Forestry Department

Protecting our Forests; Sustaining Lives

JAMAICA

NATIONAL FOREST MANAGEMENT AND CONSERVATION PLAN 2016 - 2026

USAID FROM THE AMERICAN PEOPLE

FINAL

(SEPTEMBER 2017)

Acknowledgements

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Stakeholders Consulted

ORGANISATION
CORE TEAM FOR THE DEVELOPMENT OF NFMCP
Forestry Department (FD)
MEGJC/Climate Change Division (CCD)
USAID/Jamaica
US Forest Service
TECHNICAL ADVISORY COMMITTEE (TAC)
MEGJC Environment and Risk Management Division
Mona GeoInformatics Institute
National Environment Protection Agency (NEPA)
National Land Agency (NLA)
Planning Institute of Jamaica (PIOJ)
Rural Agriculture Development Authority (RADA)
Tulloch Estates - Private Landowner
University of The West Indies, Life Sciences Department
Windsor Research Centre (WRC)
RESOURCE PERSONS TO TAC (TAC PLUS)
Various individuals from the agencies mentioned above
Tree Growers Association
University of the West Indies - Marine Labs
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Buff Bay LFMC
Caribbean Coastal Area Management Foundation
Cockpit Country LFMC
Constitution Hill LFMC
Dolphin Head LFMC
Forest Conservation Fund (now Environmental Foundation of Jamaica)
Institute of Jamaica
Jamaica Conservation and Development Trust
Jamaica National Heritage Trust
Meteorological Services Division
Mines and Geology Division
Ministry of Science Technology Energy and Mining
Ministry of Tourism and Entertainment
Ministry of Youth and Culture
Office of Disaster Preparedness and Emergency Management
Rio Minho LFMC
Southern Trelawny Environmental Agency
Spring Dunrobin LFMC
Urban Development Corporation

Abbreviations and Acronyms

AOSIS	Alliance of Small Islands States
BSJ	Bureau of Standards of Jamaica
CBO	Community-based Organisation
CCD	MEGJC Climate Change Division
CEADIR	Climate Economic Analysis for Development, Investment, and Resilience project
CIF	Climate Investment Fund
COP	Conference of Parties
CPC	Chief Parliamentary Council
CSM	Carbon Stock Monitoring
CSO	Civil Society Organisation
DAC	OECD Development Assistance Committee
DBJ	Development Bank of Jamaica
DRM	Disaster Risk Management
EFJ	Environmental Foundation of Jamaica
EIA	Environmental Impact Assessment
ERMD	MEGJC Environment and Risk Management Division
FAO	Food and Agricultural Organisation
FCF	Forest Conservation Fund
FD	Forestry Department
FMA	Forest Management Area
FMP	Forest Management Plan
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFF	Global Forest Fund
GFFFN	Global Forest Financing Facilitation Network
GHG	Greenhouse Gases
GOJ	Government of Jamaica
ICF	International Climate Fund
IDB	Inter-American Development Bank
IDP	International Development Partner
IOJ	Institute of Jamaica
IPCC	Intergovernmental Panel on Climate Change
JAMPRO	Jamaica Promotions/Trade and Invest
JCDT	Jamaica Conservation and Development Trust
JFB	Jamaica Fire Brigade
JNHT	Jamaica National Heritage Trust
JSIF	Jamaica Social Investment Fund
KPI	Key Performance Indicator
LFMC	Local Forest Management Committee
LICJ	Land Information Council of Jamaica
LUCA	Land Use/Cover Change assessment
MDA	Ministries, Departments and Agencies
MEGJC	Ministry of Economic Growth and Job Creation
MOFP	Ministry of Finance and Public Service
MGD	Mines and Geology Division
MICAF	Ministry of Industry, Commerce, Agriculture and Fisheries
MLGCD	Ministry of Local Government and Community Development (MLGCD)
MOE	Ministry of Education
MOJ	Ministry of Justice
MOT	Ministry of Tourism
MRV	Measuring, Reporting and Verifying
MSET	Ministry of Science, Energy and Technology
MSJ	Meteorological Service of Jamaica
MTF	Medium Term Socio-Economic Policy Framework
MTM	Ministry of Transport and Mining
NBSAP	National Biodiversity Strategy and Action Plan
NCU	Northern Caribbean University
NEPA	National Environment and Planning Agency
NERGIS	National Emergency. Response GIS Team
NFI	National Forests Inventory
NFMCP	National Forest Management and Conservation Plan
NGO	Non-Governmental Organisation
NLA	National Land Agency
NRV	Natural Resource Valuation
NSDMD	MEGJC National Spatial Data Management Division
NSWMA	National Solid Waste Management Authority
ODPEM	Office of Disaster Preparedness and Emergency Management
OECD	Organisation for Economic Cooperation and Development

PASMP	Protected Areas System Master Plan
PC	Parish Council
PCJ	Petroleum Corporation of Jamaica
PDC	Parish Development Committee
PES	Payment for Ecosystem Services
PIOJ	Planning Institute of Jamaica
PMER	Performance Monitoring, Evaluation and Reporting
PPCR	Pilot Programme for Climate Resilience
PR & CC	Forestry Department Public Relations & Corporate Communication
PSOJ	Private Sector Organisation of Jamaica
PSP	Permanent Sample Plots
RADA	Rural Agricultural Development Authority
REDD	Reducing Emissions from Deforestation and Forest Degradation
SCPU	Forestry Department Strategic Corporate Planning Unit
SDC	Social Development Commission
SDG	Sustainable Development Goal
SFM	Sustainable Forest Management
SRC	Scientific Research Council
TAC	NFMCP Technical Advisory Committee
TCPA	Town and Country Planning Act
TEF	Tourism Enhancement Fund
TPDCO	Tourism Product Development Company
UDC	Urban Development Corporation
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
USAID	United States Agency for International Development
USFS	United States Forest Service
UTECH	University of Technology
UWI	University of the West Indies
UWI/CSG	University of the West Indies Mona– Climate Studies Group
UWI/DLS	University of the West Indies Mona– Department of Life Sciences
WRA	Water Resources Authority

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Executive Summary

The development of the National Forest Management and Conservation Plan (NFMCP) 2016-2026 was pursued in a consultative manner over a period of approximately two and a half years, giving due consideration to all parties which were to have a role in the execution of the Plan: Governmental agencies, academia, private landowners, the private sector and their associations, local authorities, non-governmental organisations, community based organisations and international development partners.

Within an effort to develop a number of sectors plans which aim to achieve climate resilience for Jamaica, the forest sector under the guidance of the Forestry Department (FD) was the first sector to begin that process. NFMCP has therefore fully integrated mechanisms to build Jamaica's climate resilience; the need to mainstream climate change into the national development process; as well as obligations to local and multilateral policies and conventions. It also has taken into account the lessons learnt from the 2001-2010 Plan.

History of NFMCP

The Forestry Department (FD) had its early beginnings in 1937 with the passage of the Forest Law, which led to the creation of the Forest Branch in the Lands Department. By 1942 the Branch had evolved into the Forest Division located in the Ministry of Agriculture. Work was started on several reforestation projects. However, in 1988, Hurricane Gilbert destroyed most of the mature and immature pine plantations and caused the temporary abandonment of reforestation efforts. This disaster highlighted the need for a structured framework within which to sustainably manage Jamaica's forests since deforestation and forest degradation was a continuing process, due to population pressures, agricultural expansion, shifting cultivation, mining, land clearing for housing and extraction of forest resources. The Government recognized that the actions of the past were not sufficient to address the many issues and that a more strategic approach to the management of forest estates was needed. In 1990, with the support of the United Nations Development Programme (UNDP), the first National Forest Action Plan (NFAP) was developed.

Subsequently, in 1996 with the passage of the Forest Act, the Forestry Department (FD) was created with an emphasis on reforestation, conservation and greater community participation; FD became an Executive Agency in 2010. The FD, guided by the legislation, prepared the National Forest Management and Conservation Plan (NFMCP) 2001-2010. Subsequently, a 5-year Strategic Forest Management Plan was developed for the period 2010-15. In 2015, funding was secured for the development of a new 10-year NFMCP. The funding was provided by the United States Agency for International Development (USAID) Climate Economic Analysis for Development, Investment, and Resilience (CEADIR) project.

Results

An evaluation gap analysis carried out on the 2001 Forest Plan concluded that during the 2001 to 2015 period, the Agency and its partners were fairly successful in building the capacity of the Agency by strengthening its monitoring framework, improving information systems and its biophysical inventory, establishing, and upgrading nursery facilities, re-establishing the Forest Research Branch and investing in the training of community forest specialists. A number of Local Forest Management Committees (LFMCs) were established. An incentive programme for private forest landowners and socio-economic studies of

forest communities was done. In addition, the public awareness programme grew extensively through targeted public relations, conducting perception surveys, and collaboration with the Ministry of Education regarding environmental educational materials.

There was less success in some forest management activities relating to land tenure, squatting and the development and implementation of Local Forest Management Plans (LFMPs). With respect to forest cover, reforestation targets were not achieved and approximately 954 hectares were replanted from 2007 to 2015. Climate change mitigation activities generally accomplished little with respect to joint implementation of carbon sequestration projects. Also no values had been placed on the various components and resources within the forest estates.

The 2001-2010 NFMCP provided several valuable lessons which informed the development of the 2016-2026 NFMCP. The extent to which the forest sector impacts several areas of the country's social fabric became clear; including its heritage, the economy, and the daily lives of its people. Given its scope and the number of organisations involved in its execution, a shared vision and effective collaboration for its successful implementation is a priority. Also, the NFMCP needs to be properly resourced from its inception if the outcomes are to be achieved.

Issues informing the 2016-2026 NFMCP

The 2016–2026 NFMCP has been developed to ensure alignment to various key national policies geared at achieving national sustainable development objectives. In addition, its development comes against the background of Jamaica's international obligations for which the Forestry Sector plays a significant role. These policies and multilateral agreements include:

- Revised Forest Policy for Jamaica (2015);
- Climate Change Policy Framework (2015), prepared by the Government of Jamaica/ European Union/ United Nations Environment Programme Climate Change Adaptation and Disaster Risk Reduction (CCADRR) Project;
- Vision 2030 Jamaica - National Development Plan and its 3-year Medium Term Socio-economic Policy Framework (MTF);
- Sustainable Development Goals (SDG);
- United Nations Forum on Forests (UNFF);
- United Nations Framework Convention on Climate Change (UNFCCC);
- United Nations Convention on Biological Diversity (UNCBD);
- United Nations Ramsar Convention; and
- UNESCO World Heritage Sites.

There is global agreement that the adaptation of forests to climate change and mitigation are inextricably linked and the country should embrace the opportunity of developing strong forest adaptation and mitigation programmes. Sustainable forest management will influence carbon sequestration by trees, conserve biodiversity and provide valuable ecosystems. In Jamaica, forest restoration, through reforestation, afforestation, and halting degradation, along with some degree of tree cover in areas with other land use types (including urban spaces and small-scale agriculture), will all contribute to forest/tree cover acting as a carbon sink which removes carbon dioxide. The guiding principles of the Reducing Emissions from Deforestation and Forest Degradation (REDD+) programme is that through more sustainable forest management practices, it is possible to:

- Reduce greenhouse gases emissions produced by the forest sector; and
- Enhance the capacity of the forest sector to act as a carbon sink, by storing and enhancing carbon in the five carbon pools (i.e. aboveground biomass, belowground biomass, soil organic carbon, litter and dead wood).

Jamaica's forest cover

A land utilisation survey conducted from 1998 to 2013 found that 40% or 439,937.8 hectares of the county is covered with forests. During that period, the annual gain in forest cover was 0.41%. ***Table 6*** in the Plan (republished below) provides a detailed breakdown of the forest types and the quantity.

Land Use/Cover Change in Jamaica: 1998 and 2013, hectares				
Forest Land Use /Cover >75% Land Use/Cover Classification	1998	2013	Difference hectares	Per Cent Loss/Gain
Closed broadleaf forest	88,230.5	84636.6	-3,594.0	-4.1
Disturbed broadleaf forest	174,724.6	175590.6	866.0	0.5
Open dry forest – Tall	41,998.5	37559.7	-4,438.8	-10.6
Open dry forest – Short	12,104.0	2615.1	-9,488.9	-78.4
Plantation	8,186.9	8319.0	132.1	1.6
Secondary forest*	+	40453.7	40,453.7	
Mangrove forest	9,731.4	9732.8	1.4	0.0
Swamp forest	2,247.0	122.9	-2,124.1	-94.5
Sub-total	**337,223.0**	**359,030.4**	**21,807.4**	**6.5**
Annual change in forest cover (percent)				0.4
Secondary forest*		80907.4		
Total Forest Cover		**439,937.8**		

Table: National Land Use/Cover Change Assessment (1998-2013)

∗ Denotes new forest cover class.

Vision, Goal, Results Framework and Thematic Areas of the Plan

The NFMCP forms part of the policy tools that guide the work of the Forestry Department and as such its vision statement is the same as presented in the Forest Policy for Jamaica 2017: *"By 2062, Jamaica's forests and its biodiversity are sufficiently restored and sustainably managed, so once again the island can adequately be described as "the land of wood and water", capable of meeting the social, economic and ecological needs of current and future generations."*

Guided by its planning processes, the obligations under the UNFF and Jamaica's National Development Plan, the Forestry Department has articulated the goal of NFMCP as: *"Sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience."*

The NFMCP seeks to achieve this goal through four Strategic Forest Management and Conservation Objectives (SOs):

- SO1: Reverse forest degradation, deforestation and the loss of forest biodiversity, through conservation and sustainable forest management, as well as strengthening the legislative, policy and institutional framework of the sector.
- SO2: Enhance economic, social and environmental benefits of forests through the sustainable utilisation of forest resources.
- SO3: Build the capacity within the Forestry Department, its partners and forest communities to manage, protect and conserve the forest resources.
- SO4: Increase public education and awareness to protect, conserve, restore and manage Jamaica's forests.

The strategic forest management and conservation objectives will be achieved by implementing different actions over a period of time. Given the complex and cross-cutting nature of managing forests sustainably, involving many stakeholders and interested parties, the Forestry Department has articulated several guiding principles by which the Plan will be implemented to achieve the long-term goal. These are based on guiding principles detailed in the 2001 NFMCP, the input of stakeholders as well as the principles from the UN Forest Instrument.

- Enhancing partnerships and encouraging authentic dialogue and participation among all stakeholders.
- Combating climate change.
- Implementing sustainable forest management.
- Innovating forest finance.
- Increasing public education and awareness.
- Enhancing the decision-making capability.
- Ensuring alignment to Vision 2030 Jamaica – the National Development Plan.
- Embracing relevant National and Sectoral Policies.
- Meeting international obligations and commitments.

A Logic Model for NFMCP has been drawn up, providing a holistic view of the NFMCP through the contributing relationships from outputs to outcomes, grouped in Thematic Areas, and on to impact. The Logic Model shows five Thematic Areas, identified during the planning process for NFMCP. The outputs (total of 58) and outcomes (total of 13) are grouped under these major management concerns. In order to achieve the Strategic Forest Management and Conservation Objectives, all outcomes will have to be achieved. The outputs have been sub-numbered to indicate to which outcome they directly contribute.

The Thematic Areas of NFMCP 2016-2026 are:

1. Forest Governance and Conservation;
2. Forest Utilisation;
3. Capacity for Sustainable Forest Management;
4. Education, Training and Awareness;
5. Monitoring and Information Management.

Cross-cutting issues are: Climate change; Coordination and harmonisation among stakeholders; Resource mobilisation.

Stakeholders

Many actors (government entities, private land owners, NGOs, community groups and academia) from a range of sectors are to be involved in the implementation of NFMCP. The Forestry Department is the lead organisation and has ultimate responsibility for the implementation of NFMCP. It will however be supported in this by nine partner organisations, which have responsibilities for executing some of the key actions and for delivering important outputs towards the achievement of the NFMCP outcomes.

The ten "primary implementing entities" are:

1. Forestry Department (FD);
2. Jamaica National Heritage Trust (JNHT);
3. National Environment and Planning Agency (NEPA);
4. National Land Agency (NLA);
5. Meteorological Service of Jamaica (MSJ);
6. Ministry of Economic Growth and Job Creation (MEGJC);
7. Ministry of Transport and Mining (MTM);
8. Office of Disaster Preparedness and Emergency Management (ODPEM);
9. University of the West Indies Mona– Climate Studies Group (UWI/CSG);
10. University of the West Indies Mona– Department of Life Sciences (UWI/DLS).

In order to achieve broad-based participation and partnerships with multiple entities, a number of secondary partners have roles and responsibilities in implementing NFMCP. These include:

- Ministries, Departments and Agencies (MDA), part of the public sector;
- Private sector related to work in any of the sectors covered by NFMCP;
- Non-governmental organisations (NGOs);
- Local Forest Management Committees (LFMCs);
- Pertinent research institutes and academia.

Thematic Areas

Under Thematic Area 1, Forest Governance and Conservation, eleven actions have been identified. Its expected outcomes are:

- Outcome 1.1: Strengthened governance, policy and legislative framework to ensure sustainable development of the forest sector.
- Outcome 1.2: Forest biodiversity protected.

Under Thematic Area 2, Forest Utilisation, eleven actions have been identified. Its expected outcomes are:

- Outcome 2.1: Innovative mechanisms established for financing sustainable forest management and obtaining benefits from forest use.
- Outcome 2.2: Sustainable harvesting and use of timber products from forests.
- Outcome 2.3: Sustainable use of non-timber products and services of forests.

Under Thematic Area 3, Capacity for Sustainable Forest Management, sixteen actions have been identified. Its expected outcomes are:

- Outcome 3.1: Improved participatory planning to manage, protect and conserve Jamaica's forests.
- Outcome 3.2: Strengthened institutional capacity for REDD+ readiness.
- Outcome 3.3: Strengthened capacity of Local Forest Management Committees and other community groups.

Under Thematic Area 4, Education, Training and Awareness, seven actions have been identified. Its expected outcomes are:

- Outcome 4.1: Forest communities, the general public as well as targeted groups have increased capacity regarding sustainable forest practices.
- Outcome 4.2: Strengthened capacity for natural resource valuations, carbon stock monitoring and silviculture.

Under Thematic Area 5, Monitoring and Information Management, thirteen actions have been identified. Its expected outcomes are:

- Outcome 5.1: Improved availability of spatial data for sustainable forest management practices, promoting investment, and for assessing vulnerabilities and risks in the forest sector.
- Outcome 5.2: Strengthened capacity for impact and vulnerability assessments and for management of research and knowledge systems.
- Outcome 5.3: Improved collaborative monitoring of forest resources.

The budgets for all thematic areas remain to be finalised based on finance negotiations.

Management of the Plan

The NFMCP will be implemented in two phases. The first five years of implementation represent the first phase after which there will be a mid-term evaluation, that may lead to the continuation of actions found within this document; accompanied by new actions based on the achievements and building on the lessons learnt in the first five years.

The management framework being used for the execution, monitoring and evaluation, and continuing improvement of the NFMCP is derived from a tried and proven adaptive management approach. Its four components are Plan, Do, Check and Act (PDCA). The NFMCP Technical Advisory Committee (TAC) coordinates the appropriate execution of each of these components at all levels during the implementation of the Plan.

There are many parties which have a role in the implementation of the NFMCP. The Agency is the lead organisation, having the responsibility for coordination and overall reporting. It is assisted by nine other primary implementing agencies, which have responsibilities for executing some of the key actions and for delivering important outputs towards the achievement of the NFMCP outcomes. Further, there are a number of secondary partners, which contribute to the implementation of specific actions.

Monitoring and Evaluation

A strategy for Performance Monitoring, Evaluation and Reporting (PMER), as well as a detailed PMER plan for the NFMCP have been prepared (presented as separate documents). The implementation of NFMCP and its progress towards achievements will be monitored at regular intervals (for most results monthly or quarterly). Evaluations of specific results as well as the overall Plan are to be done based on the M&E schedule. Reporting by the FD to various audiences is to be streamlined as much as possible.

Funding and resources

The following considerations will be taken into account:

- Role and policy prescriptions of the GOJ and its relevant entities.
- Safeguarding the interests of rural communities.
- Incorporating Payment for Ecological Services in forest financing strategies.
- Private investment as a component of national forest financing.

Strategies for sustainable financing of the forest sector include:

- Promote forestry investments as engines for economic growth
- Make forest investments and programmes compatible with REDD+ and other international mechanisms
- Promote non-timber forest products as economically attractive investments
- Integrate Payment for Ecosystem Services (PES) in the economics of forestry
- Sourcing energy funds

The estimated cost of implementing the NFMCP remains to be determined. Both domestic and international sources of financing will be identified and secured to enable the full implementation of NFMCP. At this time, the main sources identified include:

Domestic sources

- The Government of Jamaica (GOJ)
- National Housing Trust (NHT)
- Tourism Enhancement Fund (TEF)
- The Private Sector

International sources

- Green Climate Fund (GCF)
- Global Environment Facility (GEF-7)
- Overseas Development Assistance (e.g., USAID, Global Forest Fund, International Climate Fund, etc.)

The financing instruments which have been identified include: (a) Budget allocation by GOJ; (b) Grants: (c) Seventh Replenishment of the GEF Trust Fund (GEF-7); (d) Grants available through bilateral and multilateral Overseas Development Assistance; (e) Donations.

