LAMU
SOUTHERN SWAMP FOREST BLOCK ECOSYSTEM RESTORATION PLAN (2024-2029)

KENYA
Forest Service

LAMU MANGROVE
COMMUNITY FOREST ASSOCIATION

MKUNUMBI COMMUNITY FOREST ASSOCIATION
Jamii na Misitu

LAMU SOUTHERN MANGROVE SWAMP RESTORATION PLAN
(2024 - 2029)

James M Mburu

Regional Forest Conservator

Coast Conservancy

KENYA FOREST SERVICE

Date: 30th October, 2024

Approval Page

Lamu Southern mangrove swamp 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 Lamu Mangrove Community Forest Association (LAMACOFA) and Mkunumbi Community Forest Association (MKUCOFA)

Foreword

WWF-Kenya

The Lamu Southern Swamp mangrove ecosystems represent one of Kenya's most valuable coastal forests. Rich in biodiversity, these ecosystems support a remarkable array of marine species and hold significant ecological importance. They also serve as a prominent tourist attraction, contributing to the economic prosperity of the local community and residents of Lamu County. However, these precious ecosystems face mounting threats, driven by population growth and the increasing reliance on natural resources such as fuelwood, construction materials, and agricultural expansion. This has led to accelerated degradation of natural resources, particularly mangroves, in recent years.

In response, the Mangrove Restoration Plan for the Lamu Southern Swamp mangrove ecosystem has been developed as a strategic framework aimed at restoring critical ecological components and processes. This collaborative effort is designed to restore and conserve mangrove ecosystems for the benefit of both the environment and the people of Lamu.

This plan has been made possible with the support of WWF-Kenya through the Triple Benefit Project-Land to Sea (TBP-L2S), funded by Danida. The project envisions a healthy natural environment that supports human well-being, strengthens climate resilience, and fosters thriving biodiversity across the Coastal Kenya Landscape (CKL). Central to the TBP-L2S's mission is empowering communities to protect, restore, and sustainably manage coastal ecosystems in CKL while deriving sustainable livelihoods from them.

Collaboration in the development of this Mangrove Restoration Plan involved key stakeholders, including the Wetlands International,Kenya Forest Service (KFS), the County Government of Lamu, KEFRI, KWS, KMFRI, Mkunumbi and Lamu Community Forest Associations (CFA), and Eden People + Planet. This plan is intended to promote sustainable restoration practices and improve the coordination of mangrove restoration work in the Lamu Southern Swamp. Ultimately, the Mangrove Restoration Plan will serve as a comprehensive guide for the sustainable development and restoration of mangrove ecosystems and associated resources, contributing to socio-economic growth.

We call upon all stakeholders to support the Kenya Forest Service (KFS) and the forest-adjacent communities in implementing this plan. Together, we can address the critical environmental and livelihood challenges facing Lamu while contributing to the broader national development goals.

Dr. Asma Awadh
Programme Manager,
Coastal Kenya Landscape,
World Wide Fund for Nature (WWF)-Kenya

Wetlands International

Mangrove ecosystems are vital to the health of coastal regions, offering crucial services such as shoreline stabilisation, carbon storage, and biodiversity conservation. They act as natural barriers against coastal erosion and storm surges, while also serving as breeding grounds for fish and other marine life, directly supporting the livelihoods of coastal communities. However, due to increasing human pressure and environmental changes, these ecosystems are under threat, highlighting the urgent need for restoration and protection.

In the Lamu Southern Swamps, the value of mangroves cannot be overstated. The local communities have long relied on these ecosystems for sustainable livelihoods, such as fishing and eco-tourism. Wetlands International is proud to support the ongoing efforts to restore degraded mangrove areas in this region. Correct restoration, particularly through scientifically-backed methods like the Community-Based Ecological Mangrove Restoration (CBEMR) approach, ensures that these efforts are effective and long-lasting. This approach not only revives the health of the mangroves but also improves the socio-economic resilience of the communities that depend on them.

We are particularly encouraged by the collaborative spirit demonstrated by the Lamu Southern Swamps community and stakeholders. This restoration plan represents a critical step forward, bringing together local expertise, conservation organisations, and government bodies to ensure the success of the activity. Together, we can safeguard the future of these essential ecosystems, ensuring that they continue to provide their invaluable services for generations to come.

Julie Mulonga,
Director,
Wetlands International East Africa

Executive Summary

The development of the Lamu Southern Swamp Restoration Plan (2024-2029), was initiated by WWF-Kenya in close collaboration with Kenya Forest Service, Kenya Forestry Research Institute (KEFRI), Wetlands International, Eden People+Planet, KWS, County Government of Lamu, LAMACOFA and MKUCOFA.

Lamu Southern Swamp is part of the larger Lamu mangrove ecosystem, covering an estimated area of 5,200 ha. It is one of the five key mangrove geographical zones (swamps) of the entire Lamu mangrove ecosystem, identified by the then forest department in the 1980s, now the Kenya Forest Service (KFS). The mangroves block of Lamu Southern Swamp form part of the Lamu County's mangrove ecosystem, which comprises a total of five blocks, namely: Northern Swamps, Pate Island Swamps, Northern Central Swamps, Lamu Southern Swamps and Mongoni and Dodori Swamps. The management of these forest blocks is a collaborative endeavour involving the Kenya Forest Service, Community Forest Associations (CFAs), and various partnering organisations.

The forest is threatened by illegal harvesting of forest products, increased pressure from the high population of the forest adjacent communities, inadequate enforcement of forest rules and regulations, inadequate community participation in forest conservation and management. This plan has outlined elaborate measures for addressing these threats for enhanced forest conservation and livelihood improvement. The plan has proposed Four programmes includes;

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

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

Acknowledgments

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, County Government of Lamu, CSOs, NGOs (WWF- KENYA, Wetlands International, Eden People +Planet) and the local community through Lamu and Mkunumbi Community Forest Associations

KENYA Forest Service	We thank our key partners, the Kenya Forest service led by Mr. James M Mburu, the Regional Forest Conservator, Coast Region for his technical and professional guidance during the preparation of the Lamu Southern Swamp Restoration Plan. The coordination of Mr. Samuel Lodiro, the County Forest Conservator and that of Mr. Mwachupa Tsango, the Assistant Forest Station Manager, Lamu Forest Station and Madam Patricia Maina, the Sub County Forest officer Lamu greatly contributed to the successful completion of this plan.
FOR PEOPLE AND PROGRESS LAMU COUNTY	We express our deepest appreciation to the County Government of Lamu – Department of Environment for their crucial role in the development of the Restoration Plan for the Lamu Southern Swamp Block ecosystem. We are particularly grateful to Mr. Mohamed Rashid Dirie, Chief Officer Environment, whose visionary leadership and strategic direction were pivotal to this initiative. Our sincere thanks also go to Mr. Mohamed A. Mohamed, Director Climate Change, for his leadership and strategic oversight. We further acknowledge Mr. Mohamed Abubakar, County Environment Officer, for his practical input and unwavering commitment, which significantly contributed to the successful development of this plan.

WWF KENYA TOGETHER FOR NATURE	WWF Kenya was very instrumental towards the plan development process since inception with spearheading the mapping of degraded areas in Lamu Southern Swamp, stakeholder mobilisation, financial, logistical and technical support. Our special thanks to Rahma Kivugo (Marine Project Officer), Nickson Kirimo (Project Assistant), Bahati Dzengo (Project Assistant), the GIS and M&E teams, for their tireless efforts in the mapping, coordinating and expert contributions during the Lamu Southern Swamp Restoration plan development Process.
Wetlands INTERNATIONAL	We extend our deepest gratitude to Wetlands International for their generous and invaluable technical and financial contribution to the development of this restoration plan. Special thanks to Shawlet Cherono (Senior Project Officer), Abdul Hazeez (Project Assistant), and Edmond Kuto (Regional GIS Officer) for their unwavering dedication towards the vision to restore and protect the mangrove ecosystem in Lamu Southern Swamps.
KENYA WILDLIFE SERVICE	We extend our gratitude to Kenya wildlife service for your participation and support in preparing the restoration plan. Special thanks to KWS team led by Assistant director Lamu Mr. Ahmed Ibrahim, warden Mpeketoni Mr. Ngetich Hillary for their collaboration and invaluable contribution during plan development.
KENYA FORESTRY RESEARCH INSTITUTE KEFRI	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 Lamu team led by Henry M. Komu (Assistant Regional Director), Emmanuel Karisa and Simeon Mwadiga (Research Scientists) for their collaboration and technical support.

