Forestry Department
Protecting our Forests; Sustaining Lives

European Union

NATIONAL MANGROVE & SWAMP FORESTS MANAGEMENT PLAN 2023-2033

The Forestry Department
173 Constant Spring Road
Kingston 8, Jamaica WI
Telephone: 1-876-618-3205
Email: fdinfo@forestry.gov.jm
Website: www.forestry.gov.jm

Jamaica's National Mangrove & Swamp Forests Management Plan

This publication was funded by the European Union. Its contents are the sole responsibility of the Forestry Department and its implementing partners and do not necessarily reflect the views of the European Union.

This document was prepared by Camilo Trench, PhD and his selected team of consultants in close collaboration with the staff of the Forestry Department and its stakeholders.

National Mangrove & Swamp Forest Management Plan

Overview: This ten-year Plan was developed through an intensive collaborative and review process with our national stakeholders over one year through funding made available under the 11th European Development Fund Budget Support Programme to Jamaica. Through implementation and funding partnerships, the strategies and actions herein will seek to cauterise the threats and implement measures to improve the status and ecosystem functions of Jamaica's Mangrove and Swamp Forests.

Approved by: _____

Ainsley A. Henry, JP
CEO & Conservator of Forests
Forestry Department

Date: January 20, 2023

Table of Contents

List of Tables

List of Figures

Foreword

The need for a national approach to better manage the declining forested wetlands in Jamaica was the main impetus behind the creation of this document. The management plan gives a previously lacking census of the quantity of forested wetlands in Jamaica, their status is described in a Situational Analysis, and seven (7) sub-programmes were discussed to satisfy the four stated strategic objectives. These actions and steps are aligned with attaining the realistic goal of over 50% of the remaining forested wetland legally and physically protected from degradation and misuse.

Acknowledgements

The Forestry Department acknowledges the Consultancy team under the directives of Dr Camilo Trench for their tireless energies and dedication displayed to ensure this collaborative Plan was timely, valid and comprehensive. We are also profoundly grateful to the numerous stakeholders participating in the process. The drafting of such a document took innumerable hours of consultations and meetings with a broad cross-section of key experts from the Government of Jamaica Planning and regulatory offices, Ministries, Non-governmental organizations, researchers, and educators, as well as the various users of the forested wetlands who work in tourism, fisheries, and other related jobs. The opinions and thoughts of numerous citizens who use the forested wetlands formally or informally as homes or places of business were also garnered by both the consultancy team and the Forestry Dept.

The participatory collaboration with National Environment and Planning Agency staff has been exemplary and greatly appreciated.

A special thank you to the Forestry Team, who participated in the data capture, spatial analyses, consultation, reviews, editing and the final production of the plank.

Thank you all

Executive Summary

Forested wetlands are ecosystem areas with moist or inundated conditions, like mangrove (mangroves, mangal) and swamp forests. These forests are globally recognized and revered for their many products and services but continue to face degradation and negative impacts from both natural and anthropogenic factors. Jamaica's forested wetlands had higher loss rates historically, which have slowed in recent decades due to increased regulation, with at least six forested wetlands becoming protected. However, in Jamaica, mangroves and swamp forests are experiencing continued natural and anthropogenic threats owing to coastal development (both planned and unplanned), artisanal use (timber, charcoal, small-scale farming uses), hydrological modifications from agriculture and infrastructure development and climate change effects which are still pervasive in Jamaica and had resulted in the loss of 770ha of mangroves between 1996 and 2016. Other mangrove conservation challenges with linked social and economic obstacles include:

MANGROVE THREATS/CONSERVATION CHALLENGES	SOCIO-ECONOMIC OBSTACLES
Coastal developments-Planned/Permitted (hotels and housing)	• New developments usually equate to employment and business growth, which help promote rural-urban migration and a proliferation of unplanned developments/informal communities. • Governmental pressure to fast-track developments. • Low regard for environmental conservation. • High unemployment rate.
Civic Projects (roads and bridges, air and seaports etc.)	• Lack of civil infrastructure slows productivity. • Governmental pressure to fast-track developments. • Community support.
Illegal logging; cutting for firewood and charcoal burning	• only source of income for some households. • A high percentage of the community is living in poverty. • Social norm.
Natural Disaster (Hurricanes, Storms, floods, etc.)	• Low-income earners may occupy easily accessible lands, i.e., wetlands. • In many instances, relocating informal/unplanned communities from government-owned wetlands is politically unpopular and unfeasible. • Critical infrastructure (e.g., airports, ports) and buildings in wetland areas are at higher risk of damage.
Disrupted hydrology-incidental/unintentional	• Lack of proper planning involvement from government and civic planning agencies. • Unplanned or poorly planned developments and informal communities can severely disrupt mangrove forests.
Lack of knowledge about the system and its value (in monetary terms and otherwise).	• Minimal or no public education programmes specific to wetland importance. • Insufficient public education budget for wetlands in government institutions.
Lack of long-term funding	• Grant funding opportunity is more accessible to established institutions and individuals with higher educational levels. • Wetland conservation grants are generally available short-term (1 to 5 years).
Unplanned settlements; multiple squatter settlements	• High occurrence in wetland areas makes these settlements challenging to remove/relocate economically or politically. • High occurrence in GOJ-owned wetlands due to limited monitoring and management of these lands. • Lack of property rights.

MANGROVE THREATS/CONSERVATION CHALLENGES	SOCIO-ECONOMIC OBSTACLES
	• Proximity to job opportunities and city centres. • Inflation and poverty - wetlands are easily developed compared to hilly areas.
Pollution; lack of garbage collection, improper disposal of solid waste and incidental marine litter	• Lack of garbage collection in volatile communities. • Insufficient enforcement of anti-litter laws. • Unplanned informal settlements sited close to storm drains/gullies. • Improper waste disposal is normalized in Jamaican culture. • Population growth.
Siloed and uncoordinated legislative framework in place to legally protect wetlands	• Need for the completion of a Wetlands Policy for Jamaica (e.g., Draft Mangrove and Coastal Wetlands Policy and Regulation) • Need for a comprehensive financial strategy for mangrove management and conservation.
Lack of enforcement activities and project implementing agency for mangrove areas	• Paucity of field enforcement officers. • Low political will. • Enforcement activities fall under multiple agencies' jurisdictions with no clear ownership.
Climate change impact	• Original infrastructure for the country is coastally based and designed prior to climate change realities/thoughts. • Small island developing states are significantly vulnerable to climate change impact and primarily depend on funding from development or multilateral agencies.

As such, the Jamaican government is taking numerous actions to preserve and protect the country's remaining forested wetlands because it recognizes these ecosystems provisioning, regulatory, and cultural importance to Jamaica. In conjunction with this, Jamaica has been a signatory to various important regional conventions, has established international partnerships, designated protected areas, and developed national plans and guidelines supporting wetland conservation and sustainable use. There are currently four sites designated as wetlands of international importance (The Ramsar Convention on Wetlands of International Importance, Especially as Waterfowl Habitat,1971), otherwise known as the Ramsar Convention, totalling 37,487 ha covering land and sea, namely: Black River Lower Morass, Mason River Protected Area, Palisadoes - Port Royal Protected Area and the Portland Bight Wetlands and Cays, benefit from legal protection under the national environmental legal and policy framework as different categories of the protected area. Existing policies, legislations, and conventions relevant to sustainable conservation, management and utilization of forested wetlands in Jamaica include:

- The Natural Resources Conservation Authority (NRCA) Act, 1991 and its Regulations
- Wildlife Protection Act, 1945 and Wildlife Protection (Amendment of Second and Third Schedules) Regulations, 2016
- The Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000 (Amended 2015)
- The Forest Act, 1996 and Forest Regulations, 2001
- The Town and Country Planning Act, 1957 (amended in 1999)
- The Beach Control Act, 1956 (amended 2004)
- The Fisheries Act, 2018
- The Jamaica National Heritage Trust Act, 1985

In addition, there are also several international agreements that Jamaica is a signatory to that are associated with forested wetland conservation. These are:

- United Nations Convention on Biological Diversity (UNCBD), 1992
- Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, "Ramsar Convention", 1971
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1997

- Convention concerning the Protection of the World Cultural and Natural Heritage (ratified 1983)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Paris Agreement (ratified 1995)
- United Nations Framework Convention on Climate Change (UNFCCC) Reducing Emissions from Deforestation and forest Degradation (REDD+) programme, 2015.
- Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters (or the Escazu Agreement), 2019
- High Ambition Coalition for Nature and People, 2021

The National Mangrove and Swamp Forest Management Plan (NMSFMP) has been developed to ensure alignment with Jamaica's national development planning, including the Vision 2030 Jamaica National Development Plan, to achieve sustainable development objectives. Vision 2030 Jamaica is a strategic road map to guide the country to achieve its goals of sustainable development and prosperity by 2030. Other notable plans include the following:

- **Medium-Term Policy Framework -** primary mechanism for translating Vision 2030, Jamaica's long-term national goals and outcomes, into action.
- **The Climate Change Policy Framework for Jamaica -** supports Vision 2030 by reducing the risks imposed by climate change to all of Jamaica's sectors and development goals through the Hazard Risk Reduction and Adaptation to Climate Change working group.
- **The Forest Policy for Jamaica (2017) -** builds on the Strategic Forest Management Plan (SFMP) 2010-2015 as a framework for increasing the Forestry Department's capacity to manage state-owned forests.
- **National Forest Management and Conservation Plan, 2016-2026** - developed to ensure Jamaica's alignment with critical national policies geared towards achieving national sustainable development objectives to sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience.
- **Policy for Jamaica's System of Protected Areas, 1997 -** policy to harmonize the administrative and management processes for the system of natural and cultural protected areas within Jamaica.
- **National Land Policy of Jamaica (1997) -** ensure the sustainable, productive and equitable development, use and management of the country's natural resources.

Along with the supporting legislation for mangrove protection are government organizations in Jamaica that are key to the management of forested wetlands, as their responsibilities have direct and indirect impacts on the conditions of these forested wetlands. However, the overall mandate for mangrove management falls under the Natural Resources Conservation Authority, one of three statutory bodies for which NEPA carries out their technical (functional) and administrative mandate. Key entities impacting and or protecting mangroves and swamp forests in Jamaica include:

- National Resources Conservation Authority (NRCA)
- National Environment and Planning Agency (NEPA)
- Forestry Department (FD)
- National Land Agency (NLA)
- Urban Development Corporation (UDC)
- Ministry of Economic Growth and Job Creation (MEGJC)
- Ministry of Local Government and Community Development (MLGCD)
- Municipal Corporations

Despite the existing legislative and institutional arrangements for forested wetland protection in Jamaica, managing these resources is challenging. The strengths, weaknesses, opportunities, and threats for mangrove conservation are summarized below:

STRENGTHS	WEAKNESSES
• The Forest Act, 1996 and Forest Regulations, 2001 prohibit damage to or removal of trees within any wetland, swamp or mangrove forest in a forest estate or protected area and an adjacent buffer zone. • An environmental permit (EP) is required for "wetland modification, clearance or removal". • NEPA has incorporated Natural Resource Valuation principles into its Environmental Impact Assessment for developments and wetland modification permit considerations, applying higher monetary penalties for mangrove loss/damage. • GOJ agencies and statutory bodies own most mangrove lands (approximately 65%). • Most people know the importance of mangroves and that special protection is applied to wetlands. • Jamaica has focused on forested wetlands at academic institutions. • Mangrove restoration projects, including blue carbon, are underway in Jamaica. • There is an ongoing inventory of forested wetland/mangrove forests in Jamaica. • The island has rich wetland biodiversity and natural resources. • An abundance of legislation provides a basic framework for the conservation and sustainable use of Jamaica's forested wetlands. • Jamaica is a party to several international conventions, enabling access to funding wetland conservation programmes. • Jamaica has already achieved its targets for protected areas, whereby the CBD's Aichi Target 11 requires all signatory countries to have at least 17% of their land area and at least 10% of its coastal area protected by 2020.	• 30 - 40% of mangrove lands are privately owned. • GOJ agencies have lands that have informal settlements. • Unsustainable livelihood practices are embedded as a part of Jamaican society. • Untapped cross-sectoral collaboration for optimal forested wetland management. • Minimal sustainable use (ecotourism) of mangroves being marketed or developed for revenue generation. • Several protected and conservation areas where wetlands are found have multiple designations declared under different acts and managed by numerous institutions. This can and has created confusion in their overall management. The complete list of protected areas and associated laws are listed in the 'Draft Overarching Policy for Jamaica's Protected Areas System'. • There is inadequate coordination between institutions, which leads to policy incoherence, lack of common standards, policy gaps, policy implementation, and infusion of environmental issues into sectoral policies. • Comprehensive legislation with corresponding regulations does not exist for mangrove/wetland protection. • There is no overarching policy framework for wetland management. • Using buffer zones around protected conservation areas and heritage and cultural sites is largely not done in Jamaica. Considerations for implementing these zones have been integrated into the Protected Areas System Master Plan 2013-2017, but currently, it is only being done for World Heritage Sites and Game Reserves. • Areas are sometimes zoned for development without the full appreciation/ understanding of the international treaties to which Jamaica has signed, e.g., Ramsar. • Effort to better understand the intrinsic and economic values of the country's wetland resources is required. Natural resource valuation and cost-benefit analyses of forested wetland ecosystems need to be undertaken on a national scale rather than on a small scale (currently, it is undertaken on particular projects that require EIAs). • Key institutions lack accountability to ensure policies and plan to facilitate wetland conservation, protection and management are appropriately executed and enforced. • The system for monitoring wetland modifications etc., requires improvement; there is no enforcement culture, and roles and responsibilities are not well defined. This often results in agency conflict and overlap. • Low funding levels are allocated (budgetary support) in the national environmental and natural resources budget.

OPPORTUNITIES	THREATS
• Technological advances (e.g., drone technology, satellite imagery, GIS capabilities) can allow for improved and more efficient monitoring of forested wetland resources. • The legislative review process can allow outdated legislation to be updated to include more relevant issues, including forested wetland protection. • An economic valuation can contribute to better informed and more holistic decision-making about resource use and identify opportunities for effective wetland conservation. This includes a better understanding of derived benefits, monetary and non-monetary. • The growing use of social media can allow for more awareness of environmental issues and the importance of preserving a healthy natural environment, including forested wetlands. • Climate change and blue carbon funding for mangrove conservation are available. • Civil society engagement appears to be increasing. • Additional Fish Sanctuaries (formerly Special Fishery Conservation Areas, SFCAs) may be declared. • Funding/grants for alternate livelihoods/ interventional strategies are more available. • The Protected Areas System Master Plan (PASMP), as designed, provides a framework for managing protected areas and is a requirement under the Convention for Biological Diversity's (CBD's) Programme of Work for Protected Areas. • Education- growing education level means the potential for a greater understanding of the importance of the environment and its relationship with sustainable development. • Community-based ecosystem management provides an opportunity for stakeholder engagement to improve collaboration for effective management between agencies and community resource users. • Development Orders in parishes/areas with rich forested wetlands can be updated to address: (i) outdated planning legislation guiding development, (ii) lack of approved government policies on mangroves/wetlands, (iii) gaps between planning and environmental management (economic vs environmental management) (iv) a planning system supported by reactive initiatives. • More focus and emphasis on the monetary and non-monetary benefits of preserving forested wetlands so that people at the governmental and local levels understand their value.	• Infrastructural development, including demand for high-density tourism and housing developments, particularly along the coastline. • Rapid urbanization and consistently high poverty rates lead to squatting and illegal encroachment, especially in Government owned lands. • Improper solid waste disposal and limited enforcement island wide – results in waste becoming entangled in forested wetlands, thus impacting the hydrology and other environmental conditions. • Invasive alien species. • Poor land use planning. • Illegal logging activities. • Increasing wastewater generation and disposal, especially from industry and tourism. • Insufficient actions and resources to support the effective management of forested wetlands – as indicated in the new Forest Policy for Jamaica, without deliberate effort by the Government, the quantity and quality of forest cover on private lands will decline. • Climate-related threats: more frequent droughts and floods resulting from rising temperatures, increased hurricane intensity and increased variability in rainfall. • Enforcement is compromised due to a lack of financial resources. • Lack of political will and vision (related to the environment). • Inadequate understanding of the linkages between environmental issues and economic policy. • Lack of education and understanding of the general public on activities that impact wetland ecosystem health and function.

One of the major challenges to having a more robust, legal, institutional and policy framework for forested wetland protection continues to be the sectoral nature of legislation and policy. This issue is not unique to forested wetland conservation or Jamaica. There is a lack of integration of relevant biodiversity targets and approaches throughout policies, regulations, planning and economic development strategies across all levels of government and sectors of the economy. There are pathways and entry points that can be leveraged to achieve a more streamlined strategy and efficient use of resources through:

- The integration of local, regional, and international conservation and biodiversity targets for forested wetland ecosystems in the Town and Country Planning and Development Orders to ensure local development guidelines and long-term planning objectives are aligned.
- Strengthening the enforcement of environmental laws and regulations at the local and national level
- The development of legislation that focuses on forested wetlands to facilitate increased protection.
- Integrating alternative regulatory instruments, such as economic incentives, into legislation to promote sustainable use of forested wetlands.
- Determining the rights of private landowners and the role of private conservation has been a largely unresolved issue in the legislative arena.

The National Mangrove and Swamp Forest Management Plan 2023 - 2033 (NMSFMP) will complement the suite of policy tools that guide the work of the Forestry Department, National Environment and Planning Agency and other government of Jamaica stakeholders that manage forested wetlands. Based on the existing legislative protections for forested wetlands in Jamaica, the country has approximately 5828 ha of mangrove and swamp forests with gazetted protection through various Acts, including the NRCA Protected Areas, Forestry and the JNHT Acts.

The Plan has been developed to coordinate with the stakeholders managing these resources, enabling them to act with improved or newly implemented Laws and regulations and to have the plan aligned with Jamaica's national development plans. The NMSFMP has ambitions of conserving an additional 4340 ha of GOJ-owned wetlands and 1300 ha of privately owned wetlands and the restoration of at least 1000 ha of currently degraded mangroves and swamps. Several activities should bolster these actions to increase related human resource and technological capacity, increase forested wetland research, improve data management and information sharing, promote sustainable livelihoods, and public education.

THE VISION OF THE NMSFMP:-

"By 2033, Jamaica's forested wetlands will be nationally recognized and valued by the Jamaican citizens, with over 67% (10,144 ha) of existing forested wetlands are conserved and/or restored and being sustainably used for income generation and green spaces, maintaining ecosystem services and delivering benefits essential for all people."

The NMSFMP 2023-2033 will function as a technical guidance document that provides tangible and realistic management actions and methodologies for a comprehensive, consistent, and science-based approach to managing forested wetland habitats in Jamaica.

The GOAL of the NMSFMP is:

"To implement strategies that will achieve the conservation of additional/new protected forested wetland areas, amounting to a minimum of 30% (4,430 ha) of Jamaica's forested wetlands (40% of Jamaica's Government-owned forested wetlands and 20% of privately owned forested wetlands) by 2033".

The Strategic Objectives of the NMSFMP are to:

1. Reverse the loss and degradation of forested wetlands and conserve those that remain, through wise use and management, strengthening the legislative, policy and institutional frameworks and mainstreaming forested wetlands across government and society.

2. Improve the technological and technical staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.
3. Increase public awareness, information dissemination, and formal education levels about forested wetlands to complement increased protection, conservation and restoration of these ecosystems.
4. Enhance the fair and equitable economic, social and environmental benefits to all from forested wetlands ecosystem services.

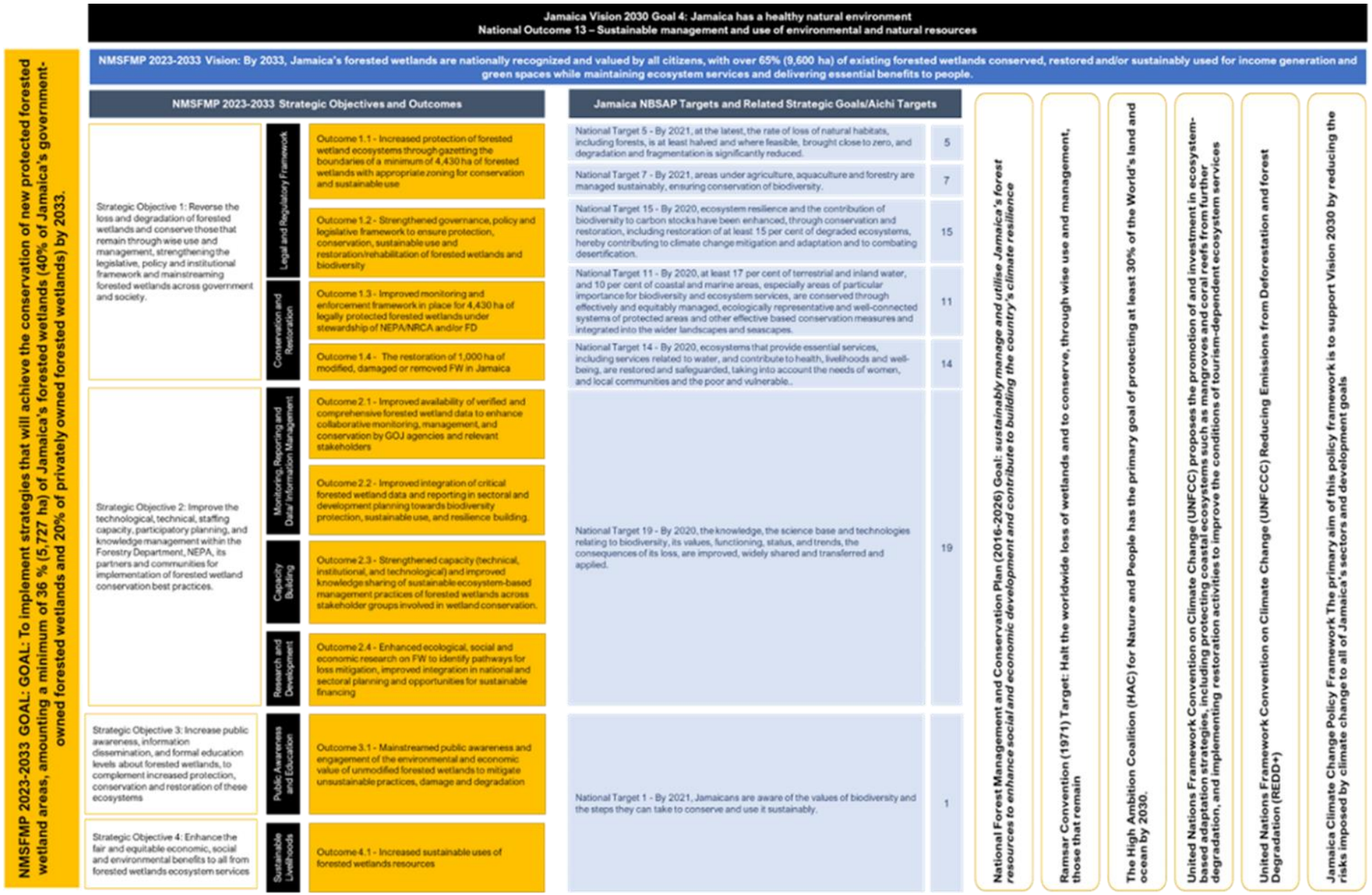
Each strategic objective has corresponding cross-cutting sub-programmes to establish and manage activities geared towards the conservation and sustainable use of Jamaica's forested wetlands. The seven (7) sub-programmes (SP) of the NMSFMP 2023-2033 are:

The fundamental objective of the NMSFMP is to promote conservation, sustainable use, and, where necessary, restoration (or rehabilitation) of forested wetland ecosystems and their associated habitats to benefit all Jamaican people and their livelihoods fairly and equitably. The guiding principles for the policy are as listed below:

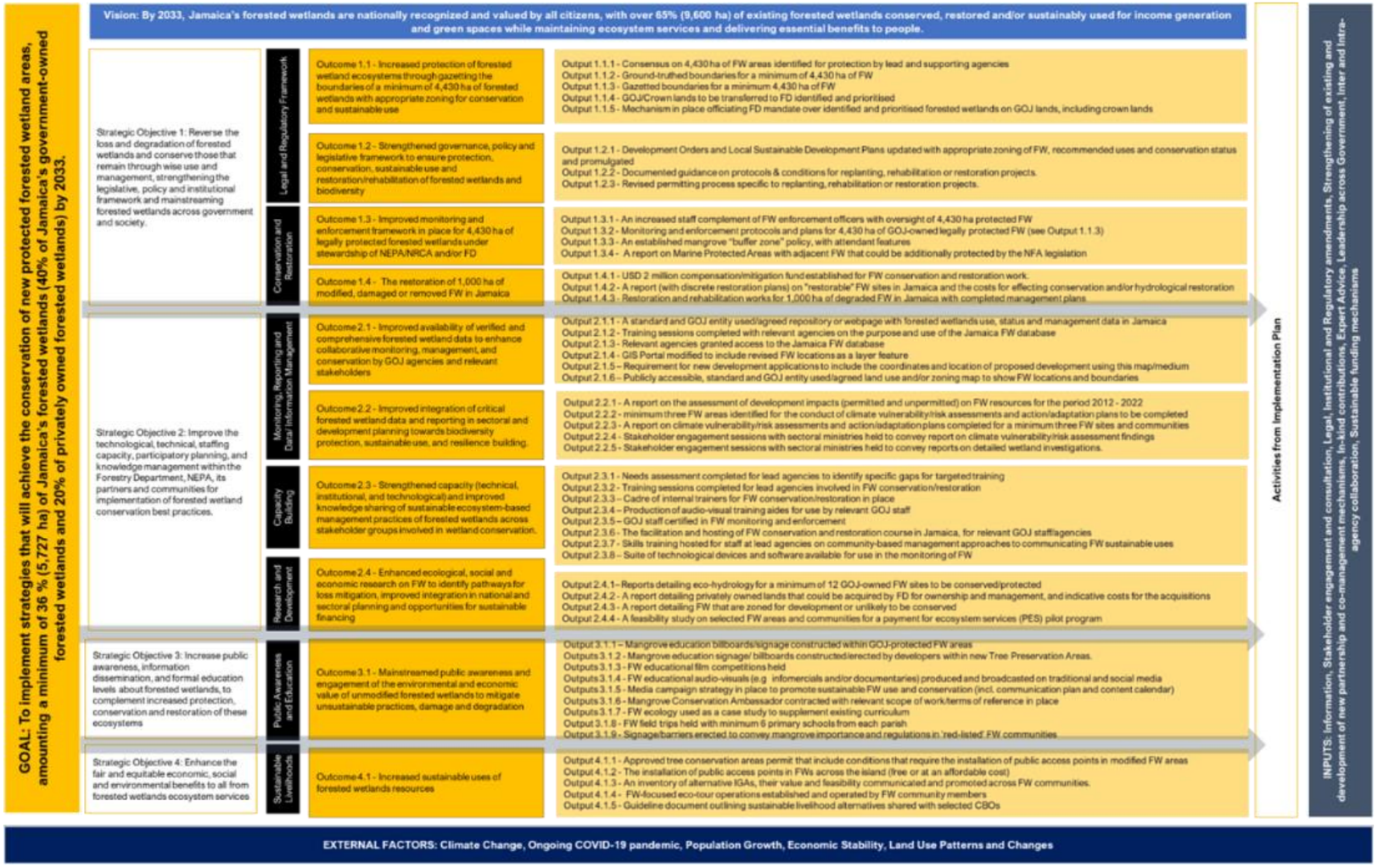
1. Integrated Ecosystem Approach
2. Transparency
3. Precautionary Approach
4. Local And Traditional Rights and Knowledge
5. Scientific Knowledge and Expertise
6. Climate Action
7. Sectoral Integration
8. Alignment With National Development Planning
9. Meeting International Obligations and Commitments
10. Adaptive Management
11. Planning Functions and Responsibilities

The NMSFMP 2023 - 2033 has ten outcomes (linked to the four Strategic Objectives) and 53 outputs, each falling under one of the seven (7) sub-programmes. The overall success of the NMSFMP will rely heavily on implementing the various activities and sub-Programmes. Based on the feedback from the Situational Analysis consultation process geared at informing the proposed management actions, the seven sub-Programmes and estimated costs amount to **USD 9,043,000.00 for the ten years** of the management plan of only the plan activities, with the monitoring and evaluation costs is USD 8,973,000.00. Detailed costings and strategies are outlined in the attendant document of this plan titled "*Jamaica's National Mangrove and Swamp Forest Management Plan 2023-2033; Financing Strategy*".

The graphic below shows the interrelation between strategic Objectives, subprogrammes, outcomes and outputs.


Jamaica Vision 2030 Goal 4: Jamaica has a healthy natural environment
National Outcome 13 – Sustainable management and use of environmental and natural resources
NMSFMP 2023-2033 GOAL: To implement strategies that will achieve the conservation of new protected forested wetland areas, amounting a minimum of 36 % (5,727 ha) of Jamaica's forested wetlands (40% of Jamaica's government-owned forested wetlands and 20% of privately owned forested wetlands) by 2033.
NMSFMP 2023-2033 Vision: By 2033, Jamaica's forested wetlands are nationally recognized and valued by all citizens, with over 65% (9,600 ha) of existing forested wetlands conserved, restored and/or sustainably used for income generation and green spaces while maintaining ecosystem services and delivering essential benefits to people.
NMSFMP 2023-2033 Strategic Objectives and Outcomes
Jamaica NBSAP Targets and Related Strategic Goals/Aichi Targets
Strategic Objective 1: Reverse the loss and degradation of forested wetlands and conserve those that remain through wise use and management, strengthening the legislative, policy and institutional framework and mainstreaming forested wetlands across government and society.
Legal and Regulatory Framework
Outcome 1.1 - Increased protection of forested wetland ecosystems through gazetting the boundaries of a minimum of 4,430 ha of forested wetlands with appropriate zoning for conservation and sustainable use
Outcome 1.2 - Strengthened governance, policy and legislative framework to ensure protection, conservation, sustainable use and restoration/rehabilitation of forested wetlands and biodiversity
Conservation and Restoration
Outcome 1.3 - Improved monitoring and enforcement framework in place for 4,430 ha of legally protected forested wetlands under stewardship of NEPA/NRCA and/or FD
Outcome 1.4 - The restoration of 1,000 ha of modified, damaged or removed FW in Jamaica
National Target 5 - By 2021, at the latest, the rate of loss of natural habitats, including forests, is at least halved and where feasible, brought close to zero, and degradation and fragmentation is significantly reduced.
5
National Target 7 - By 2021, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
7
National Target 15 - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, hereby contributing to climate change mitigation and adaptation and to combating desertification.
15
National Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective based conservation measures and integrated into the wider landscapes and seascapes.
11
National Target 14 - By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, and local communities and the poor and vulnerable..
14
Strategic Objective 2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.
Monitoring, Reporting and Data/ Information Management
Outcome 2.1 - Improved availability of verified and comprehensive forested wetland data to enhance collaborative monitoring, management, and conservation by GOJ agencies and relevant stakeholders
Outcome 2.2 - Improved integration of critical forested wetland data and reporting in sectoral and development planning towards biodiversity protection, sustainable use, and resilience building.
Capacity Building
Outcome 2.3 - Strengthened capacity (technical, institutional, and technological) and improved knowledge sharing of sustainable ecosystem-based management practices of forested wetlands across stakeholder groups involved in wetland conservation.
Research and Development
Outcome 2.4 - Enhanced ecological, social and economic research on FW to identify pathways for loss mitigation, improved integration in national and sectoral planning and opportunities for sustainable financing
National Target 19 - By 2020, the knowledge, the science base and technologies relating to biodiversity, its values, functioning, status, and trends, the consequences of its loss, are improved, widely shared and transferred and applied.
19
Strategic Objective 3: Increase public awareness, information dissemination, and formal education levels about forested wetlands, to complement increased protection, conservation and restoration of these ecosystems
Public Awareness and Education
Outcome 3.1 - Mainstreamed public awareness and engagement of the environmental and economic value of unmodified forested wetlands to mitigate unsustainable practices, damage and degradation
National Target 1 - By 2021, Jamaicans are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
1
Strategic Objective 4: Enhance the fair and equitable economic, social and environmental benefits to all from forested wetlands ecosystem services
Sustainable Livelihoods
Outcome 4.1 - Increased sustainable uses of forested wetlands resources
National Forest Management and Conservation Plan (2016-2026) Goal: sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience
Ramsar Convention (1971) Target: Halt the worldwide loss of wetlands and to conserve, through wise use and management, those that remain
The High Ambition Coalition (HAC) for Nature and People has the primary goal of protecting at least 30% of the World's land and ocean by 2030.
United Nations Framework Convention on Climate Change (UNFCC) proposes the promotion of and investment in ecosystem-based adaptation strategies, including protecting coastal ecosystems such as mangroves and coral reefs from further degradation, and implementing restoration activities to improve the conditions of tourism-dependent ecosystem services
United Nations Framework Convention on Climate Change (UNFCCC) Reducing Emissions from Deforestation and forest Degradation (REDD+)
Jamaica Climate Change Policy Framework The primary aim of this policy framework is to support Vision 2030 by reducing the risks imposed by climate change to all of Jamaica's sectors and development goals

Further, this conceptual graphic here shows the logic frame for the National Mangrove and Swamp Forest Management Plan.



This National Mangrove and Swamp Forest Management Plan (2023-2033) is designed to assist its users and managers in maximizing benefits fairly and equitably to all stakeholders. The plan makes efforts to address the situations likely to impact Jamaica's forested wetlands adversely and to support opportunities and interventions for improved management, conservation and sustainable use. It should be noted that the plan is not intended to be a panacea to the challenges likely to be imposed upon the country's forested wetland ecosystems. The plan is ambitious, with multiple targets, assumptions and risks. It is contingent on the support and contribution from all levels of government, non-government agencies, academia, the private sector and local communities. It is anticipated that stakeholders will lend technical and other resources towards implementing the plan and various sub-programmes. Overall, the NMSFMP embraces an EBM (ecosystem-based management) approach, addressing issues of ecosystem governance, legislation, communications, biodiversity protection, community-based interventions, research, and social and economic benefits.

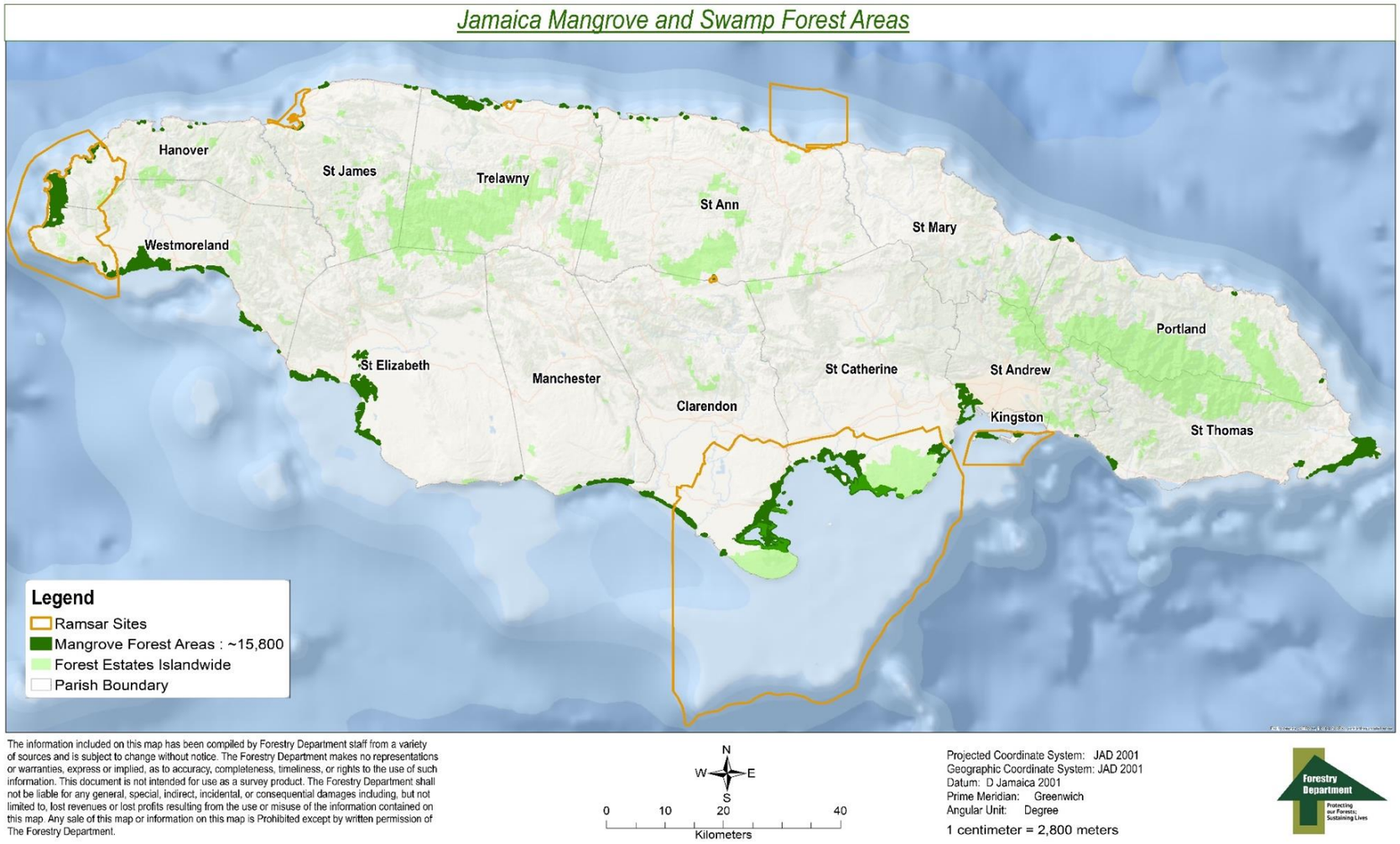
The Plan has an estimated budget of US$ 8.7m to be funded by GOJ financing, grants and co-financing from various stakeholders. The Forestry Department (FD) will oversee the implementation, review and updating of the NMSFMP but will also benefit from significant inter-ministerial representation, like The National Environment and Planning Agency (NEPA), Ministry of Economic Growth and Job Creation (MEGJC), National Land Agency (NLA), Office of Disaster Preparedness and Emergency Management (ODPEM), National Fisheries Authority (NFA) and University of the West Indies (UWI) Mona. With efficient and effective implementation of this plan, it is intended to help its users and management maximize benefits fairly and equitably, as it addresses the circumstances that negatively influence Jamaica's forested wetlands while supporting possibilities and interventions for better control, conservation, and sustainable usage.