SECTION A

Contextual

Setting/Framework

1 Background

1.1 History of the Forest Sector in Jamaica

Jamaica, the third largest island in the Caribbean, is situated about 145 kilometres south of the island of Cuba, with a total landmass of 10,991 square kilometres and a population of approximately 2.7 million people. The country has several rugged mountain ranges, with the highest point, the Blue Mountain Peak, rising over 2,256 metres (7,402 feet). More than 120 rivers flow from the mountains to the coast.

Approximately 60% of the island's bedrock is white limestone; 25% is volcanic and cretaceous; 10% alluvial; and 5% yellow limestone. Jamaica's climate is mainly tropical, with the most important climatic influences being the Northeast Trade Winds and the island's orographic features, that is, mainly the central ridge of mountains and hills.[1]

The island was called "the land of wood and water" when Christopher Columbus arrived in May 1494. By 1655 the English had colonized the country, gradually developing the agricultural sector firstly through the large-scale cultivation of sugar cane to be followed by coffee. The English accomplished this by alienating much of the low-lying lands and by the end of the eighteenth century, due to the necessity of the production of ground provision for the expanding enslaved population, the higher lands were applied for and apportioned.[2] This approach to land use and distribution meant that most of the country's land, apart from the cockpit lands of Trelawny and St James, passed out of the control of the Government.

The development pattern pursued by the English resulted in significant loss of forest cover, which was accompanied by a general change in climate over several years. By 1879 the "land of wood and water" experienced five years of continuous drought that adversely affected the mainly agrarian economy. This resulted in severe declines in sugar exports. By 1885 Maxwell Hall, the country's meteorologist, in a public lecture discussing the drought situation stated:

> It is now many years since the reciprocal influences operating between the existence of forest in a country and the climate of that country have been accepted to being directly related the one to the other . . . we have direct proofs afforded to us that in older countries where forests have been largely or entirely cleared there have followed certain conditions which can scarcely be otherwise regarded as direct effects; these are briefly: the diminution of rivers, the drying up of streams and springs, the recurrence of destructive floods, of unseasonable and prolonged droughts, the raising of temperature of both air and soil, excessive drainage, aridity of soil, and uncertainty in the growth of crops.
>
> (Hall cited in Hooper 1886, 7)

It is against this background, that the Government of the day asked E.M. Hooper to provide some recommendations for the recovery of the country's forest in a clear recognition of the importance of forests to national welfare and economic development. At that time the country was experiencing forest loss in the order of 30,000 acres each year due to clearing and burning. Hooper noted that such a rate of loss was unsustainable and recommended the reservation of highlands for conservation and protection

[1] Planning Institute of Jamaica, The State of the Climate Report (Kingston: PIOJ, 2012).
[2] E.D. Hooper, *Report Upon the Forests of Jamaica* (London: Waterlou and sons, 1886).

purposes and the reforestation of denuded lands in key limestone forests. His recommendations are summarized as follows.[3]

1) Reserve the highlands of the Blue Mountains, arranging to escheat, acquire, or obtain amicable surrender of private lands where necessary.
2) Demarcate and survey the Reserve so formed and protect it against fire, theft, and trespass.
3) Retain as forest reserves all blocks of Crown Lands on the limestone formations that exceed 2,000 acres in extent. Restrict cultivation of ground provisions in them wherever possible or expedient.
4) Protect the Reserves against the felling of valuable timbers and generally conserve them. Enforce rigidly all conditions in the Cinchona leases, etc.

He also suggested the formation of the Forest Department and later legislation was passed for the management of the forests as marked by the passage of the Mountain and River Reserves Law of 1889 and the Law of 1892.

Approximately 40 years later, A. Wimbush, the then Chief Conservator of Forests for Madras India, was invited by the Colonial Office to visit Jamaica to deal with problems related to deforestation, protection of existing forests lands and reforestation. The Chief Conservator found that while some efforts to manage forests had borne fruit, for example the passage in 1927 of the "Law to regulate Afforestation", in general the state of affairs was unsatisfactory. This was largely due, firstly to the demand for forest resources mainly wood to construct railway sleepers, secondly to the destruction of forest due to fires that were lit to clear land and finally in Wimbush's words, "inadequately controlled shifting cultivation has been allowed and encouraged by Government on Crown Lands, and since these are the only areas which carry any Government Forest, we have arrived at one of the main reasons for the unsatisfactory state of affairs as regards forestry in Jamaica" (Wimbush 1935). He noted that the only area spared from deforestation was the Cockpit Country, mainly because of its inaccessibility, and thus it still contained valuable tropical forests — a large extent of which still pertains today. Wimbush recommended a series of actions involving a significant programme of protection for several forest types along with reforestation; both he found were required for a sustainably managed forest sector.[4]

This brief review of the history of the management of forests shows that the challenges of land use are not dissimilar over the period and reaffirms the importance of forests to Jamaica's national development. As far back as one hundred and thirty years ago, it was recognized that forests were valuable for mitigating the effects of climate change, the sustainable provision of water supply, the protection of the country's infrastructure as well as indirectly linked to the success of the agricultural sector. Ironically, agriculture was one of the land utilization activities, which still today contributes to forest degradation and deforestation and there is a delicate balance that must be maintained between agricultural production and sustainable forest management practices. The early recommendations, that is, the establishment of forest reserves, legislation, and staff to administer forest estates are strategies that remain relevant in the forest sector of today's Jamaica.

[3] A. Wimbush, *Report on Forest Problems in Jamaica* (1935).
[4] Ibid.

1.2 Why a Forest Plan?[5]

Against the background of the recommendations of Hooper and Wimbush, the Forestry Department (FD) had its early beginnings in 1937 with the passage of the Forest Law. This led to the creation of the Forest Branch in the Lands Department. By 1942 the Branch had evolved into the Forest Division located in the Ministry of Agriculture.

With the inception of the Forest Division several reforestation projects were undertaken. Arguably one of the most notable projects took place from 1974 to 1979 when over 3,000 hectares of plantation were established. However, by 1988, Hurricane Gilbert destroyed most of the mature and immature pine plantations, and reforestation efforts were temporarily abandoned. The disaster of 1988 highlighted the urgent need for a more structured framework within which to sustainably manage Jamaica's forests. It became clear that the formation of the Forest Division and the passage of legislation did not halt deforestation and forest degradation as forest estates continued to diminish because of population growth pressures, agricultural expansion, shifting cultivation, mining, land clearing for housing and extraction of forest resources. Despite these actions, the challenges of how to manage the forest resource in such a manner that the benefits of ecosystem services, prevention, or reduction of disasters due to flooding and landslides, maintenance of soil fertility and microclimates, provision of livelihoods, mitigation of climate change and protection of our cultural and aesthetic values remained. The Government recognized that the actions of the past were not sufficient to address the complex, perplexing and competing demands that placed increasing pressures related to land utilization on waning levels of forest resources. It was further acknowledged that what was needed was a more strategic approach to the management of forest estates. The development of a forest action plan was determined to be the most appropriate framework through which to sustainably manage the forest sector. In 1990 with the support of the United Nations Development Programme (UNDP) the first National Forest Action Plan (NFAP) was developed.

Since, the development of the first NFAP, then Forest Division underwent further evolution; and in 1996 with the passage of the Forest Act, the Forestry Department (FD) was created with an emphasis on reforestation, conservation, and greater community participation. By 2001 the FD guided by the 1996 legislation prepared the National Forest Management and Conservation Plan (NFMCP) 2001-2010. As the Agency grew there was increasing focus on its institutional strengthening and by 2004 the Cabinet Office took a decision to transform the FD into an Executive Agency. This was accomplished on May 1, 2010. This current plan has been developed within the strengthen institutional frame and has built on the lessons learnt from the previous efforts, which are described in the following section of the plan.

1.3 Accomplishments of Previous Forest Management and Conservation Plans

The 1990 National Forest Action Plan (NFAP) supported the implementation of three important activities: (I) the compilation of data on the composition and condition of the forest resource; (ii) the development of a Forest Policy; and (iii) the passage of new legislation — the Forest Act of 1996, which expanded the powers and responsibilities of the Forestry Department. The new legislation enshrined (given its critical importance) the requirement for the Conservator of Forests to prepare a National Forest Management

[5] National Forest Management and Conservation Plan (March 2001).

and Conservation Plan (NFMCP)[6] in consultation with government departments, key stakeholders and interested parties.

The first NFMCP was approved by both houses of Parliament in 2001. The following key principles guided its development: (i) sustainability of forest development, (ii) holistic and inter-sectoral approach towards forest values and resources, (iii) consistency with national development policies and the socio-economic environment, (iv) partnership, participation, and transparency, (v) national policy commitment, (vi) international commitment, (vii) raising awareness, and (viii) a long-term iterative process.

The 2001–2010 NFMCP contained several strategic pillars. These are:

- community participation;
- public education;
- forestry research;
- Local Forest Management Plans;
- cooperative management agreements;
- forest protection;
- forest production programmes;
- investment and incentives;
- role of the Forestry Department;
- role of the Private Sector; and
- Coordination and monitoring.

There was also the development of the Strategic Forest Management Plan 2010–2014[7] in which the Forestry Department (Agency) articulated the status of the forestry sector, outlined five strategic objectives and established targets by which it could monitor its progress.

In 2015, a gap assessment on the accomplishment of the 2001 Plan was undertaken with the view to inform the development of a new Plan.[8] The 2001 Plan contained a total of 11 strategies, many of which required that resources be secured by the Agency either from within or outside of the Agency. The gap assessment report acknowledged that this first NFMCP was very ambitious particularly given the resource constraints faced by the organisations with the responsibility to execute various aspects of the plan and the degree of interagency coordination, which would be required for its execution. In light of those considerations, the report found that indeed in several instances numerous actions were not undertaken, mainly because the required resources were not available and this included the support of sister government entities and private landowners. Thus, in implementing the 2001 NFMCP the Agency had focused its resources on the high priority actions, which were under their direct control. However, it must be acknowledged that the accomplishments of the plan were mainly, but not entirely, an Agency effort and some degree of support was forthcoming from other entities; although the level of the support affected the completion of some actions during the implementation period under review. This finding from the assessment, that is, the need for effective interagency collaboration given the cross-cutting

[6] Forest Act, 1996, Section 16.
[7] Forestry Department Strategic Forest Management Plan 2010–2014.
[8] Forestry Department, National Forest Management and Conservation Plan, 2001 Gap Summary (April 2015).

nature of the forest sector, was a significant lesson and correcting this shortfall is one of the key actions in the 2016–2026 plan. The overall results of the assessment are highlighted in Figure 1.

The gap assessment found that during the 2001 to 2015 period the Agency and its partners were fairly successful in building the capacity of the Agency by strengthening its monitoring framework, improving information systems and biophysical inventory that informs its forest management decisions, establishing, and upgrading nursery facilities, re-establishing the Forest Research Branch and investing in the training of community forest specialists. In respect of private forests and community participation there have been some accomplishments with the establishment of Local Forest Management Committees (LFMCs), the development of incentive programmes for private landowners and socio-economic studies of forest communities. In addition, the public awareness programme grew extensively through targeted public relations programmes, conducting perception surveys, design of educational materials and collaboration with the Ministry of Education regarding environmental educational materials.

	Strategy Objective	Number of Actions	Number Met	Number Partially Met	Number with Gaps	% fully met	% Gaps
A	Build FD	17	5	6	6	29.4	35.3
B	Private Forests and Participation	3	1	2	0	33.3	0
C	Public Awareness	12	10	2	0	83.3	0
D	Forest Management Plans	27	5	6	16	18.5	59.3
E	Restore Forest Cover	14	2	1	11	14.3	78.6
F	CC Adaptation	12	0	6	6	0.0	50.0
G	Forest Management	16	5	8	3	31.3	19.00
H	Forest Benefits	6	0	0	6	0.0	100

Key:

	70% or more fully or partially met
	Less than70% fully or partially met

Figure 1 Summary of Accomplishments linked to Forest Strategy Objectives

Despite these successes there were actions in which stated intent was not accomplished to the degree anticipated. This occurred in areas of forest management particularly with regards to issues related to land tenure, squatting and the development and implementation of Local Forest Management Plans (LFMPs). With respect to forest cover, the reforestation targets were not achieved and approximately 954 hectares were replanted from 2007 to 2015. In the main, climate change mitigation activities were not

implemented as little was accomplished with respect to joint implementation of carbon sequestration projects. This outcome was equally true for the forest benefit activities as to date no values have been placed on the various components and resources within the forest estates.

1.4 The Role of Forests in National Economic Development, Lessons Learnt and Responding to New Exigencies

The benefits of Jamaica's forests and its contribution to the country's economic development have not been extensively studied. This places Jamaica's forest sector at a disadvantage in the 'race' for scarce government resources. Nevertheless, even in the absence of hard empirical data the experiential and traditional knowledge of the contribution of forests to national development is undeniable. The country's forests and forest resources contribute to food production, timber, provision of fuel wood and other forest resources, livelihoods, biodiversity and ecosystems services and there is no doubt about the contribution that well managed forests can make to climate change adaptation and mitigation.

Globally, it has been agreed that forests will play a significant role in climate change mitigation and it is posited that maintaining nature's capacity to buffer the impacts of climate change will be less costly and more efficient than the utilization of heavy infrastructural technology. This justifies the recommendation for investment in ecosystems (forests) as an attractive economic alternative.[9] The potentially adverse impact of climate change on Jamaica's economic development has been extensively discussed and documented.[10] An examination of the agricultural sector in Jamaica reveals that it accounts for 6.7% of GDP, employs 18.2% of the labour force and has over 200,000 farmers. In recent years, floods, cyclones, drought, and forest fires have contributed to a slowdown in the sector, resulting in growing concerns about food security. In terms of disasters, in 2011, the Planning Institute of Jamaica (PIOJ) provided an assessment of the costs of disasters on Jamaica's infrastructure. The PIOJ's assessment of the period from 2001 to 2010 revealed that natural disasters cost the country approximately 111 billion Jamaican dollars[11] and that one of the main contributing factors was identified as environmental conditions.

Even if the impact of these natural disasters on agriculture and infrastructure can only be determined by proxy figures, in the absence of more direct data on the benefits of forests to Jamaica's economic development, the information is sufficient to demonstrate the importance of sustainable forest management to national economic development. Considering that analysis, the importance of an effectively implemented and adequately resourced NFMCP to national development is significant and has been recognized in the preparation of the NFMCP 2016–2026.

The learning derived from the implementation of the 2001 NFMCP provided several valuable lessons, which informed the development of the 2016 NFMCP. One of the most important lessons was the recognition of the extent to which the forest sector impacts several areas of the country's social fabric; including its heritage, the economy, and the daily lives of its people. Given the cross-cutting nature of the

[9] Bruno Locatelli and Emilia Pramova, Forests and Adaptation to Climate Change: What is at Stake? (Center for International Forestry Research, Indonesia, World Resource Institute).
[10] Climate Studies Group, Mona (CSGM), State of the Jamaican Climate 2012 (produced for the Planning Institute of Jamaica).
[11] PIOJ, Assessing the Costs of Disasters on Jamaica's Infrastructure: Evidence from the Damage and Loss Assessment (Kingston: PIOJ, 2013).

sector and the demonstrated value of forests, the development of a holistic plan to guide the forest sector is a national imperative. The second lesson is that given its scope and the number of organisations involved in its execution, there is need for a shared vision and effective collaboration for its successful implementation. The final lesson is the need for the NFMCP to be properly resourced from its inception if the outcomes are to be achieved.

In summary, any gaps in the accomplishment of the 2001 NFMCP are related to several equally important and interrelated issues. These are: insufficient recognition at the highest levels of the decision-making pyramid of the complex relationship between sustainable forest management and national economic development; the existence of 'silos', which resulted in insufficient effective collaboration on key activities beyond the direct remit of the Agency; and the relative under-resourcing of the Plan. However, despite the gaps in the accomplishments in the 2001 to 2015 period, what was accomplished has established a relatively sound platform from which to launch an even more ambitious forestry programme.

Table 1 Impact on Jamaica's Gross Domestic Product (GDP) from some Selected Natural Disasters[12]

Selected natural disasters in Jamaica and their impact event	**Year**	**Category**	**Cost($J)**	**Impact (% GDP)**
Hurricane Michelle	2001	4	2.52	0.8
May/June Flood Rains	2002	-	2.47	0.7
Hurricane Charley	2004	4	0.44	0.02
Hurricane Ivan	2004	3	36.9	8.0
Hurricanes Dennis &Emily	2005	4	5.98	1.2
Hurricane Wilma	2005	5	3.6	0.7
Hurricane Dean	2007	4	23.8	3.4
Tropical Storm Gustav	2008		15.5	2.0
Tropical Storm Nicole	2010		20.6	1.9
Total			111.81	

Additionally, State of the Jamaican Climate 2012 Report[13] and the later updated report of January 2016[14] provides detailed information of the impact of climate change on the country's temperatures, rainfall, sea

[12] PIOJ, Assessing the Costs of Disasters on Jamaica's Infrastructure: Evidence from the Damage and Loss Assessment.
[13] CSGM, State of the Jamaican Climate 2012.
[14] Climate Studies Group, Mona, Draft Report – Jamaica: Future Climate Changes (University of the West Indies, January 2016).

levels and cyclones, and supports the necessity of a well-resourced NFMCP to help build climate resilience within the country. Further, several eminent scientific studies have predicted that Jamaica is one of the countries that will experience the full impact of climate change sooner rather than later. Scientists refer to this phenomenon as 'climate departure'; it is defined as "the moment when average temperatures, either in a specific location or worldwide, become so impacted by climate change that the old climate is left behind." It can be thought of as a tipping point. A city or country experiences 'climate departure' when the average temperature of its coolest year from then on is projected to be warmer than the average temperature of its hottest year between 1960 and 2005.

A study published in the prestigious peer-reviewed scientific journal *Nature*,[15] predicts that the Earth as a whole will reach 'climate departure' in 2047. In addition, the study projects the climate departure dates for each country based on the Global Circulations Models (GCMs). The authors project bad news for many of the world's most vulnerable countries, noting that these countries will be impacted the earliest and the Caribbean is among the group of such countries. In the case of Kingston, Jamaica the climate departure date predictions in the RCP 8.5 and RCP 4.5 are 2023 and 2028, respectively.

Given these new exigencies that the country faces increasing and more severe impacts from climate change and considering the policy objectives laid out in Vision 2030 Jamaica for the Forest Sector, these considerations have significantly influenced the preparation of the 2016 NFMCP.

[15] C. Mora, A.L. Frazier, and R.J. Longman, et al., 'The projected timing of climate departure from recent variabilities', *Nature* 502 (2013): 183–87.

2 The Issues Informing the 2016–2026 NFMCP

2.1 National Policies

The 2016–2026 NFMCP has been developed to ensure alignment to three key national policies geared at achieving national sustainable development objectives. In addition, its development comes against the background of Jamaica's international obligations for which the Forestry Sector plays a significant role. These policies and multilateral agreements are briefly described below.

2.1.1 The Forest Policy for Jamaica

The revised Forest Policy[16] 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 Agency'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".[17]

At the heart of the Policy is a commitment to engage the Jamaican people in the protection, conservation, and management of Jamaica's forests. Perhaps best expressed in the words of a retired Forester,

> The task that now faces Jamaica is a steep one: we must put back the trees on the land. It is not a job that should be left to the Forestry Department alone. It is the responsibility of each and every able-bodied Jamaican to join in this national effort to recapture the fast disappearing beauty of our country and thus ensure the stability of our remaining rivers.
>
> (Norman Bertram Vickers, Forestry Department 1968)

2.1.2 The Climate Change Policy Framework

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 develop an integrated approach in order to effectively build resilience at all levels and to have the required enabling policies in place.

It is against that background that the Climate Change Policy Framework (2015) was prepared under the Government of Jamaica/ European Union/United Nations Environment Programme Climate Change Adaptation and Disaster Risk Reduction (CCADRR) Project through a number of consultations, using as a basis, the Vision 2030 Jamaica – National Development Plan (2009) and Jamaica's Second National Communications on Climate Change (2011), presented to the United Nations Framework Convention on Climate Change.[18]

[16] Forestry Department, Forest Policy for Jamaica (2017).
[17] Ibid.
[18] Green Paper No. 1/2013 Climate Change Policy Framework and Action Plan.

The general objective of the Policy Framework is to create a sustainable institutional mechanism to facilitate the development, coordination and implementation of policies, sectoral plans, programmes, strategies, and legislation to address the impacts of climate change. These sectors, which have so far been identified, are: water, energy, agriculture, fisheries, forestry, coastal and marine resources, health, mining, tourism, transportation, solid waste management, planning and disaster risk reduction and response management.[19]

The Climate Change Policy Framework's five objectives are: (i) 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; (ii) to support the institutions responsible for research, data collection, analysis and projections at the national level on climate change, its impacts, and appropriate adaptation and mitigation measures, to facilitate informed decision-making and strategic actions at all levels; (iii) to facilitate and coordinate the national response to the impacts of climate change and promote low carbon development; (iv) to improve communication at all levels on climate change impacts and also adaptation and mitigation related opportunities so that decision makers and the general public will be better informed; and (v) to mobilize climate financing for adaptation and mitigation initiatives.

Further, the Policy Framework and Action Plan (2015) outlines the strategies that the country will utilize in order to mainstream climate change into all facets of the country's life. The guiding principles that are directing the implementation of the Climate Change Policy are:

- Sustainable use of natural resources;
- 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.