KMFRI Kenya Marine and Fisheries Research Institute	We are grateful to Kenya Marine and Fisheries Research Institute (KMFRI) led by Dr. Judith Okello for participating and providing technical support in the process of preparation of the restoration plan.
Eden: People+ Planet	We recognize the importance of stakeholders contributions towards conservation of mangroves ecosystems within Lamu County. Eden People +Planet express our sincere gratitude to Mr. Henry Kilingo (Forest superintendent) for his invaluable contributions during the plan development.
LAMU MANGROVE COMMUNITY FOREST ASSOCIATION MKUNUMBI COMMUNITY FOREST ASSOCIATION Jamii na Misitu	LAMACOFA and MKUCOFA greatly acknowledge the immense support from different partners in making the development of this Lamu Southern Swamp Restoration Plan a success. Special thanks to Lali Abdulrahman Aboud from LAMACOFA, Farid Shee and Rassam Mansur from MKUCOFA for their collaboration and actively participating in identification of Degraded Sites, Restoration Interventions and Plan Implementation

ACRONYMS and Abbreviations

BETA - Bottom Up Economic Transformation Agenda

BMU - Beach Management Unit

CBD - Convention on Biological Diversity

CBEMR - Community Based Ecological Mangrove Restoration

CCCAP - County Climate Change Action Plan

CFA - Community Forest Association

CFC - County Forest Conservator

CIDP - County Integrated Development Plan

CGL - County Government of Lamu

CMMC - County Mangrove Management Committee

CSOs - Civil Society Organizations

FOLAREP - Forest and Landscape Restoration Plan

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

LAMACOFA - Lamu Mangrove Community Forest Association

LAPSSET - Lamu Port South-Sudan Ethiopia Transport

LMMC - Lamu Mangrove Management Committee

LSS - Lamu Southern Swamps

MKUCOFA - Mkunumbi Community Forest Association

NBSAPs - National Biodiversity Strategies and Action Plans

NDCs - Nationally Determined Contributions

NGO - Non-Governmental Organisations

NGAO - National Government Administration Officer

NMEMP - National Mangrove Ecosystem Management Plan

NMMC - National Mangrove Management Committee

SWOT - Strength Weakness Opportunities and Threats

TNC - The Nature Conservancy

UNFCCC - United Nations Framework Convention on Climate Change

WI - Wetlands International

WIO - Western Indian Ocean

WWF - Worldwide Fund for Nature Kenya

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CHAPTER ONE: INTRODUCTION

1.1 Background

Mangrove ecosystems provide extensive goods and services that sustain life. They not only support biodiversity but also regulate climate and contribute to the livelihoods of coastal communities through fisheries, tourism, and wood products. Mangroves of Kenya, for instance, contribute significantly to the country's economy. About 70% of the country's fishery is supported by mangroves (GoK., 2017).

According to the State of Mangroves in the Western Indian Ocean Report 2022, there was a consistent decline in the Country's mangrove extent, amounting to a net loss of 1,139 Ha between 1996 and 2016. However, in the past decade, global, National, and local mangrove actors have been working towards conserving and managing mangroves. These efforts have given the mangroves some breathing room, as evidenced by the notable increase in mangrove extent. There has been an increase of about 578 Ha mangrove cover between 2016 and 2020 along the Kenyan coast[1]. One approach widely used to bring back forest cover is the restoration of degraded mangrove areas.

Despite the well-documented benefits of mangroves, they are still under immense pressure from population growth and development. Lamu accounts for about 61% of the 61,000 Ha of the Kenyan mangrove total cover (GoK., 2017). During the early 1900s, Lamu mangroves were immensely exploited and exported to treeless Arab countries. Currently, despite the existence of legal authorization for mangrove harvesting in Lamu, illegal harvesting for mainly house construction along the coast continues to degrade the mangrove ecosystem.

Lamu Southern Swamp is part of the larger Lamu mangrove ecosystem, covering an estimated area of 5,200 Ha. It is one of the five key mangrove geographical zones (swamps) of the entire Lamu mangrove ecosystem, identified by the then forest department in the 1980s, now the Kenya Forest Service (KFS). The mangroves block of Lamu Southern Swamp form part of the Lamu County's mangrove ecosystem, which comprises a total of five blocks, namely: Northern Swamps, Pate Island Swamps, Northern Central Swamps, Lamu Southern Swamps and Mongoni and Dodori Swamps. The management of these forest blocks is a collaborative endeavour

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involving the Kenya Forest Service, Community Forest Associations (CFAs), and various partnering organisations.

This specific region includes the mangroves of Mkunumbi and Kimbo Creeks. A multi-sectoral mapping exercise led by Kenya Forest Service and supported by WWF-Kenya and Wetlands International in partnership with KEFRI, County Government of Lamu, Lamu and Mkunumbi CFAs conducted in Lamu Southern Swamp in 2022, 2023, and 2024 established that approximately 164.84 Ha is degraded. Restoration of the degraded areas has been ongoing in the absence of a restoration plan. This plan will focus on the coordination of restoration activities.

1.2 Justification and Rationale for the Plan

Developing a mangrove restoration plan for Lamu Southern Swamp is crucial due to its ecological and socio-economic significance. This area hosts about 14% of Lamu's mangroves, vital for biodiversity, fisheries, shoreline protection, and carbon sequestration. Local communities depend on these resources for their livelihoods. However, human activities like illegal logging and natural events such as the 1997/8 El Nino have degraded the mangroves, creating a need for restoration.

Current restoration efforts are fragmented, leading to inefficiencies and conflicting outcomes. This plan will unify these efforts, ensuring efficient resource use, sharing best practices, standardising methods, and enabling comprehensive monitoring. Such a plan would also attract funding and support by demonstrating a collective commitment to environmental sustainability.

1.3 Objectives of the Plan

Overall Goal

- A thriving mangrove ecosystem in Lamu Southern Swamp that supports local communities, biodiversity, and climate change resilience.

Specific Objectives

- To restore and conserve diverse, resilient mangrove ecosystems that provide vital ecological services, support sustainable livelihoods, and enhance coastal resilience, through community engagement, scientific innovation, and strong policy frameworks.

1.4 Approach to Plan Development

The development of this plan adopted a participatory approach, incorporating and building on information from satellite image analysis, local knowledge, ground truthing and restoration experiences undertaken in the area.

Mapping exercises of degraded areas in the LSS were conducted on two separate occasions; 26 June 2022 - 2 July 2022 and from 25 - 28 April 2023 involving relevant stakeholders. These include Kenya Forest Service (KFS), Kenya Forestry Research Institute (KEFRI), County Government of Lamu – Department of Environment, Wetlands International, WWF-Kenya, and the CFA. The data on the geospatial and degradation information acquired during the ground validation exercise was processed to produce detailed maps, degradation status and recommendation reports for restoration of degraded areas of the Southern Mangroves Swamps of Lamu during a write-up workshop held on 2 - 5 May, 2023.

Development of the zero draft for the LSS restoration plan was done in a write shop that was held in Mpeketoni, Lamu County between 20 - 22 May 2024. This exercise drew participation from Kenya Forest Service (KFS), Kenya Forestry Research Institute (KEFRI), Kenya Wildlife Service (KWS), Wetlands International, WWF-Kenya, Lamu Mangrove Community Forest Association and Mkunumbi Community Forest Association. Information gaps identified in the zero draft were identified and a second write shop was organised from 25 – 27 June 2024 in Mpeketoni to get information to fill the gaps. The prescription for LSS restoration intervention objectives and activities was done during the write shop.

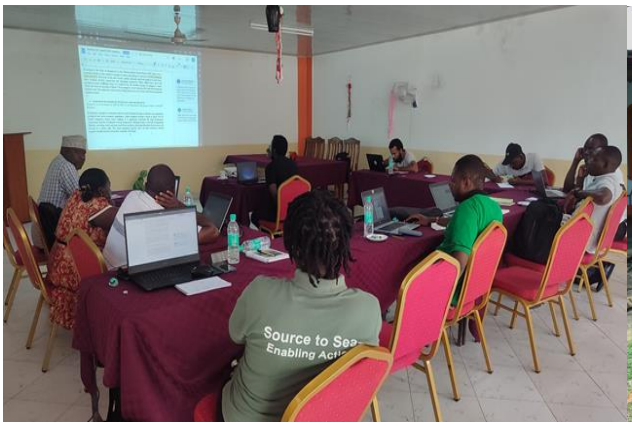


Plate 1: First Writeshop

Plate 2: Second Writeshop

The validation workshop of the Lamu Southern Mangrove Swamps 2024 – 2029 was held on 5th September, 2024 at Mpeketoni, Lamu County involving relevant stakeholders.

Plate 3: Validation workshop

Title and duration of the plan

The plan shall be referred to as "Lamu Southern Swamp 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 Lamu Southern Swamp Mangrove Ecosystem Restoration Plan aligns with 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 Lamu Southern Swamp 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 Lamu Southern Swamp Forest Block Ecosystem 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 utilisation 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 Lamu Southern Swamp.
- 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 Lamu southern swamp 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;

- **Lamu County Integrated Development Plan (CIDP) 2023–2027** - The County Government Act, 2012, Section 104, obligated counties to develop County Integrated

Development Plans (CIDPs) and set up planning units in all county administrative levels. The Lamu CIDP for the planning period 2023 – 2027 represents the views, aspirations, priorities, and needs of the Lamu County community. In it, mangroves are recognized as an important natural resource in the county. Under environmental conservation, planting of mangroves is a key focal area aimed at boosting forest cover and rehabilitation of the degraded mangroves ecosystems, with special focus on mangrove conservation and protection while enhancing community involvement in conservation efforts.

- **Lamu County Spatial Plan 2016-2026** - Section 110 of the County Governments Act 2012 gives the basis for the development of County Spatial Plans that set out basic guidelines for a land use management system in Counties. In Lamu, large-scale development projects such as the Lamu Port, South Sudan and Ethiopia Transport (LAPSSET) introduce new opportunities for growth as well as threats to natural ecosystems and especially large-scale removal of mangrove forests. In cognizance of this, the Lamu County Spatial Plan (2016-2026) has developed Action points to address this threat. Some of the key actions will include the protection and conservation of mangroves as nurseries for fish, prevention of encroachment in mangrove areas, promotion of sustainable mangrove harvesting plans, and promotion of the use of mangroves forest as carbon sinks for revenue generation.

- **The Lamu County Climate Change Action Plan (CCAP) 2023–2027** is a strategic five year plan that guides the county's efforts to mitigate and adapt to climate change. It addresses the specific climate challenges faced by Lamu, such as rising sea levels, increasing temperatures, changing precipitation patterns, and the vulnerability of coastal and mangrove ecosystems. Key areas of focus include enhancing community resilience, sustainable land use, improving water resources management, disaster risk management and protecting biodiversity. The Action Plan provides a framework to prioritize the Lamu Mangrove Southern Swamp Restoration Plan as part of a broader strategy to strengthen community resilience to the impacts of climate change, reduce emissions, and promote sustainable development in Lamu.