Abbreviations and Acronyms

AA	Administrative Authorities
AAJ	Airports Authority of Jamaica
CBA	Community-Based Adaptation
CCAM	Caribbean Coastal Area Management Foundation
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CEPA	Communication, Education and Public Awareness (programme)
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CMS	Centre for Marine Sciences
CP	Contracting Party
DBH	Diameter at Breast Height
DBML	Discovery Bay Marine Laboratory
DOs	Development Orders
EBM	Ecosystem-Based Management
EDF	European Development Fund
EHU	Environmental Health Unit
EIAs	Environmental Impact Assessments
EP	Environmental Permit
EU-BSP	European Union Budget Support Programme
EU-GEF	European Union Global Environment Facility
FAO	Food and Agriculture Organization
FD	Forestry Department, Forestry Dept.
FSN	Fish Sanctuary Network, Jamaica
FW	Forested Wetland
GCF	Green Climate Fund
GEF	Global Environmental Facility
GIS	Geographic Information System
GPS	Global Positioning System
GOJ	Government of Jamaica
GTCO2e	Gigatons of CO2 Equivalent
Ha	Hectare
ICT	Information and Communication Technology
IFRC	International Federation of the Red Cross and Red Crescent Societies
IUCN	The International Union for Conservation of Nature
JAMIN	Jamaica Awareness of Mangroves in Nature
JCF	Jamaica Constabulary Force

JDVRP	Jamaica Disaster Vulnerability Reduction Project
JFB	Jamaica Fire Brigade
JNHT	Jamaica National Heritage Trust
JPS	Jamaica Public Service Company
JSIF	Jamaica Social Investment Fund
JTB	Jamaica Tourist Board
LFMCs	Local Forest Management Committees
LSDPs	Local Sustainable Development Plans
LULC	Land Use and Land Cover
MEGJC	Ministry of Economic Growth and Job Creation
MER	Monitoring, Evaluation and Reporting
MSET	Ministry of Science, Energy and Technology
MDAs	Ministries, Departments and Agencies
MGD	Mines and Geology Division
MLGCD	Ministry of Local Government and Community Development
MOE	Ministry of Education
MOF	Ministry of Finance
MOHW	Ministry of Health and Wellness
MT	Ministry of Tourism
MTF	The Medium-Term Socio-Economic Policy Framework
NBSAP	National Biodiversity Strategy and Action Plan for Jamaica
NDC	Nationally Determined Contribution
NEPA	National Environment and Planning Agency
NFMCP	National Forest Management and Conservation Plan
NGO	Non-governmental Organization
NLA	National Land Agency
NMSFMP	National Mangrove and Swamp Forest Management Plan (also known as the National Mangrove Management Plan or NMMP)
NRCA	Natural Resources Conservation Authority
NSDMD	National Spatial Data Management Division
NSWMA	National Solid Waste Management Authority
NWA	National Works Agency
NWC	National Water Commission
PAC	The Protected Area Committees
PASMP	Protected Areas System Master Plan
PCJ	Petroleum Corporation of Jamaica
PDCs	Parish Development Committees
PEP	Primary Exit Profile
PES	Payment for Ecosystem Services

PIOJ	Planning Institute of Jamaica
PoWPA	Programme of Work for Protected Areas
PR	Public Relations
PS	Private Sector
Ramsar Conv.	Ramsar Convention on Wetlands of International Importance, Especially as Waterfowl Habitat
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RFP	Request for Proposal
RPPD	Rural Physical Planning Division
RSIS	Ramsar Sites Information Service
SA	Situational Analysis
SEP	Stakeholder Engagement Plan
SDC	Social Development Committee
SDG	Sustainable Development Goals
SFMP	Strategic Forest Management Plan
SO	Strategic Objectives
SODECO	Solutions for Developing Countries
SP	Sub-Programme(s)
SRC	Scientific Research Council
STATIN	Statistical Institute of Jamaica
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAC	The Technical Advisory Committee
TCPA	Town and Country Planning Authority
TEF	Tourism Enhancement Fund
TPDCo.	Tourism Product Development Company
TOC	Table of Contents
TOR	Terms of Reference
TNC	The Nature Conservancy
UDC	Urban Development Corporation
UNCBD	The United Nations Conservation on Biological Diversity
UNFF	United Nations Forum on Forests
UNFCCC	United Nations Framework Convention on Climate Change
UWI	The University of the West Indies
UWI-KHEAM	The University of the West Indies Kingston Harbour Eco-System Adaptation Measure
WRA	Water Resources Authority



Map of the national distribution of mangrove and Swamp Forests, 2022

1 Background

1.1 The Rationale for the National Mangrove and Swamp Forest Management Plan

In Jamaica, mangroves and swamp forests (collectively called forested wetlands) are experiencing continued natural and human-derived threats. In 1989, the swamp forest cover in Jamaica was 2,358 ha, and by 1998, 111 ha was lost, leaving the total swamp forest cover at 2,247 ha (Evelyn and Camirand 2003). Regarding mangrove forest cover in 2013, 9,800 hectares (ha) of mangroves were recorded in Jamaica, mainly along the south coast (World Bank 2019). Data suggest that over 770 ha of mangrove forest cover in Jamaica has been lost over the 1996-2016 period. Forested wetland ecosystems are threatened by coastal development (planned and unplanned), changes in land use leading to clearing and land degradation, and extraction (timber, small-scale farming uses), compounded by climate change. Despite national goals, policies, and governmental ambitions, the country continues to have an annual net loss of mangrove and swamp forests. The Government of Jamaica (GOJ) has recognized the value of these ecosystems to the Jamaican population. It is moving towards interventions and action plans to conserve and protect the country's remaining forested wetlands.

Jamaica is also a signatory to various important regional conventions, established international partnerships, designated protected areas, and developed national plans and guidelines that support the conservation and sustainable use of wetland resources. There are currently four sites designated as wetlands of international importance under The Ramsar Convention on Wetlands of International Importance, Especially as Waterfowl Habitat,1971 (otherwise known as the Ramsar Convention), totalling 37,487 ha covering land and sea[1]. The sites are the Black River Lower Morass, Mason River Protected Area, Palisadoes - Port Royal Protected Area and the Portland Bight Wetlands and Cays; all benefit from legal protection under the national environmental legal and policy framework as different categories of the protected area.

The National Forest Management and Conservation Plan (NFMCP) 2016 - 2026 outlined the tasks required to formulate a National Mangrove and Swamp Forest Management Plan (NMSFMP) to promote a biodiversity-positive approach toward sustainable management of Jamaica's remaining forested wetland ecosystems. The NFMCP (2016-2026) furthermore indicated that the "high vulnerability of mangrove and swamp forests may allow the Forestry Department to pursue the transfer of Government-owned mangrove and swamp forest parcels outside of the Forestry Department's management responsibility from the National Land Agency (NLA)". Funding for the development of this plan came via the 11th European Development Fund Budget Support Programme, with the intention for the document to serve as the "*main government document to guide mangrove management in Jamaica".* However, the NMSFMP is not intended to be a legal or policy document, nor should it include any site-specific management details.

The NMSFMP should equip The Forestry Department, other GOJ entities and their global partners to manage Jamaica's mangrove and swamp forests better, having developed strategies and tools to address areas needing immediate or gradual intervention. The outcomes of the NMSFMP should improve collaborative and integrative management of Jamaica's forested wetlands to ensure tangible ecosystem benefits are fairly and equitably delivered to present and future generations of Jamaicans and support national development goals.

1.2 Importance of Mangroves and Swamp Forests

Forested wetlands worldwide have many beneficial features to the human population, though many of these are not widely recognized or appreciated. Details of the over 200 documented uses of mangroves and swamp forests are well described (Tomlinson 1986; Kathiresan, Kandasamy, and Bingham 2001; Hogarth 2017). These functions may be grouped into regulating, supporting, provisioning, and cultural benefits (Webber *et al*., 2016).

- **Regulating:** 1. Climate regulation; 2. Shoreline stabilization; 3. Water filtration and pollution regulation. 4. Coastal Protection and Resilience.

[1] https://rsis.ramsar.org/ris-search/Jamaica?f%5B0%5D=regionCountry_en_ss%3ALatin%20America%20and%20the%20Caribbean&f%5B1%5D=regionCountry_en_ss%3AJamaica

- **Supporting**: 1. Habitat for various biota, including juvenile fish that are essential components of coral reefs and other ecosystems and critical commercial species; 2. Carbon sequestration; 3. Spawning ground for numerous marine species.
- **Provisioning**: 1. Fisheries production 2. Aquaculture production 3. Pharmaceutical generation 4. Charcoal and lumber resources 5. Honey 6. Tannins 7. Salt.
- **Cultural benefits**: 1. Recreation and tourism; 2. Educational opportunities 3. Aesthetic and cultural values.

The importance of mangroves as natural barriers to coastal erosion is now widely acknowledged. This has encouraged the acceleration of related policies, especially following the 2004 Indian Ocean Tsunami and the 2005 storm surge from Hurricane Katrina (Mandal et al. 2019). A 2016 World Bank study also highlighted the role of mangroves in lowering erosion in the countries of the Philippines, Guatemala, Rwanda, Colombia, Costa Rica, Indonesia, and Botswana, indicating that wave height can be reduced by 13% to 66% over a 100-meter-wide mangrove belt and by 50% to 100% over a 500-meter-wide mangrove belt. The increase in research on mangrove functionality and importance (Lee *et al.* 2014) has grown significantly in recent decades, with mangrove forests being increasingly celebrated globally for some of their vital roles, including sustainable fisheries, shoreline protection (Uddin *et al.* 2013; Barbier 1993; World Bank 2019), and the bioremediation of wastes (Reef, Feller and Lovelock, 2010; Alongi 2008). Global recognition of the mangrove's importance in carbon export/sequestration (Duke et al. 2007; Donato *et al*. 2011) provides further credibility for mangroves, especially regarding offsets to global emissions and tradable carbon credits (Trench, 2021). Swamp forests are crucial for preserving biodiversity, maintaining water quality, and assisting regional artesian fisheries. Additionally, they facilitate connectivity across coastal ecosystems and serve various purposes, including flood control, organic matter storage, sediment retention, and carbon management. However, swamp forests are particularly vulnerable to the anthropogenic and natural factors that cause forest degradation due to wetlands' usefulness as agricultural land (Prospere, McLaren and Wilson 2016).

1.3 The Jamaican Context

Jamaica's 2016-2021 National Biodiversity Strategy and Action Plan for Jamaica (NBSAP) reports that while wetlands represent only 2% of Jamaica's total surface area, they comprise a large part of the densely populated coastal zone. Vast areas of wetlands in Jamaica are characterized by mangrove forests found along 290 km of the coastline, being used in various ways and contributing to multiple industries and livelihoods.

In Jamaica, mangrove and swamp forest ecosystems provide habitats for many important species, including the West Indian manatee (*Trichechus manatus*), listed as endangered on the IUCN Red List. The West Indian Whistling Duck (*Dendrocygna arborea*) and the American Crocodile (*Crocodylus acutus*) are listed as vulnerable on the IUCN Red List of Threatened Species and listed in *Appendix I* of the Convention on International Trade in Endangered Species (CITES). Most American Crocodile populations in Jamaica inhabit the mangrove swamps and marshes along the island's southern coast, including the Black River Great Morass and the Milk River, but with a few isolated populations on the north coast in the parishes of Hanover and Trelawny. The Black River Safari tour in Jamaica is an excellent example of the sustainable use of wetland/mangrove forest resources, attracting many fee-paying tourists daily to view the ecosystem, especially the large reptiles. However, the value and respect for the American Crocodile are not generally emulated across Jamaica. These protected animals are routinely killed for meat or out of fear in most other communities they inhabit.

The critical socio-economic benefits of mangroves and swamp forest ecosystems are linked to the ecological services they provide. They provide crucial wildlife habitats and nursery areas for birds, shrimp, crabs and fish – all food and livelihood provisions for coastal communities. Additionally, many of these coastal communities, and ultimately the Jamaican economy, depend primarily on tourism and agriculture, some of which are provided by forested wetland ecosystem services (Richards 2008). In particular, the sustainability of the fishing industry is contingent on the health and integrity of mangrove ecosystems. Over 220 fish species, including commercially important fish (snapper, grunt, parrotfish, barracuda, mackerel), as well as economically essential crustaceans (penaeid shrimp, crabs), are dependent on mangroves for habitat and nursery grounds (NRCA, 1997). Ecotourism also utilizes the unmodified/natural structure and showcases the diversity of mangrove and swamp forests for sightseeing, boat excursions, swimming, and

other attractions. These industries provide benefits to local communities by making use of their traditional knowledge to support lives and livelihoods (NRCA 1997, Trench 2018).

Since 2004, Jamaica has experienced ten major hurricanes resulting in significant loss and damage to people and property. Estimated costs from the impact and losses caused by these hurricanes total over US$2 billion (Cavallo and Noy, 2009). Hurricane Ivan (2004) accounts for the single highest damage and loss, amounting to over US$0.5 billion in damages (Burgess *et al*., 2013). There is predicted to be an increase in the intensity of hurricanes, despite decreases in frequency (State of the Jamaican Climate, 2015). Coastal communities are expected to become more vulnerable with the projected trends and impacts of climate change for Jamaica. The effect of sea level rise, coupled with intensified storm surges in Latin America, and the Caribbean, is also predicted to be highest in Jamaica, with 60% of the population living within 5km of the coastline and therefore exposed to potential losses of coastal GDP set to exceed 27% (World Bank, 2009). The increased exposure, vulnerability, and intensity of predicted changes will directly impact infrastructure, homes, people, and livelihoods and cause further degradation of coastal ecosystems like mangroves and swamp forests. The economic implications are likely to be experienced at all scales, affecting local communities, fisheries, tourism, and many other sectors.

In this regard, mangroves and swamp forests can support Jamaica's economy through adaptation planning. Coastal flooding from storms in Jamaica, with the presence of mangroves and swamp forests, results in an estimated US$136.4 million in damages annually (World Bank 2019). The expected damages should these ecosystems be lost would increase to US$169 million. Therefore, mangrove forests provide over US$32.7 million in annual flood reduction benefits to assets and infrastructure (residential, industrial, service) in coastal areas. The local populations in these coastal areas also experience the benefits of flood risk reduction offered by mangrove and swamp forests from storms. In three communities studied, 177,000 residents are physically shielded and protected by mangroves (World Bank 2019). One example can be seen in the mangroves and sand dunes of the Palisadoes-Port Royal Protected Area (P-PRPA), which are well-documented to provide natural coastal protective services associated with the relatively calm waters of Kingston Harbour. This vegetation flanking the Southern harbour boundaries, which keeps the tombolo intact from erosion, makes for calm weather conditions allowing regular ship docking and transhipment activities, which are essential to the Jamaican economy. Approximately 70% of Jamaica's population lives in coastal areas, and about 56% of its economic assets (international airports, harbours, tourism infrastructure) are located on the coast (Richards, 2008).

The annual carbon sequestration values for the estimated total mangrove area in Jamaica is placed at 3.7 million Tonnes of Carbon sequestered

Mangrove and swamp forests also provide ecosystem services beyond coastal protection. Mangroves contain three to four times the mass of carbon typically found in boreal, temperate or upland tropical forests. The annual carbon sequestration values for Jamaica's estimated total mangrove area is at 3.7 million Tons of Carbon sequestered, valued at US$180 million(Present Net Values calculated for 100 years, World Bank, 2019). These costs represent the avoided costs to society of not releasing this stored carbon into the atmosphere.

The considerations outlined in this section have influenced the development of the NMSFMP and are reflected in the vision, goal and strategic objectives outlined in later sections of this document. The plan attempts to make inter-linkages with international, regional and national planning and targets, as well as existing conservation and biodiversity action plans, to create synergies with a focus on lessons learnt and resource optimisation.

2 Situational Analysis

Swamp and mangrove forests are Jamaica's two most common types of forested wetlands. Swamp forests are areas with a dominance of water-tolerant woody trees that are continually or seasonally flooded by riverine water sources. Mangrove forests are best described as woody angiosperms (flowering plants) found in the intertidal zone and adjacent communities of tropical and sub-tropical coastlines (Gill and Tomlinson, 1969) that can withstand prolonged tidal inundation due to specialized roots with spongy aerenchyma tissue (Hogarth, 2015). The importance of mangroves and swamp forests is recognized through several legislations and policies that offer more protection to these sensitive wetland ecosystems. Jamaica's 2016-2021 National Biodiversity Strategy and Action Plan for Jamaica (NBSAP) states that while wetlands represent only 2% of Jamaica's total surface area, they comprise a large part of the densely populated coastal zone. Vast areas of wetlands in Jamaica are characterized by mangrove forests found along 290 km of the coastline, being used in various ways and contributing to multiple industries and livelihoods.

2.1 Historical Changes and Mangrove and Swamp Forest Status

An accurate account of historical changes in mangrove cover is hampered by the limited high-quality national data available on the spatial extent of mangroves. Important to note is that in Jamaica, mangroves and swamp forests have typically been counted together and only recently have they been recorded separately (Henry, 2018). Additionally, there is generally a paucity of data or reports on the long-term trends in Jamaica's forested wetlands' extent, status and health. However, some individual site-level data exist (NEPA, 2013). The Land Use/Cover Change Assessment (2015) reported that wetlands, comprising mangrove forests and swamp forests, experienced a loss of approximately 95% or 2,100 hectares between 1983 and 2013. This was primarily due to "the conversion of these wetlands into (i) fields of herbaceous crops, fallow, cultivated vegetables etc., (ii) Herbaceous wetland and (iii) buildings and other infrastructures; in descending order" (FD - LUCA, 2015). While acknowledging the limitations of the said land use and land cover assessment, this significant reduction warranted immediate intervention.

Therefore, in developing the NMSFMP, the Forestry Department provided the consulting team with results and reports from their European Union Budget Support Programme (EU-BSP) mangrove assessments. These reports revealed that over 15,000 ha of forested wetlands were examined for location and size, land ownership, status and threats and vegetation characteristics. The report stated that the most significant percentages of coastal mangroves were found in the "southern sections of St. Thomas, St. Catherine, Clarendon, St. Elizabeth and Westmoreland parishes, primarily in sheltered bays, estuaries, and inlets". The spatial mapping software identified wetland parcels as mangroves and swamp forests if over 75% of these areas had over 1 ha of mangrove trees or swamp forest species.

The data collected by these surveys represent a significant milestone in managing Jamaica's mangrove forest. A government agency has reviewed known and suspected forested wetlands by aerial image analysis and physically verifying the location and status of Jamaica's forested wetlands. This report highlighted the relative boundaries, vegetative characteristics, geology, and status of the country's forested wetlands. While some types of impact, such as pollution, were quantified per parish, others, such as land reclamation in forested wetlands, were only mentioned, as no specific metric was denoted. With regards to the impact of pollution on mangroves, it was highlighted by this report that pollution was more evident in the population centres, with parishes such as St Catherine, St. Andrew/Kingston and St. James showing high pollution indices", which affect mangrove forest deleteriously.

Desktop and verification surveys revealed that Jamaica had a net loss of mangrove forests in the last five years. In their 2017 State of the Environment Report, NEPA stated that "no monitoring data were available for seagrass meadows and mangroves, but these are believed to be relatively stable, due to strict enforcement of the no-net loss policy". However, the number and footprint of negative/destructive works in mangrove forests island-wide continue to surpass the gains in mangrove forests from natural mangrove expansion (accretion) and restoration projects.

For the NMSFMP, mangrove losses are any human-driven reduction in the size of natural mangrove forest vegetation, including its soil and hydrology (excluding hurricanes etc.). This would include direct reclamation (dumping) or mangrove "die-back" associated with human-induced changes in hydrology, e.g., where a roadway lacks culverts and a section of mangroves die in response to reduced water flows.

FIGURE 2-1: FIVE HECTARES OF MANGROVE LOSS FOR A HOTEL DEVELOPMENT NEAR FALMOUTH, TRELAWNY: BEFORE (2015), AFTER (2021)

FIGURE 2-2: SIX HECTARES OF MANGROVE LOSS TO CREATE THE NEW FALMOUTH MARKET (GOJ PROJECT), TRELAWNY; BEFORE 2015, AFTER 2018

Mangrove forest gains for this summary were considered if an area was rehabilitated through human intervention (by replanting, hydrology corrections or slope modifications) for more than two (2) years from a previously documented degraded condition and where a difference in forest cover could be observed by reviewing aerial images. Though a mangrove forest cannot be restored in two years, studies in Jamaica have shown that most vegetative factors can show positive signs of rehabilitation and may be considered as being on a path to restoration (Trench, 2021). A rehabilitated site shows vegetation growth (tree height, nodes and DBH), functioning hydrology, marginally increased soil organic content, early carbon sequestration characteristics and recruitment of fauna that use the habitat. Restoring a mangrove forest previously degraded to full ecological functionality may take over a decade (Osland *et al*., 2012). **Table 2-1** below presents a review of known mangrove losses and gains over five years by the consultant. This review was conducted by analysing land use change on the Google Earth platform in select locations and cross-referencing these images with issued development permits. Information about the sites undergoing restoration was gathered from the relevant GoJ, NGO and or Academia stakeholders executing these restoration attempts. The data does not capture all changes in mangrove forests in Jamaica between 2017 and 2021, but rather the details of permitted and documented cases of mangrove losses or gains.

TABLE 2-1: VERIFIED ACCOUNTS OF MANGROVE LOSSES AND GAINS AND LOCATIONS (2017 TO 2021)

Location	Parish	Quantity lost/rehabilitated (hectares)	Agency/Sector
Losses-reduction in mangrove area			
Coral Spring: H 10*	Trelawny	-5	Tourism
Burwood: Royalton	Trelawny	-5	Tourism
"Champion" Supermarket Plaza-Falmouth	Trelawny	-1	Commerce
Mahoe Bay: Sandals	St. James	-0.56	Tourism

Green Island/Industry Cove	Hanover	-4	Tourism
MBJ-Airport: Runway Expansion	St. James	-4	Ministry of Transport
TOTAL LOSSES		**-19.56**	
Gains-Rehabilitation in progress			
Portland Cottage	Clarendon	0.5	Government
Malcolm's Bay	St. Elizabeth	1.2	Academia
Freeport/Bogue	Montego Bay	0.5	Academia
Long Bay/Lilliput	St. James	0.1	Academia
Palisadoes-Rock revetments	Kingston	0.4	Government
TOTAL GAINS		**+2.7**	

The results demonstrate that Jamaica lost more than six times the amount of mangrove forest gained through active restoration initiatives in only five years. Please note that the figures above only include documented or permitted losses (wetland modification permits granted by NEPA). Likely, there were more losses from unplanned/unpermitted developments or via developments which were not granted NEPA permits.

While there were other publicized and documented restoration projects underway and recently implemented (e.g. NEPA-Winn's Morass, Falmouth - 0.5 hectares of restoration and approximately 20 hectares earmarked for conservation, SODECO - Southern Clarendon - over 400 hectares, Refuge Cay in Port Royal Cays by UWI, Centre for Marine Sciences); these projects did not meet the 5-year-old criteria or did a review of the site showed any significant gains in forest cover from an aerial perspective. The SODECO/IDB mangrove restoration project, slated to be completed in 2026, is Jamaica's largest mangrove restoration project. This represents Jamaica's intentions to "scale up" the pilot mangrove restoration projects being grant-financed to US$2.45 million by the UK Blue Carbon Fund.[2]

The Situational Analysis and the FD EU-BSP assessment reports highlighted stakeholder views that most of the mangrove losses were related to Tourism development. This data further validates the opinions reflected during stakeholder consultations, where respondents regarded tourism-related developments as the most detrimental industry to forested wetland conservation in Jamaica. A NEPA State of the Environment Report stated that in Trelawny, tourism expansion alone was responsible for over 160 ha of mangrove forest reclaimed between 2005 and 2010 (NEPA 2010). The review of recent mangrove losses for the NMSFMP revealed at least one case where mangrove losses were facilitated and implemented by GOJ Agencies: The Port Authority of Jamaica and Trelawny Municipal Corporation. The relocation of the Falmouth Market involved the reclamation of 6 hectares of mangrove forest and perhaps unwittingly facilitated the further expansion of an adjacent informal settlement. The reclaimed market area was an access road to the adjoining community.

The level of protection of our forested wetlands is discussed further in the document. Based on the existing legislative protections for forested wetlands in Jamaica, the country has approximately **5828 ha** of mangrove and swamp forests with gazetted protection through various Acts, including the NRCA Protected Areas, Forestry and the JNHT Acts.

2.2 Ownership of Mangrove Lands

Based on the Forestry Department's EU BSP Indicator 3: Mangrove and Swamp Forest Verification Report Year 1-3 (2022), most forested wetlands (swamp and mangrove forests) in Jamaica were owned by GOJ ministries and Agencies and Statutory bodies. These two categories totalled over 7,378.68 ha of the 15,853.74 ha investigated in those surveys. Over 6500 ha were noted to be under private ownership, with 1939 ha of forested wetland ownership being unclear. These data are presented below:

- Government entities: 7,378.68 ha
- Private/Individual Ownership: 6535.50 ha

[2]https://jamaica-gleaner.com/article/news/20200519/uk-pumps-360-million-restore-mangroves-jamaica?msclkid=89acd799b49311ec8b7c69ded4354a33; accessed April 2, 2022.

- Tenure Gaps[3](unsure): 1,939.60 ha

The relatively high GOJ ownership of forested wetlands in Jamaica may be a positive factor for the Forestry Department's Mangrove conservation plans and ambitions. This factor may afford government entities with greater scope to conserve these forested wetlands since privately owned parcels of land may be more subject to development pressure and may be more difficult to designate as protected areas. Nevertheless, several well-known and traditionally large parcels of unplanned development settlements in wetlands occur on government-owned lands island-wide, with a high occurrence of these parcels sited close to major resort towns, e.g., Falmouth, Savanna-la-mar, Green Island, and Orange Bay.

[3] Ownership gaps in the tenure information received from NLA.

2.3 Drivers, Pressures and Threats

It is widely acknowledged globally that accelerated mangrove loss results from growing pressures of agricultural, urban and industrial developments along coastlines, combined with climate change and sea-level rise (Duke *et al*., 2007; Gilman *et al*., 2007; Hogarth, 2017). The threats to mangroves worldwide may vary based on the main economic drivers of where they occur. In the case of the Caribbean, development pressure to forested wetlands is traditionally due to tourism developments (Trench, 2021).

The extraction of products from mangroves or mangrove forests (removal of fish, shellfish, tree trunks, and honey at subsistence and artisanal levels) is much less damaging, as they require the mangrove tree or the organisms inhabiting the mangroves to replenish to give more of its product over time, while the trees continue to sequester carbon, produce oxygen, and support biodiversity in most cases (Trench 2021). Most extractive industries are more damaging to trees than the forest's hydrology. Wood-chip production, salt pond construction, charcoal burning, and tannin extraction also lead to significant losses of mangroves (Valiela, Bowen, and York, 2001). Smaller amounts of mangrove forest disturbances occur through natural phenomena like hurricanes (Smith *et al*., 2009), but these are less damaging than human actions.

Fossil and archaeological records show that mangroves and associated fishery resources were used sustainably by the original inhabitants of Jamaica, e.g., Arawak Indians/Tainos (Lacerda *et al*., 1993). In Jamaican literature, mangrove loss has been mainly attributed to direct tourism, residential and civil development, and secondary anthropogenic effects like pollution (Trench 2021). Based on a review of satellite images and in-situ surveys, Jamaica lost over 2,000 hectares of mangroves in 10 years (NEPA, 2010). This NEPA value is somewhat supported by the Forestry Department's most recent land use/land cover assessment (2015), revealing that mangrove and swamp forest cover cumulatively decreased by 2123 ha between 1998 and 2013. However, this conflicts with the World Bank (2019) study, which stated that 770 ha were lost between 196 and 2016.

Significant mangrove degradation may also be attributed to agriculture-related projects (sugar cane farming and establishment of aquaculture ponds), in addition to natural factors like hurricanes accounting for some mangrove loss. Overwhelming evidence supports stakeholder views that tourism-related pressure in the last decade has been the primary motivation for mangrove forest loss in Jamaica. Jamaica's northern parishes (central tourism belt) declined nearly 300 hectares of mangroves between 2005 and 2010 (NEPA, 2010). Degradation, albeit unwittingly, has been linked to aquaculture or agricultural expansion, especially in Southern Clarendon. The expansion of fish farms in Old Harbour Bay, Milk River and Mitchell Town has led to the removal of mangrove forests (UWI-DBML, 2021).

Other studies by the University of the West Indies Centre for Marine Sciences revealed that 13.3 hectares of mangrove forests in Old Harbour Bay experienced die-back resulting from hyper-salinity conditions created by anthropogenic actions. Shrimp farm operators (as early as the 1980s) redirected riverine waters from a small tributary which historically entered a mangrove area, into their operations for use and then out into the area's main inlet canal. The operators diverted their effluent water into a solitary culvert going under Thompson Pen Road, which led into and sustained the mangrove area up to 2007 (UWI-DBML, 2021). Residents reportedly blocked this culvert in 2015 due to construction failure, preventing fresh water from entering the mangroves. This mangrove forest was converted to a salina over three decades as saline water entered the basin-like area and had no dilution as the new water sources were diverted.

The destruction of mangroves in Port Royal and Palisadoes on the south coast of Jamaica to facilitate road, airport and marina construction is also a notable example (Goodbody, 2003). Also, the advent of a city discharging its waste into a semi-enclosed harbour has had many consequences on the organisms inhabiting the area and human livelihood. Mansingh *et al*. (1995) documented that pesticide contamination (e.g., diazinon and aldrin) was evident in oysters and fish sampled within Kingston Harbour and its mangroves.

Known existing threats and challenges to mangrove conservation are highlighted in this section (**Table 2-2**). Both planned and unplanned development is the biggest driver for mangrove degradation and remains the most significant challenge faced in conserving forested wetlands. Pollution (effluent and solid waste) also causes significant damage to mangrove forests and is an ever-present challenge to conservation efforts. Among the other challenges identified are civic projects, illegal logging, and the lack of legislative forces. These have manifested significant and cumulative anthropogenic pressures/threats affecting critical mangrove ecosystems. This is occurring against the backdrop of climate change, which both adds pressure, exacerbates existing vulnerabilities, and presents threats to mangrove forests and, by extension, challenges to mangrove conservation across the Island.

These threats and challenges align with recent findings from the Support for REDD+ readiness preparation in Jamaica. Agriculture, hotels, settlement, and infrastructure were implicated as the causes of forest degradation in general, in addition to overarching themes of heavy debt, colonial legacy and individualism.

In response to these challenges, Jamaica has become a signatory to various important regional conventions, established international partnerships, designated protected areas and developed national plans and guidelines supporting wetland conservation and sustainable use. These are examined in Section 2.4.

TABLE 2-2: MANGROVE CONSERVATION CHALLENGES WITH LINKED SOCIAL AND ECONOMIC OBSTACLES

MANGROVE THREATS/ CONSERVATION CHALLENGES	SOCIO-ECONOMIC OBSTACLES
Coastal developments -Planned/Permitted (hotels and housing)	• New developments usually equate to employment and business growth, which help promote rural-urban migration and a proliferation of unplanned developments/informal communities. • Governmental pressure to fast-track developments. • Low regard for environmental conservation. • High unemployment rate.
Civic Projects (roads and bridges, air and seaports etc.)	• Lack of civil infrastructure slows productivity. • Governmental pressure to fast-track developments. • Community support.
Illegal logging; cutting for firewood and charcoal burning	• Only source of income for some households. • High percentage of the community lives in poverty. • Social norm.
Natural Disaster (Hurricanes, Storms, floods, etc.)	• Low-income earners may occupy easily accessible lands, e.g., wetlands. • In many instances, relocating informal/unplanned communities from government-owned wetlands is politically unpopular and unfeasible. • Critical infrastructure (e.g., airports, ports) and buildings in wetland areas are at higher risk of damage.
Disrupted hydrology-incidental/unintentional.	• Lack of proper planning involvement from government and civic planning agencies. • Unplanned or poorly planned developments and informal communities can severely disrupt mangrove forests.
Lack of knowledge about the system and its value (in monetary terms and otherwise).	• Minimal or no public education programmes specific to wetland importance. • Insufficient public education budget for wetlands in government institutions.
Lack of long-term funding	• Grant funding opportunity is more accessible to established institutions and individuals with higher educational levels. • Wetland conservation grants are normally available short-term (1 to 5 years).
Unplanned settlements; multiple squatter settlements	• High occurrence in wetland areas makes these settlements challenging to remove/relocate economically or politically. • High occurrence in GOJ-owned wetlands due to limited monitoring and management of these lands. • Lack of property rights. • Proximity to job opportunities and city centres.

MANGROVE THREATS/ CONSERVATION CHALLENGES	SOCIO-ECONOMIC OBSTACLES
	• Inflation and poverty- wetlands are easily developed compared to hilly areas.
Pollution; lack of garbage collection, improper disposal of solid waste and incidental marine litter	• Lack of garbage collection in volatile communities. • Insufficient enforcement of anti-litter laws. • Unplanned informal settlements sited close to storm drains/gullies. • Improper waste disposal is normalized in Jamaican culture. • Population growth.
Siloed and uncoordinated legislative framework in place to legally protect wetlands	• Need for the completion of a Wetlands Policy for Jamaica (e.g., Draft Mangrove and Coastal Wetlands Policy and Regulation) • Need for a comprehensive financial strategy for mangrove management and conservation.
Lack of enforcement activities and project implementing agency for mangrove areas	• Paucity of field enforcement officers. • Low political will. • Enforcement activities fall under multiple agencies' jurisdictions; no clear ownership.
Climate change impact	• Original infrastructure for the country is coastally based and designed prior to climate change realities/thoughts. • Small island developing states are significantly vulnerable to climate change's impact and primarily depend on funding from development or multilateral agencies.

.

2.4 Legislative, Policy and Institutional Framework

This section reviews policies, legislations, and conventions relevant to sustainable conservation, management and utilization of forested wetlands in Jamaica.

TABLE 2-3: LEGISLATIVE, REGULATORY AND POLICY FRAMEWORK FOR MANGROVE PROTECTION IN JAMAICA

NAME	DESCRIPTION	RELEVANCE TO NMSFMP
The Constitution of Jamaica	The 1962 Constitution protects property rights and establishes principles on property ownership in Jamaica. The legal status of owned property applies to the ownership of flora and fauna in Jamaica. The proprietor owns all flora on his/her property, and if he/she catches wildlife on his/her property (subject to the Wildlife Protection Act), then he/she owns these wild animals, subject to the Wildlife Protection Act. In 2011, Chapter III of the Constitution of Jamaica was amended to include a new Charter of Fundamental Rights and Freedoms. Section 13(3) (l) of the Constitution now recognizes "the right to enjoy a healthy and productive environment free from the threat of injury or damage from environmental abuse and degradation of the ecological heritage."	Many forested wetland areas are on private lands, which may present challenges and opportunities for collaborative and sustainable protection, conservation, or management. The NMSMP will aim to implement strategies that conserve and promote the sustainable use of forested wetlands equitably for all Jamaicans.
LEGISLATION		
The Natural Resources Conservation Authority (NRCA) Act, 1991 and its Regulations	This Act is the overarching legislation for environmental protection and management in Jamaica. Under the Act, the NRCA may 'take such steps as are necessary for the effective management of the physical environment of Jamaica to ensure the conservation, protection and proper use of its natural resources. The Authority may also promote public awareness of the ecological systems of Jamaica and their importance to the social and economic life of the Island; and advise the	The Natural Resources Conservation (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order, 1996, prescribes the island of Jamaica and the territorial sea of Jamaica as the area where specified activities are prohibited without a permit. This includes 'the modification, clearance, or reclamation of wetlands' and 'the dredging, excavation,

	Minister on general policies relevant to the management, development, conservation and care of the environment. The Act has an extensive enforcement framework, and the Authority is further empowered through the Beach Control Act, the Watersheds Protection Act and the Wildlife Protection Act to take enforcement action. Regulations were last amended in 2015 to remove the 'Grandfather' clause and limit an environmental permit to five (5) years.: The regulatory framework includes the following: • The Natural Resources (Permit and Licences) Regulations 1996 and (Amendment) Regulations 2015. • Natural Resources (National Parks) Regulations 1993 and (Amendment) Regulations 2003. • The Natural Resources (Marine Parks) Regulations 1992, (Amendment) Regulations 2003, and (Amendment) Regulations 2015. • The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order 1996 and (Amendment) Order 2015. • The Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013. • Natural Resources Conservation (Palisadoes – Port Royal Protected Area) Order 1998 • Natural Resources Conservation (Portland Bight Protected Area) Order 1999 • Natural Resources Negril Environmental Protection Area Order 1997 • The Natural Resources Conservation (Black River Protected Area) Order, 2021	clearing and reclamation of riverine, swamp, beach, wetlands or marsh areas. The Natural Resources Conservation (Permits and Licences) Regulations, 1996, set out the requirements for application for a permit or licence.

Wildlife Protection Act, 1945 and Wildlife Protection (Amendment of Second and Third Schedules) Regulations 2016	The Wildlife Protection Act of 1945 is mainly concerned with protecting specified faunal species and is the only statute in Jamaica designated explicitly to this. This Act protects several rare and endangered faunal species. The Wildlife Protection (Amendment of Second and Third Schedules) Regulations 2016 provides substitutions for the Second and Third Schedules of the principal Act, which lists these species. Protected animals include those listed in the Third Schedule to the Act and all birds except those listed in the second part of the Second Schedule. Protected animals such as the American Crocodile (*Crocodylus acutus*) are subject to management plans which have identified essential wetland habitats for their conservation.	Plants, such as mangrove trees, are not protected under the Act. The establishment of two types of protected areas, namely Game Sanctuaries and Game Reserves, is authorized under this Act. A Game Sanctuary / Game Reserve is a parcel of land, body of water or area comprising both land and water within which the hunting of animals (including birds), removal of eggs or the nest of any bird and the use or possession of any dog, gun, catapult or any other weapon which could be used to hunt any animals or birds is prohibited. In addition, all Forest Reserves are designated as Game Reserves and form part of the Protected Areas System of Jamaica. For each Game Sanctuaries/Game Reserve, there is a 50-meter distance from the boundary; this is called a protective zone (National Environment and Planning Agency, 2017).
The Endangered Species (Protection, Conservation and Regulation of Trade) Act 2000 (Amended 2015)	The Endangered Species (Protection, Conservation and Regulation of Trade) Act was created in 2000 to ensure the codification of Jamaica's obligations under the Convention for the International Trade in Endangered Species of Wild Fauna and Flora. This Act governs international and domestic trade in endangered species in and from Jamaica. The regulations associated with this Act were amended in 2015 and included updated fees for the various permits and certificates granted through this legislation	Several recognized endangered species inhabit or can be found in forested wetland areas, including the American crocodile (*Crocodylus acutus*), the West Indian manatee (*Trichechus manatus*) and the West Indian whistling duck (*Dendrocygna arborea*).
	The Forest Act provides the legal framework for Jamaica's conservation and sustainable use of Forests. Forest Reserves	Mangrove and Swamp Forests may be declared public/private Forest Reserves or

The Forest Act, 196 and Forest Regulations, 2001	and Forest Management Areas may be declared under the Act and applied to Crown and Private lands (if the owner applies). A forest management plan must be developed for each forest reserve and forest management area every five years. Certain activities are permitted within these areas with a permit or licence or the permission of the Conservator of Forests. It is an offence to destroy trees, cause damage, light fires, carry axes, or kill or injure wild birds or animals in a forest reserve or forest management area.	Forest Management Areas. In such cases, all the rules/conditions with this legislation apply. Additionally, regulation 42 of the Regulations states that "a person shall not cut, damage, disturb or cause to be disturbed the forest produce within any wetland, swamp or mangrove forest in a forest estate or protected area and an adjacent buffer zone."
The Town and Country Planning Act, 1958 (amended in 1999)	The objective of this Act is to ensure the orderly development of land. Development Orders provide detailed local land use policies and zoning covering most of Jamaica. The content of Development Orders (DOs) is prescribed in Section 10 (1) of the Act. At subsection (b), it is stated that a DO for any defined area shall 'contain such provisions as are necessary or expedient for prohibiting or regulating the development of land in the area to which the development order applies and generally for carrying out any of the objects for which the order is made.' In areas covered by a Development Order, planning permission is required from the local authority or the Town and Country Planning Authority if the area is "called in" or if the development does not conform to the zoning in the Development Order	The Act provides for the making of Tree Preservation Orders (Section 25) whereby a local authority may seek to preserve trees or woodlands in their area and prohibit wilful damage or destruction of trees or require replanting trees. The Act provides for notification of, designation, and the right to submit objections to the declaration of such an Order, including provisions for compensation. The Order may also secure replanting any Sector of the woodland area in which trees were felled during the forestry operations permitted under the order.
The Beach Control Act, 1956 (amended 2004)	The Beach Control Act regulates rights to the foreshore and the sea floor in Jamaican waters. Provisions in the Act govern commercial and recreational activities, the control and management of development on the beach through licensing provisions, and the protection of the marine ecosystem. Marine-protected areas may be declared under the Act. The Act provides for the NRCA to apply to the Court for an order, if so warranted, for a person who has caused any damage to the foreshore or the floor of the sea to rehabilitate	Mangrove forests or wetland areas may fall under the protection of the Act by their physical location.

	the area or in the case of damage to a natural resource pay damages to the Authority	
The Fisheries Act, 2018	This Act repeals the Fishing Industry Act and provides for efficient and effective management and sustainable development of fisheries, aquaculture	Forested wetlands serve as substantial nursery grounds for commercial fisheries. The industry may have a vested interest in their protection for viability. However, the Act has no provisions to protect/conserve mangrove forests.
The Jamaica National Heritage Trust Act, 1985	This Act establishes the Jamaica National Heritage Trust as a statutory body to protect Jamaica's national heritage, including any place, animal or plant species or object/building.	Forested wetlands can come under legal protection should they fall within a heritage area, e.g., the Seville Heritage site in St Ann and Port Royal, Kingston. While the PPRA is additionally protected as a Ramsar site, the Seville site has approximately 24 ha of mangroves protected under the JNHT Act of 1985.

