoration interventions such as promoting and upscaling IGAs, restoration of the degraded sites, and capacity building of the local communities living adjacent to the fragile ecosystems. This Plan has elaborated some of the key restoration interventions with consideration of the principles for successful mangrove restoration, which include but are not limited to; ensuring biophysical conditions are appropriate for mangrove recovery and socio-economic conditions considerations to allow mangrove recovery.

4.2 Restoration Programs

To achieve the objective of this restoration plan, the program actions in the tables below are to be undertaken;

1. Awareness and sensitization
2. Protection of mangrove areas
3. Reafforestation of degraded areas
4. Livelihood and socio- economics
5. Research and education

4.3 Site Recommendations

A total of 276.5 ha was identified to be ideal for restoration. Due to the low-moderate degradation levels, protection for natural regeneration was observed to be the most needed restoration approach. This was followed by enrichment planting for some of the sites and lastly assisted planting, for some of the areas that demonstrated extensive degradation. The selected sites had a composition of *Rhizophora Mucronata*, *Avicennia*

marina, *Sonneratia alba*, *Ceriops tagal* and *Bruguiera gymnorhiza*. Below are the sites, including their total area, level of degradation, species and site recommendations;

Table 6: Site recommendations

No	Village	Site	Species Observed	Ongoing initiatives	Recommendations	Area(Ha)
1	Uyombo	P12	<i>Rhizophora mucronata</i> , <i>avicennia marina</i>		Natural Regeneration	
2	Uyombo	P12b	<i>Ceriops tagal</i>		Natural Regeneration	29.2
3	Matsangoni	P81	<i>Avicennia marina</i>	Planting by CFA, Cobec 2019	Enrichment Planting	0.3
4	Matsangoni	P8	<i>Avicennia marina</i> , <i>Ceriops tagal</i>		Protection for NR	
5	Matsangoni	P5	<i>Ceriops tagal</i>		Protection for NR	
6	Matsangoni	P6	<i>Avicennia marina</i>	Planted by Cobec	Enrichment Planting	12.7
7	Matsangoni	P61	<i>Avicennia marina</i> ,	None, near point P6, planted by Cobec	Enrichment Planting	12.6
8	Matsangoni	P7	<i>Rhizophora mucronata</i> , <i>Ceriops tagal</i> , <i>Bruguiera gymnorhiza</i>		Enrichment Planting	0.1
9	Matsangoni	P4	<i>Avicennia marina</i>		Enrichment Planting	18.4
10	Uyombo	C7	<i>Ceriops tagal</i>		Enrichment Planting	4
11	Uyombo	C7-1	<i>Avicennia marina</i> ,	Cobec planted a small area	Assisted Regeneration	1.8
12	Matsangoni	Chambuko (ziwani) P1	<i>Avicennia marina</i> ,	None	Natural Regeneration	4.9

13	Matsangoni	Chambuko (ziwani) P2	Avicennia marina,		Natural Regeneration	3.6
14	Matsangoni	P3	Avicennia marina,	None	Natural Regeneration	
15	Sabasaba	C16	Ceriops tagal, rhizophora mucronata		Natural Regeneration	37.7
16	Sabasaba	P16	Ceriops tagal, Avicennia marina,		Natural Regeneration	
17	Sabasaba	P15	Ceriops tagal		Natural Regeneration	
18	Kadaina	P14-1	Ceriops tagal		Natural Regeneration	70.9
19	Magangani	P24	Avicennia marina, Ceriops tagal		Enrichment Planting	0.5
20	Magangani	P25	Ceriops tagal		Protection for NR	
21	Magangani	P25b	Avicennia marina, Ceriops tagal		Enrichment Planting	0.1
22	Kirepwe	C5-1	Sonerratia alba	Rotary club of Kenya Malindi branch and community planting at the landward periphery	Natural Regeneration	
23	Sita	C2-1	Avicennia marina		Natural Regeneration	10.6
24	Dabaso	C1-1	Rhizophora mucronata		Assisted Planting	0
25	Uyombo	C7	Avicennia marina, Ceriops tagal		Assisted Planting	6.4
26	Uyombo	C9	Bruguiera gymnorrhiza	Ongoing planting by Uyombo BMU	Assisted Planting	1.3