- **The Lamu County Forest and Landscape Restoration Action Plan (LAMU-FOLAREP) 2021-2030** is a comprehensive ten years strategy aimed at restoring degraded landscapes and forests in Lamu County, including its critical mangrove ecosystems. The plan supports sustainable management, conservation, and restoration of forests and landscapes to address environmental challenges, promote biodiversity, and enhance community livelihoods. It aligns with Kenya's broader commitment to land restoration and climate change mitigation through global initiatives like the Bonn Challenge and AFR100.

CHAPTER TWO: DESCRIPTION OF LAMU SOUTHERN SWAMP MANGROVE ECOSYSTEM

2.1 Geographic Location

The Lamu mangrove forest is found in Lamu County which lies between latitudes 10 40' and 20 30' South and longitude 400 15' and 400 38' East. Lamu county forest mangroves consist of a vast mainland and 65 Islands forming the Lamu archipelago. Of these Islands, the five major ones that are inhabited include Lamu, Manda, Pate, Kiwayu, and Ndau.

Lamu has a coastline of approximately 130 km and is renowned for its rich biodiversity and unique ecosystem that combines both marine and terrestrial wildlife. Lamu archipelago is a significant world ecological and cultural heritage with 61% of Kenya's mangrove forests located here.

2.2 Legal and Administrative Status

Lamu County has a total land surface area of 6,474.7 Km^2 that includes the mainland and over 65 islands that form the Lamu Archipelago. Its total coastline length is 130 km while land water mass area stands at 308 km. Mangroves forests occur along the coastline and cover approximately 37000 Ha. The government of Kenya describes mangrove areas as all land between high water and low water marks (ordinary spring tides). The Legal Notice No. 174 of 20th May, 1964 declared mangroves a government reserve forest and The FMCA 2016/Forest act 2005, thus bestows management responsibility of mangroves occurring in the Southern Swamps to the Kenya Forest service represented at the county level by the County Forest Conservator (CFC). The

Lamu Southern swamps has extensive mangrove forests that occur on reef platforms behind protective outcrops of coral limestone.

- It covers Shella, Mkomani, Hindi, Mkunumbi, and Bahari wards in Lamu West constituency.

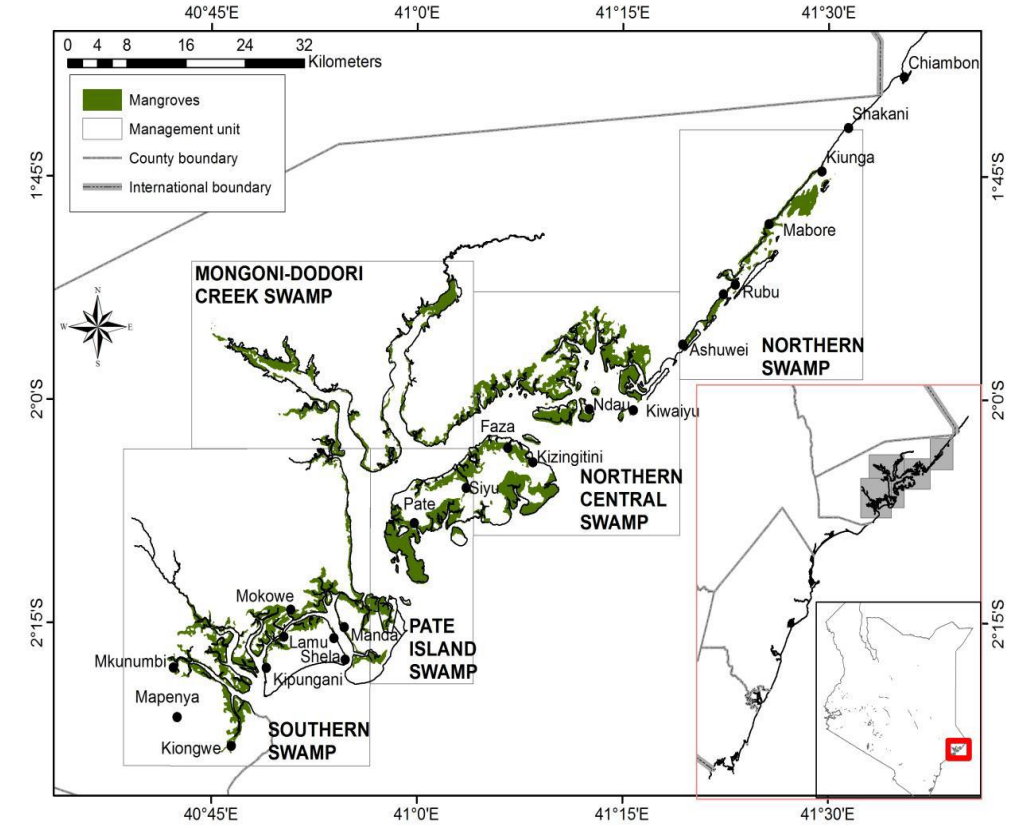


Figure 1 Map 1: Distribution of mangrove forests in Lamu County

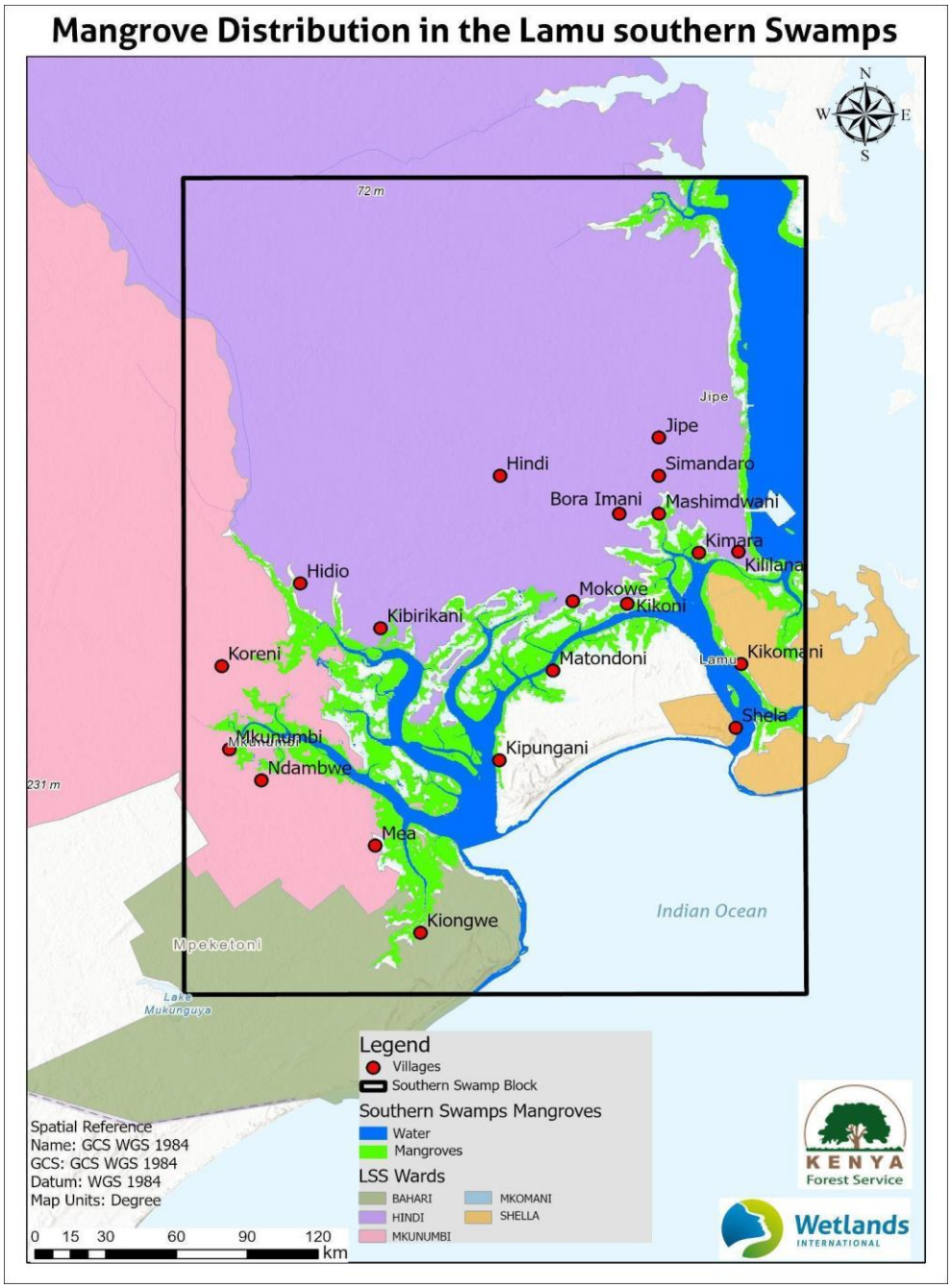


Figure 2 Map 2: Mangrove distribution in Lamu Southern Swamp

2.3 History of CFAs and Current status

This restoration plan covers mangrove areas under the Lamu and Mkunumbi Community Forest Associations (CFAs). Lamu CFA was established in 2010 and registered in 2015. The CFA signed its first forest management agreement and the second agreement in March 2023. Lamu

CFA has a membership of 1034, with 658 females, 270 males, and 106 youths. The CFA's area of jurisdiction covers 8260 hectares of mangrove ecosystem. The CFA includes approximately 13 villages within a 5 km radius from the forest edge.

Mkunumbi CFA was formed on 14th April 2023 with a total membership of 424, with 195 males, 229 females and 350 youths.
Online application for the registration of the association was done on 26th April 2023 and finally, Mkunumbi CFA was officially Registered (Certificate of Registration issued) on 19th October 2023.