2.4.1 International Agreements

Mangrove conservation and sustainable use can be guided and supported through international legal frameworks' mechanisms, processes and principles. Mangroves are internationally recognized as an important resource, a vital source of carbon storage and important habitat for globally valued biodiversity, including species with unique genetic properties that may hold important applications[4]. Therefore, the international community has a legitimate interest in mangrove conservation. International laws create the standard and principles applicable to mangroves and the activities that impact them and provide a structure and best practices with which national and local legislation can align.

Jamaica is a signatory to several international agreements, with the most relevant to forested wetland conservation being: -

United Nations Convention on Biological Diversity (UNCBD) – The convention requires parties to integrate biodiversity considerations into sectoral and cross-sectoral plans, programmes and policies, and national decision-making strategies and action plans. In response to their obligation under UNCBD the GOJ developed a National Biodiversity Strategy and Action Plan for Jamaica (NBSAP, 2016 - 2021), the goals of which are as follows:

i. address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
ii. reduce the direct pressures on biodiversity and promote sustainable use.
iii. improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
iv. enhance the benefits to all from biodiversity and ecosystem services; and
v. enhance implementation through participatory planning, knowledge management and capacity building. Several of the Aichi Biodiversity Targets in Jamaica's NBSAP (2016 - 2021) are relevant to forested wetland conservation, including Target 5 (halve the rate of loss of natural habitats); *Target 7* (sustainable agriculture, aquaculture, and forestry), *Target 11* (protection of 17% of terrestrial and inland water and 10% of coastal ecosystems); *Target 15* (restoration of 15% of degraded ecosystems). Jamaica became a party to this treaty on April 6, 1995.

Ramsar Convention on Wetlands of International Importance, especially as Waterfowl Habitat, "Ramsar Convention" 1971 – The Ramsar Convention's broad aims are to halt the worldwide loss of wetlands and to conserve, through wise use and management, those that remain. Parties to this convention regularly report on implementing their commitments, including those relating to swamp and mangrove forests. The last report would have been reviewed at the Convention of The Parties held in November 2021. Jamaica became a contracting party on February 7, 1998, and has four (4) sites covering a combined total of 45,860.20 hectares, according to the Ramsar Sites Information Service (RSIS) platform[5]. These are the Black River Lower Morass in 1997, Palisadoes–Port Royal Protected Area in 2005, the Portland Bight Wetlands and Cays in 2006 and the Mason River Protected Area in 2011.

The protection and designation of these sites cover not only the forested areas but also shoals, reefs and seagrass beds in the case of Black River Lower Morass, Portland Bight Wetlands, Cays and Palisadoes-Port Royal Protected Area. The sections which are purely forested wetlands cover areas of approximately 104.74 ha (PPRPA), 4,330.59 ha (Portland Bight) and 1,368.75 ha (Black River): totalling 5,804.08 ha of forested wetlands already protected in Jamaica.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) – CITES generally seeks to protect endangered plants and animals globally, owing to the cross-boundary nature of animals and plants. This protection requires international cooperation. It aims to ensure that the international trade of wild animal and plant species does not threaten the species survival in the wild, and it accords varying degrees of protection to over 35,000 species. Jamaica became a Party to CITES on June 22, 1997. In 2000, Jamaica enacted domestic legislation, the Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000 and Regulations to fulfil its obligations to CITES. The Convention and Act encompass several fauna that inhabits or can be found within forested wetland areas.

[4] Donato, D. *et al*. (2011). Mangroves among the most carbon-rich forests in the tropics. Nature geoscience 4: 293–297; Macintosh, D.J. and Ashton, E. C. (2002). A Review of Mangrove Biodiversity Conservation and Management. Centre for Tropical Ecosystems Research, University of Aarhus, Denmark; Deshmukh, S. and Balaji, V. (Eds). (1994). Conservation of Mangrove Forest Genetic Resources: A Training Manual. JTTO-CRSARD Project, M.S. Swaminathan Research Foundation, Madras, India.

[5] https://rsis.ramsar.org/ris-search/Jamaica?f%5B0%5D=regionCountry_en_ss%3ALatin%20America%20and%20the%20Caribbean&f%5B1%5D=regionCountry_en_ss%3AJamaica-accessed Oct 30, 2022

Convention concerning the Protection of the World Cultural and Natural Heritage (ratified 1983), **United Nations Framework Convention on Climate Change, and the Paris Agreement** (ratified 1995) – Mangroves are recognized as an essential resource for adaptation and mitigation to climate, while also being significantly threatened by same. While not explicitly addressing mangroves, Jamaica's revised 2020 Nationally Determined Contribution (NDC) includes emissions from the land-use and forestry sector for the first time.

United Nations Framework Convention on Climate Change (UNFCC) – Jamaica has been a party to the United Nations Framework Convention on Climate Change (UNFCCC) since 1995. This requires timely updates on its actions to respond to climate change. The Third National Communication of Jamaica (2018) identifies the decline of coastal wetland coverage as having significant ecological and economic implications for the country. It also proposes promoting and investing in ecosystem-based adaptation strategies, including protecting coastal ecosystems such as mangroves and coral reefs from further degradation and implementing restoration activities to improve the conditions of tourism-dependent ecosystem services.

United Nations Framework Convention on Climate Change (UNFCCC) Reducing Emissions from Deforestation and forest Degradation (REDD+) is a climate change mitigation programme that incentivises developing countries to reduce or remove forest carbon emissions by awarding them carbon credits. Jamaica is currently engaged in the first of three REDD+ phases, the 'readiness' phase. This will build capacity towards a National Forest Monitoring System (NFMS), Forest Reference Emissions Level (FREE) and Safeguard Information System such that Jamaica can qualify for 'implementation' (phase two) and 'payments-for-results' (phase three).

The proposed Jamaican REDD+ strategy objectives are:

- Install effective REDD+ management structures embracing complete national jurisdiction.
- Anchor more crown and private land under sustainable tree cover.
-
- Upscale an inclusive, sustainable forestry & agroforestry economy
- Improve forest protection and restore degraded forest lands to maximise their conservation or productive contribution.

Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters, also known as the "Escazu Agreement."- the treaty aims to protect the rights of present and future generations to live in a healthy environment. The treaty seeks to achieve the effective implementation of the rights to access environmental information as well as justice regarding ecological matters. Thirdly, the treaty aims to improve public participation in environmental decision-making. With the treaty in full effect, the citizens' environmental rights will be better protected. Jamaica signed the treaty on September 26, 2019; however, it has not yet been ratified.

High Ambition Coalition for Nature and People

The High Ambition Coalition (HAC) for Nature and People aims to protect at least 30% of the World's land and ocean by 2030. The "30 by 30" (30% by 2030) target is a global target that aims to halt the accelerating loss of species and protect vital ecosystems that are the source of economic security. Over 50 governments from across six continents are committed, including Jamaica.

Leaders Pledge for Nature

At the September 2020 United Nations Summit on Biodiversity, political leaders pledged to reverse biodiversity loss by 2030. In this regard, leaders committed to undertake urgent actions to put nature and biodiversity on a path to recovery over ten years up to 2030.

The Global Biodiversity Framework

The Post-2020 Global Biodiversity Framework is a ten-year plan with critical targets to:

- Ensure that, globally, at least 30% of land and sea areas, especially areas of particular importance for biodiversity and its contributions to people, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas. Also, that other effective area-based conservation measures are integrated into the broader landscapes and seascapes.
- Reduce nutrients lost to the environment by at least half, pesticides by at least two-thirds, and eliminate plastic waste discharge.

- Use ecosystem-based approaches to contribute to mitigation and adaptation to climate change, contributing at least ten gigatonnes of CO^2 equivalent ($GTCO^2e$) per year to mitigation; and ensure that all mitigation and adaptation efforts avoid negative impacts on biodiversity.

The final Global Diversity Framework is still being negotiated and adopted by Parties at the time of writing this plan.

2.4.2 National Policies and Plans

The National Mangrove and Swamp Forest Management Plan have been developed to ensure alignment with Jamaica's national development planning to achieve sustainable development objectives. This section briefly describes these plans, while Section 3.5 illustrates links to the NMSFMP 2023-2033.

Vision 2030 Jamaica – National Development Plan

Vision 2030 Jamaica is a strategic road map to guide the country to achieve its goals of sustainable development and prosperity by 2030. The critical underlying objective of Vision 2030 Jamaica is to secure sustained and broad-based improvement in the quality of life that will transform Jamaica into: "the place of choice to live, work, raise families and do business". To achieve this objective, the National Development Plan articulates a comprehensive and integrated strategy around four fundamental goals:

- Goal 1: Jamaicans are empowered to achieve their fullest potential.
- Goal 2: The Jamaican society is secure, cohesive and just.
- Goal 3: Jamaica's economy is prosperous.
- Goal 4: Jamaica has a healthy natural environment.

Goal 4 identifies the importance of the natural environment, environmental sustainability and conservation of the country's natural resources and acknowledges that a productive and protective environment, sound social systems, and a healthy economy are key pillars of sustainable development and the welfare of the nation's citizens. Goal 4 has three national outcomes:

- National Outcome 13 – Sustainable management and use of environmental and natural resources
- National Outcome 14 – Hazard Risk Reduction and Adaptation to Climate Change
- National Outcome 15 - Sustainable urban and rural development

Vision 2030 Jamaica recognizes the role that hazard risk reduction can play in achieving sustainable prosperity for Jamaica and proposes to 'disaster-proof' development by: "transforming 'vicious spirals' of risk accumulation and disaster losses into 'virtuous spirals' of development, risk reduction and effective disaster response". The plan also reports that loss of biodiversity and a net loss of forest cover (among other environmental issues) threaten the country's sustainable future, particularly in the face of climate change. Vision 2030 Jamaica further provides the framework to ensure that climate change issues are mainstreamed into national policies and development activities. The objective is to avoid or minimize the impact of disasters related to climate change by increasing coping capacity at various levels (including economic sectors and communities) within the country. Considering those findings, the effective management of ecosystems such as forested wetlands provides essential services such as flood control, recharging groundwater and carbon sinks that are paramount to economic development and climate adaptation.

Medium-Term Policy Framework

The Medium-Term Socio-Economic Policy Framework (MTF) is the primary mechanism for translating Vision 2030, Jamaica's long-term national goals and outcomes, into action. The most recent of the three-yearly MTFs covers the period 2021-2024. As a fundamental component of the national planning framework, the MTF 2021-2024 outlines a prioritized package of policies, strategies and programmes aligned to the budget at the macro level that will be implemented primarily by Ministries, Departments and Agencies (MDAs) over the period.

The Climate Change Policy Framework for Jamaica

The primary aim of this policy framework is to support Vision 2030 by reducing the risks imposed by climate change to all of Jamaica's sectors and development goals through the Hazard Risk Reduction and Adaptation to Climate Change (HRRACC) thematic working group 3. Among its goals is to create a sustainable institutional mechanism to facilitate the development, coordination and implementation of

policies, sectoral plans, programmes, strategies, and legislation to mitigate and adapt to climate change. Building resilience to the impacts of climate change has been articulated as one of the GOJ's highest priorities. The Government has acknowledged the cross-cutting nature of climate change and the need to effectively develop an integrated approach to build resilience at all levels and have the required enabling policies in place.

Among the objectives is to *'mainstream climate change considerations into national policies and all types and levels of development planning and to build the country's capacity to develop and implement climate change adaptation and mitigation activities.'*

The guiding principles of the policy framework include:

- Sustainable use of natural resources
- A multi-sectoral approach to climate change
- Public Participation and Collaboration
- The Precautionary Approach
- Transparency and accountability
- Best science
- Polluter Pays Principle; and
- Inter- and intra-generational equity.

The Forest Policy for Jamaica (2017)

The revised Forest Policy for Jamaica, 2017, is aligned with the national sustainable development goals of Vision 2030 Jamaica. It also builds on the Strategic Forest Management Plan (SFMP) 2010 - 2015, which was developed as a framework for increasing the Forestry Department's capacity to manage state-owned forests by "increasing the participation of the private sector, community-based organizations, and Non-governmental Organizations (NGOs) in the sustainable management and conservation of Jamaica's forests.

The policy addresses crucial gaps and needs for the forest sector, including:

- The introduction of mechanisms to govern forest management data collection,
- The demarcation of jurisdictional boundaries and the regulation of:
- activities on Crown and privately-owned lands of the forest sector
- forest-based industries
- Documenting the importance of broad stakeholder involvement in the management of the island's forests to include the public and private sectors, non-government organizations, community-based organizations, Local Forest Management Committees (LFMCs) and special interest groups.

National Forest Management and Conservation Plan, 2016-2026

The National Forest Management and Conservation Plan (NFMCP) 2016 - 2026 was developed to ensure Jamaica's alignment with vital national policies geared towards achieving national sustainable development objectives. This plan aims to "*sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience."*

The plan states that:

> *"For Jamaica to have a healthy natural environment (Goal 4 of Vision 2030 Jamaica National Development Plan) the country needs to establish effective management of its forest resources and biodiversity. The rate of deforestation and loss of species and ecosystems can be reversed through strategies for strengthened good governance, legislation, climate change adaptation and enforcing regulations. Various national policies must be harmonised with sustainable forest and biodiversity management objectives."*

National Strategy and Action Plan on Biological Diversity in Jamaica 2016-2021 (2016)

National Biodiversity Strategies and Action Plans (NBSAPs) are the principal instruments for implementing the United Nations Convention on Biological Diversity (UNCBD) at the national level. The Convention requires countries to prepare a national biodiversity strategy and to ensure that it is mainstreamed into the plans of the sectors with activities that can impact biodiversity.

The goals and targets of Jamaica's National Strategy and Action Plan are based on the five strategic goals of the CBD's Strategic Plan 2011 - 2020 and its Aichi Targets. The Strategic Goals are as follows:

- **Strategic Goal A –** Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
- **Strategic Goal B –** Reduce the direct pressures on biodiversity and promote sustainable use.
- **Strategic Goal C –** Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
- **Strategic Goal D –** Enhance the benefits to all from biodiversity and ecosystem services.
- **Strategic Goal E –** Enhance implementation through participatory planning, knowledge management and capacity building.

Policy for Jamaica's System of Protected Areas, 1997

In 2016, a draft overarching policy for Jamaica's protected area system was completed to update and revise the Draft 1997 Policy for Jamaica's System of Protected Areas. The 2016 policy aimed to harmonize the administrative and management processes for the country's natural and cultural protected areas. The Policy is essential for implementing the United Nations Convention for Biological Diversity's (UNCBD), since establishing protected areas is one of the most effective mechanisms to support the conservation of Jamaica's biodiversity.

The goals of the Protected Areas Policy include economic development, environmental conservation, sustainable resource use, recreation, public education, public participation, local responsibility, and financial sustainability. The policy states that successful implementation of the Protected Areas Policy would depend on the coordination of policy and the planning and implementation among the agencies responsible for the different protected areas.

The Protected Area Systems Master Plan: Jamaica, 2013-2017

The plan is a requirement under the United Nations Convention for Biological Diversity's (UNCBD) Programme of Work for Protected Areas (PoWPA). The Protected Areas Committee (PAC) is responsible for guiding and monitoring the implementation of the Protected Area Systems Master Plan (PASMP). The plan is consistent with several national policies and plans, including the Policy for Jamaica's System of Protected Areas 1997, the National Strategy and Action Plan on Biological Diversity in Jamaica 2016-2021, and Vision 2030 Jamaica: National Development Plan (2009).

The PASMP aims to develop a comprehensive and representative protected area system, including landscape, seascape, and natural and cultural heritage. The Plan is the primary national policy document for strengthening management and extending protected area coverage. Various laws and several responsible agencies legislate ten existing protected area system categories in Jamaica. In addition, a number of other government entities (such as the Forestry Department, The National Fisheries Division (formerly the Fisheries Division) and Jamaica National Heritage Trust), local management entities, non-governmental entities, the private sector and individuals are outlined as essential role players as well. Forested wetlands can be found within various protected area categories, including:

- Protected Area, Forest Reserve
- Protected National Heritage Sites
- Environmental Protection Area
- Game Reserves/Game Sanctuaries

National Land Policy of Jamaica (1997)

The comprehensive National Land Policy was developed after an assessment of the physical resource and socioeconomic needs of the country. This assessment underscored the need for a complete understanding and appreciation of the finite nature of land resources and advocacy for sustainable use. The goals and objectives of the Policy are to ensure the sustainable, productive and equitable development, use and management of the country's natural resources.

2.4.3 Key Institutions

Table 2-4 below presents the government organizations in Jamaica relevant to managing forested wetlands. There are currently government agencies whose activities and responsibilities, directly and indirectly,

impact the condition of forested wetlands. However, the overall mandate for mangrove management falls under the Natural Resources Conservation Authority, one of three statutory bodies for which NEPA carries out the technical (functional) and administrative mandate.

TABLE 2-4: KEY ENTITIES RELEVANT TO MANGROVE PROTECTION OR IMPACTS IN JAMAICA

ENTITY	INSTITUTIONAL MANDATE RELEVANT TO FORESTED WETLANDS
National Resources Conservation Authority (NRCA)	The Natural Resources Conservation Authority (NRCA) is the statutory body established pursuant to Natural Resources Conservation Authority Act with primary responsibility for environmental management and conservation.
National Environment and Planning Agency (NEPA)	Each Contracting Party (CP) to the Ramsar Convention is required to designate an implementing agency within its government to take responsibility for the affairs of the Convention. These agencies are known as "Administrative Authorities". The Administrative Authority (AA) is the focal point for communications with the Ramsar Convention Secretariat and is the main agency responsible for implementing the treaty. In addition to being the primary agency with the mandate for environmental protection (including environmental permits and licences), National Environment and Planning Agency (NEPA) is Jamaica's AA. Furthermore, the Planning and Development Division of NEPA is responsible for preparing town and parish development plans; preparing development orders; processing applications for land development; and formulating policies on planning issues.
Forestry Department (FD)	The Forestry Department is the Executive Agency charged with managing and conserving Jamaica's forest resources, particularly those found on public lands. The Agency also supports the sustainable management of forests on Crown lands in forest reserves and estates; and the effective conservation of the said forests, including forested wetlands. FD also has the responsibility of granting permits and licences.
National Land Agency (NLA)	The National Land Agency (NLA) is an Executive Agency under the Ministry of Economic Growth and Job Creation. NLA created a modern national land (spatial) information system to support sustainable development. The Agency brings together Government's core land information functions, including Land Titles, Surveys & Mapping, Land Valuation & Estate (Crown Land) Management.
Ministry of Economic Growth and Job Creation (MEGJC)	MEGJC is the portfolio ministry for FD, NEPA and NLA. It provides policy direction for its agencies and is primarily responsible for advancing the country's prosperity through partnership, economic growth and sustainable development. Moreover, MEGJC, through these environmental management agencies, is responsible for the protection of Jamaica's natural resources, the integration of environmental considerations into national development planning, to encourage environmental sustainability and climate resilience through the development of policies, legislation, projects, and programmes for effective environmental management, protection and conservation.
Ministry of Local Government and Community Development (MLGCD)	MLGCD acts as the agent of local development. The Ministry is responsible for regional planning and strategic direction, including local sustainable development planning and control. Local Authorities, officially known as Municipal Corporations, are empowered to make by-laws, regulations and rules for the good governance of the parishes over which they have jurisdiction.

ENTITY	INSTITUTIONAL MANDATE RELEVANT TO FORESTED WETLANDS
Municipal Corporations	Local Authorities, officially known as Municipal Corporations, are empowered to make by-laws, regulations and rules for the good governance of the parishes over which they have jurisdiction.

Numerous government agencies conduct activities with direct and indirect impacts on the health, ecological integrity and sustainable use of forested wetlands. Section 9 of the NRCA Act (1991) requires that the Natural Resources Conservation Authority (NRCA) consult "any agency or department of Government exercising functions in connection with the environment." Therefore, aligning forested wetland management strategies across these entities and their respective plans at all levels is essential. Some of these entities include:

- Airports Authority of Jamaica (AAJ)
- Office of the Parliamentary Counsel (OPC)
- Environmental Health Unit (EHU), Ministry of Health & Wellness
- Jamaica Constabulary Force (JCF)
- Jamaica Fire Brigade (JFB)
- Jamaica National Heritage Trust (JNHT)
- Jamaica Public Service Company
- Jamaica Social Investment Fund (JSIF)
- Jamaica Tourist Board (JTB)
- Mines and Geology Division (MGD)
- Ministry of Finance and the Public Service
- Ministry of National Security
- Ministry of Tourism
- National Spatial Data Management Division
- National Solid Waste Management Authority (NSWMA)
- National Water Commission (NWC)
- National Works Agency (NWA)
- Office of Disaster Preparedness and Emergency Management (ODPEM)
- Planning Institute of Jamaica (PIOJ)
- Port Authority of Jamaica
- Tourism Enhancement Fund (TEF)
- Tourism Product Development Company (TPDCo.)
- Urban Development Corporation (UDC)
- Water Resources Authority (WRA)
- Recycling Partners of Jamaica

2.4.4 SWOT Analysis

The summary of the strengths, weaknesses, opportunities and threats for mangrove conservation and management in Jamaica is presented in the following Table (2-5). It emerges from the current state, critical threats, opportunities, and weaknesses identified.

TABLE 2-5: SWOT ANALYSIS

STRENGTHS	WEAKNESSES
• The Forest Act, 1996 and Forest Regulations, 2001 prohibit damage to or removal of trees within any wetland, swamp	• 30 - 40% of mangrove lands are privately owned. • GOJ agencies have lands that have informal settlements.

or mangrove forest in a forest estate or protected area and an adjacent buffer zone. • An environmental permit (EP) is required for "wetland modification, clearance or removal". • NEPA has incorporated Natural Resource Valuation principles into its Environmental Impact Assessment for developments and wetland modification permit considerations, applying higher monetary penalties for mangrove loss/damage. • GOJ agencies and statutory bodies own most mangrove lands (approximately 65%). • Most people know the importance of mangroves and that special protection is applied to wetlands. • Jamaica has focused on forested wetlands at academic institutions. • Mangrove restoration projects, including blue carbon, are underway in Jamaica. • There is an ongoing inventory of forested wetland/mangrove forests in Jamaica. • The island has rich wetland biodiversity and natural resources. • An abundance of legislation provides a basic framework for the conservation and sustainable use of Jamaica's forested wetlands. • Jamaica is a party to several international conventions, enabling access to wetland conservation programmes' funding. • Jamaica has already achieved its targets for protected areas, whereby CBD's Aichi Target 11 requires all signatory countries to have at least 17% of their land area and at least 10% of their coastal area protected by 2020.	• Unsustainable livelihood practices are embedded as a part of Jamaican society. • Untapped cross-sectoral collaboration for optimal forested wetland management. • Minimal sustainable use (ecotourism) of mangroves being marketed or developed for revenue generation. • Several protected and conservation areas where wetlands are found have multiple designations declared under different acts and managed by multiple institutions. This can and has created confusion in their overall management. The complete list of protected areas and associated laws are listed in the 'Draft Overarching Policy for Jamaica's Protected Areas System'. • There is inadequate coordination between institutions, which leads to policy incoherence, lack of common standards, policy gaps, implementation of policy and infusion of environmental issues into sectoral policies. • Comprehensive legislation with corresponding regulations does not exist for mangrove/wetland protection. • There is no overarching policy framework for wetland management. • Using buffer zones around protected conservation areas and heritage and cultural sites is largely not done in Jamaica. Considerations for implementing these zones have been integrated with the Protected Areas System Master Plan 2013-2017. Still, it is only being done for World Heritage Sites and Game Reserves. • Areas are sometimes zoned for development without the full appreciation/ understanding of the international treaties to which Jamaica has signed, e.g., Ramsar. • Effort is required to understand better the intrinsic and economic values of the country's wetland resources. Natural resource valuation and cost-benefit analyses of forested wetland ecosystems need to be undertaken on a national scale rather than on small scales (currently, it is launched on selective projects that require EIAs). • Key institutions lack accountability to ensure policies and plan to facilitate wetland conservation, protection and management are appropriately executed and enforced. • The system for monitoring wetland modifications etc. requires improvement; there is no enforcement culture, and roles and responsibilities are not well defined.

	This often results in agency conflict and overlap. • Low funding levels are allocated (budgetary support) in the national budget for environmental and natural resources.
PPORTUNITIES	**THREATS**
• Technological advances (, e.g., drone technology, satellite imagery, GIS capabilities) can allow for improved and more efficient monitoring of forested wetland resources. • Legislative review process- this can allow for outdated legislation to be updated to include more relevant issues, including forested wetland protection. • An economic valuation can contribute to better informed and more holistic decision-making about resource use and identify opportunities for effective wetland conservation. This includes a better understanding of derived benefits, monetary and non-monetary. • The growing use of social media can allow for more awareness of environmental issues and the importance of preserving a healthy natural environment, including forested wetlands. • Climate change and blue carbon funding for mangrove conservation is available. • Civil society engagement and activity appear to be increasing. • Additional Fish Sanctuaries (formerly Special Fishery Conservation Areas, SFCAs) may be declared. • Funding/grants for alternate livelihoods/ interventional strategies are available. • The Protected Areas System Master Plan (PASMP) was designed to be part of the country's answer to ensuring that its ecosystems can continue to support the population and its way of life. The PASMP provides a framework for the management of protected areas and is a requirement under the Convention for Biological Diversity's (CBD's) Programme of Work for Protected Areas. • Education- growing education level means the potential for a greater understanding of the importance of the environment and its relationship with sustainable development. • Community-based ecosystem management provides an opportunity for stakeholder engagement to improve collaboration for	• Infrastructural development, including demand for high-density tourism and housing developments, particularly along the coastline. • Rapid urbanization and consistently high poverty rates lead to squatting and illegal encroachment, especially in Government owned lands. • Improper solid waste disposal and limited enforcement islandwide – results in waste becoming entangled in forested wetlands, thus impacting the hydrology and other environmental conditions. • Invasive alien species. • Poor land use planning. • Illegal logging activities. • Increasing wastewater generation and disposal, especially from industry and tourism. • Insufficient actions and resources to support the effective management of forested wetlands – as indicated in the new Forest Policy for Jamaica, without deliberate effort by the Government, the quantity and quality of forest cover on private lands will decline. • Climate-related threats: more frequent droughts and floods resulting from rising temperatures, increased hurricane intensity and increased variability in rainfall. • Enforcement is compromised due to a lack of financial resources. • Lack of political will and vision (related to the environment). • Inadequate understanding of the linkages between environmental issues and economic policy. • Lack of education and understanding of the general public on activities that impact wetland ecosystem health and function.

effective management between agencies and community resource users. • Development Orders in parishes/areas with rich forested wetlands can be updated to address: (i) outdated planning legislation guiding development, (ii) lack of approved government policies on mangroves/wetlands, (iii) gaps between planning and environmental management (economic vs environmental management) (iv) a planning system supported by reactive initiatives. • More focus and emphasis on preserving forested wetlands' monetary and non-monetary benefits so people at the governmental and local levels understand their value.	

2.4.5 Enhancing the Legislative Framework for Forested Wetland Management

One of the major challenges to having a more robust legal, institutional and policy framework for forested wetland protection continues to be the sectoral nature of legislation and policy. This issue is not unique to forested wetland conservation or Jamaica. There is a lack of integration of relevant biodiversity targets and approaches throughout policies, regulations, planning and economic development strategies across all levels of government and sectors of the economy. There are pathways and entry points that can be leveraged to achieve a more streamlined strategy and efficient use of resources.

2.4.5.1 Town and Country Planning & Development Orders

A central component in the TCPA is the preparation, confirmation, and modification of Development Orders (DOs) to guide and regulate the types of development permitted within a specific boundary (mainly at the parish/municipal level). Confirming a DO is an essential prerequisite to guide Local Planning Authorities in granting planning permission and supporting the elaboration of local development plans (LDPs). Many DOs were prepared and promulgated in the 1960s (Jamaica State of the Environment Report, 2013). Nine (9) DOs have been confirmed, and six (6) are provisional.

Of the fifteen (15) DOs currently in place, twelve (12) have been updated in the last ten (10) years, and eight (8) have since been promulgated as confirmed. DOs (whether provisional or confirmed) are the Town and Country Planning Authority's principal regulatory instruments. However, permission can only be granted if a development application is authorised with the NRCA Act (1991) (section 11(1A) of the Town and Country Planning Act, 1958). There is an opportunity to integrate local, regional, and international conservation and biodiversity targets for forested wetland ecosystems in the DOs to ensure local development guidelines and long-term planning objectives are aligned. DOs should be used collaboratively with Jamaica's National Spatial Plan (draft 2020) as one spatial mapping unit (or masterplan) to ensure biodiversity targets for forested wetland (and other ecosystems) protection are strategically comprehensively captured at macro and micro scales.

The capacity for forested wetlands to buffer coastal communities against storm surges should underscore their critical importance in development planning, particularly in housing and essential areas of infrastructure. Removing mangroves, seagrass beds, and coral reefs to facilitate the multi-purpose use of the coastal zone has increased Jamaica's vulnerability to hurricanes and storm surges. It poses a significant threat to coastal ecosystems and marine wildlife (Climate Change Policy Framework, 2015). It is anticipated that climate change impact will increase the vulnerability of human settlements to floods, storm surges, sea level rise and hurricanes. DOs (and Local Sustainable Development Plans) should be updated to ensure core areas of forested wetland ecosystems are zoned appropriately to promote their conservation and sustainable use. DOs should also be reviewed to ensure that current and future zoning addresses the leading causes of wetland degradation and biodiversity (relative to each parish) that can be mitigated through strategic ecosystem-based planning.

2.4.5.2 Enforcement

Enforcement of environmental laws and regulations remains challenging at the local and national levels. Previous environmental planning documents and reports, including the PASMP (2013 - 2017), NFMCP (2016 - 2026), State of Environment (2013), have identified this as a weakness. There is a critical need to enhance the law enforcement capacity of environmental agencies, specifically NEPA and FD, in coordination with relevant law enforcement institutions to secure more practical application of environmental laws and regulations with the active participation of local communities and wardens. The State of Environment Report (2013) made recommendations relative to enforcement that is still relevant. These include:

- Increase capacity within the Jamaica Constabulary Force in applying environmental laws and regulations, such as the Forest Act and its regulations (including any changes to the Act).
- Strengthen the capacity of the judicial system to adjudicate environmental crimes and infringements.
- Encourage local communities to play an active role in law enforcement and compliance to develop an inclusive approach to governance, conservation, and sustainable development.

There is also an opportunity for collaboration with the local government through Municipal corporations.

Additionally, fines, sanctions and other punitive measures are not high enough to act as a deterrent or represent the seriousness of the offence. At present, the maximum fine under the Natural Resources and Conservation Act is $50,000, while persons who breach the Wildlife Act can be fined a total of $100,000. In August 2022, Prime Minister Andrew Holness announced that the country's environmental laws would be amended to impose more stringent fines on persons guilty of breaches[6]. Emphasis should be given to increasing the application of the "polluter pays" principle across all sectors, explicitly punishing repeat offenders.

2.4.5.3 Legal protection of forested wetlands

Jamaica does not have a law or policy unique to forested wetlands, and the NRCA Act is the primary law that currently protects forested wetlands under its various regulations. One mechanism to leverage the existing legal and regulatory framework for increased protection is to identify forested wetland areas to be declared as protected areas. Once these core areas have been identified, the boundaries need to be generated and gazetted with zoning recommendations for conservation or sustainable use. This is a proactive measure that can be taken to meet Jamaica's various commitments under Multilateral Environmental Agreements (MEAs). Additionally, the GOJ is pursuing the promulgation of national policies related to the conservation of biological resources, including an Overarching Protected Areas Policy (which will replace the 1997 Protected Areas Policy for Jamaica) and an Overarching Protected Areas Legislation. This legislation will provide the framework for regulating the over 300 legally declared protected areas. The legal protection of 7,600 ha of more forested wetland areas will align with the anticipated policy direction of the GOJ.

2.4.5.4 Market-based mechanisms and incentives

There is a need to incorporate into legislation alternative regulatory instruments, such as economic incentives, to promote the sustainable use of forested wetlands. A range of market-based and financial measures can create economic incentives for mangrove conservation. Payment for ecosystem services (PES), reduction of emissions from deforestation and forest degradation (REDD+) systems, financial valuation, product certification, investment and trade regulations, corporate social responsibility (CSR) requirements and direct subsidies and incentive payments can all be means of promoting conservation and sustainable use, depending on the context. But it is important to get the valuation right. Where mangroves are deemed more valuable as charcoal than standing forests, degradation will be hard to avoid, even if it is illegal.

The Forestry Department is in the process of implementing a REDD+ national strategy and action plan.

2.4.5.5 Private Land Ownership

Private lands and the rights of private landowners remain a legal challenge for environmental protection in general but are pertinent to wetland management and conservation. While the Cabinet supports the encouragement of private landowners to protect their property and calls for economic incentives to support private involvement in the management and conservation of forests, the question of the rights of private landowners and the role of private conservation is still relevant and largely unresolved within the legislative arena. However, on August 2, 2022, Prime Minister Andrew Holness announced that a policy had been developed to reclaim environmental assets located on privately-owned properties to ensure more excellent protection of ecologically sensitive natural assets[7].

Additionally, market-based incentives, such as those outlined above and supported by legislation, may be a possible entryway to support the increased protection of forested wetlands on private lands. PES frameworks for forest ecosystem services owned by private landowners have been implemented in the Caribbean and Latin American regions to encourage measures that protect wetlands[8].

[6] https://www.jamaicaobserver.com/news/stiffer-fines-coming-for-environmental-breaches/
[7] https://www.jamaicaobserver.com/news/stiffer-fines-coming-for-environmental-breaches/
[8] Slobodian, L. N., Badoz, L., eds. (2019). *Tangled roots and changing tides: mangrove governance for conservation and sustainable use*. WWF Germany, Berlin, Germany and IUCN, Gland, Switzerland. xii+280pp.

3 Management Vision, Goal and Objectives

3.1 Vision

The National Mangrove and Swamp Forest Management Plan 2023 - 2033 (NMSFMP) will complement the suite of policy tools that guide the work of the Forestry Department, National Environment and Planning Agency and other government of Jamaica stakeholders that manage forested wetlands. The vision statement for this plan is, therefore is:-

"By 2033, Jamaica's forested wetlands are nationally recognized and valued by the Jamaican citizens, with over 67% (10,144 ha) of existing forested wetlands are conserved and/or restored and being sustainably used for income generation and green spaces, maintaining ecosystem services and delivering benefits essential for all people."

3.2 Purpose

The **NMSFMP 2023-2033** will function as a technical guidance document that provides tangible and realistic management actions and methodologies for a comprehensive, consistent, and science-based approach to managing Jamaica's forested wetland habitats.

3.3 Goal and Strategic Objectives

The goal of the NMSFMP is ***"To implement strategies that will achieve the conservation of additional/new protected forested wetland areas, amounting to a minimum of 30% (4,430 ha) of Jamaica's forested wetlands (40% of Jamaica's Government-owned forested wetlands and 20% of privately owned forested wetlands) by 2033."***

The Strategic Objectives (SO) of the NMSFMP are to:

SO1: Reverse the loss and degradation of forested wetlands and to conserve those that remain through wise use and management, strengthening the legislative, policy and institutional framework and mainstreaming forested wetlands across government and society.

SO2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.

SO3: Increase public awareness, information dissemination, and formal education levels about forested wetlands, to complement increased protection, conservation and restoration of these ecosystems

SO4: Enhance the fair and equitable economic, social and environmental benefits to all from forested wetlands ecosystem services

FIGURE 3-1: STRATEGIC OBJECTIVES FOR THE NATIONAL MANGROVE AND SWAMP FOREST MANAGEMENT PLAN-JAMAICA

Each strategic objective has corresponding cross-cutting sub-programmes to establish and manage activities geared towards the conservation and sustainable use of Jamaica's forested wetlands. The seven (7) sub-programmes (SP) of the NMSFMP 2023-2033 are listed in figure 3-2 below:

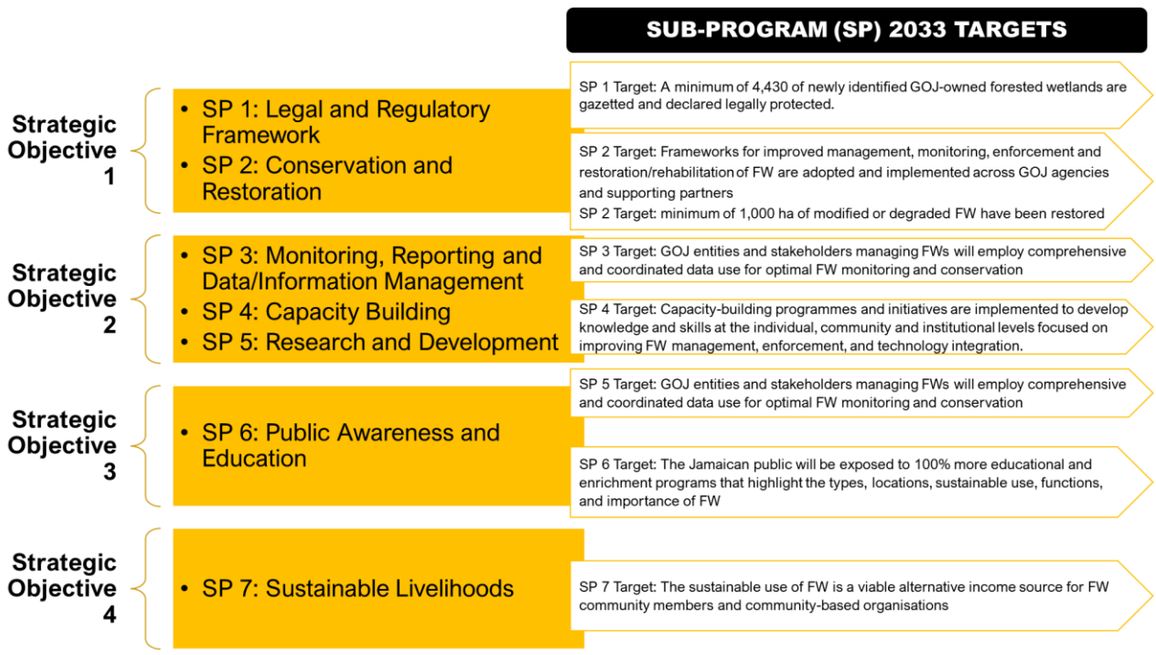


FIGURE 3-2: STRATEGIC OBJECTIVES AND ASSOCIATED SUB PROGRAMMES FOR THE NMSFMP

The logic model is presented in Section 7: Monitoring, Evaluation and Reporting.