27	Uyombo	C8	Rhizophora mucronata, Sonerratia alba	currently no initiative	Assisted Planting	0.2
28	Kadaina	P14 A	Rhizophora mucronata		Assisted Planting	0.1
29	Kadaina	C11	Avicennia marina	None	Assisted Planting	2.5
30	Kadaina	C10	Avicennia marina	None	Natural Regeneration	53.5

4.4 Restoration programs for the ecosystem

Sokoke CFA

Table 6: Sokoke Interventions programs for mangrove forest restoration in Sokoke management area

Actions	Unit	5 year Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
Awareness and Sensitization Program										
Capacity building meetings on laws and regulations for effective management of natural resources	No.	20	Reports, Minutes Attendance lists Dated photographs	4	4	4	4	4	KFS , CFA, CGK WWF-Kenya, Eden, KEFRI , COBEC, KMFRI, KWS	3
Conduct Barazas on sustainable management of mangroves.	No.	20	Reports, Minutes Attendance lists Posters Fliers Ict materials	4	4	4	4	4	KFS , CFA, CGK, WWF-Kenya, Eden, KEFRI ,	3

Actions	Unit	5 year Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
			Dated photographs						KMFRI, KWS, COBEC	
Trainings on Community Based Mangrove Restoration	No.	5	Reports, Minutes Attendance lists Dated photographs	1	1	1	1	1	KFS , CFA, CGK, WWF-Kenya, Eden, KEFRI , KMFRI, KWS, COBEC	7
Protection of Mangrove Areas										
Mapping of areas requiring interventions	Ha	225.5	Mapping reports Dated photographs Maps	22 5.5					KFS , CFA, CGK, WWF-Kenya, Eden, KEFRI , KMFRI, KWS, COBEC CGK	2.5
Conduct forest patrols	No.	240	Patrol and incident reports Dated photographs	48	48	48	48	48	KFS , KWS, CFA, CGK, COBEC CGK	20
Conduct forest health monitoring using plot-based surveys (PSPs)	No.	5	Annual Field reports Dated photographs Permanent Sample Plots	1	1	1	1	1	KEFRI, KMFRI, KFS, CFA, WWF-Kenya, Eden,	3

Actions	Unit	5 year Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
									CGK	
Aerial Surveys	No.	10	Patrol and incident reports Dated photographs	2	2	2	2	2	KFS , KWS,NGA O,CFA, COBEC, CGK	5
Biomonitoring and Forest field data collection	No	7	Field reports Dated photographs	4	1	1	1		KEFRI, KMFRI, KFS, CFA, CGK	5
Reafforestation of degraded areas										
Seedling production	No.	500,000	Nursery reports Dated photographs	100,000	100,000	100000	100000	100,000	KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya, COBEC	25
Undertake mangrove seedlings planting	Ha	49.9	Field reports Dated photographs	9.98	9.98	9.98	9.98	9.98	KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya, Eden	20
Planted Seedlings maintenance			Monitoring reports Dated photographs	50000	50000	50000	50000	50000	KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya	25
Hydrological Modifications in Kadzifitseni	Km	1.5	Field reports Dated photographs	1.5					KEFRI, KMFRI, KFS, CFA, WWF-	2

Actions	Unit	5 year Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
and Chambuko									Kenya, Eden, CGK	
Construct Barriers / community fencing and protection for natural regeneration	Km	2	Field reports Dated photographs	1.3	1.3	1.3	1.3	1.3	KEFRI, KMFRI, KFS, CFA, WWF-Kenya, Eden, CGK	5.5
Livelihood and Social economics program										
Establishment of model mangrove tree nurseries per CFA nursery)	No	1	Model nursery	1					CFA, KFS, KEFRI, CGK, WWF-Kenya, Eden	0.5
Promote and up scaling IGAs etc	No	4	Reports Dated photographs	1	1	1	1		CFA, KFS, KEFRI, CGK, WWF-Kenya, Eden.	2
Integrated Mariculture(kadaina 2 sites, uyombo bandarini, kadzifitseni, jiwe jeupe	No of Sites 5	Ponds Crab Cages 500 Fish Cages	Reports Dated photographs	1	1	1	1	1	KFS KWETU CGK KMFRI NEMA KFRI	20
Marine litter management (old harbor, new harbor of Uyombo and	No	120 Clean ups 10, segrega	Reports Dated photographs	24	24	24	24	24	KCG, KWS, KFS, IUCN, KEFRI, KMFRI, KMA, KW	15