MKU COFA's area of jurisdiction covers 2 County Assembly Wards(Mkunumbi and Bahari Ward), 3 Locations(Mkunumbi, Ndambwe and Bahari Locations) across 5 neighbouring Member Villages (Koreni, Mkunumbi, Ndambwe, Mea and Kiongwe villages)

The launch of the Mkunumbi PFMP and signing of FMA is underway.

2.4 Biophysical Description of the Forest

The Lamu Southern swamps have extensive mangrove forests that occur on reef platforms behind protective outcrops of coral limestone. The LSS intertidal area is home to an array of biodiversity and unique ecosystems with significant ecological and cultural heritage.

Climate and Weather

The climate of Lamu is highly variable both in time and in space. The county is prone to climate extremes such as floods and droughts, with the frequency and severity of these events becoming increasingly evident as global warming and climate change continue to be experienced globally. The main drivers of weather and climate conditions is the bi-annual Northwest and Southward movement of the overhead sun across the equator. This movement influences the position of the Inter-Tropical Convergence Zone (ITCZ) with other factors contributing to weather patterns and climate of the region being El Nino Southern Oscillation, Indian Ocean Dipole, the Congo Basin Air mass and the Equatorial Climate systems (Kenya Meteorological Department, 2022).

Weather in the county is characterised by two monsoon winds and warm climate. The highest average annual rainfall is 1,200 mm and reduces to 600 mm inland. The mean potential evaporation is high at 2,327 mm per year and temperatures range between 24° C - 30° C. The

hottest months are December to April and Coldest are May to July (Muthaura, 2018). The long rain season (March to May) occurs during the Southeast Monsoon while the short rains occur during the North East Monsoon (October to December). Relative humidity is constantly high throughout the year with an optimum of up to 90% during the rainy season.

Geology and Geomorphology

The Lamu basin includes the adjacent continental shelf and slope areas of the Indian Ocean. It consists of sediments of permo - carboniferous through tertiary continental rift basin sandstone, fluvial-deltaic sandstones, marine shales and carbonates. The Lamu Southern Mangrove swamps occur in the coastal plain, which is the lowest of the coastal physiographic zone rising from the sea level to 140 m. mangrove soils here are characterised as mostly montmorillonitic soils with few areas exhibiting interstratification (Kamau, 2011).

Hydrology and Topography

Lamu County is considered a water deficient landscape in Kenya. It is characterised by a poor surface hydrologic regime with a poorly drained generally flat topography that is prone to flooding during rainstorms. The terrain is largely sandy and limestone with surface water coming from direct surface runoff that feeds water bodies scattered in the terrain.

2.5 Biodiversity Description

Flora

Eight species are found in the LSS management block that covers approximately 5,200 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* and *Heritiera littoralis* which exhibit localised distribution occurring in areas with very low salinity. The table below describes the various mangrove species and their utilisation;

Table 1: LSS Mangrove Species

Mangrove species	**Local name**	**Community uses**
Rhizophora mucronata	Mkoko	Construction/fencing poles, dyes firewood
Ceriops tagal	Mkandaa	Construction/fencing poles, fuelwood
Avicennia marina	Mchu	Construction poles, fuelwood
Sonneratia alba	Mlilana	Boat ribs, construction poles, fuelwood
Bruguiera gymorhiza	Muia	Construction poles, fuelwood
Lumnitzera racemosa	Kikandaa	Fencing poles, fuelwood
Xylocarpus granatum	Mkomafi	Construction/furniture poles, medicinal value, fuelwood
Xylocarpus moluccensis	Mkomafi dume	Fencing poles, fuelwood
Heritiera littoralis	Msikundazi	Timber, boat mast, poles

Fauna

The diversity of fauna within mangroves is high due to ample food resources and a wide range of microhabitats in the system, such as soil surface substrate, permanent and temporary tidal pools, tree roots, trunks, and canopies. In LSS, these animals are represented by different phyla, ranging from protozoa and nematodes to molluscs, insects, crustaceans, birds, fish and mammals. The main groups are molluscs, crustaceans, fish, and birds. Among the epifauna, crustaceans are probably the most important. The predominant crab families include Grapsidae, Ocypodidae, Portunidae, Xanthidae, and Gecarcinidae. Mangrove forests receive thousands of migratory birds during winter every year. The common groups of birds found in LSS include wading birds (herons, egrets, ibises), shorebirds (plovers, sandpipers), floating and diving birds

(pelicans, cormorants, terns, gulls, kingfishers), birds of prey (fish eagle, osprey) and arboreal birds (bee-eaters, sunbirds).

2.5 Socio-Economic Status

Introduction

This chapter aims at assessing the demography and livelihoods of the Lamu Southern Swamp 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.

Ethnicity

Communities living adjacent to the Lamu southern mangrove swamps are culturally diverse. The largest indigenous ethnic group is Bajuni. Other communities living in the area originating from other parts of Kenya include Mijikenda, Aweer, Kikuyu, Somali, Orma, Pokomo, Luo, Wardei, Kamba, Swahili, Meru, Arab, Luhya and Taita. The Census report 2019 showed that population distribution is 121662 with a density of 31 per sq km in Lamu west.

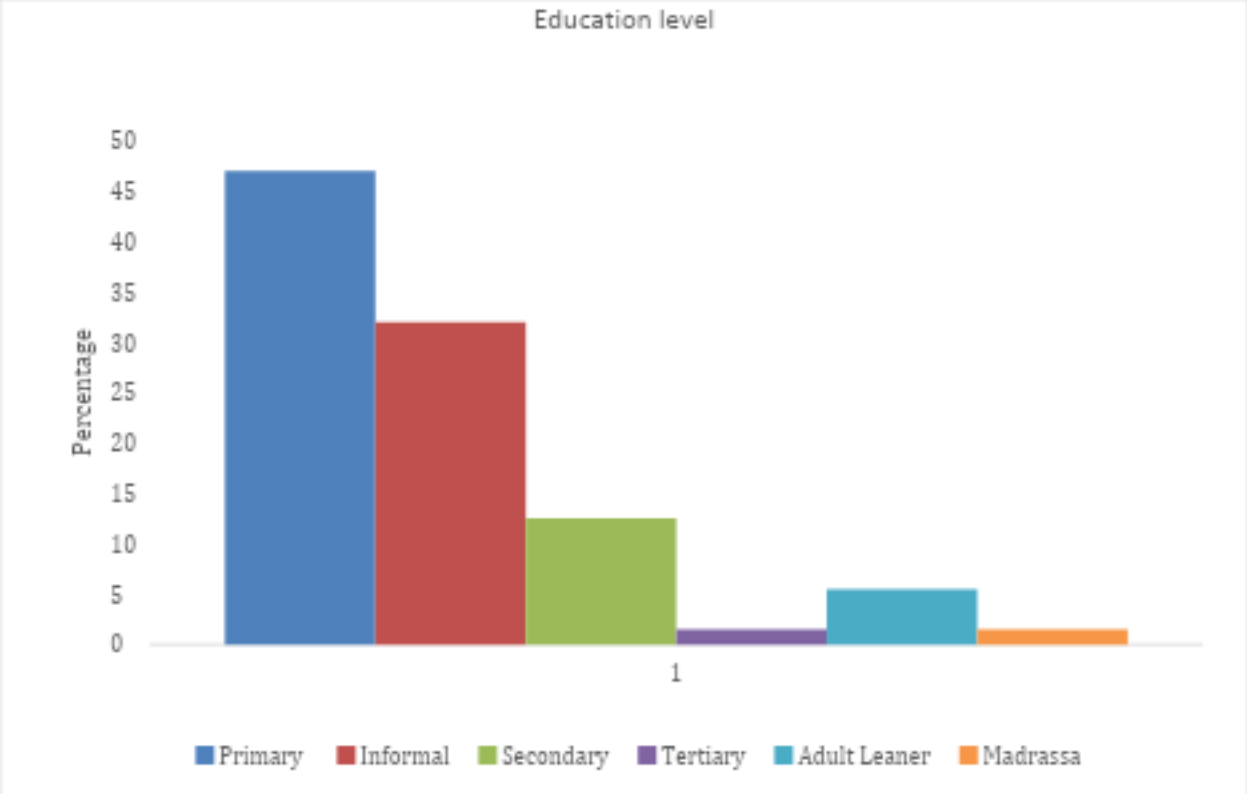
Lamu west constituency where LSS occurs contains the majority of the population in Lamu county with available livelihood options attracting settlements in areas including; Lamu island, Manda island, Mokowe, Mkunumbi and Mpeketoni areas. Population in the region is unevenly distributed due to poor infrastructure, unpredictable climatic conditions and security issues.