3.4 Guiding Principles

The fundamental objective of the NMSFMP is to promote conservation, sustainable use, and, where necessary, restoration (or rehabilitation) of forested wetland ecosystems and their associated habitats to benefit all Jamaican people and their livelihoods fairly and equitably. The guiding principles outlined in this document complement existing agreements by guiding national policy decision-makers, developers, and citizens to achieve forested wetland ecosystems' conservation, restoration, protection and sustainable management.

1. **Integrated Ecosystem Approach:** An ecosystem-based management (EBM) approach will be adopted to ensure that all forested wetland resources are managed in an integrated way and accessed sustainably to meet local community and national needs.
2. **Transparency:** There is a commitment to open and transparent decision-making processes and providing opportunities for the participation of all citizens in a manner that promotes diversity, equity and inclusion.
3. **Precautionary Approach:** Ensure that the precautionary approach (Principle 15, Rio Declaration 1992) is applied as widely as possible to avoid or minimise environmental degradation and biodiversity loss.
4. **Local And Traditional Rights and Knowledge:** Local and traditional knowledge and legal and conventional access rights are considered when developing and implementing policies, programmes and plans related to forested wetlands.
5. **Scientific Knowledge and Expertise:** Research is a dynamic exercise as it is part of ecosystem conservation, management planning, implementation, and decision-making. Management approaches need to be developed and implemented consistent with forested wetland ecosystems' temporal dynamics and complexity using the best available science.
6. **Climate Action:** The impact of climate change on forested wetlands and sustainable management and the contribution of forested wetlands to climate change adaptation and mitigation is recognised.
7. **Sectoral Integration:** Ensure that economic, social, and environmental objectives are integrated, and policies, strategies, plans and programmes are coordinated to effectively use scarce human and financial resources to ensure their most significant positive impact.
8. **Alignment With National Development Planning:** The NMSFMP will fully align with Jamaica's national planning efforts.
9. **Meeting International Obligations and Commitments:** The NMSFMP will support the country's commitment to various multilateral agreements.

10. **Adaptive Management:** Planning is an ongoing dynamic process and will need to respond to changes in the socio-economic, environmental and or political landscapes of the country and the associated communities.
11. **Planning Functions and Responsibilities:** The responsibility for planning functions should be spelt out at different levels, from the local management unit level towards the national level, consistent with national governance structures.

3.5 Alignment with National and International Plans and Agreements

The vision, goal and strategic objectives of the NMSFMP 2023 - 2033 are derived from and aligned with the targets and commitments of several of Jamaica's national plans and international agreements. The strategic objectives and goal of the NMSFMP 2023 - 2033 will be achieved through the implementation of a range of activities, including the legal protection of newly identified GOJ-owned forested wetlands, activities to increase awareness and connection with nature, supporting local communities access to forested wetlands for sustainable income generation, education, as well as capacity building to enable more Jamaicans to act to protect forested wetlands. The design of the NMSFMP 2023 - 2033 (vision, goal, and strategic objectives) were guided by the Jamaica Vision 2030 National Development Plan Goal 4 (Jamaica has a healthy natural environment) and National Outcome 13 (Sustainable management and use of environmental natural resources). The goal of the NMSFMP 2023 - 2033 is to legally protect an additional 35% of Jamaica's forested wetlands by 2033, aligning with NBSAP National Targets 11 and 15 (and the related UNCBD strategic goals/Aichi Targets). Other relevant plans and agreements that have been integrated into the various activities of the NMSFMP 2023-2033 include:

The annual carbon sequestration values for the estimated total mangrove area in Jamaica is placed at 3.7 million Tonnes of Carbon sequestered.

- The Climate Change Policy Framework
- National Forest Management and Conservation Plan, 2016-2021
- United Nations Convention on Biological Diversity (UNCBD)
- Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, "Ramsar Convention" 1971
- High Ambition Coalition for Nature 2021 and
- United Nations Framework Convention on Climate Change (UNFCCC) Reducing Emissions from Deforestation and forest Degradation (REDD+)

The NMSFMP 2023 - 2033 has ten outcomes (linked to the four Strategic Objectives) and 53 outputs, each falling under one of the seven (7) sub-programmes. Figure 3-3 on the following page illustrates how these are linked.

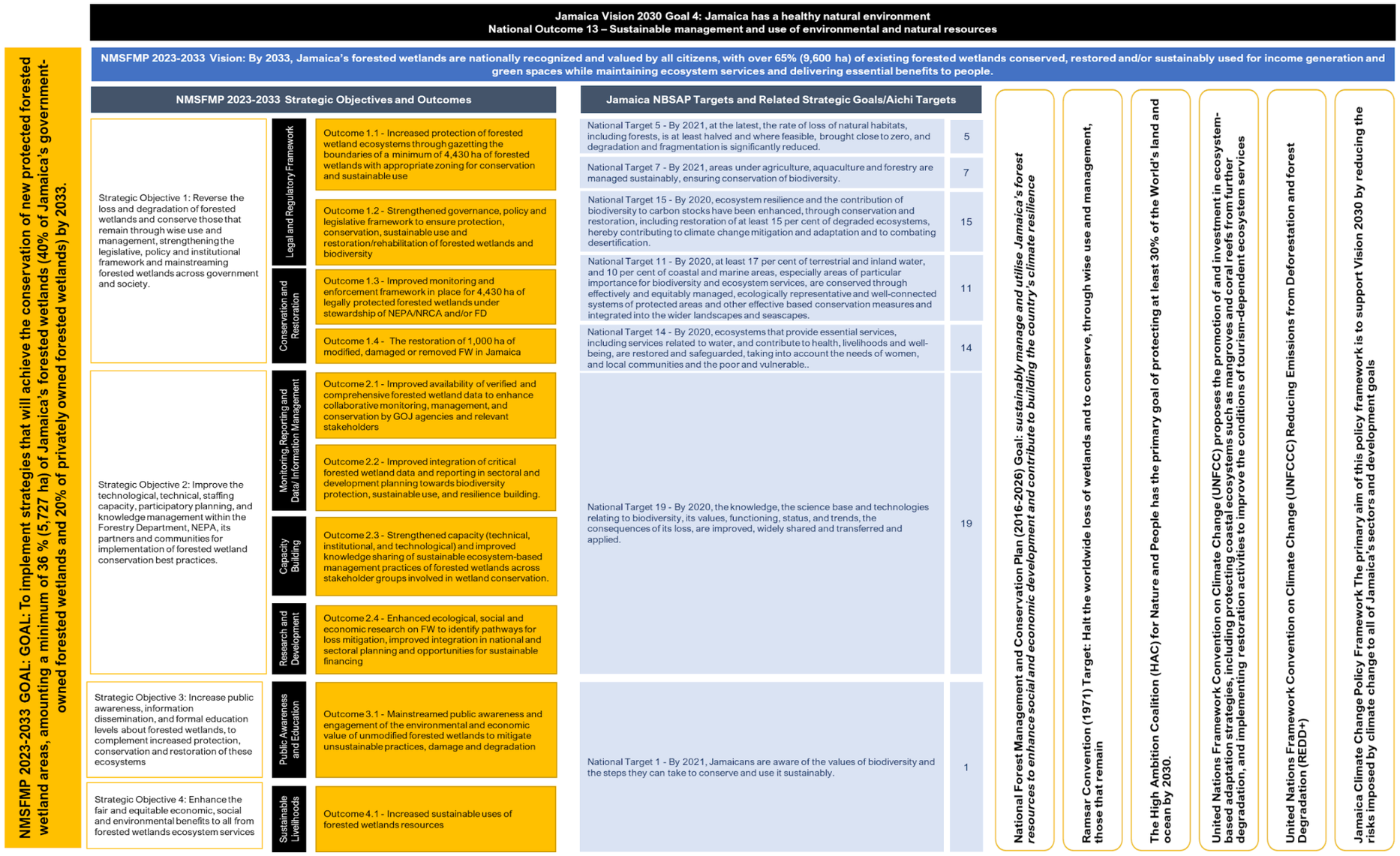


FIGURE 3-3: CONCEPTUAL DIAGRAM ILLUSTRATING ALIGNMENTS OF THE NMSFMP 2023-2033 WITH NATIONAL AND INTERNATIONAL PLANS AND COMMITMENTS

4 Management Sub-Programmes

4.1 Sub-Programme 1: Legal and Regulatory Framework

Jamaica has several fundamental legislative mechanisms and agencies responsible for protecting the environment, including forested wetlands. However, the institutional, policy and legislative framework is marked by gaps and overlapping mandates as it is related to wetland management which has, in several cases, facilitated uncoordinated and siloed efforts towards enforcement and effective use of available resources. There are numerous government agencies whose activities and responsibilities have direct and indirect impacts on the condition of forested wetlands. Activities related to coastal development, waste management, agricultural production, infrastructure improvement and tourism along the coast have resulted in declining coverage and health of Jamaica's forested wetlands. Unplanned and informal development in forested wetlands was recognized as poorly enforced or regulated due to a lack of cross-agency coordination. Therefore, there is an urgent need for better coordination between sectors, agencies and levels of government to ensure harmony among the various legislative instruments and policies that dictate wetland conservation enforcement and regulations. This improved coordination will impact these important ecosystems' conservation and sustainable use.

The mainstreaming of the ecosystem approach is needed across all government agencies charged with economic development, land-use planning, and natural resource management. According to the CBD, "the ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, applying the ecosystem approach will help balance the Convention's three objectives: conservation, sustainable use, and the fair and equitable sharing of the benefits arising from the utilization of genetic resources.[9]" This approach recognizes that people, with their cultural diversity, are an integral component of many ecosystems and complements other management and conservation approaches, e.g., as protected areas.

There is also a need to better integrate gender and youth considerations into forested wetland management and conservation actions, to improve education, alleviate poverty, empower women and girls and achieve sustainable ecosystem use. Gender norms are produced and reinforced at household, communal, institutional, and societal scales. As such, the barriers and opportunities to engage in and benefit from forested wetland conservation and management activities are reproduced at multiple scales. It is vital to better engage with actors and institutions at different scales to challenge the underlying norms and power relations and ensure long-lasting transformative change.

The importance and significant challenges facing the integrity of forested wetland ecosystems are generally well acknowledged across stakeholder groups. Additionally, several national conservation projects and programmes are underway to help support the goal and objectives of this management plan.

The Legal and Regulatory Framework sub-programme falls under **Strategic Objective 1: Reverse the loss and degradation of forested wetlands and conserve those that remain through wise use and management, strengthening the legislative, policy and institutional framework and mainstreaming forested wetlands across government and society.**

Target: By 2033, a minimum of 4,430 of newly identified GOJ-owned forested wetlands gazetted and declared protected.

Key Indicators:

- The hectares of GOJ-owned forested wetlands are newly identified to be gazetted and protected under legislation with zoning and management plans.
- Hectares of ground-truthed boundaries for newly identified GOJ-owned forested wetlands newly identified to be gazetted and protected.

[9] https://www.cbd.int/doc/publications/ea-text-en.pdf

- Hectares of newly identified GOJ-owned forested wetlands gazetted and protected under legislation with zoning and management plans.
- Change in hectares of forested wetlands under Forestry Department management.
- Percentage of staff in responsible agencies reporting improved coordination, alignment and accountabilities in forested wetland management.
- The number of relevant Development Orders and Local Sustainable Development Plans was updated to reflect gazetted boundaries for 4,430 ha of protected forested wetlands.
- Presence of permitting framework and guidelines that facilitate forested wetland restoration/rehabilitation.
- Percentage of relevant stakeholders reporting improved permitting process and guidelines for forested wetland restoration/ rehabilitation

TABLE 4-1: ACTIONS OF SUB-PROGRAMME 1 – LEGAL AND REGULATORY FRAMEWORK

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
1.1	Identify new GOJ-owned forested wetlands (FW) amounting to **a minimum of 4,430 ha** for designation as protected areas or forest reserves under the NRCA Act (1991) or the Forest Act (1996), respectively, with corresponding regulations.	FD and NEPA have a working list of potential FW areas identified [A] Stakeholder engagement will be employed to review and finalise a list of FW areas [A] Ongoing and planned development threatens the ecological integrity of existing areas before they can be legally protected. [R] Areas identified (or sections of) are privately owned; hence there may be some hesitancy to have the area declared. [R]	x										Forestry Dept. (FD)	National Environment and Planning Agency (NEPA)	This should not include FW areas that are already legally protected
1.2	Generate the boundary descriptions for the (minimum) 4,430 ha of FW identified, including recommended buffer zones and zoning for the type of use (e.g., general service, habitat protection, preservation etc.)	Fieldwork will be required to generate site boundaries. [A] Ongoing and planned development threaten the ecological integrity of existing areas before they can be legally protected [R]	x	x									FD, NEPA	Ministry with resp. for Environment, Ministry of Local Government and Community Development (MLGCD), Cabinet Office	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
		Delays or extensive timeframes in making decisions [R] Difficulty in achieving consensus from keyholders on zonation and recommended use of identified areas [R] Some of the areas identified (or sections of) are privately owned [R]													
1.3	Gazette boundaries and develop regulations under the Forest Act (1996) or the Natural Resources Conservation Authority (NRCA) Act (1991) for the 4,430 ha of FW (minimum) identified that (i) specify activities that are allowed or prohibited under recommended zonation (ii) stipulate offences and associated fines/fees (iii) outline incentive mechanisms for private landowners to protect forested wetlands on their property (iv) strengthen the framework to protect and regulate forested wetlands.	Limited or no political will delays decision-making. [R] Delays or extensive timeframes for decision-making allow for continued development of modification of identified areas. [R]		x	x								FD, NEPA	Ministry with responsibility for Environment, MLGCD, Cabinet Office	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
1.4	Transfer ownership (where possible) and management responsibility of forested wetlands on Crown Lands to the Forestry Department.	Delays or extensive timeframes for decision-making allow for continued development of modification of identified areas. [R] Some MDAs may disagree with the transfer of FW as development plans for these lands have alternate uses. [R]		x	x								NLA, FD	NEPA, Ministries, Divisions and Agencies (MDAs)	
1.5	Update relevant provisional and confirmed Development Orders (DO) (i) to reflect accurate boundaries of forested wetland areas and ensure they are appropriately zoned in alignment with specific local regulations developed for their protection (ii) refer to relevant national, regional and international biodiversity targets to ensure cohesion across sectors (iii) specify the total acreage of forested wetlands found in each area (this should also be mapped and zoned as such), and the per cent or ratio that is protected from development (iv) review to ensure current and future zoning addresses the main causes of wetland degradation and biodiversity (relative to each parish) that can be mitigated through	Ongoing and planned development threatens the ecological integrity of existing areas before they can be legally protected. [R] Delays or extensive timeframes for decision-making allow for continued development or modification of identified areas. [R] Limited cross-agency collaboration due to availability or other factors. [R]		x	x								NEPA	FD, Ministry with resp. for Environment, MLGCD, Parish Development Committees (PDCs)	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
	strategic ecosystem-based planning (v) review collectively as one spatial mapping unit (or masterplan) to ensure biodiversity targets for forested wetland (and other ecosystems) protection are strategically comprehensively captured at macro and micro scales														
1.6	Update relevant Local Sustainable Development Plans (LSDP) (i) to reflect accurate boundaries of forested wetland areas and ensure they are appropriately zoned in alignment with specific local regulations developed for their protection (ii) refer to relevant national, regional and international biodiversity targets to ensure cohesion across sectors (iii) specify the total acreage of forested wetlands found in each area (this should also be mapped and zoned as such), and the per cent or ratio that is	Ongoing and planned development may threaten the ecological integrity of existing areas before they can be legally protected. [R] Delays or extensive timeframes for decision-making allow for continued development or modification of identified areas. [R] Limited cross-agency collaboration due to availability or other factors. [R]		x	x								MLGCD	FD, Ministry with resp. for Environment, NEPA, Parish Development Committees (PDCs)	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
	protected from development (iv) review to ensure current and future zoning addresses the leading causes of wetland degradation and biodiversity (relative to each parish) that can be mitigated through strategic ecosystem-based planning														
1.7	Revise permitting requirements and processes related to wetland replanting, rehabilitation and restoration projects to minimise barriers to entry.	Limited or no political will delay decision-making. [R] Delays or extensive timeframes for decision-making allow for continued development of modification of identified areas. [R] The final process is outside the lead agency's control, and decisions are not favourable to meeting plan objectives. [R]	x	x									NEPA	FD, Ministry with resp. for Environment	*Activity is already underway, being led by NEPA.*

4.2 Sub-Programme 2: Conservation and Restoration

Forested wetland size in Jamaica has been steadily declining. There were islandwide losses of over 700 hectares in 10 years, according to the World Bank (2019), with northern parishes (central tourism belt) having 300 hectares of mangroves lost between 2005 and 2010 (NEPA, 2010).

Stakeholders identified the primary threat to forested wetlands in Jamaica as tourism-related developments (29%), followed closely by other planned and unplanned developments (22% and 14%, respectively). Tourism development activities provide financial benefits to communities but negatively impact mangrove ecosystems. Strategic actions to maximize harmony between forested wetland conservation and tourism infrastructure should be attempted. It is also vital to build the capacity of communities to manage sustainable tourism enterprises in forested wetlands.

Secondary anthropogenic effects like pollution from marine litter were also identified as significant deterrents to natural mangrove recovery, especially in highly urbanized areas like Kingston and Montego Bay. Much value may be derived from integrating marine litter reduction programmes in urban areas, which is also a complementary target for many other segments of Jamaica's natural resource management plans. Other factors that negatively affect forested wetland health include hurricanes (which is often reversible over a few decades) and the extractive industries (e.g., harvesting sticks, fence posts, charcoal production, oyster harvesting etc.)—however, these pale compared to hard development which reclaims and irreversibly damages mangrove forests. Though requiring further studies and more robust regulation, extractive industries were perceived as less damaging as the mangrove trees may replenish their biomass to give more of its products over time.

With approximately 14,000 ha of forested wetlands remaining in Jamaica, a very important management strategy may be to implement measures to reduce or eliminate mangrove forest losses via development and simultaneously invest in restoring these forested wetlands where possible. However, based on the operations and demands of our extractive and service industries, in addition to over 3200 ha of FW being in private holdings, conservation of government-owned forested wetlands and measures to slow development rates on private lands is more practical. Despite not being strongly identified by community-level stakeholders, the agricultural impact resulting in hydrological changes and reduced freshwater flows is rampant island-wide, often resulting in slow but expansive mangrove forest losses. These types of degradation are more amenable to restoration corrections and natural forest regeneration if areas are not built upon while degraded. Globally, there may be approximately 800,000 ha of degraded mangrove areas that are biophysically suitable for restorative actions (Worthington & Spalding 2018), with Jamaica targeting approximately 2000ha of mangroves for restoration. The SA report and EU-BSP surveys identified numerous degraded mangrove parcels, in addition to over 600ha currently undergoing restorative actions in Southern Clarendon. Data from the SA revealed that Jamaica lost approximately 19.56 ha of mangrove forest through permitted projects, which was more than six times the amount of mangrove forest it had gained through active and known restoration initiatives (2.7 ha) between 2017 and 2021. Global and regional trends show that mangrove restoration has positive ratings with multi-national, government and private sector funders, primarily related to attaining carbon credits for such nature-positive work. Jamaica has one blue carbon restoration project and may be poised to tap into other ecosystem restoration funds. Establishing a local "mitigation fund" was also very popular among SA respondents.

Several conservation challenges were identified during the NMSFMP stakeholder consultations and literature reviews, including:

- Infrastructural development, including demand for high-density tourism developments in forested wetland areas (poised to increase*), compounded by 30-40% of private ownership of mangrove lands.
- Significant wetland modification is legal and feasible if the developer has the resources to acquire permits and pay the associated fees (wetland modification, environmental permits, mitigation costs, fines)
- Numerous permitted and unpermitted housing developments in forested wetlands, especially on GOJ lands.
- Numerous cases of incidental forested wetlands damage by utility companies, due to lack of guidelines and enforcement and agricultural activities, due to lack of conservation and hydrology planning

- Lack of political will or human resources to alleviate squatting and illegal encroachment, especially in Government owned lands.
- Limited or no use of buffer zones around protected, conservation, heritage and cultural sites. It is only done for World Heritage Sites and Game Reserves.
- The system for monitoring wetland modifications requires improvement - no culture of enforcement, and roles and responsibilities are not well defined, often resulting in agency conflict and overlap.
- Climate change and sea level rise effects

The Conservation and Restoration sub-programme falls under **Strategic Objective 1: To reverse the loss and degradation of forested wetlands and conserve those that remain through wise use and management, strengthening the legislative, policy and institutional framework and mainstreaming forested wetlands across government and society.**

Key Indicators:

- Number of newly hired or reassigned FW enforcement officers
- Ratio of enforcement officers to forested wetland protected areas
- Monitoring and enforcement protocols and plans for 4,430 ha of forested wetland protected area(s) and dissemination list (yes/no)
- Percentage of staff in relevant agencies reporting improved capacity, resources and processes for monitoring and enforcement of 4,430 ha of newly gazetted forested wetlands

Targets:

- ***By 2033, frameworks for improved management, monitoring, enforcement and restoration/rehabilitation of FW adopted and implemented across GOJ agencies and supporting partners.***
- ***By 2033, a minimum of 1,000 ha of modified or degraded FW restored.***

- Percentage of staff in relevant agencies reporting monitoring and enforcement processes are streamlined and coordinated
- Compliance with monitoring and enforcement protocols and plans for forested wetland protected areas (yes/no)
- Existence and implementation of islandwide mangrove buffer zone policy (yes/no)
- USD 2 million restoration fund established for FW conservation and restoration work (yes/no)
- Report (with discrete restoration plans) completed on “restorable” FW sites in Jamaica and the costs for effecting conservation and hydrological restoration (yes/no)
- Hectares of degraded/damaged forested wetlands restored.
- Ratio of forested wetlands removed/damaged restored.

TABLE 4-2: ACTIONS OF SUB-PROGRAMME 2 – CONSERVATION AND RESTORATION

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
2.1	Reassign existing staff/rangers/officers (or hire as needed) to the 4,430 ha of protected FW for monitoring and enforcement.	Limited or no budget or resources to reassign existing staff. [R] Reassigned staff may not be appropriately trained in FW monitoring and enforcement. [R]											FD		
2.2	Develop and implement monitoring and enforcement protocols and management plans for 4,430 hectares of gazetted and protected forested wetlands	The revised legal protection for the areas, coupled with the use of technology, will provide effective monitoring and enforcement to reduce FW loss or degradation in these protected locations. [A] Enforcement staff is unable to implement planned management actions effectively. [R]			x	x	x	x	x	x	x	x	FD, NEPA	MDAs	
2.3	Implement an island-wide buffer zone for all FW/mangrove protected areas as per standard/protocol.	Delays in implementation as this will require changes in legislation. [R] Resistance to new measures from Tourism related											NEPA, FD, Municipal Corporations	Academia, Grant Funding agencies, NGOs	*Suggested 15-20m wide areas parallel to foreshore where*

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
		interests and private landowners. [R] A myriad of Enforcement challenges and or limitations due to unregulated, informal, and small developments. [R]													*wetlands occur*
2.4	Conduct a study to determine which Marine Protected Areas with adjacent FW could benefit from additional protection under the Fisheries Act (2018)	Land ownership data is accessible to inform the study. [A] NFA have the staff capacity to conduct this study without external consultants. [A]	x	x									NFA, NEPA,	NGOs, (Fish Sanctuary Network), Academia	
2.5	Establish a restoration fund (minimum USD 2 million) for forested wetland conservation and restoration work. Fund will be endowed by private donations allocated towards positive future FW conservation/ restoration work.	NRCA can manage and use these funds at their discretion. [A] Restoration funds will be used for associated FW conservation or restoration works. [A] Lack of relevant mechanisms to establish and manage this fund. [R]	This activity, although recommended, will not be pursued over the life of this plan.												

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
2.6	Identify FW areas needing urgent conservation and their potential for restoration and develop conservation/restoration plans and budgets for these sites. This aligns with the National Ecosystems Restoration Plan being developed by NEPA.	The NMSFMP Situational Analysis can provide data on potential "Red List" sites. [A] Some sites are not "restorable" based on physical or political factors. [R]	x										FD	NEPA, MDAs, NGO's, Academia, Consultants	
2.7	Effect restoration and conservation plans in selected "restorable" sites, totalling 1,000 ha or more, align with the National Ecosystems Restoration Plan developed by NEPA.	Jamaican consultants, academia and Govt. agencies have the technical expertise to plan and implement successful mangrove restorations. [A] Several funding options are potentially available to restore and conserve some "Red List" sites, e.g., EU GEF, other Blue Carbon funding options, and Mitigation monies from permitted Wetland modifications, e.g. hotels. [A]	x	x	x	x	x	x	x	x	x	x	FD, NEPA,	MDAs, NGO's, Academia, Consultants	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
		Restoration budgets are not precise, and there may be cost over-runs. [R] Securing partnerships from private entities due to permitting requirements and fees for restoration/rehabilitation works is challenging. [R]													

4.3 Sub-Programme 3: Monitoring, Reporting and Data Management

A vital piece of any management plan is the availability and accessibility of information related to the resource. Low access levels or difficulty accessing information on FW regulations, laws, and best practices negatively affect any public education or conservation programmes the GOJ would want to continue or implement. The Situational Analysis revealed several information deficiencies among FW stakeholders, including the fact that there was "no clear consensus among the various resource users regarding which Agency oversees the conservation of forested wetland areas in Jamaica". Community-level stakeholders were also dismissive of a legal requirement for Wetland modification permits and Environmental permits in small-scale (domestic) development, coupled with the fact that parish-level Municipal Corporations do not routinely enforce FW reclamation breaches.

Effective data/information collation and sharing must be prioritized to facilitate stakeholder confidence and cooperation, enforce regulations, and implement management strategies/actions. The SA report highlighted several conservation challenges related to Monitoring, Reporting and Data Management, listed below:

- Information related to Jamaica's Forested wetland's locations, sizes and boundaries, status (, e.g., Ramsar site, protected area, forest reserve), land ownership, relevant laws and restrictions and other information is not available in one discrete document, website, or source. Multiple sources of data/information for planning, development or conservation purposes must be sourced by developers or conservationists.
- Unsustainable livelihood practices that degrade forested wetlands are embedded in Jamaican society and are widespread and primarily un-reported.
- FW (Forested wetlands) monitoring and enforcement have numerous gaps, as there is inadequate coordination and responsibility between relevant institutions.
- There is currently no requirement for wetland modification permits when municipal corporations permit small-scale (e.g., single houses) development
- A comprehensive survey and verification of FW locations and status is needed for effective monitoring and management.

The Monitoring, Reporting and Data Management sub-programme falls under **Strategic Objective 2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.**

Key Indicators:

- Existence and implementation of a forested wetland data repository or webpage (yes/no)
- Number of training sessions completed with relevant agencies on the purpose and use of the Jamaica FW database (disaggregated by topic, institution/agency, gender)
- Number of agencies and staff with access to the Jamaica FW database

Target: By 2033, the availability and use of comprehensive data and information are coordinated across GOJ agencies and relevant stakeholders managing forested wetlands.

- Existence and implementation of an updated forested wetland GIS portal (yes/no)
- Number of new development applications submitted with map outputs from the GIS portal.
- Publicly accessible, standard and GOJ entity used/agreed land use and zoning map to show FW locations and boundaries in place (yes/no)
- Percentage of staff from responsible GOJ agencies and relevant stakeholders reporting improved availability and access to comprehensive forested wetland data.
- Percentage of staff from responsible GOJ agencies and relevant stakeholders reporting enhanced capability and improved processes to manage, monitor and conserve forested wetlands.
- Report completed on the assessment of development impacts (permitted and unpermitted) on FW resources for the period 2012 - 2022 (yes/no)
- Number of FW areas identified for the conduct of climate vulnerability/risk assessments and action/adaptation plans.

- Number of climate vulnerability/risk assessments and action/adaptation plans completed for identified FW areas.
- Climate vulnerability/risk assessment findings workshop/engagement attendees (disaggregated by topic, institution/agency, gender) (yes/no)
- Detailed wetland investigation workshop/engagement attendees (disaggregated by topic, institution/agency, gender) (yes/no)
- Number of workshop/engagement attendees (disaggregated by topic, institution/agency, gender)
- Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting that decisions are based on best-practice research and consideration for forested wetlands' full social, economic, cultural and environmental value.

TABLE 4-3: ACTIONS OF SUB-PROGRAMME 3 - MONITORING, REPORTING AND DATA/INFORMATION MANAGEMENT

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
3.1	Create a database of FW areas in Jamaica that has data on protection/conservation status or zoning, planned/current rehabilitation exercises, current management arrangement, location of permanent sampling/monitoring plots, ownership status and other relevant data	Various GOJ agencies currently possess the data, which needs to be collated and presented in a standard and user-friendly format. [A] GOJ agencies disagree on the presentation format or platform to share this information with stakeholders. [R]	x										National Spatial Data Management Division (NSDMD), FD	NEPA	
3.2	Ensure relevant agencies are trained on the purpose and use of the Jamaica FW database and granted appropriate access	Limited, low or no uptake or participation in the database. [R]		x									National Spatial Data Management Division (NSDMD), FD	NEPA	
3.3	Modify the GIS portal on the FD website to include revised FW locations as a layer/feature. This is a publicly available map, and proposed developments could be required to show the precise	Various GOJ agencies currently possess the data, which needs to be collated and presented in a	x										FD		An example of this feature may be seen in the new Electrical Inspectorate

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
	location of planned developments using this map.	standard and user-friendly format [A] GOJ agencies may disagree on the presentation format or platform to share this information with stakeholders or the need for applicants to submit the development location via this map. [R]													application process. An excerpt from this map could be required by NEPA, FD, Min of Local Government, JNHT for any development approval.
3.4	Update current land use and zoning maps with an overlay to illustrate FW locations and physical boundaries using data collected and verified by FD	Various GOJ agencies currently possess the data, which needs to be collated and presented in a standard and user-friendly format. [A] GOJ agencies disagree on the presentation format or platform to share this information with stakeholders. [R]	x										NSDMD, FD	NEPA	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
3.5	Develop a Terms of Reference for a project designed to report on and assess the impacts of permitted or unpermitted activities on forested wetland resources, services, and value for 2010 - 2022.	Lead GOJ agencies possess the data and staff to compile this report. [A] GOJ agencies disagree on the need for such a report. [R]					x	x	x	x	x	x	NEPA or FD	MLGCD, Ministry with resp. For the Environment, Ministry of Transport and Mining (MTM), Ministry of Tourism (MT), Ministry of Science, Energy and Technology (MSET)	
3.6	Conduct a gap analysis and identify spatial data and other information to select a minimum of three FW that may be vulnerable to or at risk from climate change impacts (sea level rise, storm surge) and other natural/human-induced hazards. This can potentially be linked to ongoing adaptation projects, e.g., the Jamaica Disaster Vulnerability Reduction Project (JDVRP), intended to support the GOJ in disaster risk management	This is a priority policy direction for lead agencies. [A] There is projects/programmes underway that can be linked. [A] Delays or extensive timeframes for decision-making allow for continued development of		x									Office of Disaster Preparedness and Emergency Management (ODPEM)	Jamaica Social Investment Fund (JSIF), Social Development Commission (SDC) FD, Ministry with resp. For the Environment, NSDMD	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
	in the broader context of sustainable development.	modification of identified areas. [R] No funding available [R]													
3.7	Conduct Climate Vulnerability and Risk Assessments and action/adaptation plans for a minimum of three FW of high ecosystem function/value or special interest and their communities towards a better understanding of threats, building adaptive capacity and climate resilience. This can potentially be linked to ongoing adaptation projects, e.g., the Jamaica Disaster Vulnerability Reduction Project (JDVRP), intended to support the GOJ in disaster risk management in the broader context of sustainable development.	This is a priority policy direction for lead agencies. [A] There are projects/programmes underway that can be linked. [A] Delays or extensive timeframes for decision-making allow for continued development of modification of identified areas. [R] No funding available [R]			x								ODPEM, JSIF	FD, SDC, Ministry with responsibility for Environment, NSDMD	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
3.8	Host a minimum of two meetings/workshops/stakeholder engagement sessions with sectoral ministries that directly and indirectly impact FW health and sustainable use to disseminate key findings of FW and community vulnerability/risk assessments to mainstream FW issues in sectoral planning. g.	Limited, low or no participation in engagement sessions. [R] Little or no integration of relevant information in sectoral planning. [R]		x									ODPEM, JSIF	FD, SDC, Ministry with resp. For the Environment, NSDMD	
3.9	Host a minimum of two meetings/workshops/stakeholder engagement sessions to present data on detailed mangrove investigations to inform GOJ agencies and potential developers of forested wetland's physical boundaries, hydrological features, and fragmentation risks.	Low participation in engagement sessions. [R] Limited or no integration of relevant information in sectoral planning. [R]		x									FD	NEPA, NLA	*See Sub-Programme 7 - activity 7.1 for reference*

4.4 Sub-Programme 4: Capacity Building

The management of forested wetlands and the enforcement of applicable laws and regulations must exist to facilitate mangrove ecosystems' protection, conservation, and sustainability. This must also be supported by improved capacity at the national and local levels, including the human resources capacity of the GOJ agencies managing forested wetlands. In Jamaica, there has been a slow achievement in the goals and outcomes of optimal mangrove management, and the existing strategies and action plans are incomplete/unclear in many instances. Agencies like the NRCA and NEPA have achieved some level of success with declaring protected wetlands, regulating FW developments, and attaining financial resources channelled back into the associated ecosystems. However, based on previous literature checks and data from the SA, Jamaica still has a net loss of forested wetlands. As such, several projects and programmes remain incomplete, or their impact has not met the anticipated target. This emphasizes the importance of staff competence and effective interagency collaboration, given the crosscutting nature and the implications of losing these resources to various sectors.

Conservation Challenges

To facilitate the effective management of forested wetlands, targeted strategies must be developed and implemented through the combined effort of the government, community and civil society groups/NGOs. The agencies responsible for the wetlands must clearly understand the existing conditions of forested wetlands to determine growth trends and the most critical areas for conservation whilst incorporating ICT and GIS-based tools to improve efficiency. However, it has been recognized that staff dedicated to wetland management (including enforcement officers, monitoring officers, wardens etc.) do not exist, and existing staff have had to balance time and resources for wetland conservation initiatives with other types of forest-focused and environmental projects and programmes. This underscores the need for new multi-disciplinary staff within the Forestry Department. This staff should be able to push the narrative related to the importance of forested wetlands and commit to long-term plans of action that will benefit surrounding communities, e.g., tapping into options for payments for mangrove environmental services, such as carbon sequestration. Partnerships with the regulatory agency NEPA and the local government's municipal corporation can assist with controlling illegal and unsustainable activities and limit development in forested wetlands. Nevertheless, insufficient budget allocation, contradictory cross-sectoral policies, and unclear distribution of rights and responsibilities have been compounding factors contributing to poor wetland management. Additionally, disinterest in FW conservation by the existing civil society has been identified as a challenge to helping local communities participate in "wetland positive" management decision making and benefiting from necessary training programmes.

Gaps in the legal and regulatory framework also contribute to inconsistencies in mangrove management and complicate mangrove conservation and rehabilitation efforts. Identifying gaps has helped recognise where resources should be allocated for improved efficiency and output.

Conservation challenges identified through stakeholder engagement and situational analyses include:

- Need for improved coordination and standards across the multiple institutions/agencies responsible for forested wetlands that are also protected/conservation areas.
- Need for additional staffing, training and awareness within MLGCD and Municipal corporations to review building permits for Ecological compliance, e.g., permit locations in FW that require reclamation and wetland modification.
- Need for a shift away from "mangrove gardening" approaches to rehabilitation or restoration approaches.

The Capacity Building sub-programme falls under **Strategic Objective 2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.**

Key Indicators:

- Training/ capacity needs assessment completed (yes/no)

Target: By 2033, capacity-building programmes and initiatives are implemented to develop knowledge and skills at the individual, community and institutional levels focused on improving FW management, enforcement, and technology integration.

- Number of training sessions (disaggregated by topic, institution/agency, gender)
- Cadre of forested wetland trainers available (yes/no)
- Audio-visual training aides produced for use by relevant GOJ staff (yes/no)
- Number of GOJ staff certified in FW monitoring and enforcement.
- FW conservation and restoration course in Jamaica for relevant GOJ staff/agencies held (yes/no)
- Number of skills training hosted for staff at lead agencies on community-based management approaches to communicating FW sustainable uses.
- Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting improved understanding of sustainable ecosystem-based management practices of forested wetlands.
- Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting improved understanding of forested wetland rehabilitation and restoration techniques and protocols.
- Technological devices and software acquired and in use by relevant agencies (yes/no)
- Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting improved technological capacity in monitoring forested wetlands

TABLE 4-4: ACTIONS OF SUB-PROGRAMME 4 – CAPACITY BUILDING

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
4.1	Conduct a needs assessment (including a gap analysis and prioritized list of capacity building actions) for lead agencies (i.e., FD and NEPA) to determine the challenges faced and how areas in FW management can be improved internally.	Inability to address the needs given the constraints in time and financial resources. [R] Each agency will pinpoint the key areas for training and other capacity building. [A]	x										NEPA, FD		
4.2	Plan and execute training sessions for Municipal Corporation staff (planning, enforcement, and permit approving staff) to build staff and institutional capacity and minimize development approvals without wetland modification permit (including train-the-trainer sessions to facilitate internal knowledge transfer within lead agencies)	Trained staff attrition. [R] Internal training of relevant new staff will be held consistently to facilitate knowledge sharing. [A]		x	x	x	x	x	x	x	x	x	Municipal Corp's.	FD, NEPA	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
4.3	Plan and host annual FW restoration and rehabilitation training (with a certificate of participation) (in year 1, year 3, and year 7) for GOJ, NGOs, Consultants, and other restoration practitioners to develop the skillset of interested parties and provide an avenue for NEPA to require certification or suitable educational background of personnel engaging in FW restoration/conservation projects/programmes. A training video will also be produced to supplement years with no training.	Low participation rates in training and certification programmes. [R] Requiring the use of certified rehabilitators may act as a barrier to conducting such work. [R] Training sessions will be held biennially/frequently. [A] NEPA will vet the credentials of personnel engaging in FW restoration/conservation projects/programmes. [A] There will be an established framework that takes environmental considerations into		x	x	x	x	x	x	x	x	x	NEPA	FD, Academia, Ministry of Finance and Public Service (MFPS)	This should increase the involvement of certified experts in these types of projects.