Gede CFA**Table 7: Interventions programs for mangrove forest restoration in GACOFA management area**

Actions	Unit	5 years Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
Awareness and Sensitization Program										
Capacity building meetings on laws and regulations for effective management of natural resources	No.	20	Reports, Minutes Attendance lists Dated photographs	4	4	4	4	4	KFS , CFA, CGK WWF-Kenya, Eden, KEFRI , COBEC, KMFRI, KWS	3
Conduct Barazas on sustainable management of mangroves.	No.	20	Reports, Minutes Attendance lists Dated photographs	4	4	4	4	4	KFS , CFA, CGK, WWF-Kenya, Eden, KEFRI , KMFRI, KWS, COBEC	3
Trainings on Community Based Mangrove Restoration	No.	5	Reports, Minutes Attendance lists Dated photographs	1	1	1	1	1	KFS , CFA, CGK, WWF-Kenya, Eden, KEFRI , KMFRI, KWS, COBEC	7
Protection of Mangrove Areas										
Mapping of areas	Ha	50.5	Mapping reports	50.5					KFS , CFA,	5

Actions	Unit	5 years Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
requiring interventions			Dated photographs Maps						CGK, WWF-Kenya, Eden, KEFRI , KMFRI, KWS, COBEC CGK	
Conduct forest patrols	No.	480	Patrol and incident reports Dated photographs	96	96	96	96	96	KFS , KWS,CFA, CGK, COBEC CGK	25
Conduct forest health monitoring using plot based surveys (PSPs)	No.	5	Annual Field reports Dated photographs Permanent Sample Plots	1	1	1	1	1	KEFRI, KMFRI, KFS, CFA, WWF-Kenya, Eden, CGK	5
Aerial Surveys	No.	10	Patrol and incident reports Dated photographs	2	2	2	2	2	KFS , KWS,NGA O,CFA,CO BEC, CGK	5
Biomonitoring and Forest field data collection	No	7	Field reports Dated photographs	4	1	1	1		KEFRI, KMFRI, KFS, CFA, CGK	5
Reafforestation of degraded areas										
Seedling production	No.	110,000	Nursery reports Dated photographs	22000	22000	22000	22000	22000	KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya, COBEC	6

Actions	Unit	5 years Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
Undertake mangrove seedlings planting	Ha	11	Field reports Dated photographs	6	5				KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya, Eden	3
Monitoring of Planted Seedlings	quarterly	20	Monitoring reports Dated photographs	4	4	4	4	4	KEFRI, KMFRI, KFS, CGK, CFA, WWF-Kenya	3
Hydrological Modifications in Magangani, eco camp and Mida boardwalk.	Km	3	Field reports Dated photographs	1	1	1			KEFRI, KMFRI, KFS, CFA, WWF-Kenya, Eden, CGK	3
Construct Barriers / community fencing and protection for natural regeneration, Mida Maweni, Magangani, Ngala girls and Mida boardwalk area	Km	5.03	Field reports Dated photographs	1.03	1	1	1	1	KEFRI, KMFRI, KFS, CFA, WWF-Kenya, Eden, CGK	8
Livelihood and Social economics program										
Establishment of model mangrove tree nurseries	No	1	Model nursery	1					CFA, KFS, KEFRI, CGK, WWF-Kenya	0.5