Table 2: Distribution of population, number of households and average households size in Lamu West

Sub county	Population	No. of households	Average household size
Lamu West	119,697	32,873	3.6

Level of Education

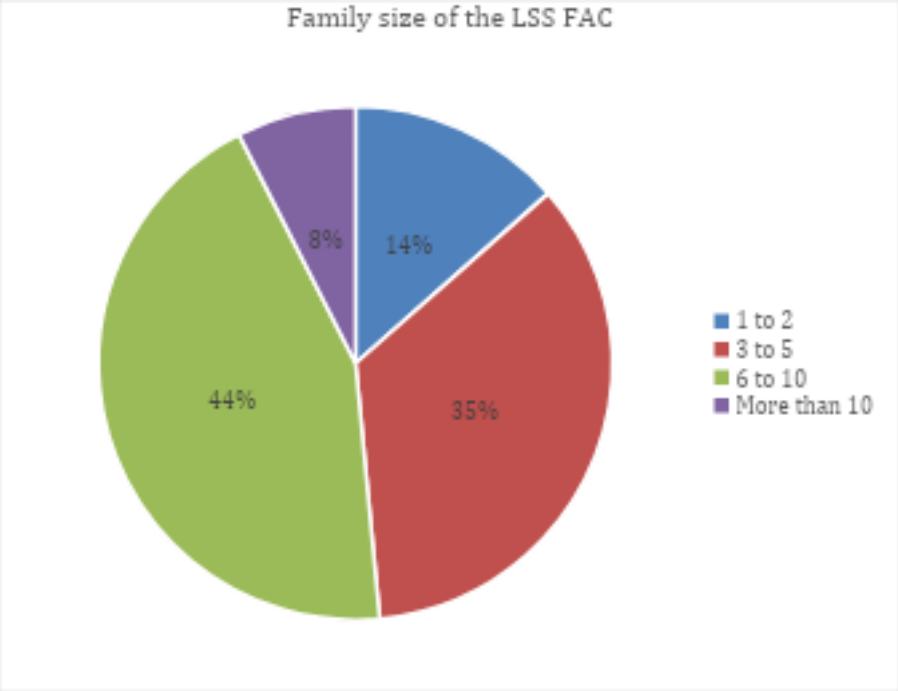
The majority of the FAC had received formal education, with 47% completing primary school. However, the percentages dropped significantly at the secondary (12.5%) and tertiary (1.5%) levels, largely due to financial constraints. It's important to note that 32% of the respondents, primarily elderly individuals, had informal education.



Family Size of the LSS FAC

The largest percentage of the LSS FAC had family sizes of 6-10 members, accounting for 44%. Most families lived together, including children and grandparents, which contributed to the large family sizes. Additionally, there were minimal family planning initiatives among most respondents which contributed to the large household numbers.

The study also revealed that 35% of households (HH) had 3-5 family members, while 8% had over 10 members. Notably, the results showed that 13% of the population had family sizes ranging from 1 to 2 members. The chart below shows the distribution of family sizes in FAC.



Economic activities

Economic activities of communities in LSS include the sale of food crops and forest products. This includes extraction and sale of both processed and unprocessed forest products such as firewood and building poles. Crop farming plays an important role as an income source as well as supplementing community food budgets.

Income sources	Frequency	%
Sale of agricultural food crops	50	17
Sale of Livestock	38	12.5
Casual employment	42	13.5
Sale of livestock products	21	6.5

Fisheries resources	21	6.5
Sale of agricultural cash crops	20	6
Business enterprises	35	11.5
Unprocessed forest products	37	12
Skilled labourers	21	6.5
Processed forest products	6	2
Remittances and gifts	5	1.5
Support from Govt.	5	1.5
Pension	8.5	3
Total	310	100

Gendered Occupations

Communities living around the LSS have a direct link to the forest that plays an important role to the community and there is a need to support conservation and restoration of the forest. Women visit the forest for firewood mainly while men are responsible for timber and poles extraction. Activities such as honey and herbal medicine collection are done by both genders. Prolonged engagement by adjacent communities in extraction of these forest resources exerts pressure on the ecosystem.

CHAPTER THREE: SITUATIONAL ANALYSIS

3.1 Introduction: History of the LSS forest

Mangroves have played a huge and important role in the history of human activity on the East African Coast. Records indicate that along with slaves and ivory, mangrove poles made up a major regional trade by the 9th Century.

Mangrove exploitation for building poles forms a subsistence livelihood for local people along the coast, with Lamu County exhibiting the highest dependence. For many years, house construction in Arab countries was dependent on mangrove poles brought by dhows (traditional Arab boats) from the East African coast. By the beginning of the 20th century, Kenya was exporting an annual average of 24,150 scores of mangrove poles from Lamu forests, equivalent to 483,000 poles per year.

Between 1941 and 1956 this export averaged 35,451.3 scores, then dropping to 13,774.4 scores in the period 1991/96.

3.2 Degradation Status of LSS Mangrove Forest Ecosystem

The overall net loss of mangroves in Lamu between 1990-2019 is 1,739 ha amounting to 60 ha per year. Mangroves in Lamu are degraded at a rate of 0.16% due to the legal and illegal harvesting of wood products. A significant indicator of mangrove degradation in LSS is the predominance of stumps due to harvesting nearer to human settlements where accessibility is easy. Field observations have shown extreme sedimentation along the mangrove periphery due to human pressure and livestock grazing. Traditional chalk-making was another human- induced disturbance that saw the extensive clearing of mangroves for wood fuel, especially in Manda Island according to the National Mangrove Ecosystem Management Plan 2017-2027. Natural calamities have also played a role in degradation where the 1997-98 El Nino resulted in extensive death of mangroves in some sections of the LSS. Dredging of Lamu channels led to the dumping of sand on the shores, where it blocked off mangrove hydrological channels.

The first and second mapping exercise done with collaborative efforts from KFS, Wetlands International, WWF-Kenya, KEFRI, CFA members, and other partners showed that 90 ha of mangroves have been degraded in the LSS. Furthermore, a subsequent mapping conducted by Wetland International in 2024 showed that an additional 26.24ha of mangroves have been

degraded. In total 116.24 ha have been confirmed to be degraded in LSS; See the table below (further details are provided in the annex table 1);

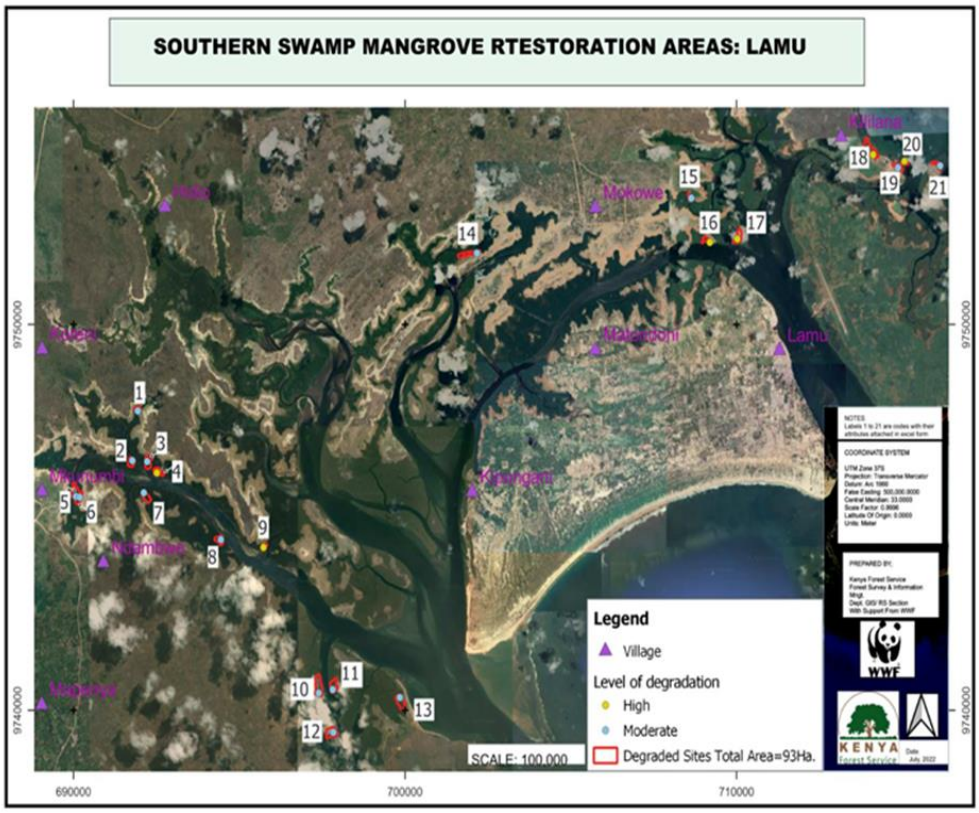


Figure 4: A Map of the LSS Degraded Sites

Table 3: LSS Mapping Results

No.	Forest beat	Name of the village	Name of the site	Ha	Degradation Status	Partners Involved
LAMACOFA						
1	Mokowe	Mokowe	Old jetty	0.52	moderate	KFS/CFA/WI
2	Kipungani	Hidio	Bantu 2	0.53		Not-allocated
3	Mashundwani	mashundwani	Bora imani	0.06	moderate	Not-allocated

4	Kililana karithara	Kililana	Njia ya ndovu	2.37	High	WWF,WI,KFS KEFRI,CFA
5	Kililana karithara	Kililana	Bandari ya bwana mkuu	1.21	moderate	WWF,CFA, KFS,KEFRI
6	Matondoni/kipungani	Kipungani	Bwaishe/ mataheda	2.53	moderate	WWF,KFS, CFA
7	Matondoni/kipungani	Kipungani	Mataheda 2	2.53	moderate	KFS,WWF,CFA ,KEFRI
8	Lamu	Wiyoni	Wiyoni	2.34	High	Not-allocated
9	Mokowe	Mokowe	Kitangani	3.02	high	WI,KFS,CFA KEFRI
10	Mashundwani	Mashundwani	18A	1.56	moderate	Not-allocated
11	Kililana karitara	Njia ya ndovu	23AC	1.47	high	Not-allocated
12	Matondoni kipungani	Hidio	Bantu 1	0.53	moderate	Not-allocated
13	Matondoni kipungani	Ungu	Kipilipili	1.59	low	Not-allocated
14	Matondoni kipungani	Matondoni	Bwaishe mwalimu	0.23	moderate	WWF, IUCN. KFS,CFA,Save Lamu, KEFRI,
15	Manda island	Manda	Tita	4.57	moderate	WWF,KFS. KEFRI,CFA
16	Manda island	Manda	Tita B	4.57	moderate	WWF,CFA, KFS,KEFRI
17	Matondoni Kipungani	Ngoi	Ngoi	6.02	moderate	Not-allocated
18	Manda island	Manda tita	23AA	2.29	moderate	Not-allocated
19	Mokowe	Mokowe	Old jetty	0.19		Not-allocated