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
		focus when applications are being reviewed. [A]													
4.4	Conduct technical FW restoration and conservation training and courses using international and local experts. Programmes and certification should be recommended for any private and public sector personnel implementing a restoration plan (every three years: ear 1, year 4, year seven and 10).	Increased training in FW restoration and conservation will improve the FW conservation landscape in Jamaica. [A] The EU GEF funding may be used to fund these courses up to year 4. [A] Staff trained under these programmes leave the government service without a return on investment. [R]	x	x	x	x	x	x	x	x	x	x	FD, NEPA,	MDAs, Consultants, Academia	The course curriculum should include topics that relate to pruning, harbouring, and any other pertinent restoration techniques.
4.5	Conduct training/workshops focused on improving the capacity to communicate and demonstrate best practices on FW sustainable use with	Trained staff leaving the organization or may be reassigned. [R] Internal training of relevant new staff		x				x					FD	NEPA, NGOs	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
	local community members.	will be held consistently to facilitate knowledge sharing. [A]													
4.6	Expand the institutional capacity of the MLGCD, Municipal Corporation, FD and relevant Local Forest Management Committees by increasing the use of technology (e.g., drones, remote sensing, GIS mapping etc.) in environmental monitoring and by training existing staff to integrate these technologies to increase efficiency.	Given the budgetary constraints, the institutions may not be able to acquire all required software and devices. [R] The necessary measures will be taken to ensure technological devices are aptly maintained and calibrated. [A] Steps will be taken to ensure the relevant staff are trained to maximize the benefits of all devices and software in FW management. [A]		x	x	x							MLGCD	MFPS, FD and NEPA	12 drones at 10k each, including training and software

4.5 Sub-Programme 5: Research and Development

Forested wetlands are being increasingly celebrated globally for their vital roles, including sustainable fisheries, shoreline protection (Uddin *et al*. 2013; Barbier 1993; World Bank 2019), and the bioremediation of wastes (Reef, Feller and Lovelock, 2010; Alongi, 2008). These findings are based on increased research (Lee *et al*., 2014) in recent decades, with the last decade having a significant interest in forested wetland roles in carbon sequestration and storage.

Despite the global interest, a gap identified in the Situational analysis report is the paucity of research regarding swamp forests in Jamaica (Prospere, McLaren and Wilson, 2016). Mangrove forests are seemingly better studied and documented, but these studies were mostly limited to biodiversity and species-level investigations. Key GOJ and Academia stakeholders confessed that Jamaica's ecohydrology, connectivity and restoration ecology of mangrove forests are not well known. The efforts by NEPA, World Bank, TNC and most recently, the Forestry Department EU BSP surveys revealed that Jamaica has approximately 14,000 ha of forested wetlands (mangroves and swamp forest). These FD surveys included an Island wide ground truthing component that was not previously conducted but supported the various aerial imagery reviews through the years. However, establishing the forested wetland sites should be complemented by attaining the scientific character and connectivity data needed to manage these forests. Currently, detailed investigations on forested wetland structure, hydrology and vegetative character are primarily done in response to an EIA, a requirement related to a development proposal for these lands. EIA investigations are generally thorough and contain a plethora of information on the property and associated ecosystems. Still, GOJ agencies do generally not commission EIA-type studies for their own management purposes.

GOJ agencies may work alongside Research and academic institutions to gather data and information, but this is not consistent and streamlined, and funding such data collection is not standardized. The challenges related to data collection on Jamaica’s forested wetlands include the following:

- An incomplete inventory of all forested wetlands island-wide (this is ongoing and a deliverable of the NMSFMP)
- High risk of mangrove forest fragmentation due to a lack of information about these sites; surveys are conducted primarily for development planning.
- Minimal information regarding mangrove forest carbon content and potential for carbon storage/conversion (studies ongoing currently)
- Minimal information regarding swamp forests’ structure, function, composition, and speciation in Jamaica.
- Minimal information regarding the biodiversity of micro-organisms and fungi found in Jamaican mangrove forests.

The Research and Development sub-programme falls under **Strategic Objective 2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities for implementation of forested wetland conservation best practices.**

Target: By 2033, a minimum of 4,430 of newly identified Target: By 2033, the Forestry Department and its partners produce four new reports/publications to address FW data gaps needed for improved management and conservation-owned forested wetlands gazetted and declared protected.

Key Indicators:

- Number of FW Eco-hydrology reports completed
- FW land ownership and acquisition feasibility report completed (yes/no)
- Report on FW that is zoned for development or unlikely to be conserved completed (yes/no)
- Feasibility study on selected FW areas and communities for a payment for ecosystem services (PES) pilot program completed (yes/no)
- Percentage of staff from relevant GOJ agencies and other relevant stakeholders reporting improved availability and quality of data and research on forested wetlands' total social, economic, cultural and environmental value
- Percentage of community members from pilot study areas reporting satisfaction with payment for ecosystem services (PES) schemes (disaggregated by the community, gender, age)

TABLE 4-5: ACTIONS OF SUB-PROGRAMME 5 – RESEARCH AND DEVELOPMENT

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
5.1	Conduct detailed investigations into the hydrological/ hydrodynamic, vegetation features and a natural resource valuation of all current GOJ-owned forested wetlands.	FD has the financial resources to conduct the studies. [A] GOJ agencies will utilize the data collected to manage the associated forested wetlands. [A]	x	x									FD	NEPA, Academia, Consultants	
5.2	Conduct a study investigating the potential for acquisition of privately owned FW lands by GOJ institutions	The FD has the capacity (financial and staffing) to conduct these studies. [A]	x										FD, NLA	MDAs	
5.3	Identify FW areas that have a high likelihood for future development work (modification, damage or removal), e.g., AAJ lands close to Airport fly zones, runway expansion slated /eminent civil or tourism developments (Excluding 4,430 ha of newly protected FW conservation and restoration areas)	GOJ agencies and stakeholders may have existing information on some of the lands that would qualify/are zoned for development. [A] Identified development zones will be appealing/suitable to relevant developers. [A] The structural integrity of these planned buildings/structures is compromised in proximity	x										FD, NEPA	MDAs	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
		or within these wetlands. [R]													
5.4	Conduct a feasibility study to identify potential FW areas/ communities to pilot a payment for ecosystem scheme (PES) programme.	Unavailable funding. [R] No involvement with the PES concept across the stakeholder group. [R]	This activity, although recommended, will not be pursued over the life of this plan.												

4.6 Sub-Programme 6: Public Awareness and Education

Public cooperation and buy-in are vital for any management plan's successful implementation. The Forest Policy for Jamaica (Forestry Dept. 2015) states that "the conservation of the existing forest cover in Jamaica is dependent on all the direct and indirect stakeholders becoming involved in the preservation of the island's forest resources".

Increased community awareness and advocacy for resolving adverse environmental impacts in Jamaica have been noticed, using 2016 to 2022 media reports on a few "controversial" proposals or developments. These include significant media uproar and even law-suits for several bids, including; widespread disapproval and the eventual abandonment of the development of a logistics hub in a marine protected area with mangrove forests and seagrass beds (Goat Islands), bauxite mining into an inland limestone forest (Cockpit Country), a quarry and development proposal for a coastal limestone forest (Bengal, St. Ann) and public outcry from 10 acres of mangrove forest losses for the construction of a hotel in Green Island, Hanover. It is a fact that mangrove forests dominate low-energy, sandy coastlines island-wide, a physical footprint in high demand by coastal developers, especially tourism-related developers. Enabling an environment for public ownership and awareness and creating a culture of sustainable wetland uses may be an excellent strategy to conserve mangrove shorelines.

The SA report identified that 100% of respondents knew that mangroves serve critical ecological functions, with 85% agreeing that unmodified/undegraded wetlands can earn significant income for Jamaica. However, socio-economic factors and a lack of enforcement of laws to protect these wetlands continue to drive unsustainable uses of FW. With formal and informal development driving the most wetland reclamation footprints in Jamaica, community level mangrove users still welcome wetland destruction to earn income directly or indirectly. To that end, the functions and importance of FW and how to use these forests more sustainably should be priority messages to the public. The SA identified the following conservation challenges related to public awareness and education:

- Minimal visibility or desired impact of public education programmes specific to wetland conservation
- Lack of education and understanding of the communities with chronic wetland degradation (red listed communities) on activities which impact wetland ecosystem health and function.
- The lack of awareness/education on alternate livelihood options and opportunities to use forested wetlands sustainably to meet socio-economic needs.
- Preliminary wetland conservation steps and actions implemented by GOJ agencies whose primary mandate is not environmental protection (e.g., Min of Local Govt./Municipal corporations, JNHT, NLA) but can approve/consent to development within wetland areas.

The Public Awareness and Education sub-programme falls under **Strategic Objective 3: Increase public awareness, information dissemination, and formal education levels about forested wetlands to complement increased protection, conservation, and restoration of these ecosystems.**

Target: By 2033, the Jamaican public exposed to 100% more educational and enrichment programmes that highlight the types, locations, sustainable use, functions, and importance of FW

Key Indicators:

- Forested wetland public awareness/media campaign strategy developed (yes/no)
- Number of FW education billboards/signage installed within GOJ-protected FW areas.
- Number of FW education signage/ billboards constructed/erected by developers within new Tree Preservation Areas.
- Number of FW educational film competitions held.
- FW ecology case study used in the existing secondary school curriculum (yes/no)
- Number of FW field trips held from each parish.
- Number of signage/barriers erected to convey mangrove importance and regulations in 'red-listed' FW communities.

- Number and type of FW educational audio-visuals (e.g., infomercials and documentaries) produced and broadcasted on traditional and social media.
- FW Conservation Ambassador contracted with the relevant scope of work/terms of reference in place (yes/no)
- Percentage of Jamaicans reporting greater appreciation of the social, economic, environmental and cultural value of forested wetlands (disaggregated by gender and age)

TABLE 4-6: ACTIONS OF SUB-PROGRAMME 6 – PUBLIC AWARENESS AND EDUCATION

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
6.1	Install and maintain "Mangrove matters" signage or billboards within target communities (with significant stands over 50 ha, along visible thoroughfares and highways) of FW: 5-year project.	Ample information exists to create content for billboards. [A] FD GEF Funding will support the costs for designing and erecting "Mangrove Matters" billboards. [A] The Parish municipal corporations may not agree to waive fees for GOJ-funded educational billboards. [R]	x	x	x	x	x						FD	NEPA, Municipal corporations (MC), Ministry with resp. for Environment, MOT, Ministry of Education and Youth (MOEY),	$14,000 per sign x 10 signs MC waive fees for educational mangrove billboards
6.2	The mandatory posting and maintenance of two (2) apparent signs or billboards are required at any new Tree Preservation Order sites (including forest size, main functions, and rules).	Tourism interests which apply for Wetland modification permits do not agree to spend financial resources on public education billboards. [R] NEPA will implement this as a new activity for relevant wetland modification permits with relevant Tree Preservation Orders. [A]	x	x	x	x	x						NEPA	FD, Ministry with resp. For Environment, MOT, MC	In-kind contribution by developer (this shall be a requirement for all new wetland modification permits with over 1 hectare of development footprint) $28,000 per site x 5 sites

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															(assuming one major coastal development per year) Municipal corporations waive fees for educational mangrove billboards
6.3	Host FW-centred competitions with high visibility and novel approaches, prize money and national media announcement (e.g., audio-visual production competition for university-level film and media students or experts with seed funds and an attractive 1st place prize): 1-year project	Ample information exists to create content for video productions. [A] Technical expertise for video filming and production exists in Jamaican institutions and schools. [A]	x										FD,	NEPA, MC, Ministry with resp. for Environment, MOT, MOEY	Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee to coordinate activities and have existing

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															teams/entities do education and engagement
6.4	Produce and air two audio-visual products (documentaries, infomercials, music videos) on mangroves and swamp forests: functions, threats, and sustainable uses. To be aired on national TV, and social media channels: 3-year project	Aired video productions are not well received by the public. [R]		x	x								FD, NEPA	MC, Ministry with resp. for Environment, MOT, Academia, NGO	Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee or use The National Ramsar committee's CEPA to coordinate

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															activities and have existing teams/entities do education and engagement
6.5	The implementation of a persistent and apparent media campaign) partnership (traditional and social media between GOJ agencies and partners to highlight FW importance, locations, protected areas, and laws.	Ample information exists to create content for the social media campaign. [A] GOJ Agencies may not have the budgetary allocation for a social media expert or a PR Dept. [R] GOJ Agencies may not produce an attractive/appealing social media product internally. [R]	x	x	x								FD	NEPA, Ministry with resp. For the Environment, NGOs	Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee or use The National Ramsar committee's CEPA to

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															coordinate activities and have existing teams/entities do education and engagement
6.6	Using a (Jamaican) celebrity/ influencer as a spokesman/ambassador on FW Conservation.	Difficulty contracting an available ambassador. [R]	x	x	x								FD	NEPA, Ministry with resp. for Environment, NGOs	Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee to coordinate activities and have existing teams/entities do education

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															and engagement
6.7	Provision of funding or assistance to secure financing to Environmental NGOs for an FW in schools (e.g., JAMIN) programme, i.e., FW ecology may be incorporated into the biology (grade 10/11) curricula (growth, measurements, biodiversity) 3-year project.	The Ministry of Education and the school's board will agree to incorporate mangrove ecology into curricula. [A] Schools' teachers and administrators are not interested in the project. [R]		x	x	x	x	x					FD, NEPA/ possibly NRCA	MOEY, Ministry with resp. for Environment, NGOs	9 NGOs Island wide with two schools each @ $10,000 per school Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee to

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															coordinate activities and have existing teams/entities do education and engagement
6.8	Evaluate and update the school education and awareness programmes to increase/enhance the current level of funding and effort, e.g., Sponsor wetland field trips for PEP/pre-high school classes (*6 from each parish = 84 schools)	Environmental NGOs can implement these projects. [A]		x	x	x	x	x					FD, NEPA	NGOs, UWI	Primary School trips x $1,000 per trip Activities 3.3 – 3.8 should be considered under an overarching educational media campaign with appropriate communication plans Consider the formation of an inter-agency committee to

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	*Notes*
															coordinate activities and have existing teams/entities do education and engagement
6.9	Design and erect concrete hybrid (mixed with lumber/bamboo/pvc. etc.) “no-new development” barriers installed in strategic locations, with wetland signage, bollards, and murals in red-listed communities	Attractive “no new development” barriers will dissuade further informal spread. [A] Insufficient monitoring or lack of community buy-in of development barriers/murals resulting in vandalism and breaches [R]	x	x	x	x	x						FD	NEPA, National Works Agency (NLA), MLGCD & Councillors, NGO,	Red-listed communities are those with immediate threats of unpermitted removal, modification or damage to FW 28 murals x $7,000 per barrier/mural

4.7 Sub-Programme 7: Sustainable Livelihoods

Unsustainable livelihood practices are embedded as a part of Jamaican society and culture. These practices, within the sphere of forested wetlands, have degraded these environments for years and have limited their ecosystem functioning. In Jamaica, the forested wetlands are mainly comprised of mangroves, providing several economic benefits to communities. As such, the livelihoods of surrounding communities are heavily dependent on their resources and services. However, in many cases, the rate at which these resources are extracted, modified, or used for commercial or other purposes is often unsustainable. Natural resources, including forested wetlands, must be replenished at an equivalent or faster rate than they are being destroyed. Otherwise, this may lead to the loss of both the resource and their role in the ecosystem and negatively impact human life and property protection.

Conservation Challenges

Historically, forested wetlands have been cleared for various reasons, for example, using timber for construction, charcoal production, use as firewood and yam sticks, to make artisanal fish pots, and for small-scale farming. Furthermore, mangroves are threatened by overexploitation of their resources, permitted coastal development projects, housing solutions, hotels, and tourist attractions. The quality and preservation of forested wetlands depend on the enforcement of conservation laws and the reasonable utilization by communities and developers due to the intricate link between livelihoods and wetland ecosystem health.

Education of developers, community members and even GOJ agency staff will play a significant role in transforming the mindset of unsustainable users, some of whom are unaware of the importance of wetlands and the repercussions of their actions. While most unsustainable development stems from citizen and commercial development, the SA report showed several instances where GOJ agencies contributed directly or indirectly to the reclamation and degradation of forested wetlands. Therefore, as a part of the protection and conservation efforts, it is important to promote livelihood activities that are environmentally sound, economically realistic, and sustainable. Problematic governance and the inadequacy of existing top-down institutional frameworks are also barriers to sustainable livelihoods. Co-management regimes, where local communities partner with government agencies, is a social network expected to improve local livelihood and forested wetland protection outcomes. Therefore, the Forestry Department and its partners must establish model programmes and incorporate marketing strategies to demonstrate to community members and developers that there is more to gain from maintaining and encouraging the sustainable use of forested wetlands. Involvement in ecotourism is one of many sources of alternative livelihoods from which community members can benefit. With meaningful financial and technical support, various avenues towards community-based ecosystem management and sustainable use can be established.

Understanding the impact of solid waste on the hydrology of forested wetlands and its importance to the health of wetlands must also form a part of knowledge sharing. Improper solid waste disposal in towns and communities results in waste flowing routinely towards the coast and negatively affects normal ecological processes in wetlands. If left unabated, solid waste can detrimentally alter the hydrological flow and, over time, choke and kill mangrove stands.

The National Environment and Planning Authority (NEPA), to protect the country's wetlands, has declared four Ramsar sites, i.e., the Black River Lower Morass in 1997, Palisadoes – Port Royal Protected Area in 2005, the Portland Bight Wetlands and Cays, 2006 and Mason River Protected Area, 2011. These protected wetlands exhibit various levels of eco-tourism use but provide examples of sustainable wetland uses via boat tours, boardwalks etc. However, the uptake of wetlands as sources of income is still generally low in Jamaica.

- Conservation challenges identified through stakeholder engagement and situational analyses include:
- Unsustainable livelihood practices are standard in many FW communities.
- Minimal sustainable use of mangroves being marketed or developed for revenue generation (6 sites currently: ecotourism)
- Need for improved framework and examples of ecosystem management and sustainable use, e.g., Black River Safari, CCAM Boardwalk, Port Royal Mangrove tours, Glistening Waters.
- Need for improved waste management practices and enforcement.

The Sustainable Livelihoods sub-programme falls under **Strategic Objective 4: Enhance the fair and equitable economic, social and environmental benefits to all from forested wetlands ecosystem services.**

Key Indicators:

- Number of approved tree conservation area permits that include conditions that require the installation of public access points in modified FW areas.
- The public access points installed in FWs across the island (free or at an affordable cost) (yes/no)
- Inventory of alternative IGAs, their value and feasibility communicated and promoted across FW communities established (yes/no)

Targets: By 2033, the sustainable use of FW is a viable alternative income source for FW community members and community-based organisations.

- Guideline document outlining sustainable livelihood alternatives shared with selected CBOs in place (yes/no)
- Percentage of community members reporting improved capacity to earn from the sustainable use of forested wetlands (disaggregated by age, gender, income and location)
- Number of new community-based forested wetland attractions operational (disaggregated by type and location)
- Percentage of community members and relevant partners reporting increased satisfaction with forested wetland commercial opportunities
- Percentage of Jamaicans reporting increased satisfaction with experiences with and opportunities to access forested wetland attractions (disaggregated by gender and age)

TABLE 4-7: ACTIONS OF SUB-PROGRAMME 7 - SUSTAINABLE LIVELIHOODS

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
7.1	Implement into all new Tree Conservation Areas permits (under the Tree Preservation Orders) the installation of a public access point (boardwalk, tower, bird observation deck etc.) The developer pays for the boardwalk/green space, and the areas are available for public use, especially if combined with beach access	Regulatory agency fails to include the installation as a part of the permit conditions. [R] Developers fail to install and maintain the public boardwalk without enforcement by the Regulatory body. [R] The legislative framework will support the enforcement and fining of developers who are non-compliant to increase effectiveness [A]		x	x	x	x	x	x	x	x	x	FD, NEPA		
7.2	Promote alternative income-generating activities (IGA) in FW communities (beekeeping, ecotourism, and farming) using	Community groups show limited interest in participating in clean-up activities. [R] Offshore FW may get less attention	x	x	x	x	x						NEPA, RADA, MOT, TPDCo.	NGOs	

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
	sustainable land management practices on private land and other feasible options.	given the added cost and logistics to collect and transport waste by boat. [R]													
7.3	Identify, fund, and enrich a minimum of six (6) new community-managed FW areas for sustainable economic use, including eco-tours, using a Community-Based Adaptation (CBA) approach. Use existing (or new) NGOs to support community members and implement such programmes whilst providing marketing and promotional support for new community-based FW attractions.	Efforts to empower community members to engage in these initiatives may be unsuccessful. [R] The relevant agencies will support the community to attain the funding and training required. [A] Assistance will be provided to market these areas to tourists, birdwatchers etc. [A] Human resources will be provided to ensure the sustainability of the business and the preservation of the	x	x	x	x	x	x	x	x	x	x	NEPA, FD,	Jamaica National Heritage Trust (JNHT), MT, Jamaica Tourist Board (JTB), Private Sector, GEF Small Grants Fund, Environmental Foundation of Jamaica (EFJ), FCF, The Nature Conservancy (TNC), NGO's	Targeted areas would include GOJ-owned FW in "low risk" areas and those within Red List areas, e.g., Falmouth, Seville, *St.* Thomas etc. (Funding/grants for alternative livelihoods /interventional strategies are available).

#	Activities	Risk [R] /Assumptions [A]	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	Lead Agency	Supporting Entities	Notes
		health of the FW. [A]													
7.4	Develop and promote sustainability guidelines for FW community members to mitigate common artisanal causes of ecosystem degradation, e.g., fuelwood, fencepost, and oyster harvesting guidelines.	Illicit users ignore guidelines for sustainable use. [R] Illicit users were unwilling to incorporate sustainable techniques or adopt alternative resources. [R] The legislative framework to support the implementation of fines for unsustainable practices will be implemented and enforced. [A]		x	x	x	x	x	x	x	x	x	NEPA, FD, National Fisheries Authority (NFA)	Academia, Social Development Commission (SDC)	

5 Monitoring, Evaluation and Reporting

5.1 Purpose and Scope of the NMSFMP 2023-2033 Monitoring, Evaluation and Reporting Framework (MERF)

Evaluating the long-term consequences of environmental change and human land use and measuring progress in response to conservation and management actions are essential components in protecting Jamaica's forested wetlands. The purpose of the NMSFMP 2023-2033 MERF is to:

- provide guidance to the forestry and environmental sectors on information and knowledge requirements.
- demonstrate accountability to the stakeholders and report on progress in achieving the targets in the NMSFMP 2023 - 2033.
- provide short- and long-term evidence to indicate the level of investment needed to stop and reverse forested wetland decline.
- ensure that the management of Jamaica's forested wetlands is evidence-based and effective.
- celebrate achievement, and promote progress.
- embed continuous improvement into the tools we use for modelling, mapping, and making decisions.
- ensure there is sufficient knowledge of the conservation requirements of forested wetland biodiversity to underpin effective conservation, restoration, and management.

5.2 Definitions

The following definitions are being used for MER Framework purposes:

- **Activity/Action -** The process of using labour and materials to produce outputs. Particularly outputs related to planned outcomes.
- **Evaluation -** A structured inquiry process to discover the worth or relevance of plans, policies, activities, assumptions, decisions, or other factors impacting the achievement of planned outcomes.
- **Indicator -** A quantitative or qualitative factor or variable that provides a simple and reliable basis for assessing achievement, change or performance. It is a unit of information measured over time that can help show changes in a specific condition. A given goal or objective can have multiple indicators.
- **Input -** Effort, materials, equipment, and funds put into natural resource management to deliver outputs and, in the longer term, achieve management outcomes and resource condition change.
- **Improvement -** "Closing the loop" to ensure that monitoring, evaluation and reporting findings are considered in decision-making concerning planning or implementation.
- **Monitoring -** To watch – systematic collection of quantitative or qualitative information for reporting and evaluation.
- **Output -** The measurable result (good or service) of activity over a fixed period delivered to a standard.
- **Reporting -** Routine communication of monitoring and evaluation outcomes to stakeholders for accountability and informed decision-making.
- **Target -** Quantitative description of the desired outcome over a defined period.

5.3 Principles

The NMSFMP 2023 - 2033 MER Framework adopts the following guiding principles for monitoring, evaluating and reporting activities:

Planning is essential for MER to support adaptive management, good governance, and knowledge management.
Planning for monitoring, evaluating, and reporting increases the likelihood that these processes deliver value to sub-programs and activities. Planning is essential to ensure that:

- the scope of monitoring and evaluation activities target the most relevant issues.
- evaluation and reporting are timed to influence critical decisions affecting NMSFMP direction and performance.
- evaluations have timely access to the right data, information, and knowledge to address key evaluation questions (KEQs)
- the right stakeholders participate in monitoring, evaluation, and reporting processes to maximise learning opportunities and programme improvement opportunities.

Planning for monitoring, evaluation and reporting typically involves the development of a schedule outlining when specific evaluation and reporting activities occur, by whom, by when, and in response to what needs.

Planning for MER starts with clearly understanding how the NMSFMP is anticipated to achieve intended outcomes.
Monitoring, evaluation, and reporting activities deliver the greatest value based on a clear understanding of the outcomes to be achieved and the mechanisms by which planned activities will, in time, contribute to these outcomes. Typically, the program logic is used as a methodology for developing and explaining programs cause and effect relationships showing a program's pathways from its allocated resources (inputs), activities, outputs, and longer-term outcomes. It also highlights assumptions and external factors influencing the program:

Planning for monitoring and evaluations should be informed by established key evaluation questions (KEQs) before identifying indicators.
Monitoring is the systematic collection of quantitative and qualitative information. It must be clear how data derived from monitoring will be applied to meet the information needs of evaluation and reporting processes. Key evaluation questions (KEQs) focus on data-gathering efforts, thereby increasing the likelihood that the correct data are collected so evaluation and reporting can lead to improvement and good governance.

To determine the effectiveness of an implemented programme, KEQs seek to address the following evaluation criteria:

- **Effectiveness –** relates to the success of achieving stated objectives.
- **Coherence –** relates to how well the intervention fit.
- **Impact –** relates to a programme or plan's intended and unintended, positive and negative outcomes.
- **Sustainability –** relates to the extent to which benefits of the programme are ongoing.
- **Relevance –** relates to the extent to which the right objectives, processes and provisions have been established and implemented.
- **Efficiency** relates to the extent to which resources committed to developing and implementing a programme or plan have contributed to outcomes.

According to the Organisation for Economic Co-operation and Development (OECD, 2019), "The evaluation criteria's purpose is to support consistent, high-quality evaluation within a common framework. They provide a normative framework with which to assess a specific intervention. The criteria can also be used in processes beyond evaluation, including defining frameworks and indicators for monitoring and results management, funding approval, strategic planning and intervention design, particularly to improve future interventions." They provide prompts for asking the right during evaluation and should not be considered a prescriptive methodology or goals that an intervention is trying to achieve.

Considering multiple lines of qualitative and quantitative evidence as part of evaluation processes

Evaluation processes may consider multiple evaluation questions that often cannot be addressed by a single source of evidence or analytical design. Triangulation of data, i.e., drawing on multiple lines and levels of evidence, enables the determination of both trends in resource condition and the extent to which programmes have contributed to resource condition outcomes.

Facilitate improvement through participatory approaches to monitoring, evaluation, and reporting.

The MER framework conceptualises MER as a continuous cycle of participation and communication rather than a single evaluation event. It proposes that the active involvement of all relevant stakeholders in evaluation facilitates learning and increases the likelihood that key findings are considered by programme planning and implementation decisions.

Monitoring for evaluation - not monitoring for monitoring

This MER framework primarily focuses on "what knowledge is required" rather than what can be readily measured. As such, monitoring serves the requirements of evaluation and reporting and is not an entity on its own.

5.4 Institutional Framework for NMSFMP 2023-2033 MER Framework

The Technical Advisory Committee (TAC) will ensure the effective implementation, monitoring, and evaluation of the NMSFMP through a special sub-committee responsible for monitoring and evaluation. Quarterly TAC meetings will provide a forum to discuss the implementation of the action plan and monitor progress towards the achievement of the strategic objectives. The TAC will review implementation actions and approaches, address any challenges encountered and suggest possible solutions.

5.5 Logic Framework

The logic framework for the NMSFMP 2023 - 2033 (Figure 5-1) describes the overarching relationships between the plan activities and processes, outputs, outcomes and goals, and how activities are expected to lead to outcomes as well as the general assumptions that underpin the plan.
This program logic has the following main elements:

- Vision
- Goal
- Inputs
- Strategic Objectives
- Outcomes
- Outputs
- External Factors – The environment outside the program that may have an impact on the success of the programme

The strategic objectives and goal of the NMSFMP 2023 - 2033 will be achieved through the implementation of a range of activities, including the legal protection of newly identified GOJ-owned forested wetlands, actions to increase awareness and connection with nature, supporting local communities' access to forested wetlands for sustainable income generation, education, as well as capacity building to enable more Jamaicans to act to protect forested wetlands. The NMSFMP 2023-2033 has ten outcomes (linked to the four Strategic Objectives) and 53 outputs. Each of these falls under one of the seven (7) sub-programmes of the NMSFMP 2023-2033, namely:

- Legal and Regulatory Framework
- Conservation and Restoration
- Monitoring, Reporting and Data/Information Management
- Capacity Building
- Research and Development
- Public Awareness and Education
- Sustainable Livelihoods

The logic and achievement of the strategic objectives and goal of the NMSFMP 2023-2033 are underpinned by several assumptions provided below. The logic framework will be updated as new knowledge verifies or refutes these assumptions. This list does not include the activity-specific assumptions and risks presented under each sub-programme in Section 4.

5.5.1 Assumptions

The assumptions will form the basis for testing the logic framework and evaluating and improving the implementation of NMSFMP 2023-2033. In some cases, additional data may be collected as part of research or long-term trend monitoring to test the assumptions. The assumptions are:

- increasing knowledge and awareness of forested wetlands will lead to increased Jamaicans valuing and acting to protect them.
- forested wetlands can help reduce the impacts of climate change.
- there will be increased and sustained investment in actions to improve forested wetland ecosystems through the government and other sources.
- Jamaica's forested wetlands are fundamental to the culture and heritage of all Jamaicans.
- protecting Jamaica's natural capital, including forested wetlands, will increase the resilience of key sectors of the economy.
- when exposed to environmental degradation concerns, including forested wetlands, will the public respond positively and support increased and sustained investment?
- Improved reporting by organisations and businesses on their environmental outcomes will lead to improved decision-making and biodiversity outcomes.
- Jamaicans with a greater sense of connection to nature will act to protect it more and support increased and sustained investment.
- there will be no event of a large enough scale to impact achieving the targets.
- the forestry and environmental sectors and policy and management processes are agile enough to respond to emerging issues.
- there will be no significant decisions to change land use over the implementation period without consideration of forested wetlands.
- Jamaica's natural environment is fundamental to the health and well-being of every Jamaican.
- response actions result in improved outcomes.

FIGURE 5-1: CONCEPTUAL GRAPHIC SHOWING THE LOGIC FRAME FOR THE NATIONAL MANGROVE AND SWAMP FOREST MANAGEMENT PLAN

5.6 Evaluation Approach

The evaluation approach reflects the conceptual model shown below (Figure 5-2). The evaluation will be guided by key evaluation questions (KEQs) that align with the main elements of the program logic. The KEQs are important for developing an accurate picture and evidence base to understand successes and learning opportunities from implementing the NMSFMP 2023-2033. The KEQs have been designed to provide insights into the appropriateness, efficiency, effectiveness, impact and sustainability of the Strategy Objectives and activities.

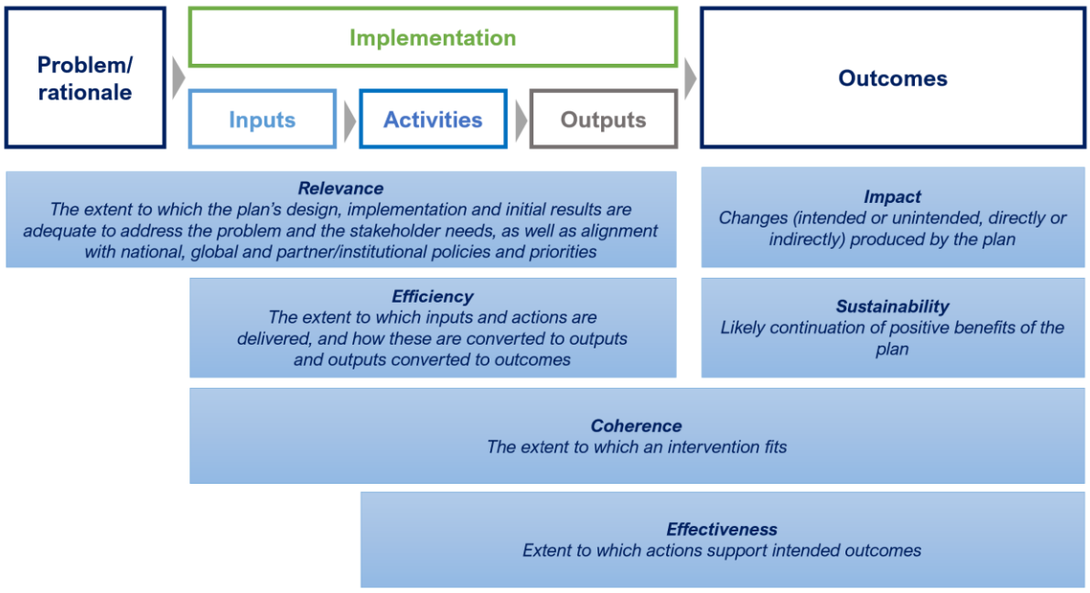


FIGURE 5-2: EVALUATION CONCEPTUAL MODEL

5.6.1 Evaluation Stages

A longitudinal approach to evaluation builds the performance story over time. Ideally, this would include the following stages:

- **Process/Implementation evaluation** enables the TAC to determine whether program activities have been implemented as intended (> 18 months). This evaluation can help differentiate ineffective programs from implementation failure (where the program has not been adequately implemented) and theory failure (where the program was adequately implemented but did not produce the intended impacts). As an ongoing evaluative strategy, it can be used to continually improve programs by informing adjustments to delivery. A process evaluation will typically try to answer questions such as:
    - Was the program implemented in accordance with the initial program design?
    - Was the program rollout completed on time and within the approved budget?
    - Are there any adjustments to the implementation approach that need to be made?
    - Are more or different key performance indicators required?
    - Is the correct data collected efficiently?
- **Mid-term evaluation** enables the TAC to gather data against indicators and measures to track, review and communicate the progress of the implementation of the NMSFMP 2023-2033. The mid-term evaluation focuses on the implementation of activities and progress towards outcomes. A significant benefit of mid-term assessment is to "take stock" of performance and make changes during delivery to maximise impact (2-5 years)
- **Lapsing/Outcome program evaluation** will allow the TAC to make a final assessment of implementation and understand the implications for future strategies. This evaluation is outcome-focused and provides insights into unintended outcomes and lessons for improvement (> five years). An outcome evaluation will typically try to answer questions such as:
    - What do the data suggest early outcomes or indications of future outcomes?
    - Did the program have any unintended consequences, positive or negative? If so, what were those consequences? How and why did they occur?

  - How ready is the program for an impact evaluation?
- Given the importance of the NMSFMP 2023 - 2033, it is recommended to conduct an **Impact evaluation** which will allow the TAC to build on the Lapsing/Outcome evaluation to assess longer-term results. The evaluation tests whether the program has made a difference by comparing what would have happened in the absence of the program. In situations where it is not possible or appropriate to undertake a rigorous impact evaluation, it may be better to monitor, learn and improve through the process and outcome evaluations. An impact evaluation will typically try to answer questions such as:
  - Were the intended outcomes achieved as set out in the program's aims and objectives?
  - Have other investments influenced the attainment of the program's aims and objectives? If so, in what way?
  - Did the program contribute to achieving the outcomes as anticipated? If so, to what extent?
  - Were there any unintended consequences?
  - What would have been the situation had the program not been implemented?
  - To what extent did the benefits of the program outweigh the costs?
  - Did the program represent good value for money?
  - Was the program delivered cost-effectively?

5.6.2 Key Evaluation Questions

The evaluator will use the KEQs to guide data gathering and analysis and to identify insights into achievements to date and areas for future improvement. The KEQs align with the main components of the planning logic and capture multiple lines of evidence to help reach conclusions about causal relationships. Using multiple lines of evidence can help overcome variabilities in datasets or data limitations, such as the limited availability of baseline data. Suggested KEQs and rationale are provided below (Table 5-2) – these KEQs are not prescriptive but should be reviewed and updated as required.

As best as possible, KEQs should also include descriptive, action and causal questions:

- **Descriptive** questions ask what has happened or what is the present situation, e.g. What were the resources used by the program directly and indirectly? What activities occurred? What changes were observed in the conditions or the participants? These questions relate to inputs, processes, outputs, outcomes and impacts.
- **Action** questions ask what should be done to respond to evaluation findings, e.g. What changes should be made to address problems that have been identified? What should be retained or added to reinforce existing strengths? Should the program continue to be funded?
- **Causal** questions ask about what has contributed to observed changes, e.g. What produced the outcomes and impacts? What was the program's contribution to producing the observed changes? What other factors or programs contributed to the observed changes?
- **Evaluative** questions ask whether an intervention can be considered a success, an improvement or the best option and require a combination of explicit values as well as evidence, e.g. In what ways and for whom was the program successful? Did the program provide value for money, considering all the costs incurred (not only the direct funding) and any adverse outcomes?

TABLE 5-1: KEY EVALUATION QUESTIONS AND RATIONALE

PLAN LOGIC COMPONENT	KEY EVALUATION QUESTIONS	RATIONALE	EVALUATION ASPECT	EVALUATION STAGE
Problem / Rationale	What was the rationale and intent of the NMSFMP 2023-2033?	Captures the basis and broad rationale for investment	Relevance, Coherence	Implementation
	How has the legislative and policy context changed since the plan was developed? Consider: ● Policy and management context ● Community expectations	Capture changes in the broader context, which may affect current or future areas of focus and implementation. Allows consideration of whether the original basis for the plan is still applicable and whether any revision or amendments may be required to ensure the ongoing relevance of the plan.	Relevance, Coherence	Implementation
	How has an understanding of Jamaica's forested wetland environments and issues evolved since the plan was developed?		Relevance, Coherence	Implementation, Mid-Term
Inputs	How is the program being implemented? Is the program being implemented correctly? Was implementation constrained in any way by inputs? Why or why not? Consider:	Provides insights into why plan elements may or may not have been successfully implemented. Contributes to understanding any barriers to successful implementation and identifies areas that may	Relevance, Coherence, Efficiency	Implementation, Mid-Term

PLAN LOGIC COMPONENT	KEY EVALUATION QUESTIONS	RATIONALE	EVALUATION ASPECT	EVALUATION STAGE
	Funding ● Resources ● Involvement of stakeholders ● Partnerships or agreements	need attention to ensure success in the future.		
Actions and Outputs	Were actions completed and outputs achieved within budget, scope and timeframes? Why or why not? Consider: ● Were budget, scope and timeframes appropriate for the intended activities and outputs? ● Are activities and outputs still considered the right areas for investment? ● What could be done differently? ● Have external factors influenced implementation?	Captures progress towards implementation of activities and delivery of outputs. Captures unforeseen risks to delivery, which may inform improved future planning. Considers whether the existing activities and outputs remain the most appropriate, efficient and effective way to achieve outcomes. It helps to understand what is working, what's not, and what may need attention to ensure ongoing and future success.	Relevance, Efficiency, Effectiveness	Mid-Term

PLAN LOGIC COMPONENT	KEY EVALUATION QUESTIONS	RATIONALE	EVALUATION ASPECT	EVALUATION STAGE
	• To what extent have completed activities and outputs contributed towards outcomes?			
Outcomes	To what extent have outcomes been achieved? Why / why not? Consider: • Were actions/outputs targeted effectively towards achieving outcomes? • Were there any unintended outcomes of the plan? • Did external factors influence the achievement of outcomes?	Assesses the success of plan implementation for delivering benefits to Jamaica. It helps to understand what is working, what is not, and what may need attention to ensure ongoing and future success. Identifies unexpected risks that impacted success, some of which may be better managed in the future	Effectiveness, Efficiency	Lapsing/Outcome
	Are outcomes appropriate to the identified need? Why/why not? Consider: • Were outcomes effectively aligned with	Identifies whether outcomes initially represented the right areas of focus, whether these remain the right areas, and	Relevance, Coherence	Lapsing/Outcome

PLAN LOGIC COMPONENT	KEY EVALUATION QUESTIONS	RATIONALE	EVALUATION ASPECT	EVALUATION STAGE
	the identified initial need? • Are outcomes still relevant, given any changes in the broader context?	what (if any) changes should be made.		
	What insights are there for ensuring achieved outcomes are maintained in future? Consider: • Are impacts likely to endure through subsequent planning timeframes? • How should management responsibilities be assigned?	Identifies actions required (if any) to ensure the plan leaves a positive and enduring impact	Sustainability, Coherence	Lapsing/Outcome
Impact			Impact, Sustainability, Coherence	Impact

5.7 NMSFMP 2023-2033 MER Framework

The NMSFMP 2023 - 2033 MER Framework (Table 5-3) provides a guide to the ongoing and systematic collection and analysis of routine performance information, refers to data collection protocols, highlights the progress of implementation and identifies results being produced with a focus on the critical evaluation questions. It includes a description of performance indicators, data collection and tools, responsibilities and timeframes.