Actions	Unit	5 years Target	Means of verification	Annual Target					Lead Agency	Budget (Kshs) Million
				1	2	3	4	5		
per CFA nursery)										
Promote and up scaling IGAs etc	No	4	Reports Dated photographs	1	1	1	1		CFA, KFS, KEFRI, CGK, WWF-Kenya, Eden.	2
Integrated Mariculture(Turtle bay 2, Dabaso, Magangani two sites and sabasaba kwa ibrahim	No of Sites	6 sites (Ponds Crab Cages Fish Cages)	Reports Dated photographs	2	1	2	1		KFS KWETU CGK KMFRI NEMA KFRI CFA	20
Marine litter management (Sita, dongo kundu, Ngala girls, Crab shark, Magangani, Mayonda and kisiwani.	No	3360 Clean ups 10, segregation bins 1 MRF	Reports Dated photographs	672	672	672	672	672	KCG, KWS, KFS, IUCN, KEFRI, KMFRI, KMA, KWETU, COBEC	15
Enhance Ecotourism, Sita sunset, prawn lake, caterpillar, crab shac, scope, MCCAG, Dhowhouse Mida,	No 7	restaurants and boardwalks	Reports Dated photographs		2	2	2	1		10
Establishment of Apiculture at magangani,	No	600-beehives Honey process-	Reports	120	120	120	120	120	Kwetu, KCG, COBEC	10

CHAPTER FIVE:**PLAN IMPLEMENTATION****5.1 Stakeholder Analysis**

Stakeholders are key in the management and utilization of mangrove resources in the Mida Forest Block Forest. They include; community groups, government institutions, non-government institutions, research and academic institutions. Identification, coordination, and collaboration between stakeholders will support effective decision-making, resource mobilization and capacity building of the community forest associations to undertake restoration activities. Key stakeholders involved in the restoration of mangroves in the Mida Creek are as identified in the table below.

Table 8: Stakeholder analysis

Stakeholders	Category	Roles and responsibilities
Ministry of Environment Climate Change and Forestry	Policy makers and Implementers	Provide policy direction and resources. Effective protection, development, management and conservation of forests and allied resources.
Community Forest Associations (Gede and Sokoke)	Beneficiaries	Coordination among user groups Forest protection through community scouting Resource mobilization Sensitization and awareness Initiate and Support Forest restoration activities Operate and manage IGAs
Beach management Units (BMUs)	Beneficiaries	Forest protection through community scouting Resource mobilization Sensitization and awareness Initiate and Support Forest restoration activities Operate and manage IGAs
County and National assemblies	Policy makers	Policy formulation Resource mobilization Awareness and sensitization

National government Administration Officers	Implementers	Maintenance of law and order Mobilization and sensitization Resource use conflict resolution and management
Kenya Forest Service	Implementers	Forest management and protection Policy formulation and implementation Enforcement of Forest Management and Conservation Act 2016 Awareness and sensitization Resources mobilization Financing forest operations Provide timely service
Kenya Wildlife Service	Implementers	Enforcement of Wildlife conservation and management Act 2013 Human-wildlife conflict resolution Awareness and sensitization
County government of Kilifi (departments of environment, fisheries, livestock, natural resources, energy, lands)	Implementers	Forest extension services Resources mobilization Policy formulation and implementation Awareness and sensitization Environment conservation and protection Promotion of sustainable natural resource use Resource use conflict resolution
Kenya Forestry Research Institute	Implementers	Forestry (Terrestrial and mangroves) and allied natural resources research Capacity building and training for sustainable development of forestry Resources mobilization
Kenya Marine and Fisheries Research Institute	Implementers	Research on mangrove restoration Resources mobilization Capacity building and training
Wildlife Research and Training institute	Implementers	Multi-disciplinary research on wildlife populations and habitat dynamics Resources mobilization

National Environment Management Authority	Implementers	Enforcement of Environment Management and Coordination Act 1999 Awareness and sensitization Resources mobilization
Universities and Academia	Partners/ collaborators	Support research on mangrove ecosystem dynamics Resources mobilization Capacity building and training
Civil societies and Organisations, NGOs Organisations NGOs and Private Sectors	Partners/ collaborators	Awareness and sensitization Resource mobilization Support mangrove ecosystem conservation, restoration and protection Support capacity building and training
Media	Partners	Provide publicity. Creation of awareness on Forest Conservation and Management.
Other Conservation Players within Mida Creek	Partners	awareness and sensitization Resource mobilization Support mangrove ecosystem conservation, restoration and protection Support capacity building and training