These principles as well as the overall strategic framework outlined in the policy have guided the development of the NFMCP.

2.1.3 Vision 2030 Jamaica – National Development Plan

Vision 2030 Jamaica is the Government of Jamaica's (GoJ's) National Development Plan (2009) and outlines the Government's stated policy intent for achieving a better future for the country. Vision 2030 Jamaica provides a common and clear planning framework for all sectors in the society to work towards making "Jamaica the place of choice to live, work, raise families and do business."

The actions outlined in the Vision 2030 Jamaica document are informed by four mutually reinforcing and interlinked 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

[19] Ibid.

- Goal 4: Jamaica has a healthy natural environment

Each goal has clearly articulated national outcomes, many of which hinge on the forest sector. However, it is Goal 4 that has guided to a large extent the development of the 2016 NFMCP.

Table 2 Goal 4 – Jamaica has a Healthy Natural Environment

National Goal 4	National Outcomes
Jamaica has a healthy natural environment	• 13 – Sustainable management and use of environmental and natural resources • 14 – Hazard Risk Reduction and Adaptation to Climate Change • 15 – Sustainable urban and rural development

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. The Vision 2030 Jamaica document reports that deteriorating air and water quality; loss of biodiversity; watershed degradation; net loss of forest cover; and increasing incidence of forest fires being experienced within the country are threatening a sustainable future. Considering those findings, the GoJ acknowledges that effective management of ecosystems such as terrestrial forests and wetland forests provide essential services such as flood control, recharging ground water and carbon sinks that are of paramount importance to economic development. In this regard, the forest sector has much to contribute to ensuring the integrity of the nation's ecosystem services.

2.1.4 Medium Term Socio-economic Policy Framework

Jamaica faces persistent economic, social, and national security challenges, pressures on the natural environment, and the increasing impacts of global climate change. The national development plan is the country's first long-term strategic development plan and is being implemented through a series of three-year Medium Term Socio-Economic Policy Frameworks (MTFs),[20] which is directly linked to Vision 2030 Jamaica – National Development Plan, and guides the implementation of the Plan through the identification of the priority outcomes, strategies, and actions for each three-year interval from 2009 to 2030.

The 2016 NFMCP builds on the achievements of the previous MTFs and has been developed with due consideration to the 2015–2018 MTF and in particular National Outcome #13 — Sustainable Management

[20] Planning Institute of Jamaica, GOJ Medium Term Socio-Economic Policy Framework 2015–2018 (Kingston: PIOJ).

and Use of Environmental and Natural Resources, and National Outcome #14 — Hazard Risk Reduction and Adaptation to Climate Change.

In terms of Outcome #13, the priorities are related to improving the state of the natural environment, thereby contributing to reduced vulnerabilities, and advancing socio-economic development. The NFMCP is linked to Sustainable Development Goals (SDGs) # 6, 12, 13, 14 and 15, that is, to:

- ensure availability and sustainable management of water and sanitation for all; and
- protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.

In the case of National Outcome #14 — Hazard Risk Reduction and Adaptation to Climate Change the NFMCP is aligned to SDGs Goals # 13 and 15 to:

- take urgent action to combat climate change and its impacts; and
- protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.

2.2 Sustainable Development Goals

In September 2000, leaders of 189 countries gathered at the United Nations headquarters and signed the historic Millennium Declaration, which established the Millennium Development Goals (MDGs), a set of eight international development goals with targets to be reached by 2015. Since the formulation of the MDGs and as countries worked to achieve the targets there was a recognition that the Goals were somewhat limited in outlook, insufficiently integrated. By the Rio+20 UN Conference on Sustainable Development in 2012, member states agreed that building on the achievements of the MDGs; to develop a set of Sustainable Development Goals (SDGs).

By 2015 after years of work through an intergovernmental process the General Assembly, agreed 17 SDGs which represented an integrated, indivisible set of global priorities for sustainable development. With the governments of each country setting their own national targets guided by the global aspirations. The goals and targets integrate economic, social, and environmental aspects and recognize their interlinkages in achieving sustainable development in all its dimensions.

The Jamaica National Development Plan, Jamaica Vision 2030 through the Medium Term Socio- Economic Framework has linked the Forest Sector to support the achievement of SDGs 6, 12, 13, 14, and 15. These are detailed below.

Goal 6	Ensure availability and sustainable management of water and sanitation for all.
Goal 12	Ensure sustainable consumption and production patterns.

Goal 13	Take urgent action to combat climate change and its impacts.
Goal 14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Forests cover 31 per cent of the world's land area and provide a very wide range of products and ecosystem services including water management and the prevention of soil erosion and landslides. Forest also are regarded as the most important habitats for biodiversity and the protection and conservation of forests in Jamaica are of significant importance in protecting the country's unique biodiversity. Additionally, forests deliver social, environmental, and economic benefits and are essential for building climate resilience as forests store more carbon than the atmosphere and have the potential to absorb about a tenth of the global carbon emissions projected for the first half of this century[21]. Thus, the Forest Sector is critical to global sustainable development and supporting the achievement of the SDGs.

2.3 Multilateral Agreements

Jamaica is a signatory to several international agreements, chief among these are the United Nations Forum on Forests (UNFF); the United Nations Framework Convention on Climate Change (UNFCCC); the United Nations Convention on Biological Diversity (UNCBD); the United Nations Ramsar Convention and the UNESCO World Heritage Sites.

2.3.1 UNFF

Member States to the UNFF are committed to the principles outlined in the Forest Instrument (FI), to the four Global objectives on forests[22] outlined below.

Global objective 1 - Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation, and reforestation, and increase efforts to prevent forest degradation;

Global objective 2 - Enhance forest-based economic, social, and environmental benefits, including by improving the livelihoods of forest-dependent people;

[21] Sustainable Development Goals and Forests – A summary of UN Open Working Group debates and country reflections, International Institute for Environment and Development, November 2013; www. http://pubs.iied.org/pdfs/G03846.pdf

[22] United Nations General Assembly Non-legally binding instrument on all types of forests (October 2007).

Global objective 3 - Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products derived from sustainably managed forests;

Global objective 4 - Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management.

In addition, the Forest Instrument outlines several national polices and measures by which these objectives can be achieved. These range from updating strategies for sustainable forest management to creating enabling environments to encourage private sector investment in the forest sector. Where it was relevant and within the capacity and capability of the GoJ, the NFMCP has aligned itself within the Jamaican context to the measures in the action plan.

The Agency is Jamaica's Focal Point for the UNFF. The country is one of six pilot countries preparing a National Action Plan guided by the global objectives and the twenty-five national policies and measures specified in the Forest Instrument. In light of this, coupled with the GoJ's commitment to the UNFF, the development of the NFMCP followed protocols outlined by the UNFF Secretariat in order to assure alignment with the Forest Instrument. To achieve this alignment, several activities were undertaken, the first of which was the conduct of a situational analysis of the forest sector,[23] which provided supporting documentation for stakeholder consultations. The second activity was the staging of a series of stakeholder consultations to ensure that 'voice' was given to the diverse group of participants in the sector and to help the Agency determine priority national policy areas and to identify suitable actions. The stakeholder consultations were supported by an expert from the UNFF Secretariat and its participants were drawn from the public sector, local forest management community groups, academia, private planters, and other interested parties. These facilitated discussions that proposed the following priority policy areas, which along with the global objectives, have been further distilled, refined, and incorporated in the NFMCP:

- strengthen the contribution of science and research to advancing sustainable forest management by incorporating scientific expertise into forest policies and programmes;
- identify and implement measures to enhance cooperation and cross-sectoral policy and programme coordination among sectors affecting and affected by forest policies and management, with a view to integrating the forest sector into national decision-making processes and promoting sustainable forest management, including by addressing the underlying causes of deforestation and forest degradation, and by promoting forest conservation;
- analyse the causes of and address threats to forest health and vitality from natural disasters and human activities, including threats from fire, pollution pests, disease, and invasive alien species;
- develop financing strategies that outline the short-, medium- and long-term financial planning for achieving sustainable forest management, taking into account domestic, private sector and foreign funding sources;

[23] Una May Gordon, Formulation of a National Action Plan (NAP) for implementing the Forest Instrument in Jamaica (A Situational Analysis, commissioned by the United Nations Forum on Forests Secretariat).

- develop and implement policies that encourage the sustainable management of forests to provide a wide range of goods and services, and that also contribute to poverty reduction and the development of rural communities;
- promote and strengthen public understanding of the importance of and the benefits provided by forests and sustainable forest management, including through public awareness programmes and education;
- establish or strengthen partnerships, including public–private partnerships, and joint programmes with stakeholders to advance implementation of sustainable forest management;
- support the protection and use of traditional forest-related knowledge and practices in sustainable forest management with the approval and involvement of the holders of such knowledge, and promote fair and equitable sharing of benefits from their utilization, according to national legislation and relevant international agreements;
- promote the use of management tools to assess the impact on the environment of projects that may significantly affect forests, and promote good environmental practices for such projects; and
- Create enabling environments to encourage private sector investment, as well as investment by and involvement of local and indigenous communities, other forest users and forest owners and other relevant stakeholders, in sustainable forest management, through a framework of policies, incentives, and regulations.

2.3.2 UNFCCC

A historic agreement regarding the global response to climate was reached in Paris at the 21st meeting of the Conference of the Parties (COP) in December 2015. The agreement came into effect on November 4, 2016 after more than 55 Parties representing 55% of global emissions have signed the agreement. In Paris, the Parties agreed to hold average global temperature rise, this century, to below 2°C above pre-industrial levels and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. Further, the agreement calls for the Parties to pursue efforts "to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels, thereby significantly reducing the risks and impacts of climate change", a position that Jamaica strongly supported as a member of the Alliance of Small Island States (AOSIS).

Of some significance for the forest sector in Jamaica, the climate change agreement — adopted by 195 countries — raised the profile of forests in ways never experienced before. At the Conference, Heads of Government from major forest countries and partner countries endorsed forests as a key climate solution and committed to providing strong, collective, and urgent action to promote equitable rural economic development, reversing deforestation and massively increasing forest restoration. In a joint statement the leaders said, "we, leaders, today in Paris on November 30th 2015, recognize the essential role forests play in the long-term health of our planet, in contributing to sustainable development, and in meeting our shared goal of avoiding dangerous climate change. We are committed to intensifying efforts to protect forests, to significantly restore degraded forest, peat and agricultural lands, and to promote low carbon rural development." The commitment of the Heads of Government was outlined in Article 5

of the agreement that "requires Parties to take action to conserve and enhance sinks and reservoirs of greenhouse gases, including forests. It also encourages parties to implement and support activities to reduce emissions from deforestation and forest degradation, and highlights the role of conservation, sustainable management of forests and enhancement of forest carbon".[24]

Further, the Paris Agreement's central aim is to strengthen the ability of countries to deal with the impacts of climate change. Considering the decisions of the COP, Jamaica, as a Party to the Convention, should put in place programmes for adaptation but perhaps more importantly to build climate resilience in communities and the country at large. In short, to align its obligations to the Paris Agreement, Jamaica must develop mitigation strategies.

Jamaica's forests offer the country an opportunity to put forward its best efforts through 'nationally determined contributions' (NDCs) via the enhancement of forest carbon stocks. This matter has been given priority in the 2016 NFMCP through the development of climate change adaptation and mitigation actions with a focus on the implementation of the United Nations Programme Reducing Emissions from Deforestation and Forest Degradation (UNREDD). Further, the Plan recognizes the importance of adaptation to climate change. The NFMCP will be the programme by which the country intends to address the climate change issues within and through the forest sector.

2.3.3 UNCBD

Jamaica has a very rich and varied biodiversity because plants, animals and other living organisms have adapted to the many different environmental conditions that exist on and/or around the island. Almost without full realisation of its impact, the country's rich biological resources have supported families and communities for generations and continue to foster economic growth and stability by supporting agriculture, tourism, fishing, craft manufacturing and a host of other activities.

Jamaica has been a party to the Convention for Biological Diversity (CBD) since 1995. The Convention commits the Government of Jamaica (GoJ) to achieving the following three goals.

1) The conservation of biological diversity.

2) The sustainable use of the components of biological diversity.

3) The fair and equitable sharing of the benefits arising from the use of genetic resources.

In response to their obligation under UNCBD the GoJ developed a National Biodiversity Strategy and Action Plan (NBSAP),[25] the goals of which are as follows:[26] (i) address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; (ii) reduce the direct pressures on biodiversity and promote su8stainable 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.

[24] United Nations / Framework Convention on Climate Change (2015) Adoption of the Paris Agreement, 21st Conference of the Parties (Paris: United Nations).
[25] The Natural Resources Conservation Authority, the National Environment Planning Agency, and Ministry of Land and Environment, National Biodiversity Strategy and Action Plan (2016).
[26] Ibid.

The *2013 State of the Environment Report* published by the National Environment and Planning Agency (NEPA)[27] reported that much of Jamaica's biodiversity is found in forest ecosystems. These are:

1) **Wet limestone forests**, found in the John Crow Mountains, central and western Jamaica;

2) The **predominantly shale forests** of the Blue Mountains and Port Royal Mountains;

3) **Short open dry limestone forests**, found almost exclusively in the south of the island in the Hellshire Hills in St. Catherine and Portland Ridge in Clarendon;

4) **Alluvial and wetland forests**, found in the coastal plains. Wetlands account for only around 2% of total land cover, but they support high amounts of terrestrial and coastal marine biodiversity. For example, mangroves and seagrass beds act as essential, early nurseries for many commercial fish such as grunts and snappers;

5) **Anthropogenic forests**, which have been created by man, such as Caribbean Pine plantations.

The forest sector therefore has a significant role in conserving and protecting the country's biodiversity by protecting and conserving its forests. The NFMCP will therefore be a significant contributor to meeting the country's obligation under the UNCBD.

2.3.4 Ramsar Convention

The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention defines wetlands to include all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans.

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world."[28]

The Parties to the Convention are committed to:

- work towards the wise use of all their wetlands;
- designate suitable wetlands for the list of Wetlands of International Importance (the 'Ramsar List') and ensure their effective management;
- cooperate internationally on transboundary wetlands, shared wetland systems and shared species.

Wetlands are among the most diverse and productive ecosystems. They provide essential services but are continually under threat. Wetland forests do not only provide vital ecosystem services to the country but also significant shoreline protection against storm surge and wind events, and significantly increase the buffering capacity against flooding and wind damage in the instances of natural disasters.

[27] National Environment and Planning Agency, *State of Environment Report 2013* (Kingston: NEPA, December 2015).
[28] www.ramsar.org

In Jamaica, the wetlands comprise mainly mangrove forests. Mangrove forests provide several economic benefits to communities, which in many cases are extracted at unsustainable rates, for example, timber for construction, yam sticks, artisanal fish pots, small-scale farming, charcoal production and use as firewood. As a result, mangroves are threatened by over exploitation of their resources, permitted coastal development projects, housing solutions, and hotels and tourist attractions. The National Environment and Planning Authority (NEPA), in an effort to protect the country's wetlands, has declared four Ramsar sites. These are the Black River Lower Morass in 1997, Palisadoes–Port Royal Protected Area 2005, the Portland Bight Wetlands and Cays, 2006 and Mason River Protected Area, 2011.[29]

2.3.5 UNESCO World Heritage Sites

The protection of cultural heritage is the mandate of United Nations Educational, Scientific and Cultural Organization's (UNESCO's) Convention concerning the Protection of the World Cultural and Natural Heritage. Parties to the Convention recognize their duty — "ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage".[30] In July 2015, the Blue and John Crow Mountains was inscribed on the World Heritage List. The listing potentially will provide the site with greater protection while at the same time achieving the delicate balance of promoting sustainable livelihoods and ecotourism within the forest reserve. The NFMCP has outlined a programme under sustainable forest utilization, which addresses the issue of protecting Jamaica's cultural and natural heritage with a focus on building community involvement and resilience.

2.4 Mainstreaming Climate Change in the Forest Sector

2.4.1 The Global Outlook on Climate Change

There is increasing evidence from around the world that the Earth's climate is changing and that human activity is the most likely cause.[31] The changes in climate are most noticeable in terms of increasing average temperatures and rising sea levels. Since the 1850s, average temperatures have been increasing, and this is particularly noticeable in the last three decades, which have been successively warmer. The average change in temperature around the world between 1880 and 2012 is 0.85°C.

The change in climate is mainly caused by human activity as is evidenced through the greenhouse effect, that is, the increasing emissions of greenhouse gases (GHGs) including carbon dioxide, methane, and nitrous oxide, creating a greenhouse effect. That is, a blanket of gases in the earth's atmosphere which retains the sun rays and warms the planet. It must be noted that the greenhouse effect is a natural phenomenon. Carbon dioxide and a few other gases in the atmosphere keep the solar rays that hit the earth's surface from reflecting into outer space, resulting in a heating of the earth's atmosphere. This in principle is a good thing, as otherwise the planet would be too cold for us to survive. However, the increased levels in greenhouse gases due to increasing industrialization fuelled mainly by fossil fuels has led to 'imbalance', resulting in an increase in the 'warming potential' of the atmosphere. GHGs are warming the climate system, with the largest contribution coming from atmospheric concentration of

[29] The National Environment and Planning Agency, Status of Jamaican Mangroves (2014).
[30] UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 Article 4.
[31] Intergovernmental Panel on Climate Change (IPCC) 2015 AR5 Summary Report.

carbon dioxide (CO_2) resulting in the changes to the climate, which are increasingly being observed and experienced.

The change in climate has profound implications for everyday life and the Intergovernmental Panel on Climate Change (IPCC) has produced several scenarios on what future climate could look like. These scenarios, named Representative Concentration Pathways (RCP), are based on GHG emissions until 2100 and describe the possible ways in which emissions could fluctuate in the future. The RCP 8.5 scenario presents a continuous growth of emissions, RCP 6 and RCP 4.5 scenarios present intermediate situations, and the RCP 2.6 scenario presents a scenario of sharp emission reductions. The projections for change in temperature are shown in Figure 2.[32]

These projections are useful for informing decisions related to the future climate and are important considerations for national development planning, which along with Jamaica's downscaled climate data is essential for developing appropriate national responses and for building the country's climate resilience.

The following section provides a summary of the status of climate in Jamaica, which has informed the development of the NFMCP and will direct efforts in mainstreaming climate change in the forest sector.

2.4.2 Overview – State of Jamaica's Climate: Challenges and Opportunities

In 2012, the Planning Institute of Jamaica (PIOJ) published a report describing the state of the Jamaican climate[33] in order to understand and address the emerging challenges of climate change, adaptation and mitigation actions that will be needed across all sectors of Jamaica's economy.

The 2012 report was an initial reference point for a description of Jamaica's climate, its variability, trends, and future projections. The report will be used by key sectors and stakeholders engaging in climate change adaptation work and by those who need to define the climate state being adapted to as well as providing information on how key sectors in the country may be impacted by climate change. In 2016 the CSGM updated the 2012 report[34] and the following section of the document outlines their major findings.

[32] IPCC 2013.
[33] Climate Studies Group, Mona (CSGM), State of Jamaican Climate 2012, produced for the Planning Institute of Jamaica.
[34] Climate Studies Group, Mona, Draft Report – Jamaica: Future Climate Changes (Kingston: University of the West Indies, January 2016).

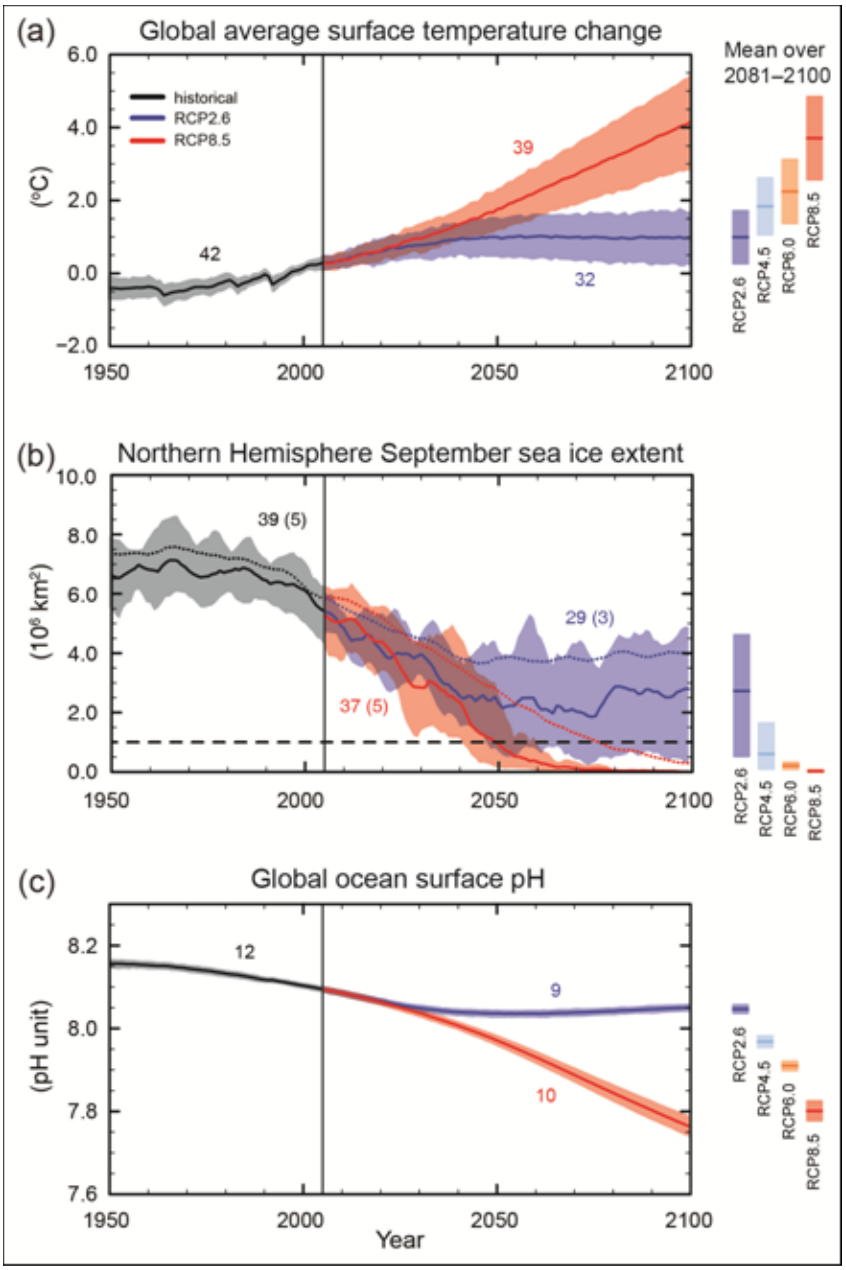


Figure 2 Simulated Time Series from 1950 to 2100

2.4.3 Projections

The climate scenarios for Jamaica were developed from several data sources and the report focused on future scenarios based on sub-island scale data provided in 26 grid boxes (see Figure 3).[35]

[35] Ibid.