20	Mokowe	Mokwe	kitangani	0.41	moderate	Not-allocated
21	Mokowe	Mokowe	Kitangani B	0.33	Moderate	Not-allocated
22	Matondoni kipungani	Kibibini	Mainuko	8.57	High	Not-allocated
23	Kililana karitara	Njia ya ndovu	23AB	3.49	moderate	WWF ,KFS CFA,KEFRI,WI
24	Kililana karitara	Kililana	Kwa majid	1.63		Not-allocated
25	Kililana karitara	Kililana	Kililana	0.50	moderate	Not-allocated
26	Matondoni kipungani	Kipungani	Chooni/mw akamba	0.91	moderate	Not-allocated
Sub-totals				53.97		
MKUCOFA						
1	Mkunumbi	Mkunumbi	Kwa Wanga	3.85	moderate	Eden People +Planet,KFS ,MKUCOFA ,KEFRI ,WI
2	Mkunumbi	Mkunumbi	Wanga 7B	5.73	moderate	Eden People +Planet, KFS ,MKUCOFA KEFRI ,WI
3	Mkunumbi	Mkunumbi	Bandarini	5.79	moderate	Eden People +Planet, KFS ,MKUCOFA KEFRI,WI
4	Mkunumbi	Ndambwe	Kwa bwana kombo A	1.28	high	Eden People +Planet,KFS MKUCOFA , KEFRI WI
5	Mkunumbi	Mea	Mea 2	9.47	moderate	Eden People

						+Planet, KFS, WI, MKUCOFA, KEFRI
6	Mkunumbi	Mea	Mea	7.09	moderate	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
7	Mkunumbi	Mkunumbi	Kwa Wanga	1.94	moderate	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
8	Mkunumbi	Ndambwe	Bwanakweli	3.97	moderate	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
9	Mkunumbi	Mkunumbi	Wanga 7A	3.75	high	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
10	Baragoni	Koreni	Mbilingii	0.20	Moderately degraded	KFS, WI, MKUCOFA, KEFRI
11	Mkunumbi	Mkunumbi	Kitototo	0.80	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
12	Mkunumbi	Mkunumbi	Kirara	0.30	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
13	Mkunumbi	Mkunumbi	Kirara Ndogo	0.40	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
14	Mkunumbi	Mkunumbi	Kijuni	0.60	Moderately degraded	KFS, WI, MKUCOFA, KEFRI
15	Mkunumbi	Ndambwe	Kwa Soloma	1.00	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI

16	Mkunumbi	Ndambwe	Bandari ya mchu	1.00	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
17	Mkunumbi	Kiongwe	Kwa hemedi	3.00	Highly degraded	KFS, WI, MKUCOFA, KEFRI
18	Mkunumbi	Mea	Majeo	1.00	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
19	Mkunumbi	Kiongwe	Mto simba	3.50	Highly degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
20	Mkunumbi	Mea	Shakani 2	1.50	Highly degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
21	Mkunumbi	Mea/Kiongwe	Shakani 1	0.50	Moderately degraded	Eden People +Planet,KFS, WI, MKUCOFA, KEFRI
22	Mkunumbi	Mea	Shogoni	0.10	Moderately degraded	Eden People +Planet, KFS, WI, MKUCOFA, KEFRI
23	Bobo milihoi	Koreni	Muhogoni 3	1.50	Highly degraded	KFS, WI, MKUCOFA, KEFRI
24	Bobo milihoi	Koreni	Muhogoni 2	2.00	Highly degraded	KFS, WI, MKU COFA, KEFRI
25	Bobo milihoi	Koreni	Muhogoni	2.00	Moderately degraded	KFS, WI, MKU COFA, KEFRI
Sub Totals				**62.27**		
Grand totals				**116.24**		

3.3 Barriers to Natural Regeneration and Restoration Initiatives

Several barriers exist that affect the progress made in restoration. These barriers can be specific to the two main approaches in mangrove ecosystem conservation; natural regeneration, and restoration, or they can affect both approaches simultaneously. Below are some of barriers to natural regeneration and restoration initiatives as described;

Poverty - High poverty levels among the local communities living adjacent to the mangrove ecosystems have had mostly for the most part put a lot of exploitation pressure on the resource. This creates the need to promote alternative livelihood practices that will aid in reducing the pressure on need for the mangrove products and services.

Literacy levels - Low literacy in/on restoration science affects the survival rate of planted seedlings. Also 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, and as well as fishing.
Concepts such as where to plant, for example ie., sand flats should be avoided, 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 are a good example of the latter mentioned.

Finance - Mangrove conservation has been known to be expensive. Adequate financing is needed from the nursery establishment and outplanting. 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 labourers to help in forest surveillance. In conclusion 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 - Uncontrolled grazing of livestock by the locals threatens mangroves especially for species occurring further landward such as *Avicennia marina*. Strategies such as fencing off and capacity building of pastoralists on the ecosystems' importance can address this challenge.

Coastal development - Infrastructure such as hotels, restaurants, port harbours, industries, and channel dredging extensively degrade these ecosystems. Some of these developments may be government-initiated making them difficult to oppose. 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 pollute mangrove ecosystems. Released pollutants harm mangroves and other marine organisms that depend on them resulting in loss of valuable ecosystem goods and services.

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. For example, mangrove forests were impacted by the 1997-98 El-Nino rains in Dodori Creek, and other parts of Lamu Southern Swamps. Such areas are yet to fully recover.

Pests, diseases 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 Lamu County with different conservation objectives in the Lamu Southern Swamp ecosystem. 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.

3.4 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 nationalised 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 CO_2 more than terrestrial ecosystems, their conservation is emphasised 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 favourable 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.

3.5 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 mobilisation, and conservation incentives. This is elucidated in Table 5 below;

Table 4: SWOT Analysis

Strength	Weakness
• Goodwill (local, political) towards addressing mangrove degradation and restoration initiatives • Supportive national/international policy and legal instruments on ecosystem restoration • Existing technical capacity in multi-disciplinary research and restoration potential assessments • Technological capacity in remote sensing and geographical information systems supporting mapping of degraded sites and real-time monitoring of restored sites. • Improved mangrove management at both national and county levels • Willingness of stakeholders to participate in mangrove restoration initiatives • Improved understanding of the role of mangroves in climate change mitigation and adaptation • Data on degraded mangrove sites is available. • Vibrant community forest associations with high interest in restoration efforts. • *Knowledge on CBEMR* • *the national restoration guideline being developed.*	• Inadequate knowledge management that can influence accurate decision-making in mangrove restoration efforts • Inadequate information dissemination on best practices for mangrove ecological restoration • High dependency on mangrove wood resources • Low investment in mangrove-based nature-based enterprises e.g. carbon financing • Limited standardised reporting templates for mangrove restoration projects • Inadequate monitoring and evaluation of previously undertaken restoration efforts • Inadequate inventory data for mangrove management • Weak linkages between research and ongoing restoration efforts • weak enforcement on entry into mangrove forests • Inadequate stakeholder engagement • Conflicting and overlapping Institutional mandates • Limited public-private partnership frameworks on mangrove restoration initiatives

Opportunities	Threats
● High interest and funding opportunities for mangrove restoration projects ● Nature-based solutions and enterprises for mangrove conservation ● Job creation and livelihood improvement ● Emergence of green, blue and circular economies to incentivize stakeholders on mangrove restoration initiatives ● Emerging of payment for Ecosystem services, including carbon financing ● Existence of a regional framework for sustainable forest management e.g. The UN Decade of Ecosystem Restoration *Opportunities - known acreage, capacity, CFA, restoration guidelines,*	● Vulnerability of mangroves to climate change (flooding, sea level rise, saltwater intrusion) and other natural calamities including pests and diseases ● Encroachment and conversion of mangrove areas to other land uses ● Increased shoreline changes ● High demand for forest goods and services driving mangrove forest degradation *Threats - donor interests, climate change*

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 emphasising 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 inventions such as promoting and upscaling of 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.

4.3 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

4.4 Restoration Programs for the Ecosystem

LAMACOFA

Table 5: Interventions programs for mangrove forest restoration in LAMACOFA management area

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing 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, CGL, Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI, KWS	3
Conduct Barazas on sustainable utilisation and management of mangroves.	No.	20	Reports, Minutes Attendance lists Dated photographs	4	4	4	4	4	KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI,KWS	3
Trainings on Community Based Ecological Mangrove Restoration (CBEMR)	No.	5	Reports, Minutes Attendance lists Dated photographs	1	1	1	1	1	KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI,KWS	7

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
Protection of Mangrove Areas										
Mapping of new areas requiring interventions	Ha	54.9	Mapping reports Dated photographs Maps	54.9					KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC, KEFRI, KMFRI, KWS	2.5
Conduct joint forest patrols	No.	240	Patrol and incident reports Dated photographs	48	48	48	48	48	KFS , KWS,CFA	20
Establish Permanent sample plots (PSPs) and collection of baseline data	No.	4	Field report, Dated photographs, Data sets	8					KEFRI, KMFRI, KFS, Wetlands International, WRTI, TNC, Eden	5
Conduct forest health monitoring within thePSPs	No	4	Annual Field reports Dated photographs Permanent Sample Plots		1	1	1	1	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden	2
Aerial Surveillance	No.	10	Patrol and incident reports	2	2	2	2	2	KFS , KWS,NGAO, Wetlands	10