5.2 Resource mobilization

Resource mobilization is an approach that involves strategic planning, sourcing, directing, and managing resources efficiently to support the realization of predetermined goals. Restoration aims to benefit both social and ecological functions of an ecosystem. However, the process can become resource intensive and pose a great challenge to the implementation of the restoration plans.

5.2.1 Need for Resource Mobilization

Resource mobilization stands at the core of the plan's success, underpinning the ability to turn visions into reality. Its significance can be seen across several dimensions:

- *Sustainability and Growth:* Securing diverse resources can help in the implementation of the plan hence ensure long-term sustainability and foster growth, adapting to changing environments and scaling up the plan interventions effectively.

- *Enhanced Impact*: Strategic mobilization allows for the optimal use of resources, maximizing the impact of projects and initiatives on the target communities or sectors.
- *Stakeholder Engagement*: It involves engaging with various stakeholders, including donors, volunteers, and the community, fostering a sense of ownership and partnership towards the common goals.
- *Capacity Building*: Mobilising resources contributes to building the capacities of organizations and communities, enhancing their resilience and self-sufficiency.
- *Innovation and Adaptability*: Access to a broader range of resources encourages innovation and allows organizations to adapt to new challenges and opportunities.

The importance of resource mobilization cannot be overstated, as it fundamentally supports the viability and effectiveness of projects and organizations, driving them towards achieving their mission and amplifying their impact.

5.2.2 Financing mechanisms and sources for the plan.

Effective implementation of the mangrove restoration plan will require substantive funds for the recurrent and the capital development expenditure. The estimated budget for implementing the Plan over the next 5 years is KES 362 million. To achieve the goals, significant investment is required. No single source of capital will be sufficient to achieve this task. There are diverse financing and market-based sources to raise these funds, among them: development cooperation resources, climate finance, CFA's contributions, County Government funds appropriated for forest conservation, management and extension, Non-Governmental Organizations (NGO's) resources, National Government budgets, environmental funds, crowd funding and private sector investments.

Optimal restoration outcomes (environmental, social and economic) are more likely to be achieved when these diverse mechanisms are applied in a coordinated approach throughout the restoration process. The development of innovative 'blended finance' mechanisms, integrating a package of financing mechanisms through a supportive enabling environment, can enable multiple issues to be addressed and the diverse needs of local actors to be met.

5.3 Monitoring evaluation and reporting framework

Monitoring and evaluation serve as a tool for assessing project achievements, success and constraints. It also provides a feedback mechanism to improve proposed activities and make adjustments wherever necessary. The process also identifies problems, their sources to help come up with strategies in addressing them for a successful implementation and continuity of the proposed activities. It shall be done mainly through the quarterly and annual reports written by the Forest Level Management Committee (FLMC) and Station Manager to the County Forest Conservator office.

Table 9: Proposed members of Restoration Plan Implementation Committee (RPIC)

No.	Institution	Position	No.	Remarks
1.	Kenya Forest Service	Secretary	2	Forest Station Manager
2.	CFA	Chairpersons,	2	CFA Executive
	Kenya Wildlife Service	Warden	1	Warden
3.	Beach Management Unit	Chairman	1	Area chairman
4.	NGAO	Deputy County Commissioner	1	Area Chief or ACC
5.	County Government	Directors – Environment and Fisheries	2	County Officers
6.	Kenya Forestry Research Institute	Regional Director	1	Regional Director or Deputy Regional Director
7.	Strategic partner	WWF/COBEC/Eden Reforestation	1	Project Officers
9.	Co-opted member	As need arises		Available as need arises with no voting powers
Total			11	

5.4 Monitoring and Evaluation Plan/Matrix

Monitoring program is vital for assessing biodiversity gain through a comparative assessment of non-degraded areas against the rehabilitated sites as well as tracking implementation of plan activities.