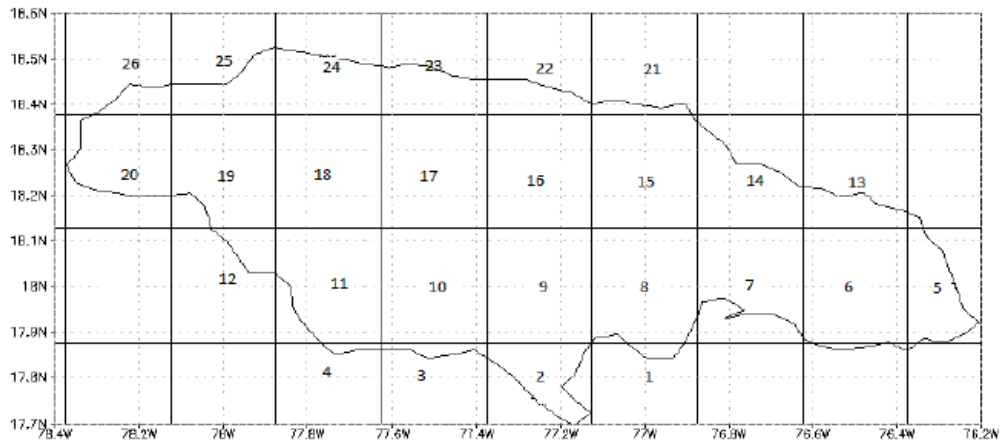


Figure 1: PRECIS 25-km grid box representation over the island of Jamaica.

Figure 3 PRECIS 25 km Grid Box Representation over the Island of Jamaica

2.4.3.1 Temperatures Projections

The temperature climatology across Jamaica is unimodal, with peak temperatures in the summer months June to September and cooler temperatures from December to March. Monthly temperatures range from 24°C to 28°C, with a mean maximum temperature of 33°C in the warmer months and a mean minimum temperature of 19^0C during the cooler months.

Globally, the mean surface temperatures have increased by 0.85°C from 1880 to 2012. In the case of the Caribbean, increases have been in a similar range of 0.5°C from 1900 to 1995. In Jamaica, the warming trend for minimum, maximum and mean temperatures is illustrated in Figure 4.[36] However, based on the calculations over the period 1950–2014, minimum temperatures are increasing at a faster rate than maximum temperatures, that is, 0.27°C /decade compared with 0.06°C /decade. In general, Jamaica's estimated temperature increases align with the global projections.

In summary, the major CSGM findings for Jamaica are as follows.

- Mean annual temperatures are projected to increase regardless of the scenario through to the end of the century.

The Regional Climate Models (RCMs) suggest increases of up to 4.0°C for the A1B scenario for the sub-island regions by the end of the century. This is in general higher than the values projected by the Global Climate Models (GCMs).

[36] Ibid.

- There is some spatial variation (across the country and even within Blocks) with coastal regions generally showing slightly smaller increases in temperature variables than interior regions.
- The months of August–October have slightly higher values of temperature change than other times of the year.

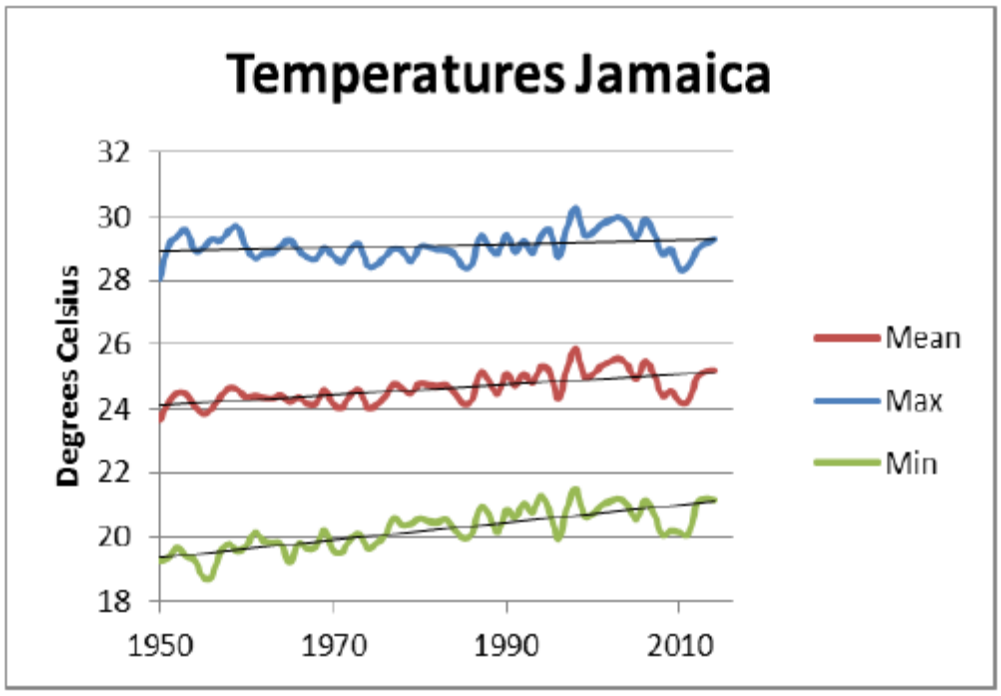


Figure 4 Mean, Average and Minimum Temperature Projections for Jamaica

2.4.3.2 Rainfall

Within Jamaica, the annual rainfall pattern is bi-modal, resulting in a rainy season from April to November and a dry season from December to March. During the rainy season, there is a mid-summer dry season occurring from July through August and rainfall peaks from May to June and September to November. Historically, the annual rainfall in Jamaica reflects a similar pattern, with most of the island's rainfall occurring in October and the driest month of the year being February (Figure 5).[37] This usually reliable pattern of rainfall has ordered the way in which major activities take place in several sectors. For forestry, the bimodal pattern affects the planting cycles.

In terms of the distribution of rainfall across the island there are variations. The interior mountainous areas experience more rainfall annually; the coastal areas are drier, with the southern coastal plains being

[37] Ibid.

the driest, experiencing approximately 1,000 mm of rainfall or less annually. The maximum rainfall is experienced on the eastern and western ends of the island (Figure 6).[38]

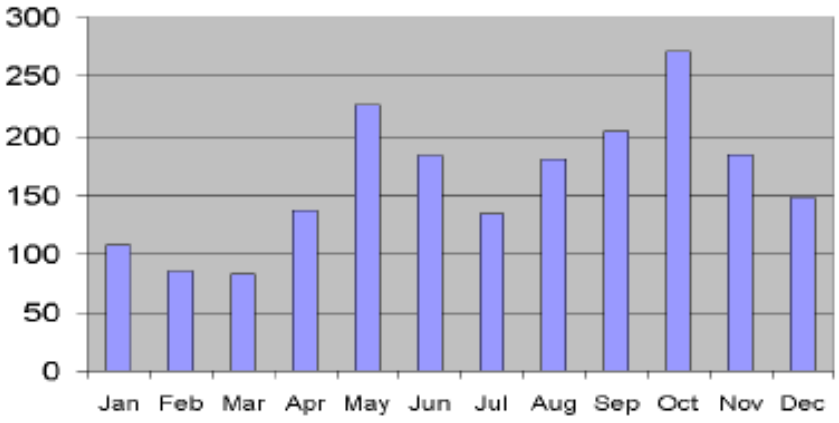


Figure 5 Jamaica's Rainfall Climatology in mm Averaging (1951–1980)

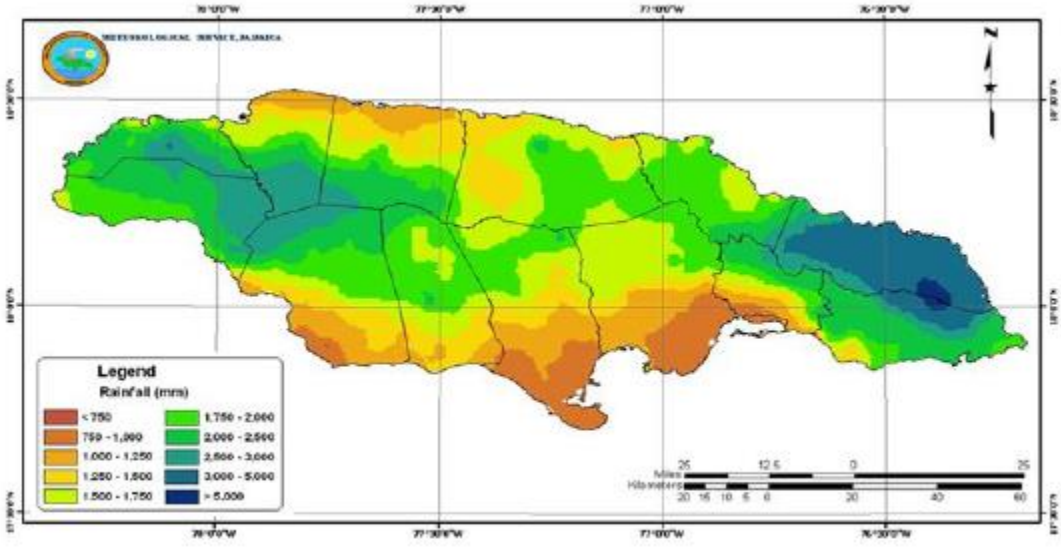


Figure 6 Distribution of Mean Annual Rainfall for Jamaica (in mm). Averaging period, 1951–1980

Historically, rainfall trends for the island unlike temperature experience inter-annual variability, that is, year-to-year and decadal variations which in part are explained by the El Nino/La Nina phenomenon. El Nino has been documented since the 1970s and lasts from 3 to 5 years, with increasing frequency and intensity. The El Nino phenomena produces drier and hotter than usual means (rainfall and temperature), resulting in the meteorological droughts experienced in the Caribbean in 2010 and 2014. In the early

[38] Ibid.

rainfall period following an El Nino event, the May to July period tends to be wetter. Generally, La Nina produces the opposite effects, that is, a wetter rainy season.

Considering these findings, the CSGM has the following major projections for rainfall in Jamaica to the end of the century.

- Dry season rainfall generally shows small increases or no change. Mean Increases are consistently between 1% and 4% across all-time series examined. Given the small amounts of rainfall received at this time, the increases are not enough to offset the overall drying pattern.
- Regional Climate Model predicts the onset of a drying trend from the mid-2030s continuing into the 2050s and through the end of the century. The percentage decreases (over the grid boxes) for annual rainfall in the defined Blocks are as summarized in Table 3.[39]
- There is some spatial variation (across the country and even within Blocks), with the south and east showing greater decreases than the north and west for each time slice.

Table 3 Range of Percentage Annual Rainfall Change across Grid Boxes comprising Four Rainfall Zones

	2020s	2030s	2050s	End of Century (2081-2100)
West	2.44 – 4.50	-10.11 – 34.37	-5.70 – 9.95	-13.23 – 6.09
East	-4.17 - -1.77	-13.91 - -8.82	-19.38 - -14.73	-28.09 - -22.91
Interior	-4.64 – 2.58	-24.84 - -3.89	-25.25 - -2.16	-37.03 - -9.70
Coasts	-18.44 - -6.97	-29.86 - -5.00	-31.24 - -1.26	-43.28 - -4.34

2.4.3.3 Sea Levels

Globally, mean sea levels have been increasing since the 1900s in the region of 0.19 ± 0.02 metres and are predicted to continue into the 21st century. This trend in sea level rise (SLR) is accelerating across the globe, although not uniformly, and there are large regional differences. In the Caribbean, there is a dearth of tide gauge data — currently there are only seven tidal measuring gauges across the region, which limits data collection and has implications for the precision of the predictive models. Despite this deficiency, there is sufficient data to support a prediction of an upward trend in SLR from 1950 to 2010 ranging from 1.3 mm to 2.5 mm/year.[40]

[39] Ibid.
[40] Ibid., page 63, Table 32.

In Jamaica's case, over a period of approximately 18 years, sea level data measured at Port Royal shows an estimated increase of 1.66 mm/year. Additionally, satellite altimetry data across the country confirms a substantial rise in sea levels since the 1950s.

In summary, the future sea level rise within the Caribbean will not differ significantly from the global projections (Table 4).[41]

Table 4 Projected Increases in Global Mean Sea Level rise (m). Projections relative to 1986–2005

	2046 – 2065		2081– 2100	
Scenario	**Mean**	**Likely range**	**Mean**	**Likely range**
RCP2.6	0.24	0.17 – 0.32	0.40	0.26 – 0.55
RCP4.5	0.26	0.19 – 0.33	0.47	0.32 – 0.63
RCP6.0	0.25	0.18 – 0.32	0.48	0.33 – 0.63
RCP8.5	0.30	0.22 – 0.38	0.63	0.45 – 0.82

For Jamaica, the projected sea level rise from RCMs for the north coast is 0.43 m to 0.67 m by the end of the 21st century, with a maximum of 1.05 m. The predictions are similar for the south coast.

2.4.3.4 Cyclones

The historical trends of Atlantic hurricane activity show significant increases in intensity, duration, and frequency since the early 1980s. Between 1950 and 2014 Jamaica has been affected by 11 cyclones. These systems ranged from category 3-5 and between 2000 to 2010 there were 6 such cyclones demonstrating the increasing frequency and severity. The Intergovernmental Panel on Climate Change (IPCC) Special 2012 Report on Extremes offers five summary statements on cyclones.[42] These are:

Conclusion 1: There is low confidence in projections of changes in tropical cyclone genesis, location, tracks, duration, or areas of impact.

Conclusion 2: Based on the level of consistency among models, and physical reasoning, it is likely that tropical cyclone related rainfall rates will increase with greenhouse warming.

Conclusion 3: It is likely that the global frequency of tropical cyclones will either decrease or remain essentially unchanged.

Conclusion 4: An increase in mean tropical cyclone maximum wind speed is likely, although increases may not occur in all tropical regions.

Conclusion 5: While it is likely that overall global frequency will either decrease, or remain essentially unchanged, it is more likely than not that the frequency of the most intense storms will increase substantially in some ocean basins.

[41] Ibid.
[42] Ibid.

While there is a great deal of uncertainty with regards to the predictions for hurricane frequency, intensity and duration, Conclusion 5 indicates that "at the very least Jamaica should contemplate a future where tropical storm/hurricane genesis, frequency and tracks are similar to what has been experienced in the very recent past (last two decades) but intensities (rainfall rates and wind speeds) are increased."[43]

To a large extent, Jamaica's downscaled climate data is aligned with the global trends. However, the data is invaluable as it provides decision makers and practitioners with more specific rather than generalized data, which is essential for the planning and actions required to build Jamaica's climate resilience. The NFMCP has incorporated in its action plan activities that will investigate the effect of climate change on the country's forests, with a view to developing adaptation strategies. In addition, the plan recognizes the importance of forests to mitigating the impacts of climate change.

2.4.4 Co-benefits of Adaptation and Mitigation Actions in Building Climate Resilience

2.4.4.1 The Case for Adaptation

In August 2008, three hundred and thirty researchers, managers, and decision makers from 50 countries gathered in Umeå, Sweden at a conference entitled 'Adaptation of Forests and Forest Management to Changing Climate with Emphasis on Forest Health: A Review of Science, Policies and Practices'. One of the key outcomes of the conference was an acknowledgement that "forest adaptation to future environmental or social conditions resulting from climate change may significantly alter how and why forestry is practised in many parts of the globe. With the climate, and as a result the environment, undergoing perceptible changes within the life span of trees, achieving sustainable forest management will increasingly resemble aiming at a moving target" (cited in Bernier and Schoene 2008).[44] In short, the participants underscored the need to incorporate adaptation to climate change in current forest management practices.

The rationale for this conclusion was clear. On the one hand, the researchers acknowledged that forests, the people, societies, and economic activities that depend on them are sensitive to climate change. Additionally, forests contribute to human well-being through a range of services. In this regard, it was highlighted that wetland (mangrove forests and swamp forests) and tropical moist forests are likely to be affected by climate change. On the other, they agreed that forests also impact climate change as carbon sinks when they grow or expand. Against this background, the international scientists supported the proposal that forests in developing countries be considered a prime tool for climate change mitigation. Currently, activities addressing these issues include reducing emissions from deforestation and forest degradation in developing countries (REDD+) and conservation and enhancement of carbon stocks through sustainable forest management.

It is against this background that there is global agreement on the importance of adaptation of forests to climate change, while also recognizing that sustainable forest management will influence carbon sequestration by trees, conserve biodiversity and provide valuable ecosystems. That is, adaptation and

[43] Ibid., page 75.

[44] P. Bernier, and D. Schoene, 'Adapting forests and their management to climate change: an overview' (paper presented at the international conference on Adaptation of Forests and Forest Management to Changing Climate with Emphasis on Forest Health, Umeå, Sweden, August 2008. An FAO Publication).

mitigation are inextricably linked and the country should embrace the opportunity of developing strong adaptation and mitigation programmes. These conclusions are integral to Jamaica's NFMCP.

Jamaica faces three options for adapting forests to climate change: no intervention, reactive adaptation, and planned adaptation. Given the country's vulnerability, no active intervention or business as usual — with management targets and practices based on the premise that the forest will adapt as it did in the past — is not an option. However, planned adaptation is challenging and involves redefining forestry goals and practices in advance in view of climate change-related risks and uncertainties. This would mean:[45]

- Identifying Sensitivities
    - Species & climate thresholds, reserve locations, topography, infrastructure & access, etc.
- Determining what changes are as a result of a changing climate regime e.g. extinction, invasive species, more frequent destruction, wildfires, water quantity and quality, external threats from migration & urbanization, need for new livelihoods, etc.
- Identifying Priorities
    - Preservation, diversification, protection, restoration, targeted expansion, monitoring, etc.
- Identifying needs to pursue actions (mindful of what gaps exist)
    - Data & research, equipment, climate services, personnel, policy, training, strong links with other sectors, etc.

2.4.4.2 The Case for Mitigation

Prior to the Age of Industrialization there were 5.9 billion hectares of forests. Today globally, forests cover about 4 billion hectares or 31% of the world's land surface. Forests are carbon stores and most forests are found in the tropics. The different forest types as well as other biomass contain varying amounts of carbon. Globally, tropical forests contain the largest carbon stock (547.8 million tonnes) in tropical and subtropical forests.[46] Additionally, in tropical areas, mangrove forests and swamp forests contain particularly high levels of biomass in their vegetation cover and soils.

Given that forests contain substantial stores of carbon, their degradation and or conversion to other types of land use causes the release of some of the carbon stored within them. The level of emissions depends on the amount of carbon stored in the forest, the extent to which the vegetation covers and soil structure are damaged or destroyed, as well as what happens to the land afterwards. For example, high levels of emission will result if the vegetation is destroyed as is often observed in slash and burn agricultural practices.

The links between forests and the carbon cycle demonstrate that the forest sector can have a large positive impact on the removal of GHGs. The total amount of carbon dioxide in the atmosphere can be reduced by decreasing emissions from both deforestation and forest degradation. Maintaining standing forests can preserve their role as the terrestrial carbon sink and reforestation can increase the sequestration of carbon, thereby decreasing the overall levels of carbon dioxide in the atmosphere.

[45] Michael Taylor, 3 Things About Climate Change and Jamaica (Kingston: CSGM).
[46] REDD+ Academy – Journal 1 Forest, Carbon Sequestration and Climate Change.

In Jamaica, forest restoration, through reforestation, afforestation, and halting degradation, along with some degree of forest/tree cover is interspersed in areas with other land use types including urban spaces and small-scale agriculture — will all contribute to forest/tree cover acting as a carbon sink that directly contributing to the removal of carbon dioxide globally.