TABLE 5-2: FRAMEWORK FOR NMSFMP 2023-2033 MONITORING AND EVALUATION

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
Strategic Objective 1: To reverse the loss and degradation of forested wetlands and conserve those that remain through wise use and management, strengthening the legislative, policy and institutional framework and mainstreaming forested wetlands across government and society.								
Sub-Program 1: Legal and Regulatory Framework								
Output 1.1.1 - Consensus on 4,430 ha of forested wetland (FW) areas identified for protection by lead and supporting agencies. Output 1.1.2 - Ground-truthed boundaries for a minimum of 4,430 ha of FW Output 1.1.3 - Gazetted boundaries for a minimum of 4,430 ha of FW Output 1.1.4 - GOJ/Crown lands to be transferred to	Outcome 1.1 - Increased protection of forested wetland ecosystems through gazetting the boundaries of a minimum of 4,430 ha of forested wetlands with appropriate zoning for conservation and sustainable use	The hectares of GOJ-owned forested wetlands are newly identified to be gazetted and protected under legislation with zoning and management plans.	0 hectares of GOJ-owned forested wetlands newly identified to be gazetted and declared legally protected	By 2033, a minimum of 4,430 ha of newly identified GOJ-owned forested wetlands gazetted and declared legally protected	Report on newly identified GOJ-owned FW for legal protection	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Hectares of ground-truthed boundaries for newly identified GOJ-owned forested wetlands newly identified to be gazetted and protected.	0 hectares of ground-truthed boundaries for newly identified GOJ-owned forested wetlands to be gazetted and declared legally protected		Report on ground-truthed boundaries	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Hectares of newly identified GOJ-owned forested wetlands gazetted and protected under legislation with zoning and management plans.	0 hectares of newly identified GOJ-owned forested wetlands are gazetted and declared legally protected		Gazetted protected area orders Jamaica Gazette	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
FD identified and prioritised. Output 1.1.5 - Mechanism in place officiating FD mandate over identified and prioritised forested wetlands on GOJ lands, including crown lands		Change in hectares of forested wetlands under Forestry Department management.	0% change		FD Forest Operations Division administrative data	Annually commencing FY 23/23	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff in responsible agencies reporting improved coordination, alignment and accountabilities in forested wetland management.	TBD		Results of targeted surveys with agency staff, Interviews with agency staff	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		[Indicator to be developed/included for habitat condition of forested wetland protected areas]	TBD		TBD	TBD	Mid-term, Lapsing/ Outcome	FD, NEPA
Output 1.2.1 - Development Orders and Local Sustainable Development Plans updated with appropriate zoning of FW, recommended uses and conservation status and promulgated. Output 1.2.2 - Documented guidance on protocols &	Outcome 1.2 - Strengthened governance, policy and legislative framework to ensure protection, conservation, sustainable use and restoration/rehabilitation of forested wetlands and biodiversity	The number of relevant Development Orders and Local Sustainable Development Plans was updated to reflect gazetted boundaries for 4,430 ha of protected forested wetlands.	No, DO and LSDP updated		Development Orders Local Sustainable Development Plans	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	MLGCD, NEPA
		Presence of permitting framework and guidelines that facilitate forested wetland	TBD		Guidance document drafted Orders drafted and promulgated Processes/guidelines adopted	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	NEPA

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
conditions for forested wetland replanting, rehabilitation or restoration projects. Output 1.2.3 - Revised permitting process specific to forested wetland replanting, rehabilitation or restoration projects.		restoration/rehabilitation.						
		Percentage of relevant stakeholders reporting improved permitting process and guidelines for forested wetland restoration/ rehabilitation	TBD		Results of targeted surveys with relevant stakeholders, Interviews with relevant stakeholders	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	NEPA
Sub-Program 2: Conservation and Restoration								
Output 1.3.1 - An increased staff complement of FW enforcement officers with oversight of 4,430 ha protected FW. Output 1.3.2 - Monitoring and enforcement protocols and plans for 4,430 ha of GOJ-owned legally protected FW (see Output 1.1.3) Output 1.3.3 - An established mangrove "buffer zone" policy with attendant features	Outcome 1.5 - Improved monitoring and enforcement framework in place for 4,430 ha of legally protected forested wetlands under the stewardship of NEPA/NRCA and FD	Number of newly hired or reassigned FW enforcement officers	TBD	By 2033, frameworks for improved management, monitoring, enforcement and restoration/rehabilitation of FW adopted and implemented across GOJ agencies and supporting partners	FD Forest Operations Division administrative data	Annually commencing FY 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Ratio of enforcement officers to forested wetland protected areas.	TBD		FD Forest Operations Division administrative data	Annually commencing FY 25/27	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Monitoring and enforcement protocols and plans for 4,430 ha of forested wetland protected area(s) and dissemination list.	TBD		Monitoring and enforcement protocols established and communicated	Annually commencing FY 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Percentage of staff in relevant agencies reporting improved capacity, resources and processes for monitoring and enforcement of	TBD		Results of targeted surveys with selected GOJ agencies	Annually commencing FY 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
Output 1.3.4 - A report on Marine Protected Areas with adjacent FW that the NFA legislation could additionally protect		4,430 ha of newly gazetted forested wetlands						
		Percentage of staff in relevant agencies reporting monitoring and enforcement processes are streamlined and coordinated.	TBD		Results of targeted surveys with selected GOJ agencies	Annually commencing FY 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Compliance with monitoring and enforcement protocols and plans in forested wetland protected areas	TBD		Protected area compliance reports		Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Existence and implementation of an islandwide mangrove buffer zone policy	No buffer zone policy in place		Mangrove buffer zone policy updated and promulgated	Annually commencing FY 27/28	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
Output 1.4.1 - USD 2 million compensation/mitigation fund established for FW conservation and restoration work. Output 1.4.2 - A report (with discrete restoration plans) on "restorable" FW sites in Jamaica and the costs for effecting	Outcome 1.6 - The restoration of 1,000 ha of modified, damaged or removed FW in Jamaica	USD 2 million restoration fund was established for FW conservation and restoration work.	This activity, although recommended, will not be pursued over the life of this plan.					
		Report (with discrete restoration plans) completed on "restorable" FW sites in Jamaica and the costs for effecting conservation and	No reports completed	By 2033, a minimum of 1,000 ha of modified or degraded FW been restored	Report and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
conservation and hydrological restoration Output 1.4.3 - Restoration and rehabilitation works for 1,000 ha of degraded FW in Jamaica with completed management plans		hydrological restoration (yes/no)						
		Hectares of degraded/damaged forested wetlands restored	TBD		Reports on forested wetland restoration projects	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Ratio of forested wetlands removed/damaged to restored	TBD		Reports on forested wetland restoration projects	Annually commencing FY 23/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
Strategic Objective 2: Improve the technological, technical, staffing capacity, participatory planning, and knowledge management within the Forestry Department, NEPA, its partners and communities to implement forested wetland conservation best practices.								
Sub-Program 3: Monitoring, Reporting and Data Information Management								
Output 2.1.1 - A standard and GOJ entity used/agreed repository or webpage with forested wetlands use, status and management data in Jamaica. Output 2.1.2 - Training sessions completed with relevant agencies on the purpose and use of the Jamaica FW database. Output 2.1.3 -	Outcome 2.1 - Improved availability of verified and comprehensive forested wetland data to enhance collaborative monitoring, management, and conservation by GOJ agencies and relevant stakeholders	Existence and implementation of forested wetland data repository or webpage	No repository in place	By 2033, the availability and use of comprehensive data and information is coordinated across GOJ agencies and relevant stakeholders managing forested wetlands.	Forested wetland repository or database	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NSDMD
		Number of training sessions completed with relevant agencies on the purpose and use of the Jamaica FW database (disaggregated by topic, institution/agency, gender)	TBD		Training reports/records, attendance sheets	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of agencies and staff with access	TBD		FD records	Annually commencing FY 23/24	Process/ Implementation,	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
Relevant agencies granted access to the Jamaica FW database Output 2.1.4 - GIS Portal modified to include revised FW locations as a layer feature Output 2.1.5 – Requirement for new development applications to include the coordinates and location of proposed development using this map/medium Output 2.1.6 – Publicly accessible, standard, and GOJ entity used/agreed to land use and zoning map to show FW locations and boundaries		to the Jamaica FW database					Mid-term, Lapsing/Outcome	
		Existence and implementation of an updated forested wetland GIS portal	No portal in place		FD website	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of new development applications submitted with map outputs from the GIS portal	TBD		Development applications report	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	NEPA
		Publicly accessible, standard, and GOJ entity used/agreed land use and zoning map to show FW locations and boundaries in place (yes/no)	TBD		FD records	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff from responsible GOJ agencies and relevant stakeholders reporting improved availability and access to comprehensive forested wetland data.	TBD		Results of targeted surveys with selected GOJ agencies and stakeholders	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff from responsible	TBD		Results of targeted surveys with selected	Annually commencing FY 23/24	Process/ Implementation,	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
		GOJ agencies and relevant stakeholders reporting enhanced capability and improved processes to manage, monitor and conserve forested wetlands.			GOJ agencies and stakeholders		Mid-term, Lapsing/Outcome	
Output 2.2.1 - A report on the assessment of development impacts (permitted and unpermitted) on FW resources for the period 2012 - 2022 Output 2.2.2 - Minimum three FW areas identified for the conduct of climate vulnerability/risk assessments and action/adaptation plans to be completed Output 2.2.3 - A report on climate vulnerability/risk assessments and action/adaptation plans completed for a minimum of three FW sites and communities	Outcome 2.2 - Improved integration of critical forested wetland data and reporting in sectoral and development planning towards biodiversity protection, sustainable use and resilience building.	Report completed on the assessment of development impacts (permitted and unpermitted) on FW resources for the period 2012 - 2022 (yes/no)	No reports completed		Report and dissemination list	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Number of FW areas identified for the conduct of climate vulnerability/risk assessments and action/adaptation plans.	TBD		Report and dissemination list	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Number of climate vulnerability/risk assessments and action/adaptation plans completed for identified FW areas	TBD		Report and dissemination list	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Climate vulnerability/risk assessment findings	TBD		Consultation/training reports	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
Output 2.2.4 - Stakeholder engagement sessions with sectoral ministries held to convey report on climate vulnerability/risk assessment findings Output 2.2.5 - Stakeholder engagement sessions with sectoral ministries held to convey reports on detailed wetland investigations.		workshop/engagement attendees (disaggregated by topic, institution/agency, gender)						
		Detailed wetland investigation workshop/engagement attendees (disaggregated by topic, institution/agency, gender)	TBD		Consultation/training reports	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Number of workshop/engagement attendees (disaggregated by topic, institution/agency, gender)	TBD		Consultation/training reports	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting that decisions are based on best-practice research and consideration for forested wetlands' full social, economic, cultural	TBD		Results of targeted surveys with selected GOJ agencies and stakeholders	Annually commencing FY 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
		and environmental value.						
Sub-Program 4: Capacity Building								
Output 2.3.1 - Needs assessment completed for lead agencies to identify specific gaps for targeted training. Output 2.3.2 - Training sessions completed for lead agencies involved in FW conservation/restoration Output 2.3.3 – Cadre of internal trainers for FW conservation/restoration in place. Output 2.3.4 – Production of audio-visual training aides for use by relevant GOJ staff Output 2.3.5 – GOJ staff certified in FW monitoring and enforcement.	Outcome 2.3 - Strengthened capacity (technical, institutional, and technological) and improved knowledge sharing of sustainable ecosystem-based management practices of forested wetlands across stakeholder groups involved in wetland conservation	Needs assessment completed (yes/no)	No reports completed	By 2033, capacity-building programmes and initiatives implemented to develop knowledge and skills at the individual, community, and institutional levels focused on improving FW management, enforcement and technology integration.	Needs assessment report			
		Number of training sessions (disaggregated by topic, institution/agency, gender)	TBD		Training reports/records, attendance sheets	Annually commencing 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Cadre of forested wetland trainers is available	TBD		NEPA and FD administrative data	Annually commencing 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Audio-visual training aides produced for use by relevant GOJ staff (yes/no)	No AV training material in place		Audio-visual training material	Annually commencing 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of GOJ staff certified in FW monitoring and enforcement	TBD		Training reports/records, attendance sheets	Annually commencing 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		FW conservation and restoration course in Jamaica for relevant GOJ staff/agencies held.	TBD		Training reports/records, attendance sheets	Annually commencing 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of skills training hosted for staff at lead agencies on community-based	TBD		Training reports/records, attendance sheets	Annually commencing 25/26	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
Output 2.3.6 - The facilitation and hosting of FW conservation and restoration course in Jamaica for relevant GOJ staff/agencies Output 2.3.7 - Skills training hosted for staff at lead agencies on community-based management approaches to communicating FW sustainable uses. Output 2.3.8 – Suite of technological devices and software available for use in the monitoring of FW		management approaches to communicating FW sustainable uses.						
		Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting improved understanding of sustainable ecosystem-based management practices of forested wetlands.	TBD		Results of targeted surveys with selected GOJ agencies and stakeholders	Annually commencing 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff from responsible GOJ agencies and other relevant stakeholders reporting improved understanding of forested wetland rehabilitation and restoration techniques and protocols.	TBD		Results of targeted surveys with selected GOJ agencies and stakeholders	Annually commencing 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Technological devices and software acquired and in use by relevant agencies. (yes/no)	TBD		Procurement records, IT divisions	Annually commencing 24/25	Process/ Implementation, Mid-term, Lapsing/Outcome	FD, NEPA
		Percentage of staff from responsible GOJ agencies and	TBD		Results of targeted surveys with selected	Annually commencing 24/25	Process/ Implementation,	FD, NEPA

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
		other relevant stakeholders reporting improved technological capacity in monitoring forested wetlands			GOJ agencies and stakeholders		Mid-term, Lapsing/Outcome	
Sub-Program 5: Research and Development								
Output 2.4.1– Reports detailing eco-hydrology for a minimum of 12 GOJ-owned FW sites to be conserved/protected. Output 2.4.2 - A report detailing privately owned lands that FD could acquire for ownership and management and indicative costs for the acquisitions. Output 2.4.3 - A report detailing FW zoned for development or unlikely to be conserved. Output 2.4.4 - A feasibility study on selected FW areas	Outcome 2.4 - Enhanced ecological, social and economic research on FW to identify pathways for loss mitigation, improved integration in national and sectoral planning and opportunities for sustainable financing	Number of FW Eco-hydrology reports completed	No reports completed		Eco-hydrology reports and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		FW land ownership and acquisition feasibility report completed (yes/no)	No reports completed		FW land ownership and acquisition feasibility report and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Report on FW that is zoned for development or unlikely to be conserved completed (yes/no)	No reports completed		Report and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Feasibility study on selected FW areas and communities for a payment for ecosystem services (PES) pilot program completed (yes/no)	No reports completed		Feasibility study and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of staff from relevant GOJ agencies and other relevant stakeholders	TBD		Results of targeted surveys with GOJ staff and selected stakeholder groups	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
and communities for a payment for ecosystem services (PES) pilot program		reporting improved availability and quality of data and research on forested wetlands' total social, economic, cultural and environmental value.						
		Percentage of community members from pilot study areas reporting satisfaction with payment for ecosystem services (PES) schemes (disaggregated by the community, gender, age)	This activity, although recommended, will not be pursued over the life of this plan.					
Strategic Objective 3: Increase public awareness, information dissemination, and formal education levels about forested wetlands to complement increased protection, conservation, and restoration of these ecosystems.								
Sub-Program 6: Public Education and Awareness								
Output 3.1.1 - Construction of FW education billboards/signage within GOJ-protected FW areas	Outcome 3.1 - Mainstreamed public awareness and engagement of the environmental and economic value of unmodified forested wetlands to mitigate unsustainable	Forested wetland public awareness/media campaign strategy developed (yes/no)	TBD	By 2023, the Jamaican public will be exposed to 100% more educational and enrichment programs that highlight the types, locations, sustainable use, functions and	Media campaign strategy and implementation plan Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
Outputs 3.1.2 - Construction/erection of FW education signage/ billboards by developers		Number of FW education billboards/signage installed within	TBD		Work orders Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
within new Tree Preservation Areas. Outputs 3.1.3 - FW educational film competitions held Outputs 3.1.4 - FW educational audio-visuals (e.g. infomercials and documentaries) produced and broadcasted on traditional and social media Outputs 3.1.5 - Media campaign strategy in place to promote sustainable FW use and conservation (incl. communication plan and content calendar) Outputs 3.1.6 - FW Conservation Ambassador contracted with the relevant scope of work/terms of reference Outputs 3.1.7 - FW ecology used as a	practices, damage and degradation	GOJ-protected FW areas		importance of FW				
		Number of FW education signage/ billboards constructed/erected by developers within new Tree Preservation Areas.	TBD		Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of FW educational film competitions held	TBD		Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		FW ecology case study used in the existing secondary school curriculum (yes/no)	TBD		Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of FW field trips held from each parish	TBD		Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of signage/barriers erected to convey mangrove importance and regulations in 'red-listed' FW communities	TBD		Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number and type of FW educational	TBD		Reports on the implementation of	Annually commencing FY 23/24	Process/ Implementation,	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
case study to supplement the existing curriculum Output 3.1.8 - FW field trips held with a minimum of 6 primary schools from each parish Output 3.1.9 - Signage/barriers erected to convey mangrove importance and regulations in 'red-listed' FW communities		audio-visuals (e.g., infomercials and documentaries) produced and broadcasted on traditional and social media			public awareness/media campaign strategy		Mid-term, Lapsing/Outcome	
		FW Conservation Ambassador contracted with the relevant scope of work/terms of reference in place (yes/no)	TBD		Signed contract Reports on the implementation of public awareness/media campaign strategy	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of Jamaicans reporting greater appreciation of the social, economic, environmental and cultural value of forested wetlands (disaggregated by gender and age)	TBD		Results of targeted qualitative surveys	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
Strategic Objective 4: Enhance the fair and equitable economic, social and environmental benefits to all from forested wetlands ecosystem services								
Sub-Program 7: Sustainable Livelihoods								
Output 4.1.1 - Approved tree conservation areas permit that include conditions that require the installation of public access points	Outcome 4.1 - Increased sustainable uses of forested wetlands resources	Number of approved tree conservation area permits that include conditions that require the installation of public access points in modified FW areas.	TBD	By 2033, the sustainable use of FW is a viable alternative income source for FW community	NEPA records	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
in modified FW areas Output 4.1.2 - The installation of public access points in FWs across the island (free or at an affordable cost) Output 4.1.3 - An inventory of alternative IGAs, their value and feasibility communicated and promoted across FW communities. Output 4.1.4 - FW-focused eco-tour operations established and operated by FW community members Output 4.1.5 - Guideline document outlining sustainable livelihood alternatives shared with selected CBOs		The public access points installed in FWs across the island (free or at an affordable cost) (yes/no)	TBD	members and community-based organisations	FD records	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Inventory of alternative IGAs, their value and feasibility communicated and promoted across FW communities established (yes/no)	TBD		Alternative IGA document and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Guideline document outlining sustainable livelihood alternatives shared with selected CBOs in place (yes/no)	TBD		Guideline document and dissemination list	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of community members reporting improved capacity to earn from the sustainable use of forested wetlands (disaggregated by age, gender, income and location)	TBD		Targeted surveys with forested wetland community members	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Number of new community-based forested wetland attractions operational	TBD		Business registrations, Companies Office of Jamaica	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

Outputs	Outcomes	Key Indicators	Baseline	Target(s)	Source/ Means of Verification	Monitoring Frequency	Evaluation Timeframe	Responsible Agency
		(disaggregated by type and location)						
		Percentage of community members and relevant partners reporting increased satisfaction with forested wetland commercial opportunities	TBD		Results of targeted surveys with community members and relevant partners	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD
		Percentage of Jamaicans reporting increased satisfaction with experiences with and opportunities to access forested wetland attractions (disaggregated by gender and age)	TBD		Results of targeted qualitative surveys, focus group results	Annually commencing FY 23/24	Process/ Implementation, Mid-term, Lapsing/Outcome	FD

5.8 External or Internal Evaluation

Evaluations can either be commissioned externally to an appropriate consultant or academic evaluator, conducted internally by agency staff or conducted using a hybrid model of an internal evaluator supported by an external evaluator:

- External evaluator(s): one evaluator serves as team leader and is supported by program staff.
- Internal evaluator(s): one evaluator serves as team leader and is supported by program staff.
- Hybrid model: an internal evaluator serves as team leader and is supported by other internal evaluators, program staff, and external evaluator(s).

If an external evaluator is hired to conduct the evaluation, the program manager and other agency staff still need to be involved in the evaluation process. Program staff are not only primary users of the evaluation findings. Still, they are also engaged in other evaluation-related tasks (such as providing access to records or educating the evaluator about the program).

The decision to conduct an evaluation internally or commission an external evaluation is usually a decision for the agency's accountable officer. It is advisable to engage an external evaluator/evaluation team when:

- the scope and complexity of the evaluation require expertise that is not internally available.
- a program or project is politically sensitive, and impartiality is a key concern.
- internal staff resources are scarce, and timeframes are particularly pressing (that is, there is little flexibility in evaluation timing).

5.9 Data Collection

Data will be collected through literature reviews, targeted interviews with stakeholders and relevant experts, collating and reviewing administrative data, field visits, workshops, rapid surveys and in-depth investigation.

As The NMSFMP 2023 - 2033 is at the inception stage, this framework provides an evaluation approach that reflects a baseline/formative evaluation.

TABLE 5-3: EVALUATION METHOD – BASELINE/FORMATIVE

Stage	2023/2
Timeframe	FY 2023/24
Purpose	Gather baseline data and set/review targets and KPIs
Evaluation activities	• Develop detailed data collection, collation, and analysis processes, including qualitative and quantitative data. • Collect, collate, and analyse data. • Establish baselines for indicators and measures. • Address all key evaluation questions. • Capture and document any insights to inform future planning. • Produce evaluation report

This stage will enable the Technical Advisory Committee (TAC) to gather important baseline data (where not yet available). It is also an opportunity to review the current indicators and measures and update them if required.

The NMSFMP 2023 - 2033 MER Framework provides a basis for a data matrix that outlines the sources and types of data that will need to be collected by the program team as part of the monitoring, as well as by the evaluator at the time of the evaluation, to ensure that the evaluation questions can be answered.

5.10 Reporting

The NMSFMP implementation will be monitored continuously, and an annual report will be prepared at the end of each financial year. The report will capture information on achievements made against set indicators, documentation of best practices for replication, challenges and recommendations on the way forward. There will be a baseline review before plan implementation, a mid-term review at the end of FY 27/28 and a lapsing programme evaluation at the end of FY 32/33. **Table 5-4** indicates some audiences who may be interested in the evaluation's findings.

TABLE 5-4: SUMMARY OF AUDIENCES AND THEIR PARTICULAR INTEREST IN THE EVALUATION

Audience	Summary of outcomes/strategic objectives achieved and challenges	Performance Against outcomes/strategic objectives, accountability and transparency	Insights for improving future policy and strategy directions	Insights for improving future implementation
TAC		✓	✓	
NRCA			✓	
Ministry with responsibility for the Environment (currently MEGJC)	✓	✓	✓	
Lead/Partner agents, supporting entities, forested wetland managers, and stakeholders		✓	✓	✓
Forested wetland/coastal communities and general public	✓			

The evaluator should document the findings in an evaluation report. The report should contain an executive summary that can be used as a standalone document and is appropriate for the Conservator of Forests and the public. The report's main body should contain details for the TAC and other implementation partners to help understand success and areas for improvement to inform future strategies, planning and implementation. Both components should be publicly available via the Forestry Department’s website.

5.11 Communication Plan

The TAC will develop a communication plan to disseminate information pertinent to the implementation, challenges, and success of the NMSFMP 2023-2033. Communication channels include the Jamaica Clearing-House Mechanism, newsletters, news releases, press conferences, electronic media (e-mail, internet, social media, and websites), workshops and focus groups.

The Communication Plan should identify the following:

- key audiences, what they want to know when and how the information will be provided and delivery platforms.
- information delegations; media spokespeople and subject matter experts
- implementation planning including available plan reporting outputs; outcomes and timing.

Specifically describe the course of action to:

- inform stakeholders about MER programme work undertaken, i.e., findings, outcomes, activities, reports, partnerships and opportunities.
- update stakeholders about the progress of the NMSFMP 2023-2033 MERF and performance monitoring trends and outcomes
- improve public awareness about NMSFMP 2023-2033 economic endeavours and community benefits.

5.12 Management of the NMSFMP

This National Mangrove and Swamp Forest Management Plan (2023-2033) is designed to assist its users and managers in maximizing benefits, fairly and equitably to all stakeholders. The plan makes efforts to address the situations likely to impact Jamaica's forested wetlands adversely and to support opportunities and interventions for improved management, conservation and sustainable use. It should be noted that the plan is not intended to be a panacea to the challenges likely to be imposed upon the country's forested wetland ecosystems. The plan is ambitious, with multiple targets, assumptions and risks. It is contingent on the support and contribution from all levels of government, non-government agencies, academia, the private sector and local communities. It is anticipated that stakeholders will lend technical and other resources towards implementing the plan and various sub-programmes. Overall, the NMSFMP embraces an EBM (ecosystem-based management) approach, addressing issues of ecosystem governance, legislation, communications, biodiversity protection, community-based interventions, research, and social and economic benefits.

5.12.1 Arrangements for Collaborative Implementation

The following represents the list of lead agencies responsible for the implementation of various activities in the NMSFMP.

The **Forestry Department (FD)** will oversee the implementation, review and updating of the NMSFMP 2023-2033, including but not limited to the following:

- Co-ordinating implementation of the NMSFMP
- Monitoring the implementation progress of the NMSFMP for both effectiveness and efficiency
- Reviewing updates provided by respective agencies ongoing partnerships/ collaborative agreements between stakeholders and review requests for new agreements.
- Making recommendations to Cabinet through individual or joint submissions through the relevant Ministry or Ministries
- Reviewing proposals for declarations of the 7,600 ha of core forested wetlands as Protected Areas
- Functioning as the reporting mechanism for the NMSFMP and a forum for individual agencies to discuss issues for either individual or collective action.
- Developing and implementing communication strategies to partners and broader stakeholders)
- Implementing and managing the financing strategy

The Forestry Department will enable a Technical Advisory Committee (TAC) of all primary implementing agencies, which provides oversight for the NMSFMP, to communicate progress and setbacks of plan implementation and make recommendations for and seek solutions to issues.

The roles and responsibilities of the various primary implementing agencies within NMSFMP are:

The **National Environment and Planning Agency (NEPA)** has roles of responsibility across all the management sub-programmes. NEPA plays a central role in preparing Development Orders, permits and licencing, using best management practices, reviewing environmental impact assessments, promoting sustainable management initiatives for the environment and developing payment mechanisms for ecosystem services. NEPA also acts as the Administrative Authority (AA), i.e., the focal point for communications with the Ramsar Convention Secretariat and is the main agency responsible for implementing the treaty. The Agency is also central to building environmental awareness and education and contributing to the state of scientific knowledge.

The **National Spatial Data Management Division (NSDMD)** falls under the MEGJC and supports the collation and management of national geospatial data.

The **Ministry of Economic Growth and Job Creation (MEGJC), which is currently responsible for the Environment,** coordinates the multi-stakeholder coordination mechanism for environmental policy dialogue and the amendment of relevant Legislation and policies. The Ministry supports NEPA in developing management plans for mangrove/swamp forests and is involved in certain data management initiatives. The Climate Change Division falls under the MEGJC, with the responsibility for mainstreaming climate change considerations into national policies and development planning and building the country's capacity to implement climate change adaptation and mitigation activities.

Ministry of Local Government and Community Development (MLGCD) acts as the agent of local development. The Ministry is responsible for local planning and strategic direction, including local sustainable development planning and control. The Municipal Corporations are the local authorities empowered to make by-laws, regulations and rules for the good governance of the parishes over which they have jurisdiction.

National Land Agency (NLA) coordinates the transfer of pertinent crown lands to the FD and a database of private forest landowners.

Office of Disaster Preparedness and Emergency Management (ODPEM) coordinates analyses of the risks and vulnerabilities of coastal ecosystems and communities in the scope of climate change and related hazards.

National Fisheries Authority (NFA) plays a central role in achieving Jamaica's 30 x 30 targets under the Global Biodiversity Framework through the conservation and sustainable utilization of fisheries resources. The Agency has responsibility for the Special Fisheries Conservation Areas (SFCAs), including licencing, registration and data collection.

Jamaica Social Investment Fund is an important partner for identifying vulnerable coastal or forested wetland communities and conducting vulnerability/risk assessments and adaptation plans.

Rural Agricultural Development Authority (RADA) and the Tourism Product Development Company (TPDCo) each play an essential role in engaging with rural forested wetland communities and identifying, communicating and promoting income-generating activities.

5.12.2 Implementing Partners

While oversight of progress towards meeting the goals and targets of the NMSFMP 2023 – 2033 will be the responsibility of the Forestry Department, successful implementation of the Sub-Programmes requires broad-based stakeholder participation and partnership. This means a cross-section of representative agencies and organisations from government, civil society, academia, and the private sector is needed to carry out and oversee activities at the system and site levels. A preliminary list of implementation partners is presented below. This list is indicative rather than exhaustive, and it is expected that over the life of the management plan, additional partners may come on board that will play a role in the implementation.

The Forestry Department will facilitate coordination and communication with the select implementation partners.

TABLE 5-5: PRELIMINARY LIST OF SELECTED IMPLEMENTATION PARTNERS

GOVERNMENT	CIVIL SOCIETY
• Ministry of Economic Growth and Job Creation • Ministry of Tourism • Ministry of Industry, Commerce, Agriculture and Fisheries	**Academic/Research Institutions** • College of Agriculture, Science and Education • Caribbean Maritime University • Northern Caribbean University

GOVERNMENT	CIVIL SOCIETY

• Ministry of Education, Youth and Culture
• Ministry of Foreign Affairs and Foreign Trade
• Ministry of Local Government and Community Development
• Office of Disaster Preparedness and Emergency Management
• Ministry of Science, Energy and Technology
• Ministry of Transport and Mining
• Squatter Management Unit, Ministry of Economic Growth and Job Creation
• Ministry of Health and Wellness
• Climate Change Division, Ministry of Economic Growth and Job Creation
• Parish Municipal Corporations, Ministry of Local Government and Community Development
• Parish Development Committees
• Ministry of Finance and the Public Service
• National Fisheries Authority and associated sub-units, e.g., Jamaica Fisheries Union, Fish Sanctuary Network
• Water Resources Authority
• National Solid Waste Management Authority
• Urban Development Corporation
• Social Development Commission
• Jamaica Special Economic Zone Authority
• National Housing Trust
• National Water Commission
• National Works Agency
• Jamaica National Heritage Trust
• Port Authority of Jamaica
• Tourism Enhancement Fund
• Housing Agency of Jamaica
• Airports Authority of Jamaica
• Planning Institute of Jamaica
	• University of Technology
	• The University of the West Indies, including:
	  ○ The Centre for Marine Sciences
	  ○ Port Royal Marine Laboratory
	  ○ Discovery Bay Marine Laboratory
	  ○ SODECO
	Non-governmental organizations (NGOs)
	• Jamaica Environment Trust
	• Montego Bay Marine Park
	• Negril Marine Park
	• Negril Environment Protected Areas Trust
	• Caribbean Coastal Area Management Foundation
	• White River Marine Association
	• Oracabessa Foundation
	• East Portland Fish Sanctuary/Alligator Head Foundation
	• Jamaica Conservation Development Trust
	• The Nature Conservancy
	Private Sector
	• Black River Tour Operators
	• Glistening Waters tour operators
	• Jamaica Hotel and Tourist Association
	• Jamaica Public Service Co
	• Chamber of Commerce- Negril
	• Chamber of Commerce- Portland
	• Chamber of Commerce-Montego Bay
	• Yardie Divers
	• Salt River Business Operators
	Regional Implementation Partners
	• United Nations Environment Program (UNEP) Caribbean Environment Program (CEP)
	• United Nations Development Program (UNDP)
	• Global Environment Facility (GEF)

GOVERNMENT	CIVIL SOCIETY
• Meteorological Service of Jamaica • Cabinet Office, Chief Parliamentary Council	• Critical Ecosystem Partnership Fund (CEPF) • Caribbean Biodiversity Fund (CBF) • International Union for the Conservation of Nature (IUCN)

5.12.3 Timelines for NMSFMP 2023 - 2033 Activities

The table below provides a reference for the NMSFMP activities by completion date. The timeframes indicate the period within which the activity will take place and not the allotted time for each activity.