Objective	Indicators success	Sources and means of verification	Responsible Agencies
Intervention 1: Implement education and awareness programs to foster understanding and appreciation of Mangrove forests for their role in ecosystem integrity and climate change mitigation.			
Hold community sensitization forums on importance of mangrove resources in mida creek.	*Enhanced understanding and appreciation of mangrove ecosystems by the local communities. *Enhanced participation of communities in mangrove conservation Activities.	Reports, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO, NK, COBEC EDEN,CGK,WRTI WWF, CFA
Intervention 2: Restore degraded mangrove forest areas.			
Delineate areas for natural regeneration	*Increased natural regeneration. *Increased biodiversity Reduced levels of degradation.	Reports, Photos and Maps	KFS,KEFRI,KWS, ASFADA, UNESCO, NK, COBEC EDEN,CGK,WRTI WWF,CFA

Training of the community nursery establishment and management	*Enhanced knowledge and skills on mangrove tree nursery establishment and management	Report, Photos	KFS,KEFRI, ASFADA, NK, COBEC, Eden, KWETU EDEN,CGK,WWF,CF A
Undertake mangrove trees nursery establishment in Mida creek	*Increased quality seedling availability *Degraded areas effectively re-vegetated	Reports, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC EDEN,CGK,WRTI WWF,CFA, KWETU
Undertake planting activities in the identified degraded mangrove areas	*Increased the number of hectares of mangrove rehabilitated *Decrease number of hectares of degraded areas	Report, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC EDEN,CGK,WRTI WWF,CFA, KWETU
Intervention 3: Enhance policing and protection measures to prevent illegal activities that harm mangrove ecosystems.			
Recruitment and training of community scouts to promote surveillance	*Number of scouts recruited and trained to enhanced surveillance in Mida forest Enhanced surveillance	Report, Photos,	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC EDEN,CGK,WRTI WWF,CFA, KWETU

Intervention 4: Provide alternative livelihoods for communities living near mangrove ecosystems, such as ecotourism ventures, integrated mariculture, and apiculture			
Establish IGAs such as; Integrated Mari-culture, Apiculture , beekeeping .Ecotourism ventures i.e. construction eco-friendly enterprises, canoe rides, bird watching sites, cultural activities	<p>*Increased the number of IGAs established Improved livelihoods</p> <p>*Creation of job opportunities</p> <p>*Increased number of ecotourism infrastructure developed</p>	Report, Photos	<p>KFS, KEFRI, KWS, ASFADA, UNESCO, NK, COBEC</p> <p>EDEN, CGK, WRTI</p> <p>WWF, CFA, KWETU</p>
Intervention 5: Initiate research programs to study the fauna and flora of mangrove ecosystems			
Undertake research on stocking levels, density and growth dynamics of mangroves.	*Increased the stocking information on the status of mangrove ecosystems	Reports, photos	<p>KFS, KEFRI, KWS, ASFADA, UNESCO, NK, COBEC</p> <p>EDEN, CGK, WRTI</p> <p>WWF, CFA, KWETU</p>

Undertake an assessment on the effect of sea water intrusion on mangrove zonation and abundance	*Increased knowledge on the effects of sea water on mangrove ecosystems *Distribution of mangroves across different zonations.	Reports, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC EDEN,CGK,WRTI WWF,CFA, KWETU
Develop technical Research orders for mangrove Research	*Enhanced knowledge on technical issues related to mangrove management	Report, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC EDEN,CGK,WRTI WWF,CFA, KWETU
Intervention 6: Promote sustainable fishing practices to ensure the long-term health of mangrove-associated fisheries			
Trainings and purchase of recommended sustainable fishing gears	*Increased use of legal fishing gears. *Increased fish stocks	Reports, Photos	KFS,KEFRI,KWS, ASFADA, UNESCO,NK, COBEC, KeFS ,Bahari Hai EDEN,CGK,WRTI WWF,CFA, KWETU