The IPCC reports that due to the combined action of natural land and ocean sinks of carbon dioxide, an average 55% of the total anthropogenic emissions were removed every year during the period 1958–2011.[47] This is a significant contribution to mitigating the impact of climate change, which is of great importance to Jamaica as a small island state. The current state of Jamaica's forests and the challenges and opportunities this presents to the management of the sector are outlined in the following section.

Against this background, the following sections of the NFMCP describe the status of land use in the country and discuss the potential impacts on the forest sector and how the NFMCP seeks to address these issues in and through the action plan.

2.5 Reducing Emissions from Deforestation and Forest Degradation (REDD+)

2.5.1 History of REDD

The 1992 UNFCCC Conference of the Parties (COP) unanimously agreed on the potential for mitigation of greenhouse gas emissions (GHG) as a forest sector contribution. Each ensuing COP has been supporting REDD+; coupled with the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. REDD+ is an effort to provide positive incentives to developing countries to contribute to climate change mitigation through activities in the forestry and land-use sectors.[48]

The idea for REDD+ emerged in 2005 at COP 11 when the Governments of Costa Rica and Papua New Guinea submitted a proposal to include the effort to Reduce Emissions from Deforestation (RED) in the climate negotiations agenda. Since that time, the idea of establishing a global mechanism to reduce emissions from deforestation and forest degradation (UNREDD) in developing countries, gained traction in the deliberations of the UNFCCC COP. Up until then, tropical deforestation had for the most part been excluded from the scope of the Kyoto Protocol's Clean Development Mechanism (CDM), which provides Certified Emission Reduction units that may be traded in emissions trading schemes.

Guided by Article 4 of the UNFCCC Convention and supported by several decisions, UNREDD+ has evolved over the last fifteen years through successive rounds of negotiations (refer Table 5). The decisions adopted by the Conference of the Parties at each of these meetings have provided the architecture for the global REDD+ mechanism. The UNFCCC COP established rules and provided methodological guidance for the operationalization of REDD+. The development of methodological guidance for REDD+ was concluded in June 2015.

[47] IPCC 2013, AR5 WGI.
[48] REDD+ Programme

Table 5 UNFCCC Conference of the Parties Agreement re REDD+

Agreement	Summary
The UNFCCC: Text of the Convention (1992), Article 4: Commitments:	Parties will publish and make available national inventories of anthropogenic sources and removals by sinks, using similar methods.
The Bali Action Plan (2007)	All parties are encouraged to reduce their GHG emissions in ways that are measurable, reportable and verifiable. Capacity building should be supported, and reporting using the latest IPCC guidelines encouraged.
Copenhagen (2009)	Emissions from forests should be reduced according to the latest IPCC guidelines and national forest monitoring systems should be established using consistent methodologies.
Cancun (2010)	A National forest monitoring system is one of the four key elements of REDD+ and it should be developed through a phased approach.
Warsaw (2013)	Formalizes earlier guidance into decisions, describes the quality of national forest monitoring systems required for measurement of REDD+ results, and the methods of reporting and verification.

2.5.2 The REDD+ Philosophy

The guiding principles of REDD+ is that through more sustainable forest management practices, it is possible to:

- Reduce GHG emissions produced by the forest sector; and
- Enhance the capacity of the forest sector to act as a carbon sink, by storing and enhancing carbon in the five carbon pools (i.e. aboveground biomass, belowground biomass, soil organic carbon, litter and dead wood).

Figure 7 illustrates, the central principle of REDD+.

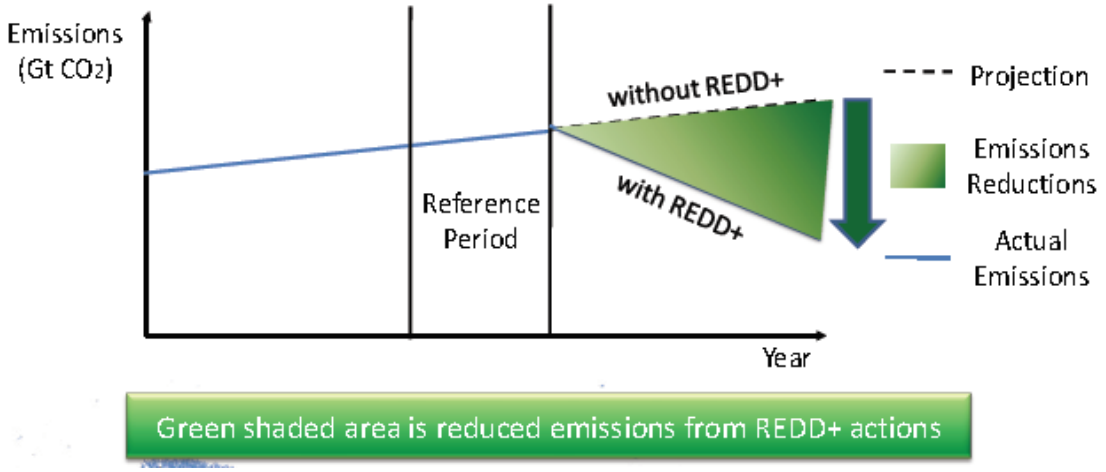


Figure 7 REDD+ and GHG Emissions (source: UN-REDD Programme)

2.5.3 REDD+ Implementation

Jamaica's REDD+ initiatives will follow global processes but implementation will be defined within the national context and is considered a pivotal forest action contributing to Jamaica's growth agenda. In undertaking the REDD+ programme as the key activity in Jamaica's development agenda for the forest sector, the GoJ through the Agency is guided by the leadership and expertise within the UNREDD Programme:

> *In order to be effective and lasting, REDD+ was originally conceived as a mechanism with a nation-wide scope, anchored to national-level policies, national implementation measures and public/private transformational investments. Such national scope would foster, achieve and demonstrate sustainable development with a social and environmental performance of magnitude. The national scope of the REDD+ mechanism is thus not arbitrary – it lays the basis for mainstreaming, impact and permanence.*
>
> (Josep Garí from the UN-REDD Programme)

The UNFCCC, REDD+ programme seeks to achieve five central outcomes:

- reduced emissions from deforestation;
- reduced emission from degradation;
- forest carbon stock enhancement;
- sustainable management of forests; and
- forest carbon stock conservation.

These outcomes are well aligned to maintaining healthy forests in addition to mainstreaming climate change in the forest sector. Climate change mainstreaming is being undertaken through three critical

mitigation strategies: reduction of emissions; enhancement of the rate of sequestration; and maintenance of existing forest carbon reservoirs.

Further, the benefits of implementing REDD+ activities to the country's growth and development are far reaching and extend beyond building a climate resilient nation. Other benefits for the forest sector, which will significantly contribute to the sector's sustainability include: (i) support to design and implement Policies and Measures (PAMs) in the forest and other sectors that have an impact on REDD+ efforts; (ii) payments per ton of carbon emissions reduced or removed; (iii) international recognition for mitigation results; (iv) biodiversity conservation; (v) poverty alleviation; and (vi) contribution as one of the catalysts for developing a green economy integrating forestry, agriculture, energy and finance.

The implementation of REDD+ activities is a phased iterative process as shown in Figure 8.

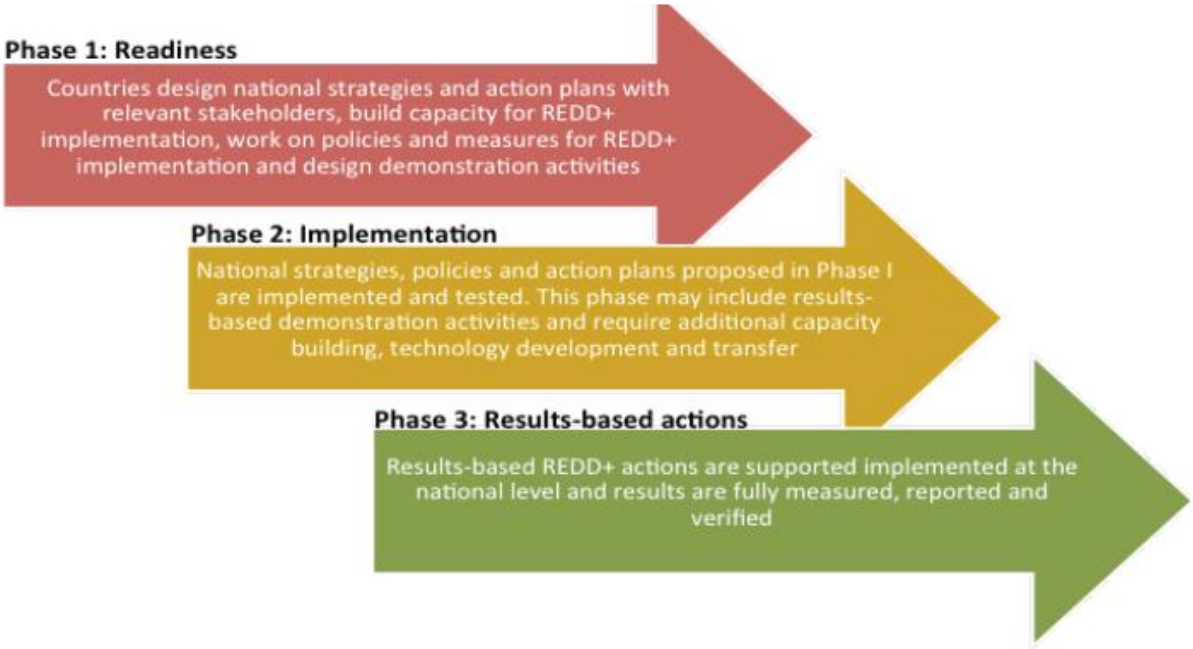


Figure 8 Phased approach to REDD+ implementation[49]

2.6 Jamaica's Forest Cover

2.6.1 Land Use/Cover Change Assessment[50]

The Land Use/Cover Change Assessment in the 2001 NFMCP was conducted by the Agency in 1999 with the support of the Canadian International Development Agency (CIDA). That study reported an annual deforestation rate of 0.1% for the period 1989 to 1998. A more recent study, published in 2015, has

[49] UNREDD Programme

[50] Forestry Department, Jamaica's Land Use Cover Assessment: A comparative assessment of Forest Change between 1998 & 2013 (Forest Resource Information Management Branch, GIS Unit, 2015).

benefited from improvements in technology in terms of high resolution satellite imagery and imagery analysis software and therefore provides more detailed and accurate classification of the forest types.

The 2015 study shows that 40% or 439,937.8 hectares of Jamaica's land is covered by forest.[51] This compares with 30% in 1998, an increase in forest cover for the country over the intervening sixteen years and is attributed mainly to the increase of secondary (ruinate) forest cover and to the improvement in technology and higher resolution satellite images which has resulted in more accurate assessments.

Of Jamaica's total forest cover, 59% is classified as broadleaf forest, which comprised closed broadleaf (19%) and disturbed broadleaf (40%) forests. Secondary (ruinate) forest experiencing even greater disturbance accounts for 28% of forest cover. Open dry tall limestone forest makes up 8%, mangrove forests and swamp forests contribute 3% and plantation forest accounts for 2% of forest cover (Figure 9).[52]

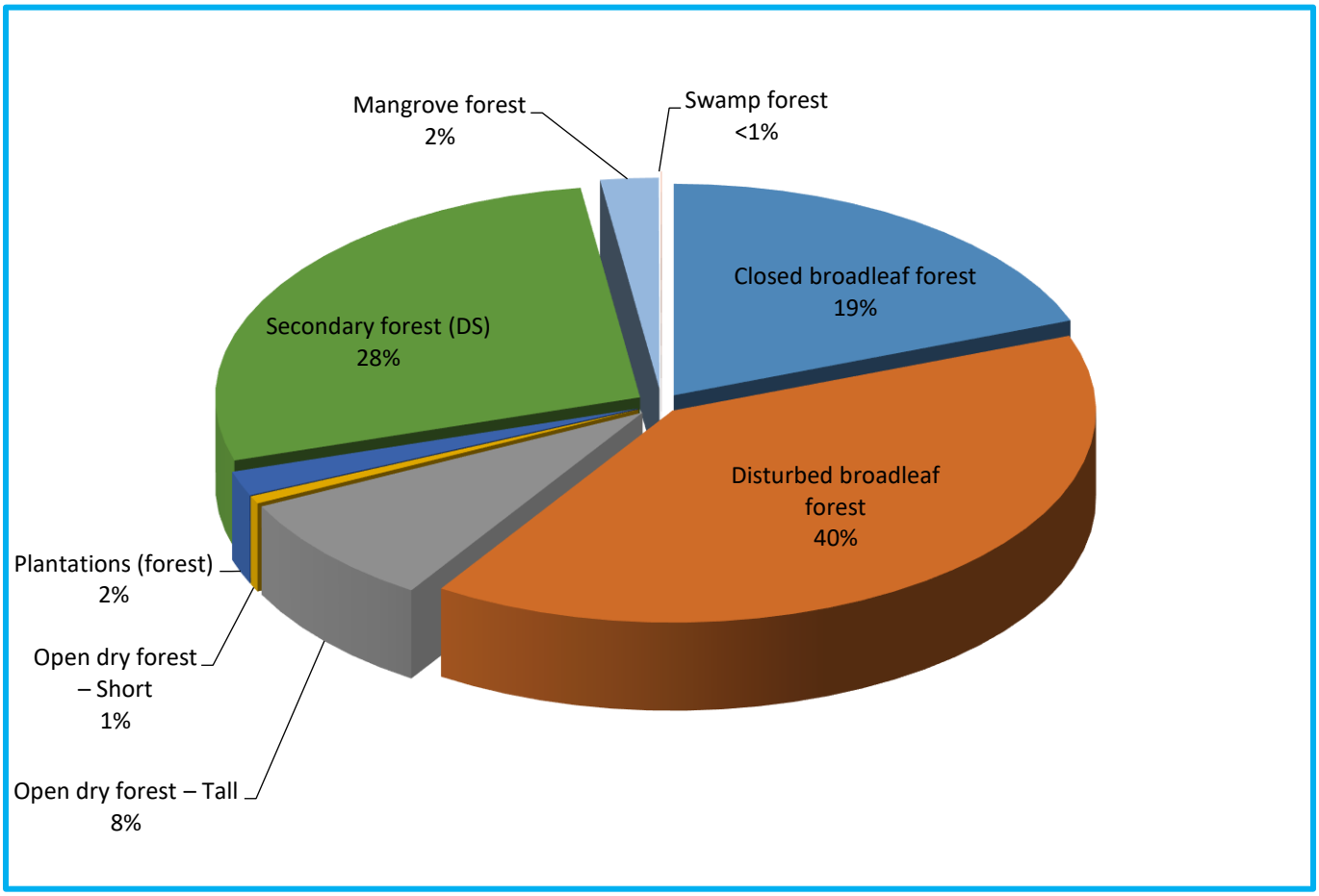


Figure 9 Forest Classifications (2013) at the National Level

[51] Does not include bamboo, which is now classified as a non-forest land use category.
[52] Ibid.

For the period 1998–2013, there has been a 0.4% gain in forest, which has been attributed to gains in secondary and to a lesser extent plantation forests. This data is of great significance and even more so with respect to building Jamaica's climate resilience is the data regarding forest loss (Table 6).[53]

Wetlands, comprising mangrove forest and swamp, experienced a loss of approximately 95% or 2,100 hectares (Figure 11). This was largely due to agricultural activity, herbaceous wetland and infrastructure including buildings and roadways.

Table 6 National Land Use/Cover Change Assessment

Land Use/Cover Change in Jamaica: 1998 and 2013, hectares				
Forest Land Use /Cover >75% Land Use/Cover Classification	1998	2013	Difference hectares	Per Cent Loss/Gain
Closed broadleaf forest	88,230.5	84636.6	-3,594.0	-4.1
Disturbed broadleaf forest	174,724.6	175590.6	866.0	0.5
Open dry forest – Tall	41,998.5	37559.7	-4,438.8	-10.6
Open dry forest – Short	12,104.0	2615.1	-9,488.9	-78.4
Plantation	8,186.9	8319.0	132.1	1.6
Secondary forest*	+	40453.7	40,453.7	
Mangrove forest	9,731.4	9732.8	1.4	0.0
Swamp forest	2,247.0	122.9	-2,124.1	-94.5
Sub-total	**337,223.0**	**359,030.4**	**21,807.4**	**6.5**
Annual change in forest cover (percent)				0.4
Secondary forest*		80907.4		
Total Forest Cover		**439,937.8**		

* Denotes new forest cover class. According to a FAO discussion paper formulated from an international workshop held in 2002; a secondary forest is defined as the woody successional vegetation that regenerates after the forest cover has been removed by human intervention. The fact that secondary forest has less species per hectare and the age, diameter of species is more homogenous than closed broadleaf forest; allows us to further define the forest class within the Jamaican context. The major species found in this forest cover includes Red Bead, Trumpet Tree, Cassia, Poinciana and Spathodia.

+ Category for which there is no reference data (1998) or no current information (2013) due to reclassification

The largest loss in terms of hectares (~9489 ha) was seen in the short open dry forest now primarily converted to bare land and open dry tall forest. The second largest conversion by size was seen in the tall

[53] Forestry Department, Jamaica's Land Use Cover Assessment: A comparative assessment of Forest Change between 1998 & 2013 (Forest Resource Information Management Branch, GIS Unit, 2015).

open dry forest with a loss of ~10.6 % (~4,439) ha most of which is currently identified as disturbed broadleaf and to a lesser extent bare rock. Cumulatively, there was a 88% reduction in open dry forest.

This revelation is of significant concern to Jamaica as tropical dry forests are considered globally as the most threatened ecosystem when compared with moist forests. Additionally, there is limited understanding of their resilience to disturbance, which is critical to the development of conservation and management strategies[54] — a key consideration in the adaptation actions outlined in the NFMCP. There was a 3.6% reduction in broad leaf cover; the reduction being more significant for the closed broad leaf category (Table 6).

[54] M. Nino, K.P. McLaren, and H. Meilby, et al., 'Long term changes in above ground biomass in a neotropical dry forest, Hellshire Hills Jamaica', *Plant Ecology* (2014).