TABLE 5-6: NMSFMP BY COMPLETION DATE

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
Strategic Objective 1	Legal and Regulatory	1.1	Identify new GOJ-owned forested wetlands (FW) amounting to a minimum of 4,430 ha for designation as protected areas or forest reserves under the NRCA Act (1991) or the Forest Act (1996), respectively, with corresponding regulations.	**FY 23/24**	1 year
Strategic Objective 2	Monitoring and Reporting	3.1	Create a database of FW areas in Jamaica that has data on protection/conservation status or zoning, planned/current rehabilitation exercises, current management arrangement, location of permanent sampling/monitoring plots, ownership status and other relevant data	**FY 23/24**	1 year
Strategic Objective 2	Monitoring and Reporting	3.3	Modify the GIS portal on the FD website to include revised FW locations as a layer/feature. This is a publicly available map, and proposed developments could be required to show the precise location of planned developments using this map.	**FY 23/24**	1 year
Strategic Objective 2	Monitoring and Reporting	3.4	Update current land use and zoning maps with an overlay to illustrate FW locations and physical boundaries using data collected and verified by FD	**FY 23/24**	1 year

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
Strategic Objective 3	Public Education and Awareness	6.3	Host FW centred competitions with high visibility and novel approaches, prize money and national media announcement (e.g., audio-visual production competition for university level film and media students or experts with seed funds and an attractive 1st place prize): 1 year project	**FY 23/24**	1 year
Strategic Objective 2	Capacity Building	4.1	Conduct a needs assessment (including a gap analysis and prioritized list of capacity building actions) for lead agencies (i.e., FD and NEPA) to determine the challenges faced and how areas in FW management can be improved internally.	**FY 23/24**	1 year
Strategic Objective 1	Conservation and Restoration	2.4	Identify FW areas island-wide in need of urgent conservation and their potential for restoration and develop conservation/restoration plans and budgets for these sites.	**FY 23/24**	1 year
Strategic Objective 2	Research and Development	5.2	Conduct a study investigating the potential for acquisition of privately owned FW lands by GOJ institutions	**FY 23/24**	1 year
Strategic Objective 2	Research and Development	5.3	Identify FW areas that have a high likelihood for future development work (modification, damage or removal) , e.g., AAJ lands close to Airport fly zones, runway expansion slated /eminent civil or tourism developments (Excluding 4,430 ha of newly protected FW conservation and restoration areas)	**FY 23/24**	1 year

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
Strategic Objective 1	Legal and Regulatory	1.2	Generate the boundary descriptions for the (minimum) 4,430 ha of FW identified, including recommended buffer zones and zoning for the type of use (e.g., general use, habitat protection, preservation etc.)	**FY 24/45**	2 years
Strategic Objective 1	Legal and Regulatory	1.7	Revise permitting requirements and processes related to wetland replanting, rehabilitation and restoration projects to minimise barriers to entry.	**FY 24/45**	2 years
Strategic Objective 2	Monitoring and Reporting	3.2	Ensure relevant agencies are trained on the purpose and use of the Jamaica FW database and granted appropriate access	**FY 24/45**	1 year
Strategic Objective 2	Monitoring and Reporting	3.5	To report and assess the impacts of permitted or unpermitted activities on forested wetland resources, services, and value for 2010 - 2022.	**FY 24/45**	1 year
Strategic Objective 2	Monitoring and Reporting	3.6	Conduct a gap analysis and identify spatial data and other information to select a minimum of three FW that may be vulnerable to or at risk from climate change impacts (sea level rise, storm surge) and other natural/human-induced hazards. This can potentially be linked to ongoing adaptation projects, e.g., the Jamaica Disaster Vulnerability Reduction Project (JDVRP), intended to support the GOJ in disaster risk management in the broader context of	**FY 24/45**	1 year

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			sustainable development.		
Strategic Objective 2	Monitoring and Reporting	3.8	Host a minimum of two meetings/workshops/stakeholder engagement sessions with sectoral ministries that directly and indirectly impact FW health and sustainable use to disseminate key findings of FW and community vulnerability/risk assessments to mainstream FW issues in sectoral planning.	**FY 24/45**	1 year
Strategic Objective 2	Monitoring and Reporting	3.9	Host a minimum of two meetings/workshops/stakeholder engagement sessions to present data on detailed mangrove investigations to inform GOJ agencies and potential developers of the forested wetland's physical boundaries, hydrological features and fragmentation risks.	**FY 24/45**	1 year
Strategic Objective 3	Capacity Building	4.4	Conduct training/workshops focused on improving the capacity to communicate and demonstrate best practices on FW sustainable use with local community members.	**FY 24/45**	1 year
Strategic Objective 1	Conservation and Restoration	2.3	Conduct a study to determine which Marine Protected Areas with adjacent FW could benefit from additional protection	**FY 24/45**	2 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			under the Fisheries Act (2018)		
Strategic Objective 2	Research and Development	5.1	Conduct detailed investigations into the hydrological/ hydrodynamic, vegetation features and a natural resource valuation of all current GOJ-owned forested wetlands.	**FY 24/45**	2 years
Strategic Objective 1	Legal and Regulatory	1.3	Gazette boundaries and develop regulations under the Forest Act (1996) or the Natural Resources Conservation Authority (NRCA) Act (1991) for the 4,430 ha of FW (minimum) identified that (i) specify activities that are allowed or prohibited following recommended zonation (ii) stipulate offences and associated fines/fees (iii) outline incentive mechanisms for private landowners to protect forested wetlands on their property (iv) strengthen the framework to protect and regulate forested wetlands.	**FY 25/26**	2 years
Strategic Objective 1	Legal and Regulatory	1.4	Transfer ownership (where possible) and management responsibility of forested wetlands on Crown Lands to the Forestry Department.	**FY 25/26**	2 years
Strategic Objective 1	Legal and Regulatory	1.5	Update relevant provisional and confirmed Development Orders (DO) (i) to reflect accurate boundaries of forested wetland areas and ensure they are appropriately zoned in alignment with specific local regulations developed for their protection (ii) refer to	**FY 25/26**	2 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			relevant national, regional and international biodiversity targets to ensure cohesion across sectors (iii) specify the total acreage of forested wetlands found in each area (this should also be mapped and zoned as such), and the per cent or ratio that is protected from development (iv) review to ensure current and future zoning addresses the leading causes of wetland degradation and biodiversity (relative to each parish) that can be mitigated through strategic ecosystem-based planning (v) review collectively as one spatial mapping unit (or masterplan) to ensure biodiversity targets for forested wetland (and other ecosystems) protection are strategically comprehensively captured at macro and micro scales		
Strategic Objective 1	Legal and Regulatory	1.6	Update relevant Local Sustainable Development Plans (LSDP) (i) to reflect accurate boundaries of forested wetland areas and ensure they are appropriately zoned in alignment with specific local regulations developed for their protection (ii) refer to relevant national, regional and international biodiversity targets to ensure cohesion across sectors (iii) specify the total acreage of forested wetlands found in each area (this should also be mapped	**FY 25/26**	2 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			and zoned as such), and the per cent or ratio that is protected from development (iv) review to ensure current and future zoning addresses the leading causes of wetland degradation and biodiversity (relative to each parish) that can be mitigated through strategic ecosystem-based planning		
Strategic Objective 2	Monitoring and Reporting	3.7	Conduct Climate Vulnerability and Risk Assessments and action/adaptation plans for a minimum of three FW of high ecosystem function/value or special interest and their communities towards a better understanding of threats, building adaptive capacity and climate resilience. This can potentially be linked to ongoing adaptation projects, e.g., the Jamaica Disaster Vulnerability Reduction Project (JDVRP), intended to support the GOJ in disaster risk management in the broader context of sustainable development.	**FY 25/26**	1 year
Strategic Objective 3	Public Education and Awareness	6.4	Produce and air two audio-visual products (documentaries, infomercials, music videos) on mangrove and swamp forests: functions, threats, and sustainable uses. To be aired on national TV, and social media channels: 3-year project	**FY 25/26**	2 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
Strategic Objective 3	Public Education and Awareness	6.5	The implementation of a persistent and highly visible media campaign) partnership (traditional and social media between GOJ agencies and partners to highlight FW importance, locations, protected areas, and laws.	**FY 25/26**	3 years
Strategic Objective 3	Public Education and Awareness	6.6	Using an international (Jamaican) celebrity/ambassador/influencer as a spokesman/ambassador on FW Conservation.	**FY 25/26**	3 years
Strategic Objective 2	Capacity Building	4.5	Expand the institutional capacity of the MLGCD, Municipal Corporation and FD by increasing technology (e.g., drones, remote sensing, GIS mapping etc.) in environmental monitoring and by training existing staff to integrate these technologies to increase efficiency.	**FY 26/27**	3 years
Strategic Objective 2	Monitoring and Reporting	3.5	Develop a Terms of Reference for a project designed to report on and assess the impacts of permitted or unpermitted activities on forested wetland resources, services, and value for 2010 - 2022.	**FY 24/45**	5 years
Strategic Objective 3	Public Education and Awareness	6.1	Install and maintain “Mangrove matters” signage or billboards within target communities (with major stands over 50 ha, along visible thoroughfares and highways) of FW: 5-year project.	**FY 27/28**	5 years
Strategic Objective 3	Public Education and Awareness	6.2	The mandatory posting and maintenance of two (2) highly visible signs or billboards are required at any new	**FY 27/28**	5 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			Tree Preservation Order sites (including forest size, main functions, and rules).		
Strategic Objective 3	Public Education and Awareness	6.9	Design and erect concrete hybrid (mixed with lumber/bamboo/pvc) "no-new development" barriers installed in strategic locations, with wetland signage, bollards, and murals in red-listed communities	**FY 27/28**	5 years
Strategic Objective 4	Sustainable Livelihoods	7.2	Promote alternative income-generating activities (IGA) in FW communities (beekeeping, ecotourism, and farming) using sustainable land management practices on private land and other feasible options.	**FY 27/28**	5 years
Strategic Objective 1	Conservation and Restoration	2.2	Implement an island-wide buffer zone for all FW/mangrove protected areas standard/protocol.	**FY 27/28**	1 year
Strategic Objective 3	Public Education and Awareness	6.7	Provision of funding or assistance to secure financing to Environmental NGOs for a FW in schools (e.g., JAMIN) programme, i.e., FW ecology may be incorporated into the biology (grade 10/11) curricula (growth, measurements, biodiversity) 3-year project.	**FY 28/29**	5 years
Strategic Objective 3	Public Education and Awareness	6.8	Evaluate and update the school education and awareness programmes to increase/enhance the current level of funding and effort, e.g., Sponsor wetland field trips for PEP/pre-high school classes (*6 from	**FY 28/29**	5 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			each parish- 84 schools)		
Strategic Objective 3	Capacity Building	4.4	Conduct training/workshops focused on improving the capacity to communicate and demonstrate best practices on FW sustainable use with local community members.	**FY 28/29**	2 years
Strategic Objective 2	Research and Development	5.4	Conduct a feasibility study to identify potential FW areas/ communities to pilot a payment for ecosystem scheme (PES) programme.	**FY 29/30**	5 years
Strategic Objective 2	Capacity Building	4.2	Plan and execute training sessions for Municipal Corporation staff (planning, enforcement and permit approving staff) to build staff and institutional capacity and minimize development approvals without wetland modification permit (including train-the-trainer sessions to facilitate internal knowledge transfer within lead agencies)	**FY 32/33**	9 years
Strategic Objective 2	Capacity Building	4.3	Plan and host annual FW restoration and rehabilitation training (with a certificate of participation) (in year 1, year 3, and year 7) for GOJ, NGOs, Consultants, and other restoration practitioners to develop the skillset of interested parties and provide an avenue for NEPA to require certification or suitable educational background of personnel engaging in	**FY 32/33**	9 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			FW restoration/conservation projects/programmes. A training video will also be produced to supplement years with no training.		
Strategic Objective 1	Capacity Building	4.6	Conduct technical FW restoration and conservation training and courses using international and local experts. Programmes and certification should be recommended for any private and public sector personnel implementing a restoration plan (every 3 years: year 1, year 4, year 7 and year 10).	**FY 32/33**	10 years
Strategic Objective 4	Sustainable Livelihoods	7.1	Implement into all new Tree Conservation Areas permits (under the Tree Preservation Orders) the installation of a public access point (boardwalk, tower, bird observation deck etc.) within the new Tree Conservation area, i.e., the developer pays for the boardwalk/green space and the areas are available for public use, especially if combined with beach access	**FY 32/33**	9 years
Strategic Objective 4	Sustainable Livelihoods	7.3	Identify, fund, and enrich a minimum of six (6) new community-managed FW areas for sustainable economic use, including eco-tours, using a Community-Based Adaptation (CBA) approach. Use existing (or new) NGOs to support community members and implement such programmes whilst providing marketing and promotional support for new	**FY 32/33**	10 years

STRATEGIC OBJECTIVE	SUB-PROGRAMME	#	ACTIVITIES	TO BE COMPLETED BY	TIMEFRAME
			community-based FW attractions.		
Strategic Objective 4	Sustainable Livelihoods	7.4	Develop and promote sustainability guidelines for FW community members to mitigate common artisanal causes of ecosystem degradation, e.g., fuelwood and fencepost harvesting, oyster harvesting guidelines	**FY 32/33**	9 years
Strategic Objective 1	Conservation and Restoration	2.1	Develop and implement monitoring and enforcement protocols and plans for 4,430 hectares of gazetted and protected forested wetlands	**FY 32/33**	8 years
Strategic Objective 1	Conservation and Restoration	2.7	Establish a minimum USD 2 million compensation fund for forested wetland conservation and restoration work. Fees (incl. restoration and permit fees), fines, performance bonds etc, associated with wetland modification permits and environmental permits would be allocated to this fund for future FW conservation/ restoration work.	**FY 32/33**	10 years
Strategic Objective 1	Conservation and Restoration	2.5	Effect restoration and conservation plans in selected "restorable" sites, totalling 1,000 ha or more	**FY 32/33**	10 years

6 Financing Strategy

The successful implementation of the NMSFMP 2023-2033 is contingent upon the effective mobilization of resources to support the activities outlined in the plan. This financing strategy will provide recommendations for feasible and implementable approaches to mobilizing existing or new/potential funding sources and mechanisms that can be directed towards forested wetland management, conservation, and restoration (where required). This strategy will aim to include human, institutional and other non-monetary (or financial) resources, and due consideration should be made beyond financial or capital support.

It should be noted that funding for forested wetland management, conservation and restoration may be limited given the competing national priorities such as poverty reduction, job creation, crime, and public health. Mainstreaming the NMSFMP activities and strategic outcomes with ongoing environmental and biodiversity conservation initiatives, involving new and existing partners, and general improvements to cross-sectoral inclusion of biodiversity issues should lead to better conservation outcomes.

6.1 Costing: NMSFMP 2023-2033

Seven (7) sub-Programmes were developed during the NMSFMP planning process aligned to the four (4) strategic objectives of the NMSFMP. The overall success of the NMSFMP will rely heavily on implementing the various activities and sub-Programmes. Based on feedback from the Situational Analysis consultative process, which informed the proposed management actions, the estimated costs amount to USD 9,043,000.00 for the duration of the management plan (including annual estimated costs for monitoring and evaluation of the plan). The cost of only the planned activities, with the monitoring and evaluation costs, is USD 8,973,000.00.

TABLE 6-1: SUMMARY OF COSTS (USD) FOR THE NMSFMP SUB-PROGRAMMES PER FINANCIAL YEAR (FY)

Strategic Objectives and Sub-Programs	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33
Strategic Objective 1	**$ 2,120,000.00**	**$ 60,000.00**	**$ 1,220,000.00**	**$ -**	**$ 1,000,000.00**	**$ -**	**$ 1,000,000.00**	**$ -**	**$ -**	**$ -**
Legal and Regulatory	$ 40,000.00	$ 60,000.00	$ 20,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Conservation and Restoration	$ 2,080,000.00	$ -	$ 1,200,000.00	$ -	$ 1,000,000.00	$ -	$ 1,000,000.00	$ -	$ -	$ -
Strategic Objective 2	**$ 560,000.00**	**$ 506,500.00**	**$ 164,000.00**	**$ 74,000.00**	**$ 4,000.00**	**$ 16,500.00**	**$ 24,000.00**	**$ 10,000.00**	**$ -**	**$ 30,000.00**
Monitoring, Reporting & Data/Information Management	$ 55,000.00	$ 94,000.00	$ 120,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Capacity Building	$ 25,000.00	$ 52,500.00	$ 40,000.00	$ 70,000.00	$ -	$ 12,500.00	$ 20,000.00	$ 10,000.00	$ -	$ 30,000.00
Research and Development	$ 480,000.00	$ 360,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ -	$ -	$ -
Strategic Objective 3	**$ 254,000.00**	**$ 363,000.00**	**$ 363,000.00**	**$ 182,000.00**	**$ 182,000.00**	**$ 86,000.00**	**$ -**	**$ -**	**$ -**	**$ -**
Public Education and Awareness	$ 254,000.00	$ 363,000.00	$ 363,000.00	$ 182,000.00	$ 182,000.00	$ 86,000.00	$ -	$ -	$ -	$ -
Strategic Objective 4	**$ 225,000.00**	**$ 55,000.00**	**$ 120,000.00**	**$ 19,500.00**	**$ 119,500.00**	**$ 3,000.00**	**$ 103,000.00**	**$ 3,000.00**	**$ 3,000.00**	**$ 103,000.00**
Sustainable Livelihoods	$ 225,000.00	$ 55,000.00	$ 120,000.00	$ 19,500.00	$ 119,500.00	$ 3,000.00	$ 103,000.00	$ 3,000.00	$ 3,000.00	$ 103,000.00
NMSFMP Monitoring and Reporting Costs	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*	*$ 7,000.00*
FY Sub Total	$ 3,166,000.00	$ 991,500.00	$ 1,874,000.00	$ 282,500.00	$ 1,312,500.00	$ 112,500.00	$ 1,134,000.00	$ 20,000.00	$ 10,000.00	$ 140,000.00

Detailed costings as per strategy, outcome and outputs are outlined in the attendant document of this plan titled "*Jamaica's National Mangrove and Swamp Forest Management Plan 2023-2033; Financing Strategy*".

6.2 Challenges to Financing

The lack of dedicated financing is a barrier to implementing the various sub-programme activities at a meaningful scale. Financing the costs of all components (including capital and operating costs) depends on funding availability, financial benefit, risk management and an enabling political environment. Some common challenges to forested wetland management and conservation in Jamaica that can negatively influence sustainable financing include:

- Difficulties in setting up projects to maintain their activities and impacts without dedicated funding support, e.g., little evidence of generating long-term sustainability, including through cash flow.

- Opportunity costs are seen as high - Inherent risks related to working with an unpredictable and complex natural system can create a perception of risky investment by potential donors.
- Difficulty in assessing or evaluating the fiscal benefit of forested wetland conservation or restoration, financial return on investment (ROI) is not immediately apparent. Mechanisms designed to generate cash flow and direct beneficiaries are generally difficult to identify.
- Focus primarily on (mass) replanting efforts to the detriment of a more holistic “ecological restoration” approach.
- Lack of long-term funding and partnerships to increase duration and sustainability.
- Policy and legislation-based challenges linked to the legal status of forested wetlands, use of coastal and marine resources and land tenure.
- Bureaucratic obstacles in achieving forested wetland restoration projects promptly (attaining permits, land ownership permissions etc.)
- Need for improved coordination across regulatory agencies to maximise resources.
- Inadequate planning without extended knowledge about the local conditions, both environmental and social, and lack of inclusion of predicted climate change impacts

Many of these challenges can be addressed or reduced through appropriate risk management in the planning phase for each sub-programme activity.

7 References

Barbier, Edward. 1993. Sustainable Use of Wetlands Valuing Tropical Wetland Benefits: Economic Methodologies and Applications. The Geographical Journal 159, no. 1: 22-32. https://doi.org/10.2307/3451486.

Burgess, C.P., Taylor, M.A., Stephenson, T., Mandal, A and Powell, L. 2013. Flood Risks for Jamaica: Present and Future Climate (1678 to 2100). In Butler D, Chen A, Djordjevic S, Hammond MJ (eds): Proceedings of the International Conference on Flood Resilience: experiences in Asia and Europe United Kingdom: Exeter pp 302.

Caribbean Policy Research Institute. 2018. Beyond Pet Bottles and Plastic Bags. Fixing Jamaica's Environment Regulatory Framework.

Chin, A. 2014. "A Comparative Study of Mangrove Forests on the North Coast of Jamaica with reference to the Port Royal Mangroves". M.Sc. Thesis, University of the West Indies, Mona Campus, Kingston, Jamaica.

Climate Studies Group, Mona University of the West Indies. 2017. The state of the Jamaican climate 2015.

Climate Studies Group, Mona (CSGM). 2020. State of the Jamaican Climate 2019. Information for Building Resilience (Second draft). Produced for the Planning Institute of Jamaica (PIOJ), Kingston, Jamaica.

Convention on Biological Diversity. (n.d.) Available from: https://www.cbd.int/ecosystem/.

Convention on Biological Diversity. 2008. Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. CBD Technical Series No. 36. Montreal, Canada: Convention on Biological Diversity.

Donato, Daniel, John Boone Kauffman, Daniel Murdiyarso, Sofyan Kurnianto, Melanie Stidham, and Markku Kanninen. 2011. "Mangroves Among the Most Carbon-rich Forests in the Tropics." Nature Geoscience 4, no. 5: 293. https://doi.org/10.1038/ngeo1123.

Duke, N.C. and Pinzon, Z.S., 1992. Aging Rhizophoraseedligs from leaf scar nodes: a method for studying recruitment and growth in tropical mangrove forests. Biotropica, 24(2).

Duke, Norman, Jan-Olaf Meynecke, Sabine Dittmann, Aaron Ellison, Klaus Anger, Uta Berger, Stefano Cannicci, Karen Diele, Katherine Ewel, Colin Field, Nico Koedam, Shing Yip Lee, Cyril Marchand, Inga Nordhaus, and Farid Dahdouh-Guebas. "A World without Mangroves?" Science 317, no. 5834 (2007): 41–42. https://doi.org/10.1126/science.317.5834.41b

Ecological Working Group (EWG). 2009. Jamaica's National Ecological Gap Assessment Report (NEGAR). Kingston: Government of Jamaica.

Ellison, Aaron, and Elizabeth Farnsworth. 1997. "Anthropogenic Disturbance of Caribbean Mangrove Ecosystems: Past Impacts, Present Trends, and Future Predictions." Biotropica 28, no. 4: 549-65. https://doi.org/10.23072389096.

Ellison, Aaron. 2000. "Mangrove Restoration: Do We Know Enough?" Restoration Ecology 8, no. 3: 219-29. https://doi.org/10.1046/j.1526-100x.2000.80033.x.

Ellison, Joanna C., and David R. Stoddart. 1991."Mangrove ecosystem collapse during predicted sea-level rise: Holocene analogues and implications." Journal of Coastal Research, pp.151-165.

European Environmental Agency (EEA) (N.A.) Figure 1: The DPSIR Framework https://www.eea.europa.eu/publications/92-9167-059-6-sum/page002.html.

Evelyn, O.B., and R. Camirand. 2003. "Forest Cover and Deforestation in Jamaica: An Analysis Of Forest Cover Estimates Over Time". *International Forestry Review* 5 (4): 354-363. doi:10.1505/ifor.5.4.354.22659.

Forestry Department 2014, Land Use and Land Cover Assessment Report

Forestry Department. 2017. National Forest Management and Conservation Plan 2016-2026. Kingston: Forestry Department.

Forestry Department. 2018. Proposed Mangrove and Swamp Forest Assessment Methodology: Forestry Department Mangrove and Swamp Forest Assessment

Forestry Department. 2021. National Mangroves Socioeconomic Survey Report (Draft 1)

Forestry Department. (2022) EU BSP Indicator 3: Mangrove and Swamp Forest Verification Report Year 1-3. *Unpublished internal company report*

Gill, A. and Tomlinson, P., 1969. Studies on the Growth of Red Mangrove (Rhizophora mangle L.) I. Habit and General Morphology. Biotropica, 1(1), p.1.

Gilman, Eric, Joanna Ellison, Norman Duke, and Colin Field. 2008. "Threats to Mangroves from Climate Change and Adaptation Options: A Review." Aquatic Botany 89, no. 2: 237-50. https://doi.org/10.1016/ j. aquabot.2007.12.009.

Giri, Chandra, Edward Ochieng, Larry Tieszen, Zhongwei Zhu, Ashbindu Singh, Thomas Loveland, Jeffery G. Masek, and Norman Duke. 2011. "Status and Distribution of Mangrove Forests of the World Using Earth Observation Satellite Data." Global Ecology and Biogeography 20 (1), pp.154-159. https://doi.org/10.1111/j.1466-8238.2010.00584.x.

Government of Jamaica. 1990. Town and Country Planning Act, 1958 (Law 42 of 1957), last amended 1990

Government of Jamaica. 1991. Ministry of Justice. Natural Resources Conservation Authority Act, Operational - July 5th, 1991.

Government of Jamaica. 1996. The Forest Act.

Government of Jamaica. 1997. Policy for the National System of Protected Areas. Kingston, Jamaica: GOJ.

Government of Jamaica. 1999. The Wildlife Protection Act.

Government of Jamaica. 2000. Endangered Species (Protection, Conservation and Regulation of Trade) Act

Government of Jamaica. 2016. Overarching Policy for the entire Protected Areas System.

Government of Jamaica. 2018. The Fisheries Act. National Heritage Trust (JNHT). 1985. Jamaica National Heritage

Henry, A., Webber, D., Webber, M., (2018). Rapid Assessment Methods Developed for the Mangrove Forests of the Great Morass, St. Thomas, Eastern Jamaica. In: Dorney, J., Savage, R., Tiner, R.W., Adamus, P. (Eds.), Wetlands and Stream Rapid Assessments. Academic Press, London, UK, pp. 529–53Trust Act

Hogarth, P.J., 2015. The biology of mangroves and seagrasses. Oxford University Press.

Hogarth, P.J., 2017. "Mangrove ecosystems."

IUCN (N.A.) Situation Analysis – An Approach and Method for Analysing the Context of Projects and Program. Available from: https://www.iucn.org/downloads/approach_and_method.pdf.

Kathiresan, Kandasamy, and Brian L. Bingham. 2001. "Biology of mangroves and mangrove ecosystems." pp.81-251.

Lee, S. Y., Primavera, J. H., Dahdouh-Guebas, F., McKee, K., Bosire, J. O., Cannicci, S., ... & Record, S. (2014). Ecological role and services of tropical mangrove ecosystems: a reassessment. Global ecology and biogeography, 23(7), 726-743.

Lewis III, Roy, Eric Milbrandt, Benjamin Brown, Ken Krauss, André Rovai, James Beever, and Laura Flynn. 2016. “Stress in Mangrove Forests: Early Detection and Preemptive Rehabilitation Are Essential for Future Successful Worldwide Mangrove Forest Management.” Marine Pollution Bulletin 109, no. 2: 764–71. https://doi.org/10.1016/J.MARPOLBUL.2016.03.006.

Mansingh, Ajai, and Arlene Wilson. 1995. “Insecticide Contamination of Jamaican Environment III: Baseline Studies on the Status of Insecticidal Pollution of Kingston Harbour.” Marine Pollution Bulletin 30, no. 10: 640-45. https://doi.org/10.1016/0025-326X(95)00038-O.

National Environment and Planning Agency (NEPA), Government of Jamaica. (2007) Guidelines for conducting environmental impact assessments.

National Environment and Planning Agency (NEPA). 2013. National strategy and action plan on biodiversity of Jamaica 2016-2021.

National Environment and Planning Agency. 2013. State of the Jamaican environment report 2013.

NRCA, Natural Resource Conservation Authority. 1997. Mangroves and Coastal Wetlands Protection Draft Policy and Regulation.

OECD (2021), Applying Evaluation Criteria Thoughtfully, OECD Publishing, Paris, https://doi.org/10.1787/543e84ed-en.

Olmsted, I., 1993. Wetlands of Mexico. In Wetlands of the world: Inventory, ecology and management Volume I (pp. 637-677). Springer, Dordrecht.

Osland, Michael, Amanda Spivak, Janet Nestlerode, Jeannine Lessmann, Alejandro Almario, Paul Heitmuller, Marc Russell, Frederico Alvarez, Darrin Dantin, James Harvey, Andrew From, Nicole Cormier, Kenneth Krauss, and Camille Stagg. 2012. "Ecosystem Development After Mangrove Wetland Creation: Plant–Soil Change Across A 20-year Chrono sequence." Ecosystems 15, no. 5: 848-866. https://doi.org/10.1007/s10021-012-9551-1.

Planning Institute of Jamaica. 2009. Vision 2030 Jamaica: National Development Plan. Kingston, Jamaica: PIOJ.

Planning Institute of Jamaica. 2018. Medium Term Socio-Economic Framework 2018-2021: Towards Inclusive Growth and Sustainable Development. Kingston, Jamaica: PIOJ.

Prospere, K., McLaren, K. and Wilson, B., 2016. Characterizing the Status (Disturbed, Hybrid or Novel) of Swamp Forest Fragments in a Caribbean Ramsar Wetland: The Impact of Anthropogenic Degradation and Invasive Plant Species. Environmental Management, 58(4), pp.655-681.

Protected Areas Committee (PAC). 2013. Protected Areas Systems Master Plan: Jamaica 2013 - 2017 (PASMP).

Rabinowitz, Deborah. 1978. “Early Growth of Mangrove Seedlings in Panama, and a Hypothesis Concerning the Relationship of Dispersal and Zonation.” Journal of Biogeography 5, no. 2 (1978): 113. https://doi.org/10.2307/3038167.

Richards, A. 2008. Development Trends in Jamaica’s Coastal Areas and The Implications for Climate Change, Urban and Regional Planner Sustainable Development and Regional Planning Division Planning Institute of Jamaica

Reef, R.; Feller, I. C.; Lovelock, C. E. 2010. "Nutrition of Mangroves". Tree Physiol. 30 (9), 1148–1160. https://doi.org/10.1093/treephys/tpq048.

Simpson, J. A. 2016. Sweet wastewater: Irrigating sugarcane with soapberry effluent–Rio Cobre, Jamaica (Doctoral dissertation, Loughborough University).

Slobodian, L. N., Badoz, L., eds. 2019. Tangled roots and changing tides: mangrove governance for conservation and sustainable use. WWF Germany, Berlin, Germany and IUCN, Gland, Switzerland. xii+280pp.

Snedaker, Samuel C. 1982."Mangrove species zonation: why?" In Contributions to the Ecology of Halophytes, pp. 111-125. Springer, Dordrecht.

Soli, G., 1966. Bioluminescent cycle of photosynthetic dinoflagellates. Limnology and Oceanography, 11(3), pp.355-363.

Stuart, S., Choat, B., Martin, K., Holbrook, N. and Ball, M., 2007. The role of freezing in setting the latitudinal limits of mangrove forests. New Phytologist, 173(3), pp.576-583.

Sussex, I., 1975. Growth and metabolism of the embryo and attached seedling of the viviparous mangrove, Rhizophora mangle. American Journal of Botany, 62(9), pp.948-953.

The Nature Conservancy. 2020. Ecological Assessment of Old Harbour Bay, St. Catherine, Jamaica.

The University of the West Indies, Discovery Bay Marine Laboratory. 2021. Mangrove Restoration Planning Survey for Old Harbour Bay, St. Catherine- Jamaica: The Salina. Prepared for The Nature Conservancy

Thomas, Shanna-Lee. 2019. "An Assessment of Seedling Growth, Survival and Natural Recruitment During Mangrove Rehabilitation at Refuge Cay, Port Royal Mangroves, Jamaica." M.Sc. Thesis. The University of the West Indies, Mona Campus, Kingston, Jamaica.

Tomlinson, P. B. The Botany of Mangroves. 1986. 413 pp. Cambridge University Press. ISBN 0521 25567 8. GBP 47.50 (USD 69.50).

Trench, C. 2018. Jamaica's Coastal Forest: The Front Line Vs. The Bottom Line. *https://www.forestry.gov.jm/resourcedocs/jamaicas_coastal_forest - the_front_line_vs_the_bottom_line.pdf*

Trench, C. 2021. Hydrological Restoration Approaches to Mangrove Forests in Jamaica. PhD thesis. The University of the West Indies, Mona. Kgn 7

Uddin, Md Shams, E. de Ruyter van Steveninck, Mishka Stuip, and Mohammad Aminur Rahman Shah. 2013. "Economic Valuation of Provisioning and Cultural Services of a Protected Mangrove Ecosystem: A Case Study on Sundarbans Reserve Forest, Bangladesh." Ecosystem Services 5: 88-93.

United Nations / Framework Convention on Climate Change. 2015. Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations.

Valiela, Ivan, Jennifer Bowen, and Joanna York. 2001. "Mangrove Forests: One of the World's Threatened Major Tropical Environments: At Least 35% of the Area of Mangrove Forests Has Been Lost in the Past Two Decades, Losses that Exceed Those for Tropical Rain Forests and Coral Reefs, Two Other Well-Known Threatened Environments." Bioscience 51, no. 10: 807-15. https://doi.org/10.1641/0006-3568 (2001)051[0807: MFOOTW] 2.0.CO;2.

Webber, M., Calumpong, H., Ferreira, F., Granek, E., Green, S., Ruwa, R., & Soares, M., 2016. Mangroves. The First Global Integrated Marine Assessment: World Ocean Assessment I, 877-886.

World Bank. 2019. Forces of Nature: Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica.

World Bank. 2019. Mangroves Monitoring and Evaluation Manual – Jamaica. World Bank.

Worthington, T. and Spalding, M., 2018. Mangrove restoration potential: A global map highlighting a critical opportunity.

Websites Accessed

https://www.jamaicaobserver.com/news/stiffer-fines-coming-for-environmental-breaches/. Accessed on October 12, 2022

https://rsis.ramsar.org/ris-search/Jamaica?f%5B0%5D=regionCountry_en_ss%3ALatin%20America%20and%20the%20Caribbean&f%5B1%5D=regionCountry_en_ss%3AJamaica. Accessed on October 30, 2022

8 Appendix

8.1 Mangrove Forest Re-verification

Based on mangrove survey gaps identified from the Forestry Department's EU-BSP report, it was agreed that several mangrove sites might need re-verification. The consultant team hosted three virtual meetings with the Forestry Department's Research team to review aerial images of the suspected or previously known forested wetland sites and agree on areas that were priorities for re-verification. These sites were visited by the consultant team, accompanied by Forestry Department staff, to perform re-verification surveys between February 19 and March 20, 2022. During these surveys, 4-6 boundary locations where mangrove forest vegetation ended/transitioned to terrestrial vegetation were marked with a handheld Garmin GPS unit. Re-verification of forested wetlands also took place by desk review. Some partially investigated or suspected mangrove forest sites not thoroughly assessed by the Forestry Department team were reviewed via information regarding them in technical reports, Environmental Impact Assessments and wetland modification applications and permits. These reports were attained through the cooperation of the National Environment and Planning Agency, from the relevant research agencies (e.g., The University of the West Indies, Environmental Consultants), or directly from the owners of the reports/datasets.

Some sites visited were not forested wetlands/mangrove forests or were too small to meet the minimum forest size criteria. Therefore, no additional information was collected from these sites. A list of the non-mangrove sites visited is provided in Table 7-1. After returning from the sites, the data was inputted into Google Earth Pro to identify and demarcate the sites into polygons. From these polygons, the team obtained an approximate hectares (ha) size of each of the verified mangrove sites visited. The size (in hectares) of forested land that was lost or gained was also recorded. Finally, notes were made on the state of the mangroves at the time of ground truthing, and the state changes up to the previous decade. The results of the re-verified sites are summarized in **Table 7-1**. The satellite images for each site are shown in Figures 7-1 to 7-11.

The re-verification surveys revealed an additional 260 hectares of mangrove forests that may be added to the existing Forestry Department inventory. The details of the areas are provided below, in addition to images of the current locations. In the south-eastern segment of St. Thomas, five new mangrove locations were identified and re-verified as mangrove forests. These forests were mostly unchanged over the last decade and are seemingly at low risk from traditional development. The area is mostly uninhabited, with small neighbouring communities like Pera and Dalvey along the edges of traditional sugar cane plantations. Another small mangrove area with a pond was also noted in Bull Bay (Wickie Wackie), which is currently under development threat from the major St. Thomas highway project underway. There was evidence of recent modification of the area from road works.

Another three mangrove locations may be added for the parish of Hanover. The community of Green Island was partially assessed in the EU-BSP surveys, but re-verification revealed another 20 hectares to be added to the national inventory. These sites were assessed to be in clear and imminent threat from informal development, as these towns economies are tourism based and informal and unplanned housing with dumping activities were observed in progress.

The Soapberry sewage treatment plant area represents the most significant addition to the mangrove surveys. Since its construction, this major waterfowl habitat has seemingly expanded internally by converting from salina/scrub to a closed mangrove canopy.

TABLE 8-1: SHOWING THE GPS COORDINATES, SIZES AND STATE OF EACH RE-VERIFIED MANGROVE AREA

GPS Coordinates	Location/ Polygon	Size in ha. (approx.)	Hectares lost (-)/ gained	Notes
18°27'11.88"N, 78°11'14.83"W	Re-verified Lucea Polygon	1.83		Dumping and development are progressing further centrally from the southern border.
18°23'13.76"N, 78°16'18.43"W	Green Island Polygon1	10		Mangrove surrounds the river running inwards.
18°23'38.85"N, 78°15'53.38"W	Green Island Polygon2	8.77	-0.52	Mangroves on either side of the river towards the north, development occurring across the centre of the forest.
17°53'8.65"N, 76°16'41.80"W	Pera Bay-Dalvey boundary	8.32		Mangroves run parallel to the shoreline but not directly alongside it.
17°52'59.38"N, 76°17'9.28"W	Pera Bay Polygon	15		Mangroves run parallel to the shoreline but not directly alongside it.
18°27'11.88"N, 78°11'14.83"W	Pera Bay Polygon2	4.17	0.56	Mangroves run alongside the river towards the north, southeast section of the forest is not comprised of mangrove vegetation.
17°52'15.01"N, 76°18'14.66"W	Canoe Bay Polygon	1.43		Mangroves run from the shoreline in a north-easterly direction.
17°52'29.71"N, 76°17'53.25"W	Canoe Bay Polygon2	7.43		Pockets of water lying centrally in the mangrove forest.
18°27'11.88"N, 78°11'14.83"W	Wickie Wackie Polygon	5.65	-0.17	Inlet of seawater surrounded by mangroves.
17°55'51.42"N 76°52'41.00"W	Green Bay	4.83		Overwash forest.
18° 0'13.32"N 76°51'26.40"W	Soapberry/Riverton	193		Riverine is nutrient-rich (sewage) and severely impacted. Mangrove expansion occurring since construction*.
TOTAL ha verified		**260.43**		

FIGURE 8-1: SHOWING THE RE-VERIFIED MANGROVE POLYGON IN LUCEA, HANOVER (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-2: SHOWING THE RE-VERIFIED MANGROVE POLYGON (1 OF 2) IN GREEN ISLAND, HANOVER (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-3: SHOWING THE RE-VERIFIED MANGROVE POLYGON (2 OF 2) IN GREEN ISLAND, HANOVER (SOURCE GOOGLE EARTH, 2022)

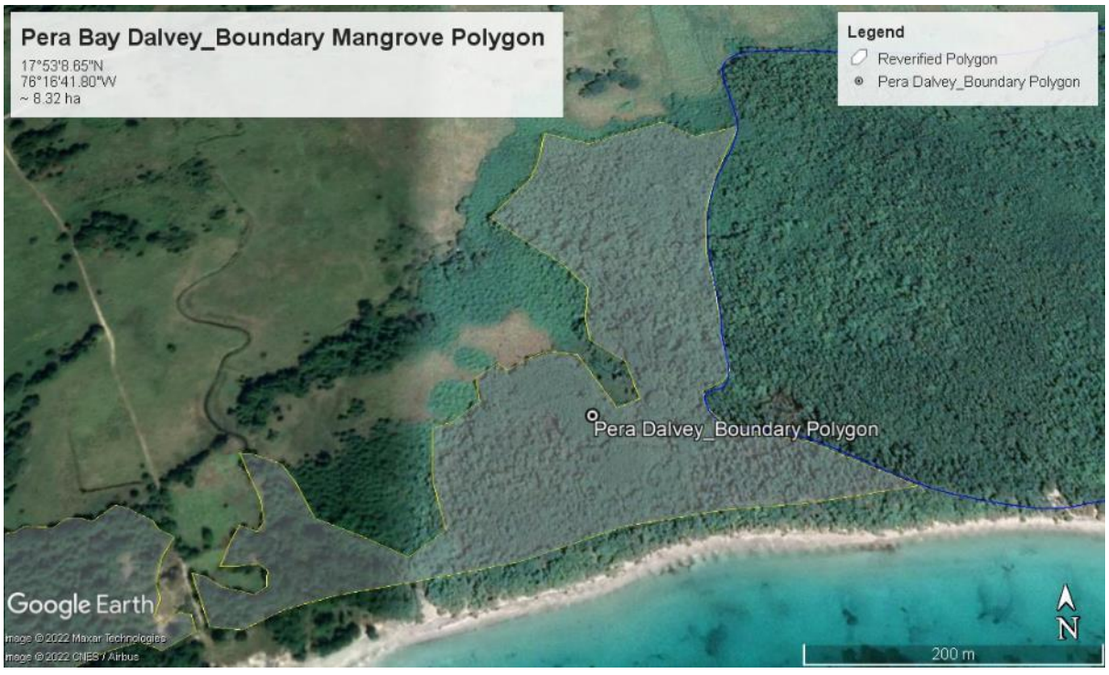


FIGURE 8-4: SHOWING THE RE-VERIFIED MANGROVE POLYGON OF PERA BAY ALONG THE DALVEY BOUNDARY, ST. THOMAS (SOURCE GOOGLE EARTH, 2022)

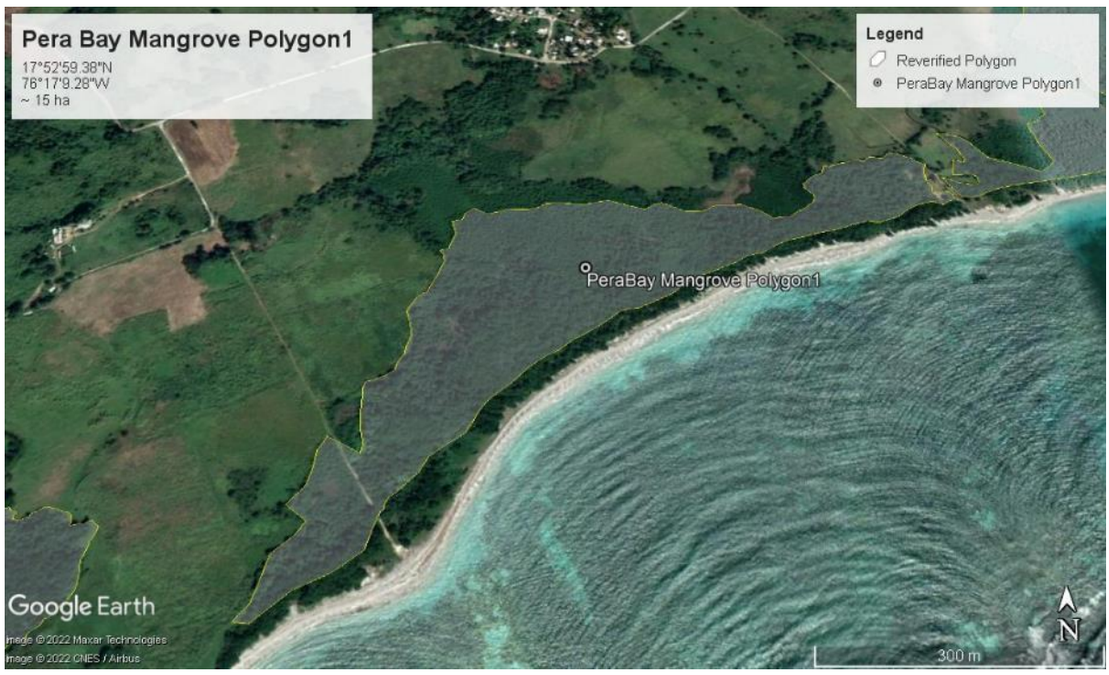


FIGURE 8-5: SHOWING THE RE-VERIFIED MANGROVE POLYGON (1 OF 2) IN PERA BAY, ST. THOMAS (SOURCE GOOGLE EARTH, 2022)