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
			Dated images						International ,CFA	
Biomonitoring	No	7	Field reports Dated photographs	4	1	1	1		KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, KeFS, KWS, WRTI	2
Reafforestation of degraded areas										
Undertake mangrove planting	Ha	56.29	Field reports Dated photographs	11.3	11.3	11.3	11.3	11.3	KEFRI, KMFRI, KFS, CGL, CFA, Wetlands International, WWF-Kenya, TNC, Eden	20
Hydrological Modifications [Kililana, Njia ya Ndovu, Kitangani]	Ha	12.52	Field reports Dated photographs	3.13	3.13	3.13	3.13		KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	3
Maintenance of planted seedlings	Ha		Field reports Dated photographs						KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	25

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
Construct Barriers / community fencing and protection for natural regeneration	Ha	6.53	Field reports Dated photographs	1.3	1.3	1.3	1.3	1.3	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	5.5
Livelihood and Social economics program										
Establishment of model mangrove tree nurseries (Capacity 200,000 seedlings)	No	1	Model nursery	1					CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	10
Promote and up scaling IGAs such as beekeeping, weaving, crab fattening, sea weed farming, Ecotourism etc	No	4	Reports Dated photographs	1	1	1	1		CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	2
Promotion of Agroforestry on the mangrove buffer zones	Ha	20	Reports Dated photographs /on farm forestry	4	4	4	4	4	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	5
Integrated Mariculture	No. of Sites	Ponds, Crab cages,	Reports Dated photographs						CFA, KFS, KEFRI, CGL, Wetlands International,	20

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
		Fish cages							WWF-Kenya, TNC, Eden	
Marine litter management	No		Reports Dated photographs						CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	15
Ecotourism	No. of sites		Reports Dated photographs						CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	10
Apiculture Establishment	No		Reports Dated photographs						CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	10
Totals										**198**

MKUCOFA

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

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing 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, CGL Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI,KWS	3
Conduct Barazas on sustainable utilisation and management of mangroves.	No.	200	Reports, Minutes Attendance lists Dated photographs	4	4	4	4	4	KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI,KWS	3
Trainings on Community Based EcologicalMangrove Restoration	No.	5	Reports, Minutes Attendance lists Dated photographs	1	1	1	1	1	KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC , KEFRI , KMFRI,KWS	7

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
Protection of Mangrove Areas										
Mapping of new areas requiring interventions	Ha	54.25	Mapping reports Dated photographs Maps	54.25					KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC, KEFRI, KMFRI, KWS	2.5
Conduct joint forest patrols	No.	240	Patrol and incident reports Dated photographs	48	48	48	48	48	KFS , KWS,CFA	20
Establish Permanent sample plots (PSPs) and collection of baseline data	No.	4	Field report, Dated photographs, Data sets	4					KEFRI, KMFRI, KFS, Wetlands International, WRTI, TNC, Eden	5
Conduct forest health monitoring Within the PSPs	No.	4	Field reports Dated photographs Permanent Sample Plots		1	1	1	1	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden	2
Aerial Surveillance	No.	10	Patrol and incident reports Dated photographs	2	2	2	2	2	KFS , KWS,NGAO, Wetland International ,CFA	10

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
Biomonitoring	No	7	Field reports Dated photographs	4	1	1	1		KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden	2
Reafforestation of degraded areas										
Seedling Production	No.	200,000	Nursery Reports and dated Photographs	100	100	100	100	100	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	5
Undertake mangrove planting	Ha	63.11	Field reports Dated photographs	12.6	12.6	12.6	12.6	12.6	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	10
Maintenance of planted seedlings	Ha	63.11	Field reports Dated photographs	5	5	5	5	5		25
Hydrological Modifications (Muhogoni - Koreni)	Ha	6.23	Field reports Dated photographs	1.3	1.3	1.3	1.3	1.3	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL	3
Construct Barriers/commu	Ha	20.16	Field reports	4.0	4.0	4.0	4.0	4.0	KEFRI, KMFRI, KFS, CFA,	2.5

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
nity fencing and protection for natural regeneration			Dated photographs						Wetlands International, WWF-Kenya, TNC, Eden, CGL	
Livelihood and Social Economics program										
Establishment of model mangrove tree nurseries (Capacity 200,000 seedlings)	No	1	Model nursery	1					CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	25
Promote and up scaling IGAs such as beekeeping, weaving, ,Ecotourism etc	No	4	Reports Dated photographs	1	1	1	1		CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	2
Integrated Mariculture (Kimbo, Chogoni,	No. of Sites	Ponds, Crab cages, 500 fish cages	Reports Dated photographs	1	1	1	1	1		20
Marine litter management	No.	120 clean-ups 10 segregation bins 1 MRF	Reports Dated photographs	24	24	24	24	24	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	15

Actions	Unit	5 years Target	Means of verification	Annual Target					Implementing Agency	Budget (Kshs) Million
				1	2	3	4	5		
Ecotourism	No. of sites	5	Reports Dated photographs	1	1	1	1	1	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	10
Apiculture Establishment	No.	600 hives Honey processing centre	Reports Dated photographs	120	120	120	120	120		10
Promotion of agroforestry on the mangrove buffer zones	Ha	50	Reports Dated photographs Woodlots	1	1	1	1		CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden	3
Totals										**185**

CHAPTER FIVE: PLAN IMPLEMENTATION

5.1 Stakeholder Analysis

Stakeholders are key in the management and utilisation of mangrove resources in the Lamu Southern mangrove swamps. 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 mobilisation and capacity building of the community forest associations to undertake restoration activities. Key stakeholders involved in the restoration of mangroves in the Lamu Southern Mangrove swamps are as identified in the table below.

Table 7: Stakeholders and their Responsibilities

Stakeholders	Category	Roles and responsibilities
Kenya Forest Service	Implementers	Forest management and protection Policy formulation and implementation Enforcement of Forest Management and Conservation Act 2016 Awareness and sensitization Resources mobilisation Financing forest operations
Community Forest Associations and user groups (Lamu and Mkunumbi)	Beneficiaries	Coordination among user groups Forest protection through community scouting Resource mobilisation Sensitization and awareness Initiate and Support forest restoration activities Operate and manage IGAs
County and National Assemblies	Policy makers	Policy formulation Resource mobilisation Awareness and sensitization

National government Administration Officers	Implementers	Maintenance of law and order Mobilisation and sensitization Resource use conflict resolution and management
Kenya Wildlife Service	Implementers	Enforcement of Wildlife conservation and management Act 2013 Human-wildlife conflict resolution Resource Mobilisation Awareness creation
County Government of Lamu Departments of Environment, Climate Change, Fisheries & Blue Economy, Livestock, Natural resources, Energy, Lands, Water	Implementers	Policy formulation and implementation Education, awareness and sensitization Environment conservation and protection Restoration of Key Lamu's ecosytem Promotion of sustainable natural resource use Funding of CIGs and IGAs Forest extension services Resources mobilisation Budget allocation and planning process
Kenya Forestry Research Institute	Implementers	Forestry and allied natural resources research Capacity building and training for sustainable development of forestry Resources mobilisation
Kenya Marine and Fisheries Research Institute	Implementers	Research on mangrove restoration Resources mobilisation Capacity building and training
Wildlife Research and Training institute	Implementers	Multi-disciplinary research on wildlife populations and habitat dynamics Resources mobilisation
National Environment Management Authority	Implementers	Enforcement of Environment Management and Coordination Act 1999 Awareness and sensitization Resources mobilisation

Universities and Academia	Partners/ collaborators	Support research on mangrove ecosystem dynamics Resources mobilisation Capacity building and training
Civil societies and Organizations, NGOs *and Private Sectors*	Partners/ collaborators	Awareness and sensitization Resource mobilisation Support mangrove ecosystem conservation, restoration and protection Support capacity building and training

5.2 Resource Mobilisation

Resource mobilisation 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 mobilisation allows for the optimal use of resources, maximising 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 organisations and communities, enhancing their resilience and self-sufficiency.
- *Innovation and Adaptability*: Access to a broader range of resources encourages innovation and allows organisations to adapt to new challenges and opportunities.

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

5.3 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. 383 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 Organisations (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.

5.4 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 8: 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	Assistant Director	1	Assistant Director

3.	Beach Management Unit	Chairman	1	Area chairman
4.	NGAO	Deputy County Commissioner	1	Area Chief or ACC
5.	County Government of Lamu	Directors – Environment and Fisheries	2	County Environment Officer County Fisheries Officer
6.	Kenya Forestry Research Institute	Assistant Regional Director	1	Assistant Regional Director or Research scientists
7.	Strategic partner	WWF/WI/Eden Reforestation	1	Project Officers
9.	Co-opted member	As need arises		Available as need arises with no voting powers
Total			**11**	

5.5 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.