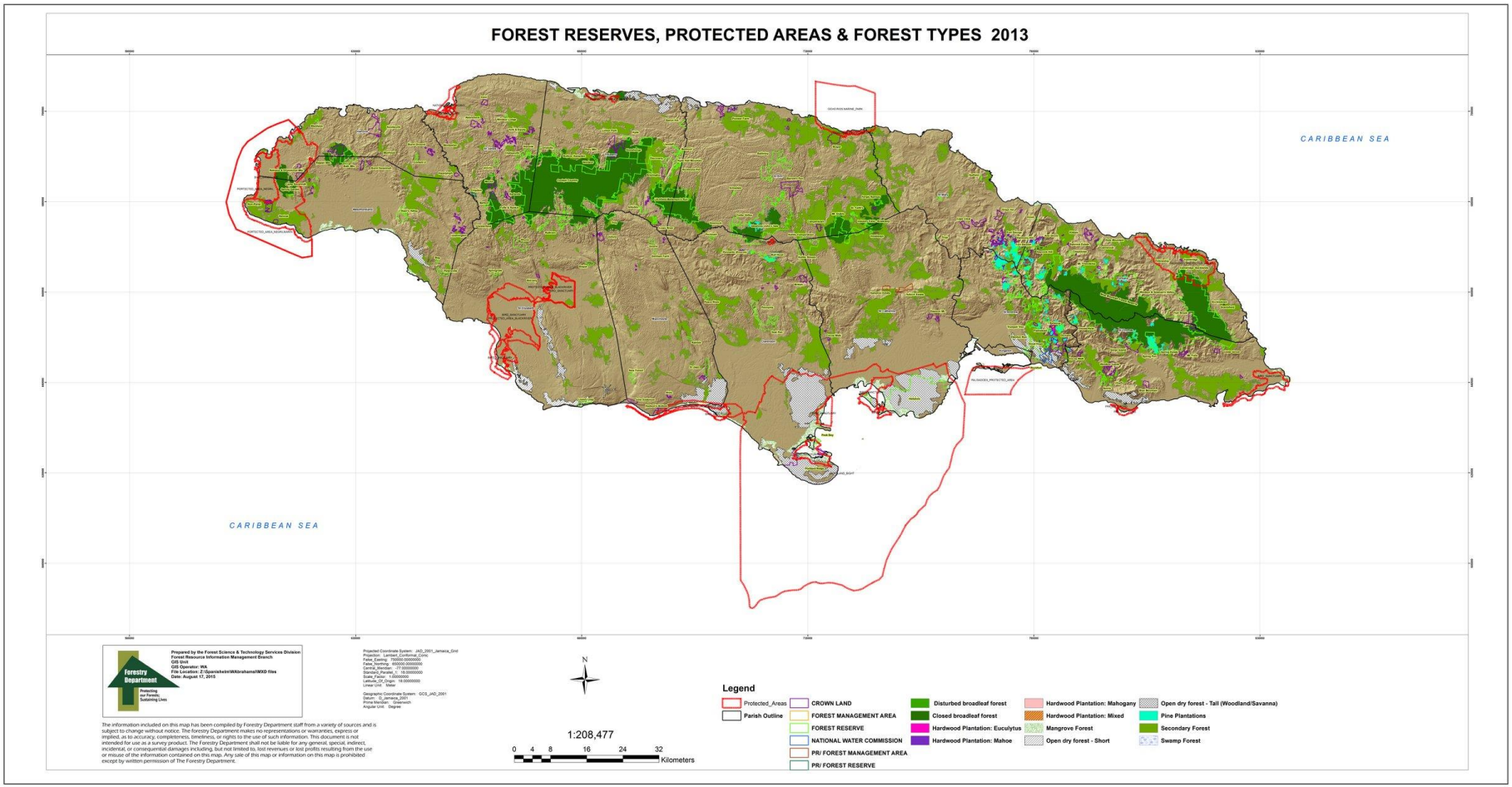


Figure 10 2013 Distribution of Forest Types

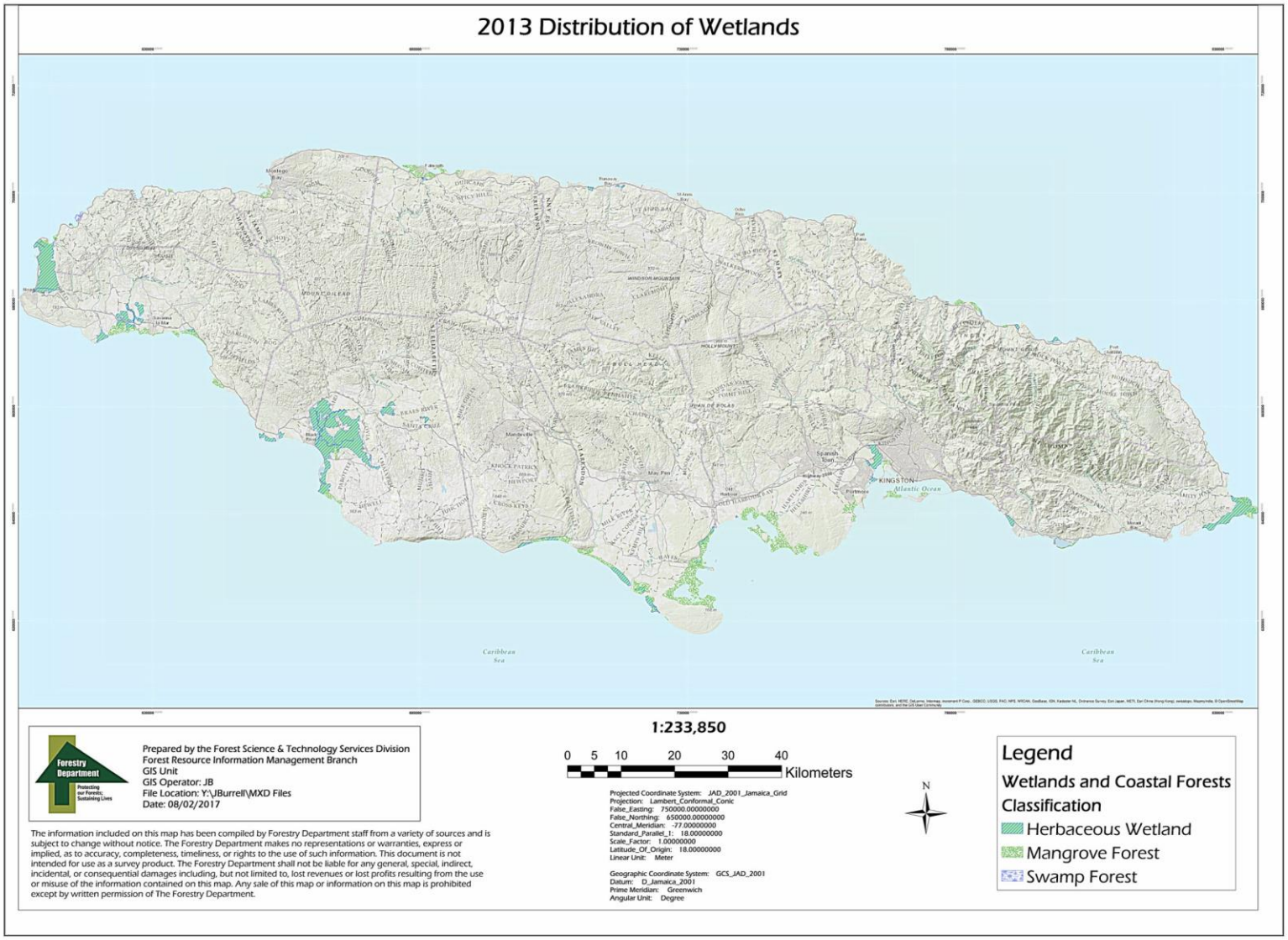


Figure 11 Distribution of Wetlands (Mangrove Forests and Swamp Forests)

The report also provides information on the location by parish of the various forest categories. Table 7[55] shows that 51% of the country's most valuable forest — broadleaf forest — is located across four parishes.

Table 7 Location of Majority of Broadleaf Forest by Parish

Forest Category	Portland (ha)	St James (ha)	St Thomas (ha)	Trelawny (ha)
Closed broadleaf forest	19,799.40	7,200.09	9,870.35	30,056.98
Disturbed broadleaf forest	14,713.02	20,260.9	10,349.33	20,977.67
Total	34,512.42	27,460.99	20,219.68	51,034.65
Percentage (%)	13.26	10.55	7.77	19.61

With regard to wetlands, swamp forests are now only found in the parish of Hanover and St Thomas and in the case of mangrove forest, 82% is found along the southern coast of the island.

The rate of deforestation within each parish is described and this information, coupled with the downscaled climate data provided in the CSGM January 2016 report, will continue to be invaluable in the planning and execution of mitigation actions.

Table 8 shows that St Ann, Hanover, Clarendon, and Kingston experienced the greatest annual rate of deforestation, ranging from -0.79% to -0.02%. Of importance is not only the rate of loss but the category of forest types that have been reduced (Table 8).[56]

The following section of the document explores how the predicted climate scenarios will affect the country's forest and how this information has been used to define the challenges and opportunities for the forest sector in the country's adaptation and mitigation actions.

2.6.2 Implications of Climate Change Projections for Forest Cover

Sea Level Rise

The projections supplied by CSGM show that there will be an increase in the sea level in the region of 0.24 m to 0.30 m (refer to Table 4) during the period 2046–2065. The map (Figure 12) shows the movement of the sea on the north and south coasts; but particularly on the southern coastline. Mangrove forests and swamp forests have been recommended as the more effective method of shoreline protection.[57]

The Land Use/Cover Change Assessment Report shows that only 2% of the country's land cover is mangrove forest and that the country has lost 94.53% of its swamp forest.[58] Based on these data, the

[55] Ibid.
[56] Ibid.
[57] Bruno Locatelli and Emilia Pramova, Forests and Adaptation to Climate Change: What is at Stake? (Center for International Forestry Research, Indonesia, World Resource Institute).
[58] Forestry Department, Jamaica's Land Use Cover Assessment: A comparative assessment of forest change between 1998 &2013 (2015), page 13, Table 1.

NFMCP has incorporated in its actions, adaptation plans to restore mangrove forest cover. While the change in sea level rise will be gradual, the projections suggest that significant impact will not be felt before 2040. This information, given the relatively slow rate of forest growth, provides the country with a twenty-year timeframe to take action, starting now, for the timely restoration of the country's mangroves as outlined in the NFMCP.

Forest Cover (Ha)					
PARISH	**1998**	**2013**	**Difference**	**Deforestation Rate**	**Annual rate**
St Ann	32154.49	28112.22	-4,042.27	-12.57	-0.79
Hanover	14057.09	13200.70	-856.39	-6.09	-0.38
Clarendon	35459.30	32909.24	-2,550.06	-7.19	-0.45
Kingston	221.71	221.04	-0.67	-0.30	-0.02
Trelawny	54262.60	56035.33	1,772.74	3.27	0.20
Portland	37088.41	39432.24	2,343.83	6.32	0.39
St James	26452.71	28972.25	2,519.54	9.52	0.60
St Andrew	9187.08	10543.44	1,356.36	14.76	0.92
St Elizabeth	23618.98	26373.82	2,754.84	11.66	0.73
Westmoreland	15855.49	18077.59	2,222.10	14.01	0.88
St Catherine	36931.47	40724.65	3,793.18	10.27	0.64
Manchester	17364.70	25677.69	8,312.99	47.87	2.99
St Thomas	23543.90	27364.73	3,820.84	16.23	1.01
St Mary	10640.42	11381.62	741.20	6.97	0.44
Total	**336,838.32**	**359,026.56**	**22,188.24**	6.59	0.4

Table 8 Annual Rate of Loss of Forests by Parish

Rainfall and Temperature

The climate change projections show that there will be increases in temperatures and a drying effect. Of interest to the forest sector is that the increases in temperatures are most likely in the interior region where the country's forest reserves are located. There will also be less rainfall, particularly in the south east. Further, the southern coastline, which has significant areas of mangrove forests and swamp forests, will experience less precipitation. The maps (Figure 13 and Figure 14) show the projection in changes in mean temperature and rainfall across the country's forest reserves.

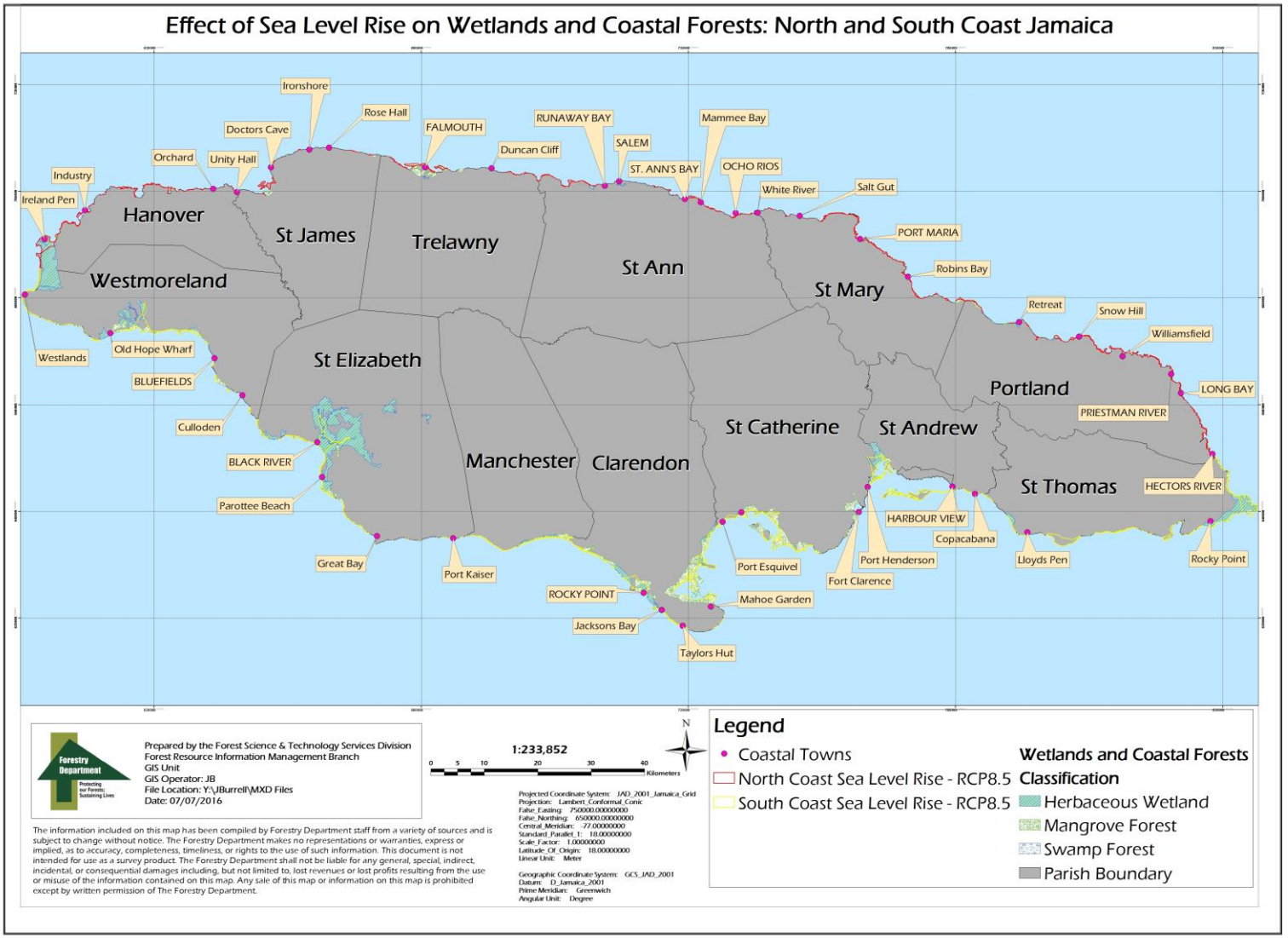


Figure 12 Sea Level Rise Prediction: Jamaica's Southern and Northern Coastline (RCP 8.5)

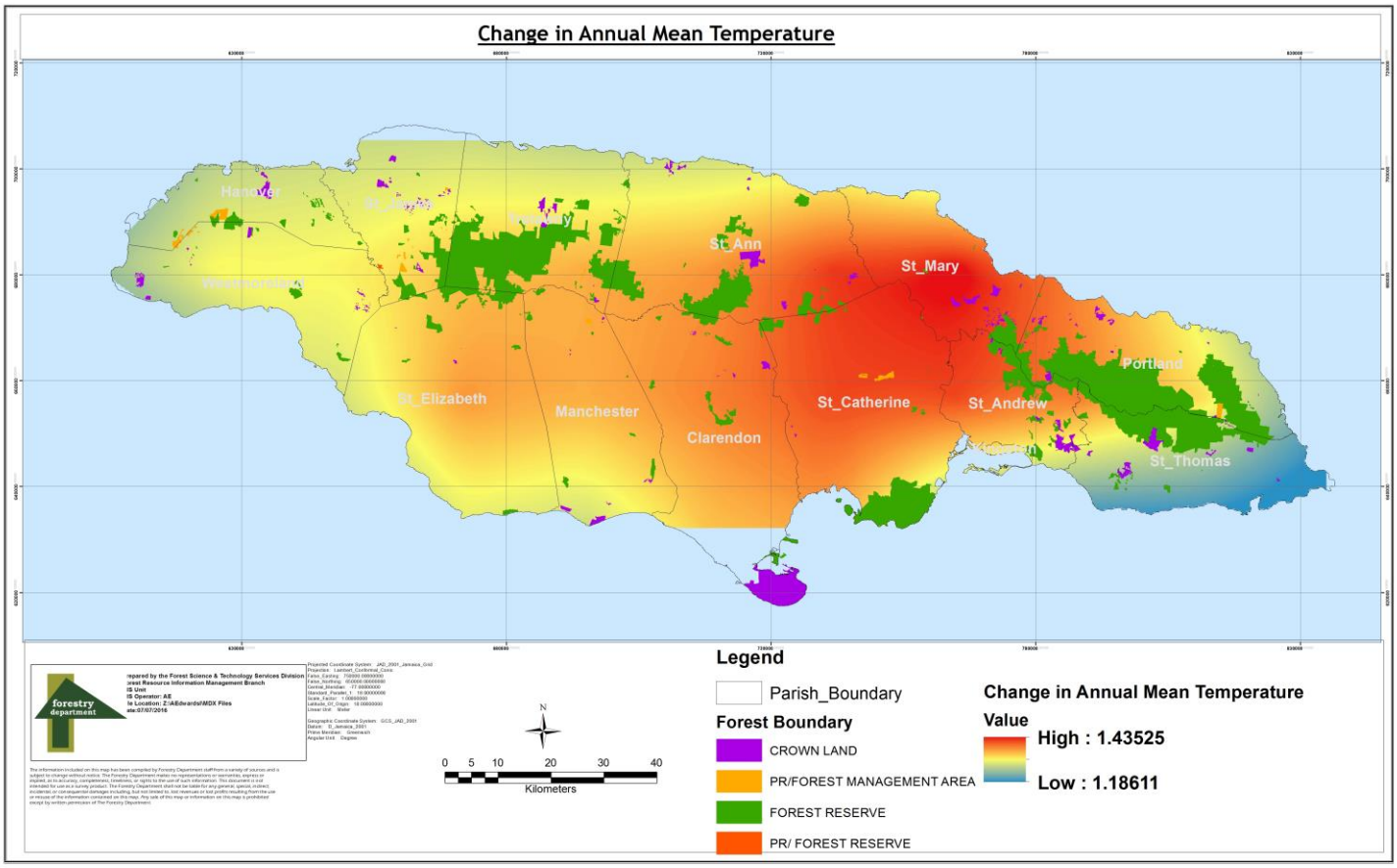


Figure 13 Climate Change Prediction Change in Annual Mean Temperature

Given the importance of forests to the country's efforts to mitigate climate change and its ability to build climate resilience, the climate prediction models are of tremendous significance. On the one hand, the models confirm that our forests will be impacted. One the other hand, the models provide useful information for the Agency as it develops its plans for forest restoration. Climate models therefore will be an increasingly important planning tool during the implementation of the NFMCP.

The following sections of the document outline the vision, goal and strategic objectives, and guiding principles which guide the execution of the plan, its management framework, and monitoring and evaluation and financial strategies.

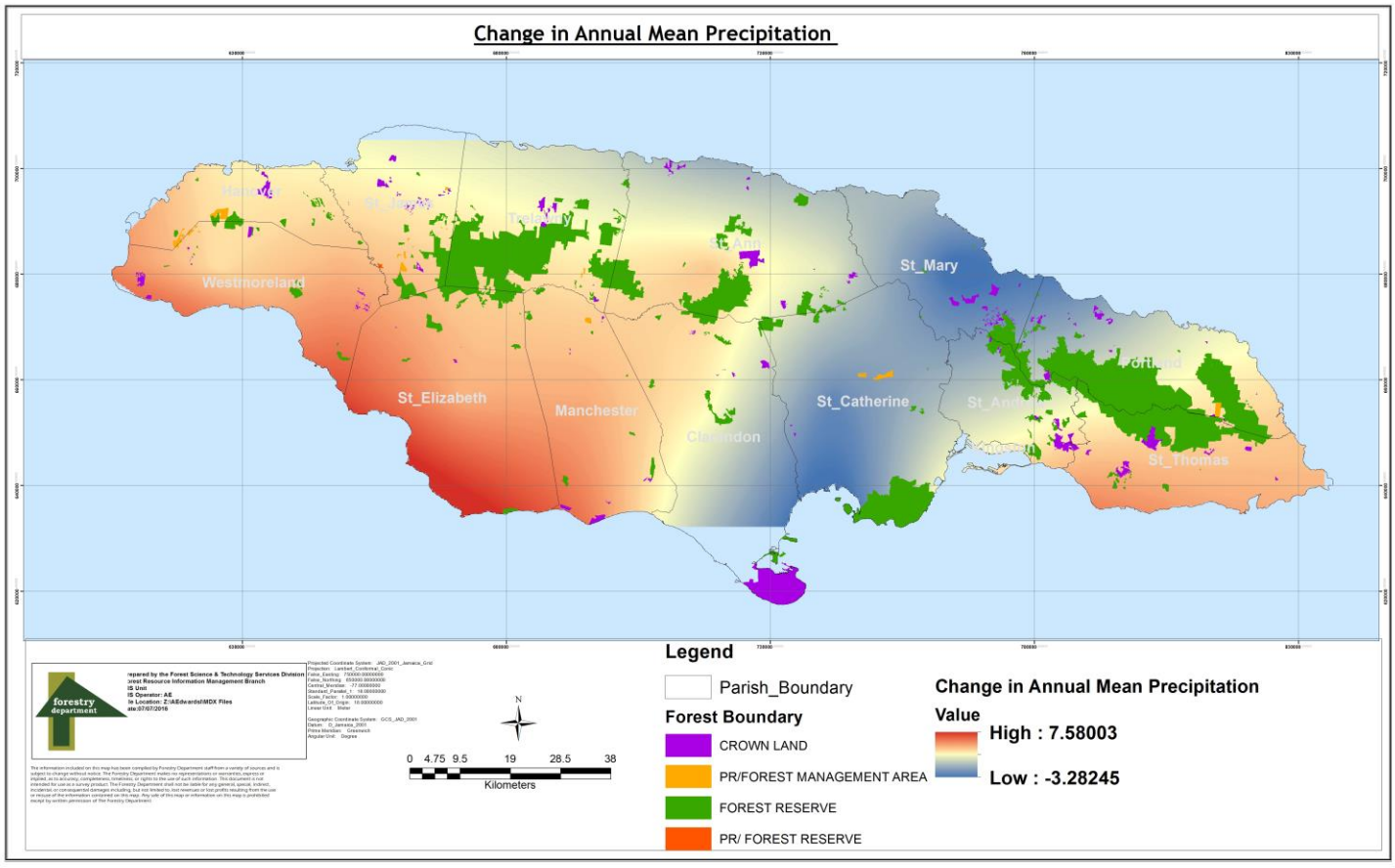


Figure 14 Climate Prediction Change in Annual Mean Precipitation

3 Vision, Goal, Results Framework and Thematic Areas of the Plan

3.1 Vision

The NFMCP forms part of the policy tools that guide the work of the Forestry Department and as such its vision statement is the same as presented in the Forest Policy for Jamaica 2017:

"By 2062, Jamaica's forests and its biodiversity are sufficiently restored and sustainably managed, so once again the island can adequately be described as "the land of wood and water", capable of meeting the social, economic and ecological needs of current and future generations."