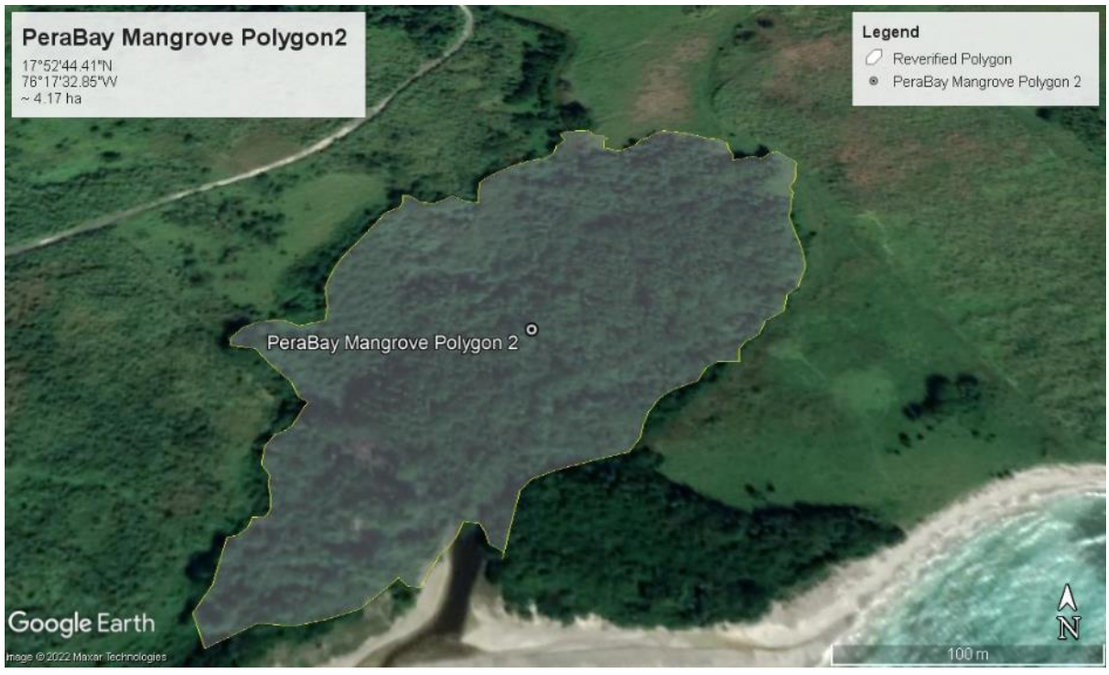


FIGURE 8-6: SHOWING THE RE-VERIFIED MANGROVE POLYGON (2 OF 2) IN PERA BAY, ST. THOMAS (SOURCE GOOGLE EARTH, 2022)

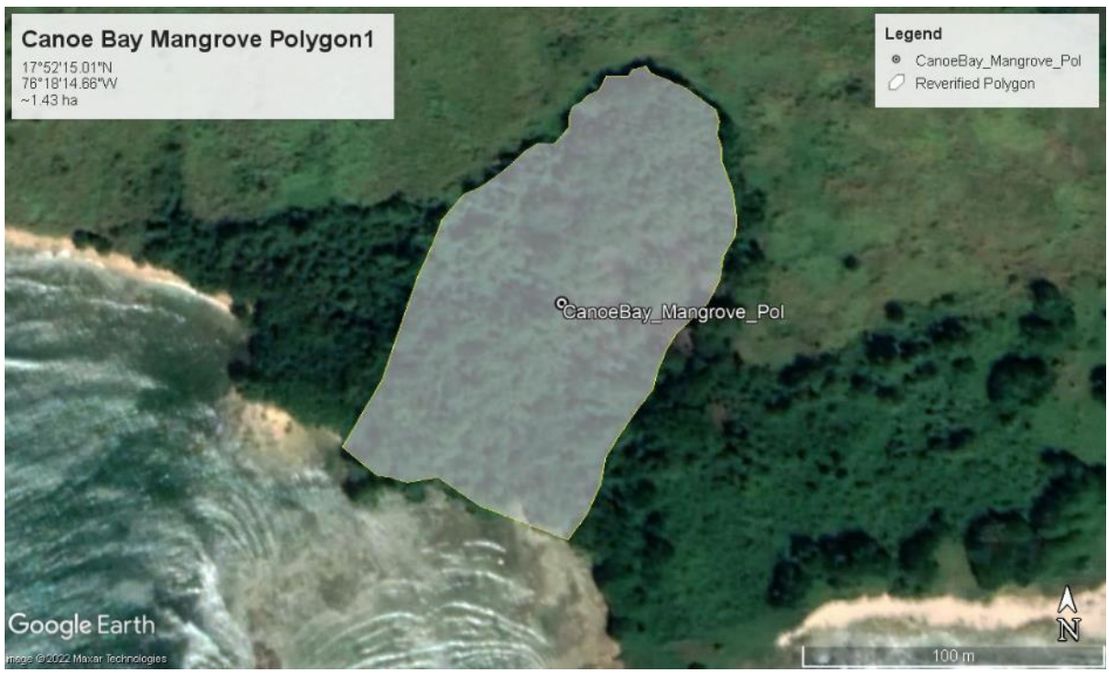


FIGURE 8-7: SHOWING THE RE-VERIFIED MANGROVE POLYGON (1 OF 2) IN CANOE BAY, ST. THOMAS (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-8: SHOWING THE RE-VERIFIED MANGROVE POLYGON (2 OF 2) IN CANOE BAY, ST. THOMAS (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-9: SHOWING THE RE-VERIFIED MANGROVE POLYGON IN WICKIE WACKIE, ST. ANDREW (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-10: SHOWING THE RE-VERIFIED MANGROVE POLYGON SOAPBERRY/HUNTS BAY (SOURCE GOOGLE EARTH, 2022)

FIGURE 8-11: SHOWING THE RE-VERIFIED MANGROVE POLYGON IN GREEN BAY, ST. CATHERINE (SOURCE GOOGLE EARTH, 2022)

8.2 Parish Maps courtesy of The Forestry Dept., Jamaica

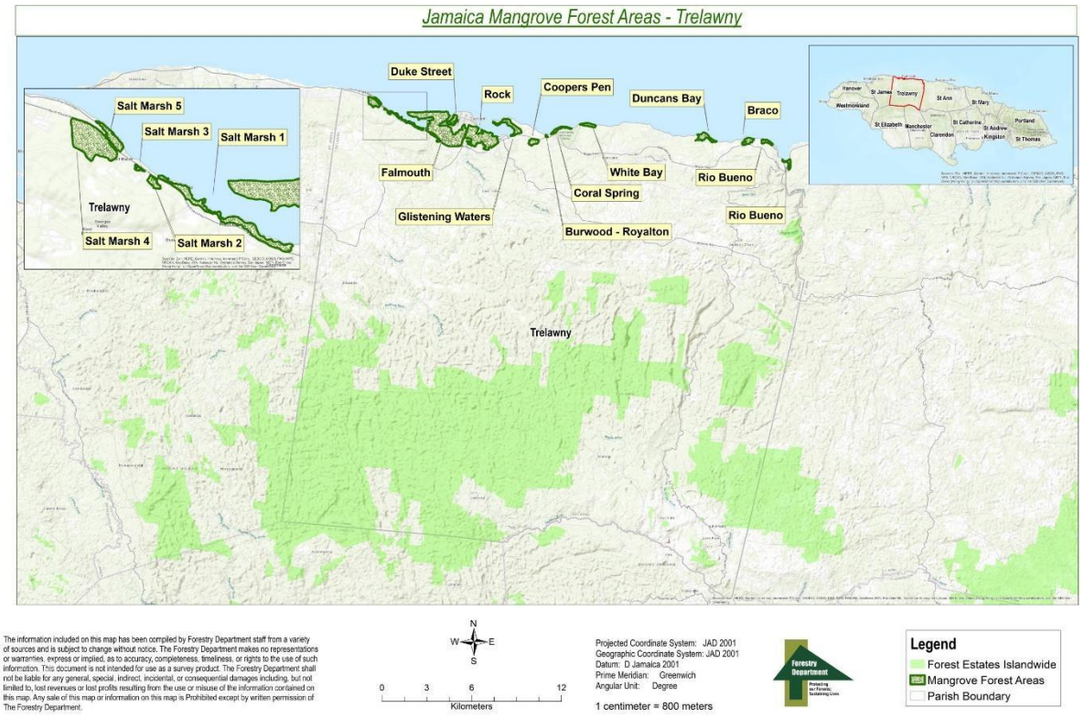


FIGURE 8-12: SHOWING TRELAWNY PARISH MAP OF FORESTED WETLAND

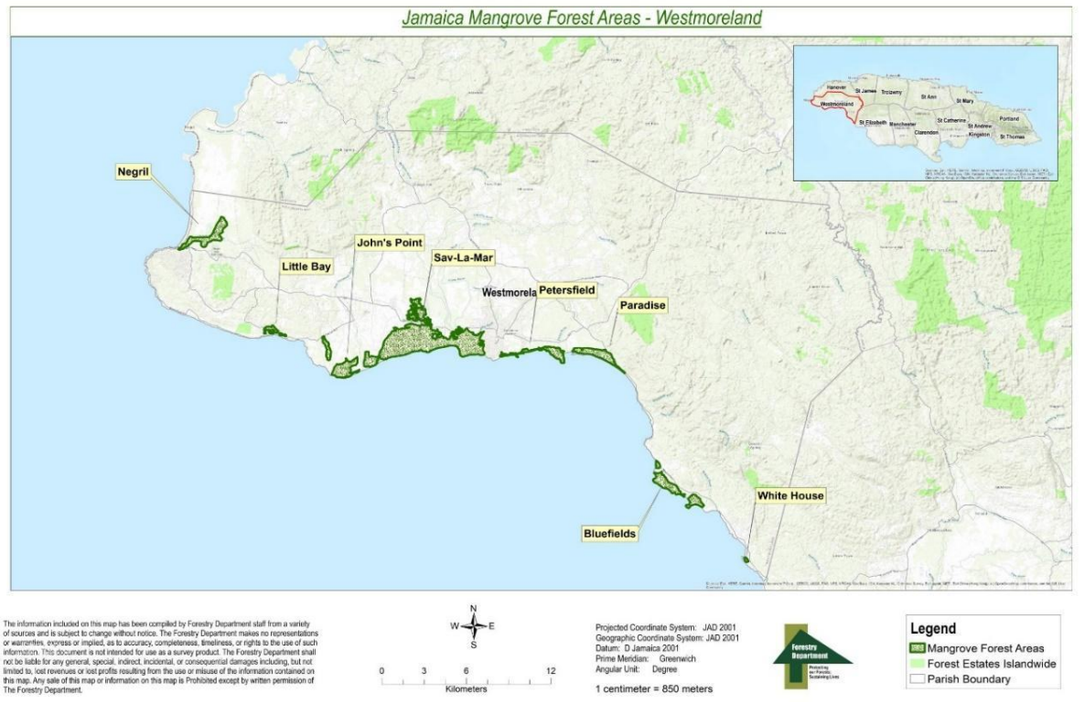


FIGURE 8-13: SHOWING WESTMORELAND PARISH MAP OF FORESTED WETLAND

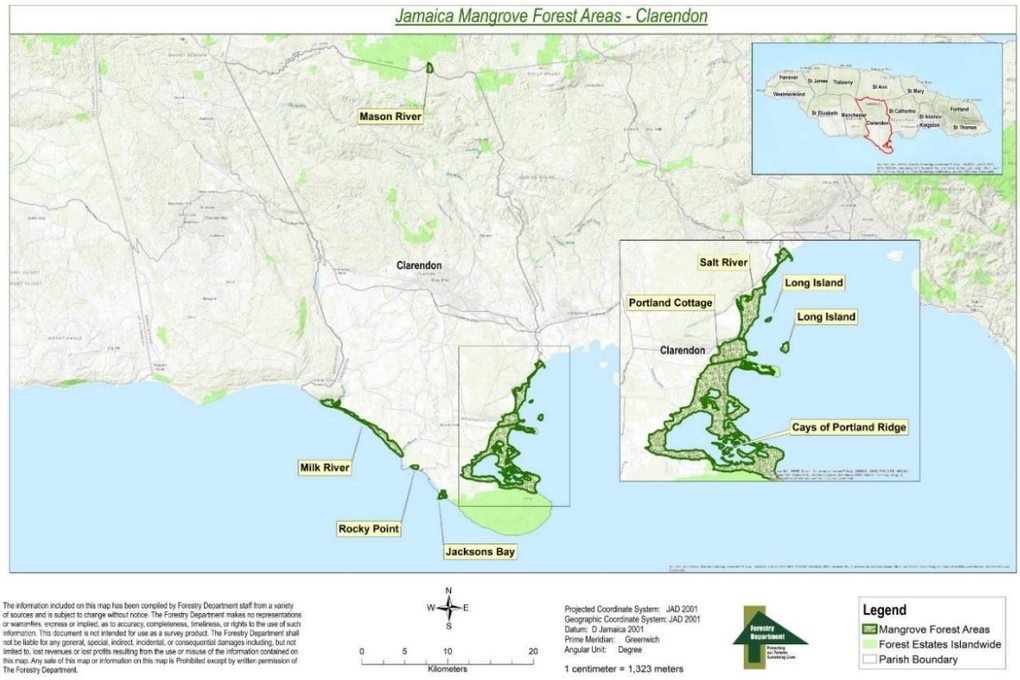


FIGURE 8-14: SHOWING CLARENDON PARISH MAP OF FORESTED WETLAND

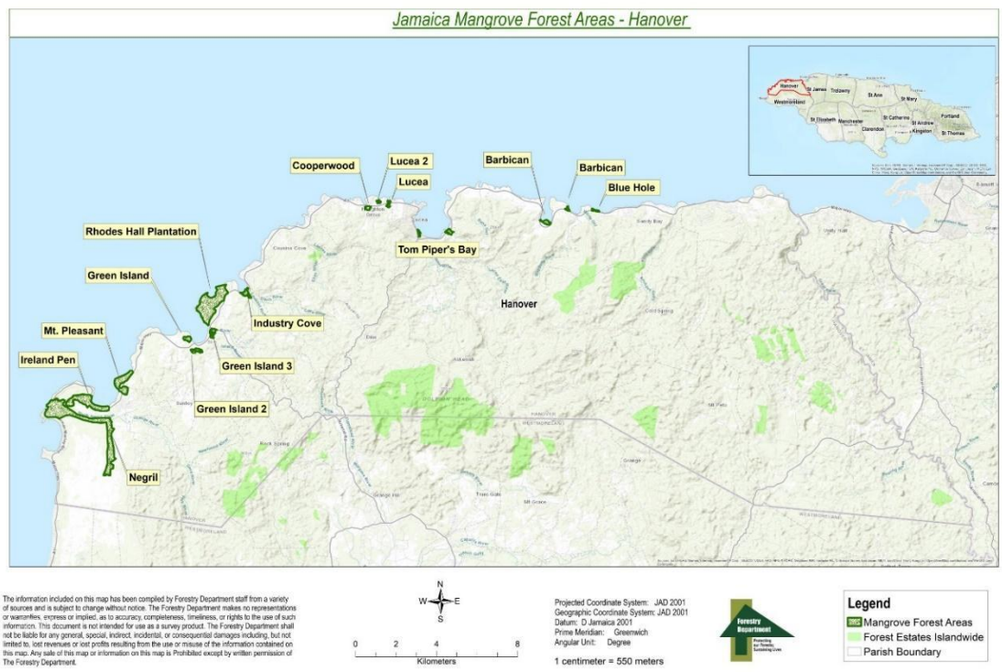


FIGURE 8-15: SHOWING HANOVER PARISH MAP OF FORESTED WETLAND

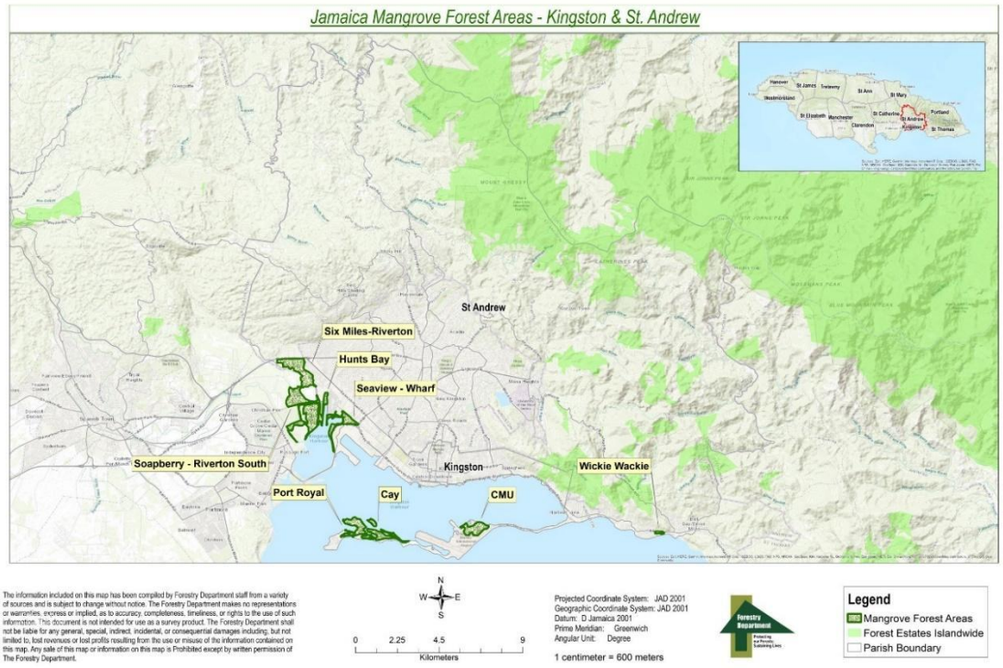


FIGURE 8-16: SHOWING KINGSTON AND ST. ANDREW PARISH MAP OF FORESTED WETLAND

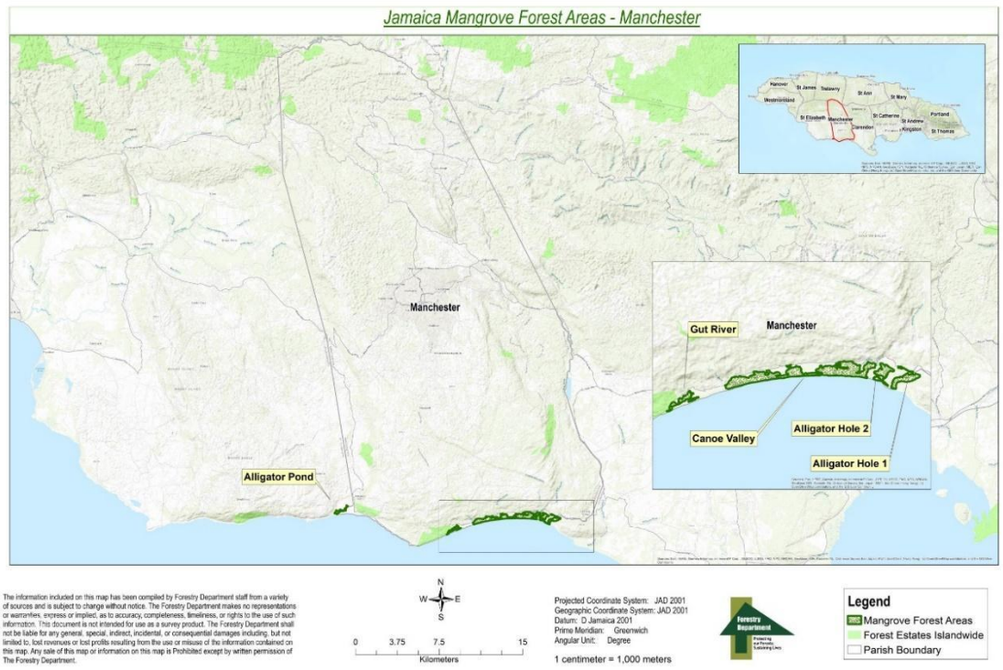


FIGURE 8-17: SHOWING MANCHESTER PARISH MAP OF FORESTED WETLAND

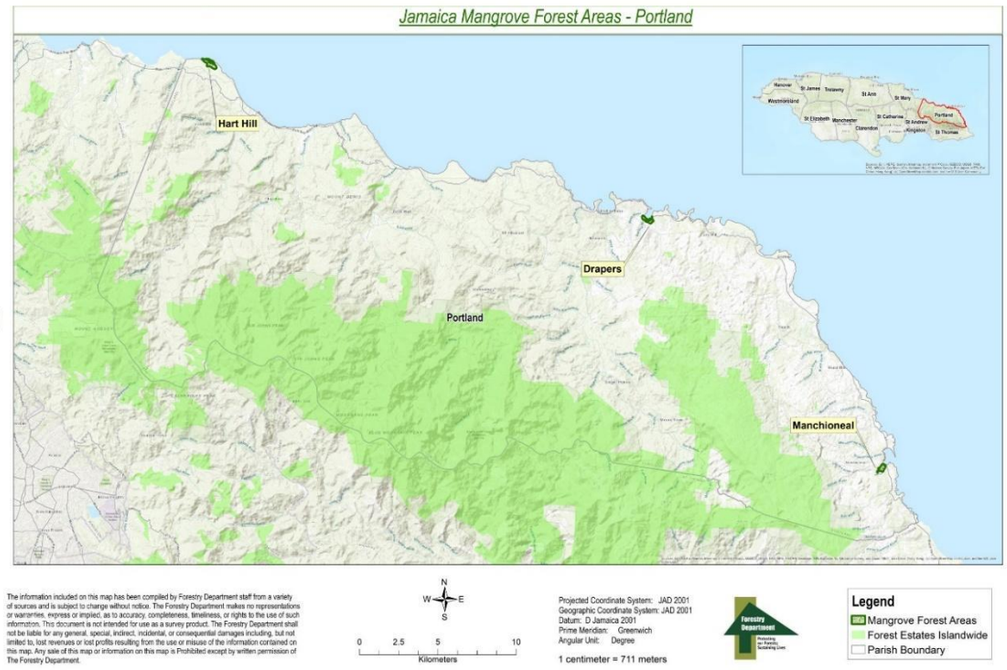


FIGURE 8-18: SHOWING PORTLAND PARISH MAP OF FORESTED WETLAND

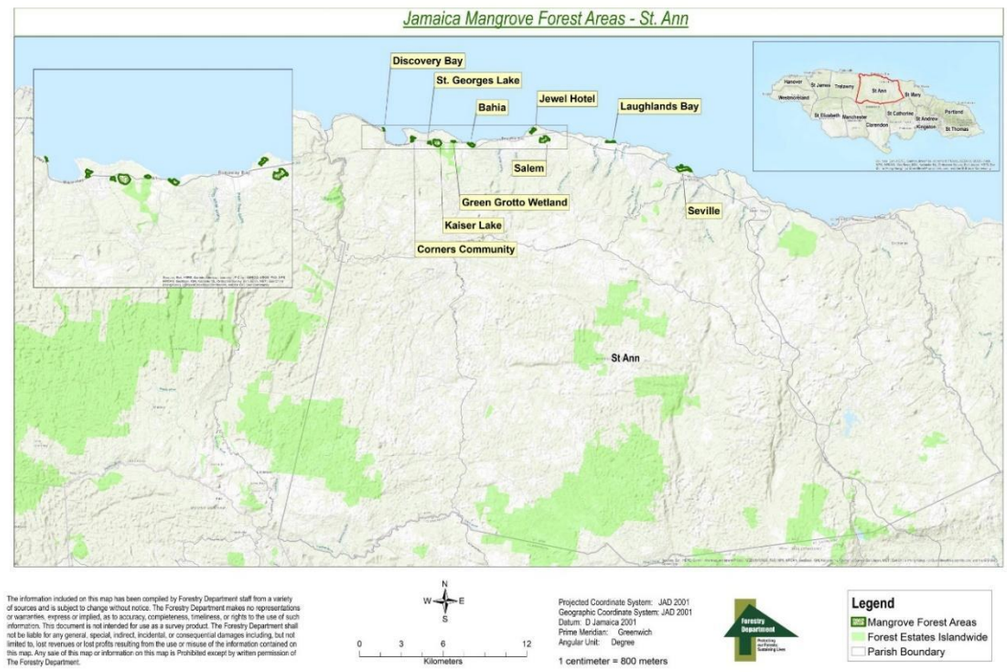


FIGURE 8-19: SHOWING ST. ANN PARISH MAP OF FORESTED WETLAND

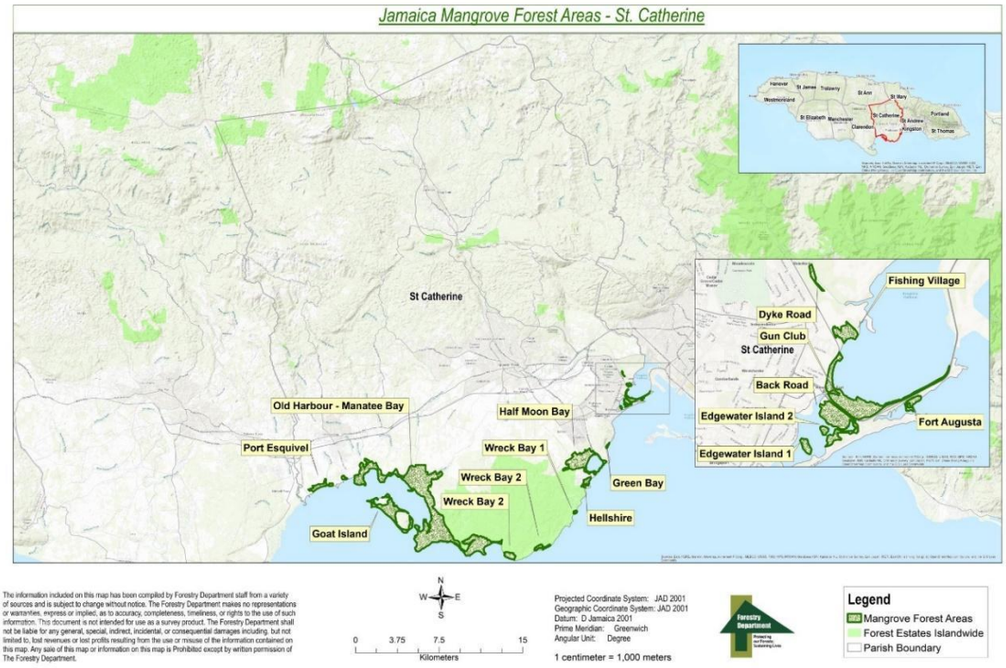


FIGURE 8-20: SHOWING ST. CATHERINE PARISH MAP OF FORESTED WETLAND

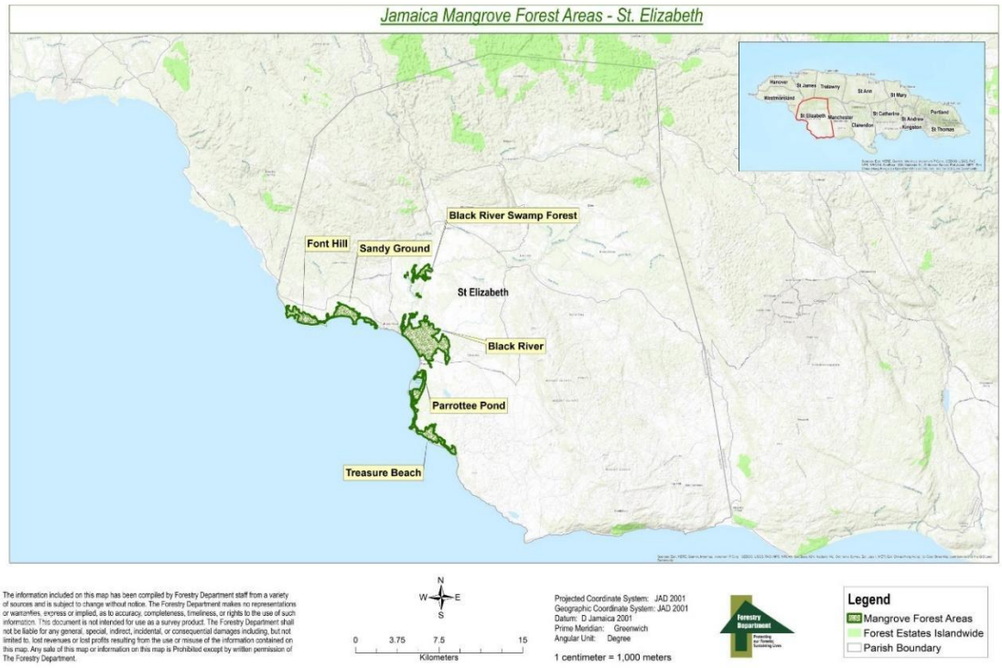


FIGURE 8-21: SHOWING ST. ELIZABETH PARISH MAP OF FORESTED WETLAND

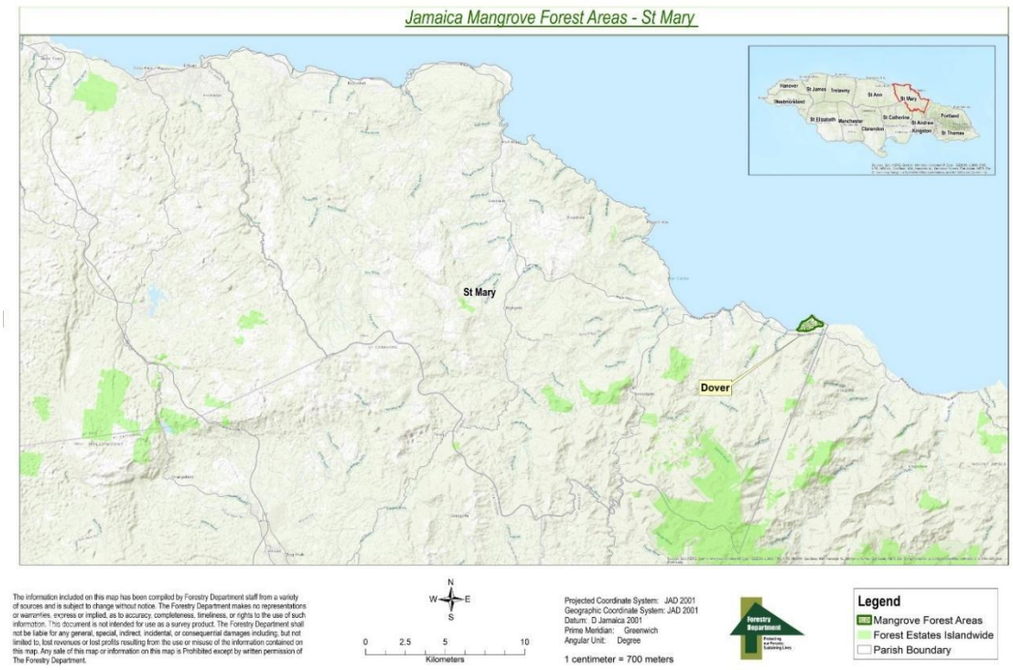


FIGURE 8-22: SHOWING ST. MARY PARISH MAP OF FORESTED WETLAND

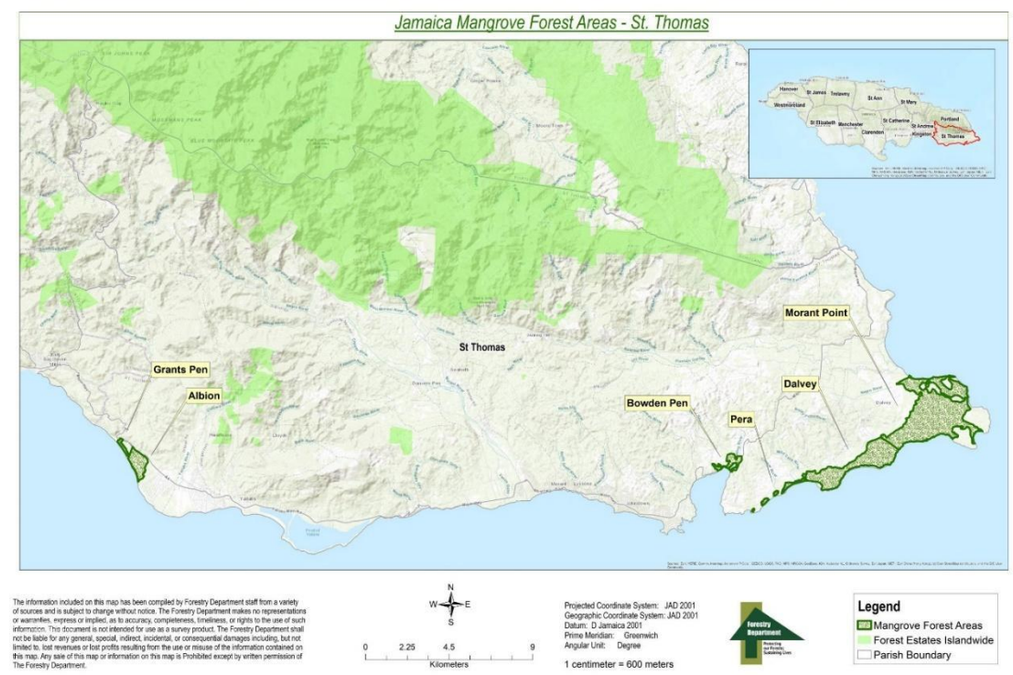


FIGURE 8-23: SHOWING ST. THOMAS PARISH MAP OF FORESTED WETLAND

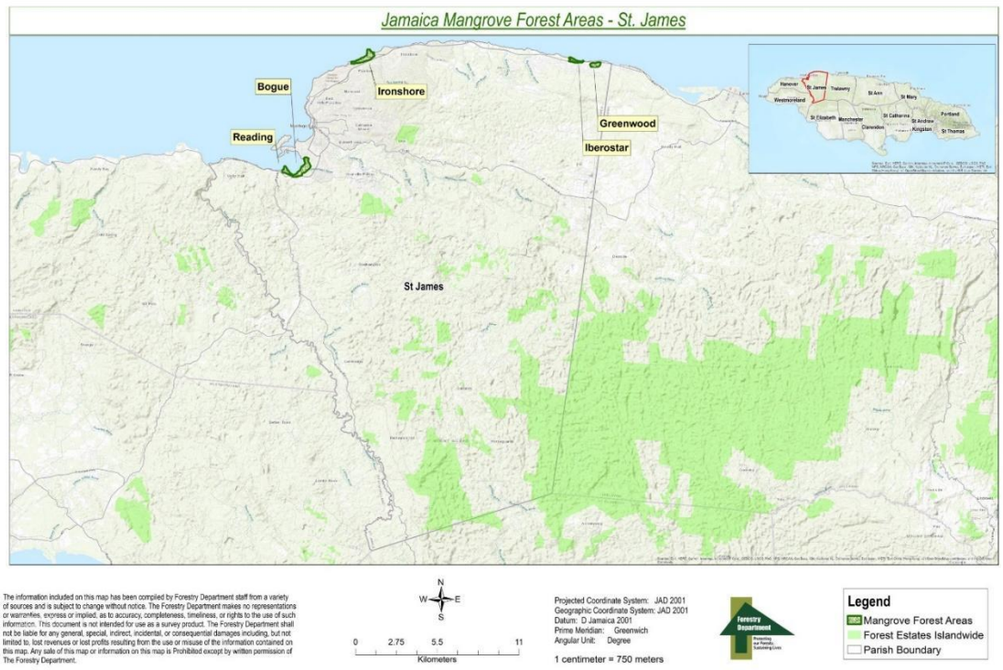


FIGURE 8-24: SHOWING ST. JAMES PARISH MAP OF FORESTED WETLAND

8.3 Stakeholders Consulted

With the assistance of the Forestry Department, the consulting team identified key stakeholders and institutions with working knowledge of mangroves and swamp forests or users of forested wetland resources. The data necessary to inform the development of the NMSFMP relied on the knowledge base, historical and socio-political context, anecdotal information, and technical inputs from the identified stakeholders.

A Stakeholder Engagement Plan that outlined the measures to be used for stakeholder engagement and dissemination of information relevant to the development of the NMSFMP, was developed. The plan allowed for frequent and strategic engagement between the consulting team and the persons directly or indirectly impacted by the activities related to the plan's development. These include communication with internal and external stakeholders regarding the NMSFMP development and implementation.

The consulting team prepared a list of stakeholders, in collaboration with the Forestry Department, during the inception phase of this plan. Stakeholders were consulted in different stages based on the level of awareness and engagement required. Key stakeholders engaged throughout the development process of the NMSFMP are highlighted in the table below.

TABLE 8-2: STAKEHOLDERS CONSULTED

Government	Civil Society

• National Fisheries Authority and associated sub-units, e.g., Jamaica Fisheries Union, Fish Sanctuary Network
• Forestry Department
• Ministry of Tourism
• National Environment and Planning Agency
• National Land Agency
• National Water Commission
• Planning Institute of Jamaica
• Port Authority of Jamaica
• Urban Development Corporation
	Academic/Research Institutions
	• Caribbean Maritime University (CMU)
	• College of Agricultural Sciences and Education (CASE)
	• University of Technology
	• The University of the West Indies, including:
	  ○ The Centre for Marine Sciences
	  ○ Port Royal Marine Laboratory
	  ○ Discovery Bay Marine Laboratory
	  ○ SODECO
	
	Non-governmental organizations (NGOs)
	• Jamaica Environment Trust

Government	Civil Society
• Water Resources Authority	• Caribbean Coastal Area Management Foundation • East Portland Fish Sanctuary/Alligator Head Foundation • The Nature Conservancy • Jamaica Institute of Environmental Professionals **Private Sector** • Sandals Foundation **Regional Implementation Partners** • FAO **Community Members and Resources Users (parishes and communities represented):** • Clarendon: Farquar Beach, Mitchell Town, Portland Cottage, Salt River, Sandy Bay • Portland: Drapers • St. Catherine: Hellshire, Jackson Bay • St. Elizabeth: Black River • St. Mary: Dover District • Trelawny: Glistening Water • Westmoreland: Johns Point, Paradise, Savanna-La-Mar, White House

8.4 NMSFMP Stakeholder Consultations

TABLE 8-3: SCHEDULE OF VIRTUAL CONSULTATIONS

Type	Stakeholders	# Of participants	Date	Content
Inception	FD NMSFMP Consultants	14	Feb 7	NMMP Expectations, team introductions
Stakeholder engagement #1	NGO's Academia FD	24	Feb 16	Introduction to NMMP and stakeholder engagement surveys results
Stakeholder engagement #2	MDAs NEPA NMSFMP NMSFMP Consultants		Feb 2022	Introduction to NMMP and stakeholder engagement surveys results
Stakeholder engagement #3: Phone calls and face-to-face surveys	Private sector Resource users, Community level resource users	52	March 2022	Introduction to NMMP and conducting surveys
Survey instrument sharing- online form	General public	50 responses	Feb-June 2022	NMMP survey questions- stakeholder views and data

Legislative gaps meeting	FD NMSFMP Consultants	6	March 2022	Discuss the legislative framework for drafting NMMP
Financing Survey instrument	Funding agencies GOJ NGO's Academia		March-May 2022	Explore ways to finance FW conservation
Validation meeting 1	NGOs GOJ Academia NMSFMP Consultants FD	22	June 22	Discussion re Situational analysis findings and draft management actions
Validation meeting 2	Resource users Tourism interest Utility companies Consultants FD NMSFMP Consultants	16	July 7	Discussion re Situational analysis findings and draft management actions
Key stakeholder interviews- one on one meeting	NEPA FD NMSFMP Consultants MDAs FAO	21	March to July 2022	To discuss management strategies, gaps, financing, limitations

*National Mangrove Management Plan (NMMP) was changed to National Mangrove and Swamp Forest Management Plan (NMSFMP) after consultations.

END OF DOCUMENT