Table 9: Monitoring and Evaluation Matrix

ACTIONS	UNITS OF MEASURE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	LEAD AGENCY
Capacity building meetings on laws and regulations for effective management of natural resources	No.	Number of meetings held, Number of individuals sensitized.	Reports, Minutes Attendance lists, Dated photographs	KFS KEFRI WWF Wetlands international KWS CFAs County Government
Conduct Barazas on sustainable utilization and management of mangroves.	No.	Number of barazas conducted	Reports, Minutes Attendance lists, Dated photographs	KFS, WWF, Wetlands international
Training on Community-Based Mangrove Restoration Protection of Mangrove Areas	No.	Number of CBMR training conducted.	Reports, Minutes Attendance lists, Dated photographs	WWF, Wetlands International KFS, KWS, KEFRI County Government of Lamu
Protection of Mangrove Areas				
Mapping of areas requiring interventions	Ha.	Number of hectares mapped out	Mapping reports, Dated photographs Maps	KFS, CFA, CGL, Wetlands International, WWF-Kenya, Eden, TNC ,

ACTIONS	UNITS OF MEASURE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	LEAD AGENCY
				KEFRI , KMFRI,
Conduct forest patrols	No.	Number of patrol conducted	Patrol and incident reports, Dated photographs	KFS , KWS,CFA
Conduct forest health monitoring using plot based surveys (PSPs)	No.	Number of PSPs surveyed	Annual Field reports, Dated photographs, Permanent Sample Plots	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden
Aerial Surveys	No.	Number of aerial surveys conducted	Patrol and incident reports, Dated photographs	KFS , KWS,NGAO, Wetland International ,CFA
Biomonitoring and Forest field data collection	No.	Number of monitoring	Field reports, Dated photographs	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden
Reafforestation of degraded areas				
Undertake mangrove seedlings out planting	Ha	Area of mangrove restored	Field reports, Dated photographs	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL

ACTIONS	UNITS OF MEASURE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	LEAD AGENCY
Hydrological Modifications	Ha	Mangrove area restored	Field reports, Dated photographs	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL
Construct Barriers / community fencing and protection for natural regeneration	Ha	Mangrove Area fenced and restored	Field reports, Dated photographs	KEFRI, KMFRI, KFS, CFA, Wetlands International, WWF-Kenya, TNC, Eden, CGL
Livelihood and Social economics program				
Establishment of model mangrove tree nurseries (Capacity 500,000 seedlings per CFA nursery)	No.	Number of model nurseries established Number of seedlings raised	Model nursery	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden
Promote and up scaling IGAs such as beekeeping, weaving, ,Ecotourism etc	No.	Number of IGAs Promoted and upscale Increased household income	Reports, Dated photographs	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden

ACTIONS	UNITS OF MEASURE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	LEAD AGENCY
Promote establishment of woodlots on farms	No.	Number of woodlots established Mangrove cover change recorded	Reports, Dated photographs Woodlots	CFA, KFS, KEFRI, CGL, Wetlands International, WWF-Kenya, TNC, Eden

Table 10: LSS Initial Mapping Details

Village name	Site name	Coordinates		Area (Ha)	Drivers for degradation	Site recommendation	species recommended	Remarks
		X	Y					
Mokowe	Mokowe Old Jetty B	40.863602	-2.244159	0.52	Sedimentation	Assisted planting	*Rhizophora mucronata, Sonneratia alba*	
Koreni	Mbilingii	40.75862833	-2.265626793	0.2	Harvesting	Assisted planting	*Rhizophora mucronata*	
Mkunumbi	Kitototo	40.763312	-2.27569531	0.8	Harvesting	Assisted planting	*Rhizophora mucronata*	
Mkunumbi	Kirara	40.76794	-2.28387	0.3	Harvesting	Assisted planting	*Rhizophora mucronata*	
Mkunumbi	Kirara Ndogo	40.76992	-2.28955	0.4	Harvesting	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza, Ceriops tagal*	
Mkunumbi	Kijuni	40.75489	-2.28342	0.6	Harvesting	Assisted planting	*Bruguiera gymnorrhiza*	
Ndambwe	Kwa Soloma	40.74012	-2.31181	1	Harvesting	Assisted planting	*Rhizophora mucronata, Ceriops tagal*	
Ndambwe	Banda ya mchu	40.76428	-2.31339	1	Harvesting	Assisted planting	*Rhizophora mucronata*	
Kiongwe	Kwa hemedi	40.77392	-2.37649	3	Harvesting	Assisted planting	*Bruguiera gymnorrhiza, Rhizophora*	

							mucronata, Ceriops tagal	
Mea	Majeo	40.78241	-2.37414	1	Harvesting	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza, Avicennia marina*	
Mea	Majeo	40.782946	-2.369581	0.3	El nino	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza, Avicennia marina*	
Kiongwe	Mto simba	40.77967	-2.38153	3.5	El nino	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Mea	Shakani 2	40.78253	-2.37906	1.5	El nino	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Mea/Kiongwe	Shakani 1	40.78561	-2.37581	0.5	El nino	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza, Avicennia marina, Ceriops tagal*	
Mea	Shogoni	40.78905	-2.35907	0.1	Harvesting	Assisted planting	*Bruguiera gymnorrhiza, Rhizophora mucronata, Ceriops tagal*	

Koreni	Muhogoni 3	40.72506	-2.2698	1.5	Sedimentation	Hydrological correction	*Avicennia marina*	
Koreni	Muhogoni 2	40.7269	-2.27059	2	Sedimentation	Hydrological correction	*Avicennia marina*	
Koreni	Muhogoni	40.73106	-2.25365	2	Sedimentation	Hydrological correction	*Avicennia marina*	
Hidio	Bantu 2	40.789166	-2.303989	0.53	Old age	Assisted planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Mashundwani	Bora imani	40.885115	-2.219710	0.06	Harvesting, Old age	Assisted planting	*Rhizophora mucronata, Sonneratia alba, Bruguiera gymnorrhiza*	
Kililana	Njia ya Ndovu	40.931132	-2.222320	2.37	Dredging, encroachment	Assisted planting	*Ceriops tagal, Avicennia marina*	
Kililana	Bandari BwanaMkuu	40.920531	-2.210846	1.21	Harvesting	Assisted planting	*Avicennia marina*	
Kipungani	Bwashee/ Mataheda	40.816385	-2.313158	2.53	Sedimentation	Assisted planting	*Rhizophora mucronata, Xylocarpus granatum*	
Kipungani	Mataheda 2	40.816098	-2.313723	2.53	Harvesting	Assisted planting	*Ceriops tagal, Xylocarpus granatum, Rhizophora mucronata*	
Wiyoni	Wiyoni	40.898874	-2.258415	2.34	Sedimentation, Foraging,	Assisted planting	*Avicennia marina,*	

					Harvesting		*Rhizophora marina*	
Mokowe	Kitangani	40.8811	-2.2414	3.02	Sedimentation caused by dredging	Hydrological correction	*Rhizophora mucronata, Sonneratia alba*	
Mashundwani	18A	40.8760	-2.2311	1.56	Harvesting	Assisted planting	*Rhizophora mucronata, Avicennia marina*	
Kwa bwana kombo		40.7601	-2.3130	1.28	Harvesting	Assisted planting	*Rhizophora mucronata, Ceriops tagal*	
Mkunumbi	Wanga 7A	40.7312	-2.2956	3.75	Old age	Assisted planting	*Ceriops tagal, Avicennia marina*	
Njia ya Ndovu	23AC	40.9338	-2.2223	1.47	Encroachment	Assisted planting	*Ceriops tagal*	
Hidio	Bantu 1	40.789245	-2.304340	0.53	Harvesting	Enrichment planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Ungu	Kipilipilini	40.802949	-2.265098	1.59	Harvesting	Enrichment planting	*Rhizophora mucronata*	
Matondoni	Baishe Mwalimu	40.857597	-2.255424	0.23	Harvesting	Enrichment planting	*Rhizophora mucronata*	
Manda	Tita	40.943667	-2.230657	4.57	Harvesting	Enrichment planting	*Rhizophora mucronata, Ceriops*	
Manda	Tita B	40.944541	-2.231914	4.57	Harvesting	Enrichment planting	*Rhizophora mucronata, Bruguiera*	

Ngoi	Ngoi	40.7971	-2.3482	6.02	Harvesting	Enrichment planting	*Ceriops tagal, Bruguiera gymnorrhiza*	
Manda Tita	23AA	40.9435	-2.2234	2.29	Harvesting	Enrichment planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Ndambwe	Kwa Bonea	40.7276	-2.3003	3.95	Harvesting	Enrichment planting	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Simi	Simi	40.7789	-2.3463	5.94	Harvesting	Enrichment planting	*Ceriops tagal, Rhizophora mucronata*	
Mokowe	Mokowe Old Jetty	40.863028	-2.244711	0.19	Bait Harvesting	Hydrological modification	*Rhizophora mucronata, Sonneratia alba*	
Mokowe	Kitangani A	40.880695	-2.241240	0.41	Sedimentation	Hydrological modification	*Rhizophora mucronata, Bruguiera gymnorrhiza*	
Mokowe	Kitangani B	40.880746	-2.240794	0.33	Sedimentation	Hydrological modification	*Rhizophora mucronata, Ceriops tagal, Bruguiera gymnorrhiza*	
Daimboi	Daimboi-Porokanya	40.790362	-2.315709	0.73	Harvesting, Sedimentation	Hydrological modification		
Kibibini	Mainuko (maji yananuka)	40.843434	-2.277218	8.57	Harvesting	Hydrological modification	*Rhizophora mucronata*	

Mkunumbi	Kwa wanga	40.7245	-2.2927	3.85	Harvesting	Protection and enforcement		
Milihoi	Milihoi	40.8179	-2.2440	5.43	Harvesting	Protection and enforcement		
Njia ya Ndovu	23AB	40.9321	-2.2238	3.49	Encroachment	Protection and enforcement		
Mkunumbi	Manzabe	40.7102	-2.3013	2.52	Harvesting	Protection and enforcement		
Hidio	Gandusi 1	40.757522	-2.256756	4.18	Harvesting	Protection for natural regeneration		
Hidio	Gandusi 2	40.757512	-2.256766	4.18	Harvesting	Protection for natural regeneration		
Kililana	Kwa Majid	40.894931	-2.222070	1.63	Harvesting, Sedimentation	Protection for natural regeneration		
Kililana	Kililana	40.903224	-2.221110	0.50	Harvesting	Protection for natural regeneration		
Choni	Mwakamba	40.790809	-2.299284	0.91	Harvesting	Protection for natural regeneration		
Totals				109.48				

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KENYA
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LAMU MANGROVE
COMMUNITY FOREST ASSOCIATION

MKUNUMBI COMMUNITY FOREST ASSOCIATION
Jamii na Misitu