3.2 Goal and Strategic Forest Management and Conservation Objectives

Guided by its planning processes, the obligations under the UNFF and Jamaica's National Development Plan, the Forestry Department has articulated the goal of NFMCP as:

"Sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience."

The NFMCP seeks to achieve this goal through four Strategic Forest Management and Conservation Objectives (SOs):

SO1: Reverse forest degradation, deforestation and the loss of forest biodiversity, through conservation and sustainable forest management, as well as strengthening the legislative, policy and institutional framework of the sector.

SO2: Enhance economic, social and environmental benefits of forests through the sustainable utilisation of forest resources.

SO3: Build the capacity within the Forestry Department, its partners and forest communities to manage, protect and conserve the forest resources.

SO4: Increase public education and awareness to protect, conserve, restore and manage Jamaica's forests.

In order 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 the enforcement of regulations. Various national policies are to be harmonised with sustainable forest and biodiversity management objectives.

Jamaica's forests are to be utilised sustainably for the provision of essential benefits, both from the harvesting and use of timber as well as from the use of other forest products, , recreation and other services. The best financial revenue streams and incentives will be researched and promoted.

The capacity for sustainable forest management in Jamaica is to be strengthened at all levels, through the implementation of a number of planning initiatives, measures for institutional development and reporting and community-based participatory development. Planning for management, protection, conservation, restoration and utilisation, as well as for hazard risk reduction and adaptation to climate change will be strengthened through participatory and gender based approaches.

For Jamaica's society to make choices in favour of forest protection and appropriate use, people of all walks of life need to know more about the values of forest ecosystems and of the wildlife living in forests. With awareness on what consists of sustainable forest practices and how forests build climate resilience, the general public will become an indispensable promoter of sustainable forest management and conservation. Additionally, the sector needs the strengthening of some professional skills for specialised tasks and an expansion of the cadre of professionals in order to optimise sustainable forest management.

3.3 Planning Process

The development of the NFMCP was pursued in a consultative manner, giving due consideration to all parties which were to have a role in the execution of the Plan: Governmental agencies, academia, private landowners, the private sector and their associations, local authorities, non-governmental organisations, community based organisations and international development partners.

Within an effort to develop a number of sectors plans which aim to achieve climate resilience for Jamaica, the forestry sector under the guidance of the FD was the first sector to begin that process. Climate resilience was therefore a main focus of the NFMCP. After funding was secured[59], the development of NFMCP took off in the first quarter of 2015 by establishing a Core Team and a Technical Advisory Committee (TAC)[60]. With assistance of the US Forest Service (USFS), the basis was laid for data gathering, achieving consensus on a process of stakeholder workshops and consultations, as well as internal communication. Moreover, a gap analysis was conducted to identify important items to be addressed by the new Plan. The Core Team and TAC also listed thematic priorities, conducted a participatory rapid vulnerability assessment and drafted a climate resilience strategy to reflect overall project goals.

The Core Team and TAC further drafted an Activity Impact Matrix (AIM), in order to prioritise themes for forest strategies against the goals of Vision 2030-National Development Plan, SDGs and UN Forest Instrument. By mid-2015, work started on the identification of indicators and targets, the planning of timelines and an initial draft NFMCP was produced. This document was reviewed and refined during

[59] *Funding was secured in October 2014 from the Climate Economic Analysis for Development, Investment, and Resilience (CEADIR) project of the United States Agency for International Development's (USAID).*

[60] *The main stakeholder agencies that were consulted during the development of NFMCP are presented in a table at the beginning of this document*.

stakeholder consultations in late 2015. A financing plan as well as a Monitoring and Evaluation plan were drafted as well.

Various feedback indicated a need for further review and refinement. During 2016 additional gaps and issues were addressed through a number of workshops relating to the alignment of the Jamaica forest sector with the United Nations Forum on Forests (UNFF) and the Forest Instrument (FI).

In February and March 2017, six public stakeholder consultations were organized across the island (Mavis Bank, Port Antonio, Montego Bay, Clarke's Town, Chapelton and Kingston). A wide range of feedback was obtained from many sectors of society, which further helped to strengthen the NFMCP. The public was also enabled to obtain the draft document through downloading from several Government websites or to consult it at a library (it was distributed to all Parish Libraries as well as some branch libraries).

A final edit of the NFMCP was done in July 2017. At this time the Performance Monitoring, Evaluation and Reporting strategic framework was also prepared based on earlier drafts and the related PMER Plan which guides the day-to-day implementation of monitoring and reporting.

3.4 Guiding Principles

The long-term vision of the Forestry Department sees Jamaica once again as "the land of wood and water." Forests and their biodiversity are restored and Jamaica is capable of meeting the social, economic and ecological needs of its people. Sustainable forest management and climate resilience are woven throughout the institutions and daily habits of Jamaicans.

The strategic forest management and conservation objectives will be achieved by implementing different actions over a period of time. Given the complex and cross-cutting nature of managing forests sustainably, involving many stakeholders and interested parties, the Forestry Department has articulated several guiding principles by which the Plan will be implemented to achieve the long-term goal. These are based on guiding principles detailed in the 2001 NFMCP, the input of stakeholders as well as the principles from the UN Forest Instrument.[61]

Enhancing partnerships and encouraging authentic dialogue and participation among all stakeholders – Private landowners, forest communities, NGOs, and government agencies will be engaged in a united vision on the sustainable management of forests.

Combating climate change – The impact of climate change on forests and sustainable forest management and the contribution of forests to climate change adaptation and mitigation will be recognised.

Implementing sustainable forest management - Due consideration will be given to emerging thinking on landscape restoration.

Innovating forest finance – Financing mechanisms for the management and conservation of the forest sector are to be diversified and methods are to be introduced to incentivize contributing activities.

[61] The "Non-Legally Binding Instrument on All Types of Forests" (the Forest Instrument) was adopted by the UN General Assembly in 2007.

Increasing public education and awareness – Abiding by its mantra, "It is the responsibility of each able-bodied Jamaican to join in this national effort to recapture the fast disappearing beauty of our country…."[62] the Forestry Department will undertake a vigorous and sustained effort to educate the various publics.

Enhancing the decision-making capability – Investments will be made in developing staff capability and in expanding and supporting forest research.

Ensuring alignment to Vision 2030 Jamaica – the National Development Plan. The NFMCP will be fully aligned to Jamaica's national planning efforts.

Embracing relevant National and Sectoral Policies – Pertinent policies and guidelines will be considered, such as the Protected Areas System Master Plan (PASMP), the National Biological Diversity Strategic Action Plan (NBSAP) and others.

Meeting international obligations and commitments – The Forest Sector will support the county's commitment to various multilateral agreements.

3.5 Logic Model for NFMCP

The Logic Model for NFMCP is presented in ***Table 9***. It provides a holistic view of the NFMCP through the contributing relationships from outputs to outcomes, grouped in the Thematic Areas, and on to impact. It includes all expected results. A full Results Framework, which also presents the indicators and data sources, is presented in another document: the "Strategic Framework for Performance Monitoring, Evaluation and Reporting (PMER) of the National Forest Management and Conservation Plan (NFMCP)."

A logic model is a tool that helps to plan, evaluate and communicate the results journey with respect to the NFMCP. It will also help focus the evaluation on the NFMCP during mid-term and at the end of the 10-year period. It should be noted that the results relationships are more complex than the linear structure would suggest. For example, some outputs contribute to multiple outcomes and some outcomes contribute to more than one thematic area or strategic objectives. It is expected that this will be addressed by highlighting these linkages in the narrative reporting as well as ongoing refinement of the PMER Framework.

The Logic Model shows five Thematic Areas, identified during the planning process for NFMCP. The outputs (total of 58) and outcomes (total of 13) are grouped under these major management concerns. In order to achieve the Strategic Forest Management and Conservation Objectives, all outcomes will have to be achieved. The outputs have been sub-numbered to indicate to which outcome they directly contribute.

In its upper line, the Logic Model also shows the various policies, agreements and conventions to which its implementation is aligned.

[62] *Norman Bertram Vickers, Forestry Department, 1968.*

TABLE 9: Logic Model for the NFMCP 2016-2026

Alignment	**UNFF SDGs UNFCCC UNCBD Ramsar UNESCO World Heritage Sites Jamaica Vision 2030 Forest Policy Climate Change Policy Framework PASMP NBSAP**				
Goal	"Sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience."				
Strategic Forest Management and Conservation Objectives	• SO1: Reverse forest degradation, deforestation and the loss of forest biodiversity, through conservation and sustainable forest management, as well as strengthening the legislative, policy and institutional framework of the sector. • SO2: Enhance economic, social and environmental benefits of forests through the sustainable utilisation of forest resources. • SO3: Build the capacity within the Forestry Department, its partners and forest communities to manage, protect and conserve the forest resources. • SO4: Increase public education and awareness to protect, conserve, restore and manage Jamaica's forests.				
Impact	Jamaica's forests are sustainably managed, protected, healthy, economically viable and socially beneficial to all.				
Thematic Areas	**1. Forest Governance & Conservation**	**2. Forest Utilisation**	**3. Capacity for Sustainable Forest Management**	**4. Education, Training and Awareness**	**5. Monitoring and Information Management**
Outcomes	Outcome 1.1: Strengthened governance, policy and legislative framework to ensure sustainable development of the forest sector.	Outcome 2.1: Innovative mechanisms established for financing sustainable forest management and obtaining benefits from forest use.	Outcome 3.1: Improved participatory planning to manage, protect and conserve Jamaica's forests.	Outcome 4.1: Forest communities, the general public as well as targeted groups have increased capacity regarding sustainable forest practices.	Outcome 5.1: Improved availability of spatial data for sustainable forest management practices, promoting investment, and assessing vulnerabilities and risks in the forest sector.
	Outcome 1.2: Forest biodiversity protected.	Outcome 2.2: Sustainable harvesting and use of timber products from forests.	Outcome 3.2: Strengthened institutional capacity for REDD+ readiness.	Outcome 4.2: Strengthened capacity for natural resource valuations, carbon stock monitoring and silviculture.	Outcome 5.2: Strengthened capacity for impact and vulnerability assessments and for management of research and knowledge systems.
	.	Outcome 2.3: Sustainable use of non-timber products and services of forests.	Outcome 3.3: Strengthened capacity of Local Forest Management Committees and other community groups.		Outcome 5.3: Improved collaborative monitoring of forest resources.

Outputs	***Output 1.1.1:*** *Cross sectoral mechanism established for integrating the Forest Sector into relevant national decision making processes.* ***Output 1.1.2:*** *Forest Act amended.* ***Output 1.1.3:*** *Support for the preparation of Parish Development Orders provided.* ***Output 1.1.4:*** *Crown lands transferred by Commissioner of Lands to the Forestry Department for sustainable management.* ***Output 1.1.5:*** *Enforcement capacity of FD increased.* ***Output 1.1.6:*** *Regulations developed for special recreational use permits, research permits, licence programmes.* ***Output 1.1.7:*** *Boundary verification programme implemented.*	***Output 2.1.1:*** *Incentives programme evaluated.* ***Output 2.1.2:*** *New or revised incentives for SFM made available and promoted.* ***Output 2.1.3:*** *Programme developed for payment of ecosystem services within forested areas.* ***Output 2.1.4:*** *Alternative livelihoods in forest communities promoted.*	***Output 3.1.1:*** *Reforestation programme for forest estates developed.* ***Output 3.1.2:*** *Forest Management Plans (FMP) for forest estates in clusters developed.* ***Output 3.1.3:*** *Watershed restoration plan developed, implemented.* ***Output 3.1.4:*** *Nursery programme implemented & evaluated.* ***Output 3.1.5:*** *Mangrove and swamp forest management plan developed & implemented.* ***Output 3.1.6:*** *Guidelines developed for management practices for riparian forests along rivers and streams within forest estates.* ***Output 3.1.7:*** *Appropriate guidelines developed for the establishment and maintenance of trees in urban settings; for cultural, aesthetics and shade purposes.* ***Output 3.1.8:*** *Database of private forest land owners created and maintained. .*	***Output 4.1.1:*** *Education programme developed to strengthen the public's understanding on the benefits of forests and its resources, the importance of sustainable forest management and conservation practices.* ***Output 4.1.2:*** *School education and awareness programme designed and implemented.* ***Output 4.1.3:*** *Forest fire-related public awareness and education programme designed, implemented.* **Output 4.1.4:** *Outreach programme for private forest owners developed and evaluated on an ongoing basis.*	***Output 5.1.1:*** *Spatial representation of disturbance within Broad Leaf forests developed* ***Output 5.1.2:*** *Level of disturbance within Broad Leaf forests assessed and mapped. Mangrove and swamp forests mapped and assessed.* ***Output 5.1.3:*** *Gap analysis conducted identifying spatial data and other information to better map the risks and vulnerabilities of forests and communities to climate change and related hazards (e.g., fire, floods, landslides).* ***Output 5.1.4:*** *Lands verified and mapped in the private lands reforestation programme.* ***Output 5.1.5:*** *Recreational, cultural and heritage sites identified and mapped.*
Outputs	***Output 1.2.1:*** *List of invasive plant and animal species in forested areas developed, maintained.* ***Output 1.2.2:*** *Invasive species control (management) plan designed and implemented.* ***Output 1.2.3:*** *Species (pilot) conservation plans developed.*	***Output 2.2.1:*** *Economic viability of wood product species assessed and appropriate timber processing methods recommended.* ***Output 2.2.2:*** *Sustainable harvesting programme developed.*	***Output 3.2.1:*** *Existing forest inventory approach reviewed and revised to support Carbon Stock Monitoring (CSM) and potential carbon trading agreements.* ***Output 3.2.2:*** *REDD+ readiness Strategy completed.* ***Output 3.2.3:*** *Analytical Report on the drivers for*	***Output 4.2.1:*** *Training programmes for natural resource/ecosystem valuations (NRVs) for all types of forests conducted.* ***Output 4.2.2:*** *Training in silviculture conducted.* ***Output 4.2.3:*** *Training in Carbon Stock Monitoring conducted.*	***Output 5.2.1*** *Working group established for research that will improve knowledge regarding the management of mangrove forests, swamp forests and short open dry limestone forests; and on the impact of climate change on all forest types.* ***Output 5.2.2:*** *Forest fire assessments conducted.*

	Output 1.2.4: *Identification of target species most relevant to the forest sector for future conservation efforts.*		*deforestation/forest degradation produced (REDD+ readiness).* ***Output 3.2.4:*** *National forest reference emission level established (calculated) (REDD+ readiness).* ***Output 3.2.5:*** *Safeguards information system (REDD+ readiness).*		***Output 5.2.3:*** *Impact assessment of mining and other permitted activity on forest goods, services, and values over time conducted.*
Outputs		***Output 2.3.1: R****esearch programme on non-timber forest products developed.* ***Output 2.3.2:*** *Producers and consumers of non-timber forest products identified.* ***Output 2.3.3:*** *Economically viable non-timber market opportunities developed.* ***Output 2.3.4:*** *Recreational sites rehabilitated.* ***Output 2.3.5:*** *Guidelines for the use of cultural and heritage sites on Forest Reserves and FMAs developed.*	***Output 3.3.1:*** *Strengthened capacity of LFMC and other community groups in project development.* ***Output 3.3.2****: Governance and decision making processes related to LFMCs strengthened.* ***Output 3.3.3:*** *Fire suppression teams established and trained within community groups in high priority/high risk areas.*		***Output 5.3.1****: Improved availability of data for driving the growth and investment in the forest sector (both timber & non timber).* ***Output 5.3.2:*** *REDD+ preparedness – Strengthened forest monitoring systems.* ***Output 5.3.3:*** *Weather stations placed in strategic locations within forested areas to garner additional data to support sustainable forest management practices.* ***Output 5.3.4:*** *Forest monitoring system using Permanent Sample Plots (PSPs) established.* ***Output 5.3.5:*** *Targeted species (giant swallowtail, yellow-and-black-billed parrot, water mahoe and bitter wood) surveyed, mapped.*
Cross-cutting issues	**Climate change**	**Coordination and harmonisation among stakeholders**			**Resource mobilisation**

In the lower line of the Logic Model, cross-cutting issues are mentioned, which play through all interventions. Climate change adaptation and mitigation is a central cross-cutting issue and the Agency and other stakeholders, in recognition of the importance and co-benefits of both adaptation and mitigation actions for building the country's climate resilience, will include these throughout the outputs and outcomes. Of note is that many of the considerations for adaptation will require new and refocused forest research and assessment.

3.5.1 Thematic Areas

The Thematic Areas of NFMCP 2016-2026 are:

1. Forest Governance and Conservation;
2. Forest Utilisation;
3. Capacity for Sustainable Forest Management;
4. Education, Training and Awareness;
5. Monitoring and Information Management.

3.6 Stakeholders

Many actors (government entities, private land owners, NGOs, community groups and academia) from a range of sectors are to be involved in the implementation of NFMCP. The Forestry Department is the lead organisation and has ultimate responsibility for the implementation of NFMCP. It will however be supported in this by nine partner organisations, which have responsibilities for executing some of the key actions and for delivering important outputs towards the achievement of the NFMCP outcomes. The ten "primary implementing entities" are presented in ***Table 10***.

Table 10 List of Primary Implementing Entities of NFMCP and their Mandates

Entity	Institutional Mandate
Forestry Department (FD)	FD, "the Agency" is the lead government entity responsible for the management of forests located on Crown lands. The goal of the Agency is to "Manage and conserve the forest resources of Jamaica for the benefit of present and future generations." The Act mandates the Agency to establish rules on directing and controlling the exploitation of forest resources, promoting reforestation, conducting research, developing and implementing public education and awareness programmes, and developing recreational initiatives in forests.
Jamaica National Heritage Trust (JNHT)	JNHT aims to foster a sense of national pride and identity through heritage education; to identify, research, record, interpret, regulate, protect and preserve the material cultural heritage resources of the Jamaican people; and to promote the sustainable utilisation and management of Jamaica's material cultural heritage resources.
National Environment and Planning Agency (NEPA)	NEPA was founded to carry out the technical (functional) and administrative mandate of three statutory bodies: Natural Resources & Conservation, Authority (NRCA), Town & Country Planning Authority (TCPA), and the Land Development & Utilisation Commission (LDUC). Its mission is to promote sustainable development by ensuring protection of the environment and orderly development in Jamaica through highly motivated staff performing at the highest standard.

Entity	Institutional Mandate
National Land Agency (NLA)	NLA was established to create a modern national land (spatial) information system to support sustainable development. Its mission is to ensure that Jamaica has an efficient and transparent land titling system, a national land valuation database and makes optimal use of government-owned land.
Meteorological Service of Jamaica (MSJ)	MSJ is a scientific division of the MEGJC and handles the business of meteorology. Its mission is to take full advantage of man's present knowledge of weather and climate; to take steps to improve significantly that knowledge; and to foresee and prevent potential man-made changes in climate that might hamper the well-being of Jamaicans.
Ministry of Economic Growth and Job Creation (MEGJC)	MEGJC is the portfolio ministry for FD, NEPA, NLA and MSJ. It provides policy direction for its agencies and has the primary responsibility of advancing the achievement of the country's prosperity through partnership, economic growth and sustainable development.
Ministry of Transport and Mining (MTM)	MTM's primary responsibility is the management of the country's land, marine and air transport and the management of the mining sector.
Office of Disaster Preparedness and Emergency Management (ODPEM)	ODPEM provides the disaster management functions in Jamaica. Its operations are designed towards: developing and implementing policies and programmes for the purpose of achieving and maintaining an appropriate state of national preparedness for natural disasters and other emergency events; encouraging and supporting disaster preparedness and mitigation measures; providing early warning, emergency response, relief and recovery operations in emergency situations; advocating and supporting risk reduction measures; providing training in all areas of disaster management; promoting a greater national awareness for disaster management issues through public education and awareness; and conducting hazard identification and risk assessments.
University of the West Indies Mona – Department of Life Sciences (UWI/LS)	UWI Life Sciences Department is involved in research aimed at creating new knowledge to help solve the challenges facing our nation. Its research encompasses work on coastal forest nursery propagation to generate best practice manuals for nursery set up and management and the production of "head-started" coastal forest species for planting islandwide.
University of the West Indies Mona – Climate Studies Group (UWI/CSG)	Formed in 1994, the Climate Studies Group Mona (UWI/CSG) is located within the Physics Department of UWI. The disciplines of equations of motion, thermodynamics, hydrodynamics, radiation and cloud physics are used to understand climate processes and engage in climate studies.

In order to achieve broad-based participation and partnerships with multiple entities, a number of secondary partners have roles and responsibilities in implementing NFMCP. These include:

- Ministries, Departments and Agencies (MDA),;
- Private sector related to work in any of the sectors covered by NFMCP;
- Non-governmental organisations (NGOs);
- Local Forest Management Committees (LFMCs);
- Pertinent research institutes and academia.

SECTION B
Thematic Areas

4 Forest Governance and Conservation

4.1 Problem statement

Historically, many factors have contributed to the degradation of Jamaica's forest cover, including the conversion of forest cover for mining and quarrying purposes; bushfires which are often used to clear land for agricultural activity; unauthorised occupation of land; illegal felling of trees on state-owned land; selective removal of valuable biodiversity including endemic trees; limited awareness of the value of forests and trees as part of Jamaica's cultural and ecological heritage; and insufficient monitoring of some forested areas, particularly mangroves.

Although in the last 20 years, Jamaica has experienced a net gain in total forest cover, the area covered by quality forest has decreased. The increase in forest cover can be attributed primarily to the regeneration of secondary forest cover (ruinate forest) on land previously impacted by bauxite mining operations and abandoned agricultural areas. The loss of quality closed broadleaf forest cover over time is caused by, among other factors:

- A number of policy and regulatory deficiencies at the central as well as local government level;
- Lack of demarcation of Forest Estate boundaries and related lack of enforcement activities;
- Encroachment and squatting on Forest Estates, especially for agriculture and housing purposes;
- Open access of forests and Illegal cutting of trees on Crown lands;
- Selective removal of valuable biodiversity including endemic tree species;
- Insufficient take up by private landowners of opportunities to declare their forested land under the Forest Act and obtain property tax incentives;
- Insufficient integration of the Agency's sustainable forest and landscape management approach;
- Insufficient linking to international concerns regarding well-managed forests for climate change adaptation and mitigation and for biodiversity conservation.

The forest sector remains underrepresented in national decision making by Ministries and Government Agencies through a lack of cross-sectoral mechanisms that take forests into account. Laws and regulations protecting forests are insufficiently enforced and few enforcement approaches exist.

Jamaica's forests are vital for conserving the country's rich biological diversity and loss of forest cover or the degradation of forests results in loss of habitats. Biodiversity loss will likely be exacerbated by the impact of changing climatic conditions, which result in further losses of habitats, especially in highly fragmented landscapes that prevent species migration.

However, there are also a number of alien invasive species (plants, animals, pathogens and other organisms) that may cause economic or environmental harm or adversely affect human health. In particular, they may cause the decline or elimination of native species through competition, predation, or transmission of pathogens, and the disruption of local ecosystems and ecosystem functions.

4.2 Expected Outcomes

The expected outcomes of the Thematic Area 1, Forest Governance and Conservation, are:

Outcome 1.1: Strengthened governance, policy and legislative framework to ensure sustainable development of the forest sector.

Outcome 1.2: Forest biodiversity protected.

4.3 Strategies

The protection of the forest will require inputs at the highest level of decision-making in national development. A key NFMCP action to be implemented, in close collaboration with the MEGJC and the Vision 2030 Jamaica structures and processes, will be the development of mechanisms for better coordination with cross-sectoral policies and programmes. These will facilitate consideration of the NFMCP in all decisions that may affect the forest sector as well as alignment between other relevant policies, programmes, and plans, and the NFMCP.

The strengthening of governance, policy and legislation, as well as forest law enforcement will be activities central to achieving the results of the NFMCP. The forest sector already has several policy and legal instruments for management in place, including: (a) The Forest Act 1996; (b) The Forest Regulations 2001; and (c) The Forest Policy for Jamaica 2017. Under this Thematic Area, NFMCP will aim to amend the Forest Act and support the development of Parish Development Orders with priorities related to forest resources. In light of the vulnerability of mangrove forests, areas owned by the Commissioner of Lands should be transferred to the Agency for sustainable management.

The need for effective partnership and collaboration with lead organisations and the stakeholders which are targeted in each of the actions cannot be overstated; particularly given that compliance to legislation requires cooperation. So, there will be renewed and concerted efforts during the execution of the plan to engage private land owners, local forest communities, municipalities, and the relevant government entities. While the Agency will have overall responsibility for the execution of these actions, the lead Ministry will be the Ministry of Economic Growth and Job Creation (MEGJC) who has the overarching responsibility for the passage of legislative changes in this instance. All the entities with a lead or supporting role — FD, NEPA, NLA — report to the MEGJC, with the exception of the Ministry of Transport and Mining (MTM).

The adaptation activities are focused on the identification and management of invasive species; identification, restoration and management of mangrove forests and swamp forests; adaptation of tree species to climate change; and conservation of dry lime stone forests.

Invasive species in forested areas will be investigated with a view to finding means of better control or eradication. Additionally, adaptation of tree species to climate change will be investigated as well as the impact of sea level rise on the mangrove and swamp forests.

4.4 Action Plan and Responsible Agencies

The Action Plan for Thematic Area 1 is detailed in ***Table 11***. There are eleven (11) actions identified, coordinated by the following lead agencies[63]: Forestry Department (FD), Ministry of Economic Growth and Job Creation (MEGJC), Ministry of Transport and Mining (MTM), National Environment and Planning Agency (NEPA) and the National Land Agency (NLA).

Supportive partner organisations in the implementation of the 13 actions are: Cabinet Office, Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF), Chief Parliamentary Council, Mines and Geology Division (MGD), Parish Councils, Parish Development Committees (PDC), Rural Agricultural Development Authority (RADA), Water Resources Authority (WRA), Institute of Jamaica (IOJ), Security Agencies and the University of the West Indies/ Department of Life Sciences (UWI/DLS).

Table 11. Actions of Thematic Area 1: "Forest Governance and Conservation"

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
1-1	Implement in collaboration with the National Development Plan process and linked to the Medium-Term Framework, a cross-sectoral mechanism for integrating the Forest Sector into relevant national decision-making processes that support sustainable forest management, the building of the country's climate resilience, and the implementation of the NFMCP.		Cabinet Office, MEGJC	Existence of cross sectoral mechanism (including NDP mechanisms) for integrating the Forest Sector into relevant national decision-making processes (*Yes/No*)	
1-2	Amend the Forest Act and its regulations along with related legislation to ensure harmonisation in order to: (i) fill existing gaps in the current act; (ii) add additional offences; and (iii) improve the Agency's ability to protect, and regulate the forested areas.		**MEGJC and FD**, CPC, NEPA/TCPA, Cabinet Office	Amended Forest Act approved, promulgated	**RISK**: Length of time taken to revise legislation. Final process outside Agency control

[63] For planning purposes, only one of the ten Primary Implementing Entities (identified in Table 10) can act as Lead Agency for a specific action.

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
1-3	Collaborate with NEPA in the preparation, revision and updating of the Parish Development Orders, giving due consideration and placing high priority on forest resources.	TBD	**NRCA Forward Planning Committee (NEPA)**, FD, Parish Councils and PDCs	Number of Parish Development Orders updated	
1-4	Transfer by the Commissioner of Lands, crown lands to the Forestry Department for the management of mangrove forests and swamp forests.	TBD	**NLA,** FD	Existence of signed mechanism permitting Agency's management of mangrove forest and swamp on crown lands (*Yes/No*)	
1-5	Support the strengthening of the approaches governing issues of tenure and trespass on forest estates.	2016-2026	**MEGJC, FD, RADA, MICAF, NLA, security agencies**		Support for programme not sufficient
1-6	Develop regulations that permit and license activities such as: special recreational use, research, and lease programme, and permit the use of performance bonds.	2018-2019	**MEGJC**, **FD,** NEPA, Cabinet Office	Number of regulations for special recreational use permit, research permits, licence, and/or lease programmes	**RISK**: Untimely & unfavourable response from the Minister
1-7	Expand and accelerate the boundary verification programme for forest estates.	2016-2020	**FD**	Number/percentage of forest estates or regions covered in the boundary verification programme	RISKS: Activity needs to be transformed into a project to be completed. Funding a major constraint.
1-8	Develop and maintain list of invasive plant and animal species in forested area and design and implement a plan for control of these species.	2017-2018	**FD,** NEPA, IOJ, UWI/DLS	Up-to-date invasive species list in place (*Yes/No*)	**RISK:** Unfavourable weather conditions can significantly delay completion of activity

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
1-9	Set up a working group to design a control (management) strategy and plan for Invasive species and implement it.		FD, NEPA – ecosystem branch, IOJ, UWI/DLS	Number of invasive species controlled	
1-10	Develop initial (pilot) species conservation plans and survey and map the distribution of targeted species — Giant s Swallowtail Butterfly, Yellow-billed Parrot, Black-billed Parrot, Water Mahoe, and Bitterwood.	2016	**NEPA, FD**, IOJ	Number of species conservation plans developed. Status of implementation of species conservation plans	
1-11	Identify other potential target species most relevant to the forestry sector for future conservation efforts.	2017	**NEPA, FD**, IOJ	Number of species identified for future conservation efforts	

5 Forest Utilisation

5.1 Problem Statement

The worldwide concern about the global effects of climate change has drawn attention to tropical forests, both as sources of atmospheric heat-trapping gases when they are degraded or destroyed by fire and as sinks for these same gases when they are well-managed or restored.[64] Improved forest management and sustainable forest utilisation, including preserving ecosystem services and enhancing social welfare, is considered by international policymakers as a way to mitigate climate change. This consideration is shared by the decision makers in Jamaica.

The economic viability of local wood species is not easily known; the country lacks a central repository of data on the market price, supply, and demand for local timber.

There are many more forest services than the traditional focus of forest use (timber production). A diversification of the scope of forest utilisation activities within forest estates need to be sought by engaging many other sectors of society. The development of alternative livelihood in forest communities which are sustainable is a challenge. Payment mechanisms for ecosystem services are complex, as are

[64] Forest and Climate Change: adaptation and mitigation, *European Tropical Forest Research*, Issue 50 (November 2009).

the development of new incentives, outside of regular budgetary allocations to the Agency, to promote sustainable forest management or forest restoration.

Although forest trails exist island-wide, their infrastructure and related facilities are inadequate for recreational activities around forest appreciation, leisure and ecotourism.

5.2 Expected Outcomes

The expected outcomes of the Thematic Area 2, Forest Utilisation, are:

Outcome 2.1: Innovative mechanisms established for financing sustainable forest management and obtaining benefits from forest use.

Outcome 2.2: Sustainable harvesting and use of timber products from forests.

Outcome 2.3: Sustainable use of non-timber products and services of forests.

5.3 Strategies

Under Thematic Area 2, a programme of incentives for private forest land owners will be evaluated and appropriate incentives for investment in forests will be promoted. Appropriate programmes for Payment of Ecosystem Services (PES) and alternative livelihood will also be established.

Much focus will also be laid on developing sustainable economic use of forests, both with regard to timber and non-timber forest resources.

5.4 Action Plan and Responsible Agencies

The Action Plan for Thematic Area 2 is detailed in ***Table 12***. There are eleven (11) actions identified, coordinated by the following two lead agencies: Forestry Department (FD) and the Jamaica National Heritage Trust (JNHT).

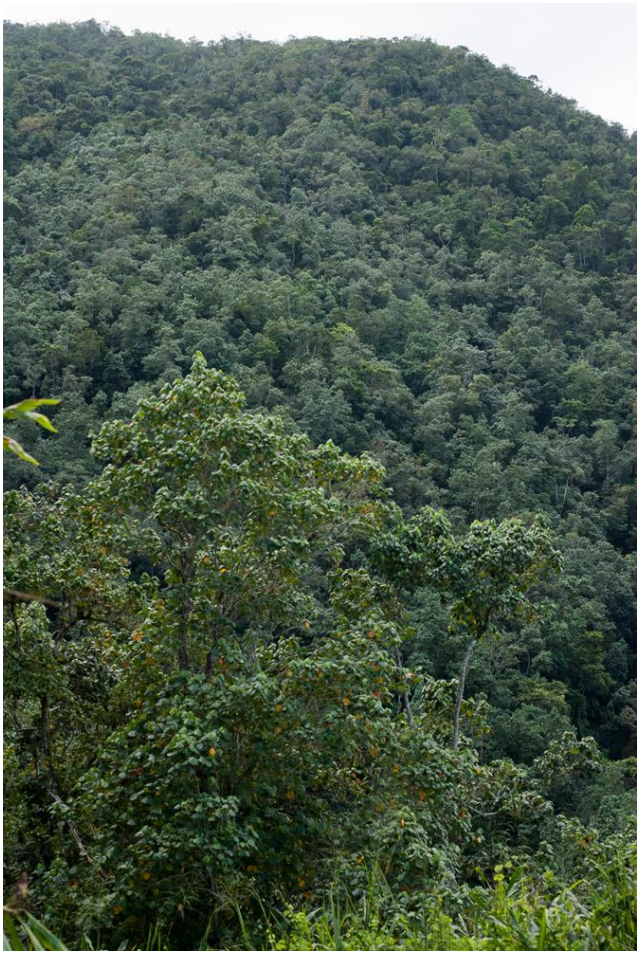
Supportive partner organisations in the implementation of these actions are: Ministry of Finance and the Public Service (MOFP), National Environment and Planning Agency (NEPA), Parish Councils, Parish Development Committees (PDC), Water Resources Authority (WRA), Local Forest Management Committees (LFMC), Jamaica Conservation and Development Trust (JCDT) and various other Non-Governmental Organisations (NGO), Private Sector, Jamaica Business Development Corporation (JBDC), Northern Caribbean University (NCU), Scientific Research Council (SRC), University of Technology (UTech), University of the West Indies/ Department of Life Sciences (UWI/DLS), Bureau of Standards Jamaica (BSJ), Petroleum Corporation of Jamaica (PCJ) and the Tourism Product Development Company (TPDCo).

Table 12. Actions of Thematic Area 2: "Forest Utilisation"

Action #	Action	Start and End date	Responsibility	KPI Link	Risks/Assumptions
2-1	Review the administrative procedures and evaluate the financial and non-financial offerings for the incentives programme.	2016-2017	**FD**	Review of incentive programme conducted (*Yes/No*).	**Risk:** Activity started in FY 2016 with development of SOP. Inability to determine suitable incentives.
2-2	Utilisation of findings to strengthen the programme, improve the attractiveness of the incentives and generally improve its efficiency and effectiveness.	2018-2020	**FD**, MOFP, NEPA, Parish Councils and PDCs	Number of incentives (new or revised) available to private landowners	Lack of funding for financial incentives. Rejection of proposed incentives by the target group.
2-3	Develop programme for payment of ecosystem services within forested areas.	2022-2026	**FD,** NEPA, WRA	Existence of programme for payment of ecosystem services in forested areas (*Yes/No*)	**RISK:** Insufficient information sharing among partners. Inability to identify suitable consultants to conduct trainings
2-4	Promote alternative livelihoods in forest communities through the development of ecotourism; honey production; and farming using sustainable land management practices on private land and other feasible alternatives.	2018-2026	FD, SDC, NGOs, LFMCs	Number of LFMCs and CBOs benefiting from project development support initiatives	**Risks:** No control of private lands. Assumptions: Incentives would need to be developed
2-5	Identify, document and disseminate information on the economic viability of wood product species and recommend appropriate timber processing methods for these species.	2020-2026	**Collaboration: FD,** JBDC, SRC, UTech, UWI, NCU, and private sector	Availability of information on economically viable and resilient wood product species (*Yes/No*)	**Risk:** Absence of human capacity with wood science skill sets
2-6	Develop sustainable harvesting plan utilising data on sustainable annual cuts for the Forest Management Plan Areas (FMP).	2017- 2026 (ongoing for the life of the plan)	**FD**	Number of harvesting plans developed	**Risk**: Poor data management. Synergies within the Agency at all divisional levels needed.
2-7	Develop a research programme for non-timber forest products focused on producing	**2019-2026**	**FD**	Existence of research programme for non-timber forest	**Risk**: Change in market demands

Action #	Action	Start and End date	Responsibility	KPI Link	Risks/Assumptions
	marketable products in the support of diversifying options for sustainable forest utilisation and the development of forest communities.			resources (*Yes/No*). Number of research outputs (by type) generated by research programme for non-timber forest resources as planned	
2-8	Conduct market surveys in order to identify producers and consumers of non-timber products, for example, fuelwood, charcoal, yam sticks, natural fibres, medicinal products, biomass from treatments and thinning, and other goods and establish the feasibility for further developing markets for these products.	2018-2019	FD	Number of market surveys conducted	**Risks:** Lack of understanding about forestry sector among market research firms; inadequate resources (funding). **Assumptions:** That capable market researchers are identified to conduct the research
2-9	Based on the results of market feasibility studies, develop and expand economically viable non-timber market opportunities.	2020-ongoing (throughout the life of the plan)	**FD**, Petroleum Corporation of Jamaica, Bureau of Standards of Jamaica (BSJ)	Number of investment profiles for non-timber products prepared	**Assumptions:** that the identification and documented information and processing methods detailed are completed for the dissemination to begin in 2020. Conflicting priorities among responsible entities
2-10	Rehabilitate recreation sites (e.g. Gourie, Clydesdale).	2018-2026	**FD**, TPDCO, JCDT	Number of recreational sites and trails rehabilitated	**Risk**: Unavailability of funding. Absence of business plan for sites
2-11	Collaborate with relevant stakeholders to identify cultural and heritage sites on forest reserves and FMAs, and develop guidelines for the use of these sites.	TBD	**JNHT**, FD	Number of cultural and heritage sites on forest reserves and FMAs identified. Availability of	

Action #	Action	Start and End date	Responsibility	KPI Link	Risks/Assumptions
				guidelines for the use of cultural and heritage sites on Forest Reserves and FMAs (*Yes/No*)	



6 Capacity for Sustainable Forest Management

6.1 Problem Statement

The Government of Jamaica supports the utilisation of participatory approaches in the formulation of policy governing the sustainable management of the island's forested areas. It recognizes that the foundation of any such intervention is the facilitation of a platform that incorporates principles of equity,

transparency and which encourages widespread public participation in the planning and implementation phases.

However, there is insufficient institutional capacity in FD, its partners and forest communities to adequately support the efficient and effective implementation of NFMCP. Participatory planning with the many stakeholders in order to produce and implement the various types of Forest or Watershed Management Plans, reforestation programmes or guidelines for trees in urban settings, requires organisational strengthening, engagement of all actors in the planning cycle and sufficient communication.

In the scope of climate resilience, proper participatory planning for managing mangrove and swamp forests is particularly important. These are the most cost-effective natural systems for shoreline defence during extreme weather events and absorbing excess water runoff.[65]

Simultaneously the country's systems for measuring and verifying deforestation and forest degradation, as well as reporting it effectively nationally and internationally, are to be strengthened. The GOJ will embark on Phase 1 of the UNREDD+ readiness programme. The implementation of REDD+ is a complex undertaking and the Agency will be mindful of issues that have been identified by the UNREDD programme as technical challenges, which have hindered full-scale and impactful implementation of the programme.[66] These are:

- **Permanence**: how to ensure that reductions in emissions from deforestation are not eventually reversed by later activities;
- **Displacement:** how to ensure that actions are not otherwise negated by increases in deforestation activities elsewhere;
- **Finance:** ensuring meaningful sources of finance and adequate private sector engagement;
- **Conflicting interests:** powerful political and economic interests may favour continued deforestation and degradation;
- **Institutional arrangements:** implementation must be coordinated across various government levels and agencies – e.g. Ministries of Environment and Forest should successfully coordinate with Ministries of Finance and Planning;
- **Benefit sharing:** if benefits are to be distributed, effectiveness, efficiency and equity need to be balanced; tenure insecurity and safeguards must be genuinely addressed; and transparent institutions put in place; and
- **Technical complexity**: measuring emissions from forestry and establishing reference levels can be a technical challenge.

Community-based organisations, such as Local Forest Management Committees (LFMC) often lack sufficient capacity to participate in undertake sustainable management of forest estates. They also have weak governance or institutional capacity for project development and management. One issue where LFMCs are critical is forest fire control. Fires result in large quantities of carbon dioxide being released into the atmosphere. Successful forest fire prevention and containment will preserve forest cover, while

[65] IUCN, https://www.iucn.org/content/building-climate-change-resilience-through-water-management-and-ecosystems.
[66] UNREDD Programme

simultaneously protecting biodiversity, protecting stocks of timber and other forest products and reduce release of CO2 into the atmosphere

6.2 Expected Outcomes

The expected outcomes of the Thematic Area 3, Capacity for Sustainable Forest Management, are:

Outcome 3.1: Improved participatory planning to manage, protect and conserve Jamaica's forests.

Outcome 3.2: Strengthened institutional capacity for REDD+ readiness.

Outcome 3.3: Strengthened capacity of Local Forest Management Committees and other community groups.

6.3 Strategies

The actions under this Thematic Area focus on enhancing the country's capacity to manage, protect, & conserve forests through developing and implementing a number of plans: forest management plans for forest estates in clusters, watershed restoration plans, a reforestation programme, mangrove and swamp forest management plans, and guidelines for the establishment & maintenance of trees in urban settings. Building collaborative partnerships, key to the implementation of actions across NFMCP, is particularly vital for this Thematic Area. The actions identified will require developing close working relationships between government, private land owners, investors, farmers, charcoal producers, local forest communities and the wider public. It will take a combination of facilitation tools along with a significant investment in time to achieve the collaborative framework for participatory planning. There is a strong focus on the protection and restoration of mangrove forests and swamps, since this is a key part of the strategy to adapt to climate change.

The activities in the REDD+ readiness phase, outlined in ***Table 13***, include carbon stock monitoring, establishing a reference emission level, using safeguards, developing a strategy and an analytical report form the first step. These actions will be reviewed during the mid-term review of the NFMCP, at which time future actions will be determined.

NFMCP will support LFMCs in strengthening their institutional capacities, in particular relating to governance and project management. With regard to forest fires, it will also train and equip local communities as first responders (Thematic Area 3), conduct relevant public awareness and education programmes (Thematic Area 4) and develop risk profiles for forest fires in forest estates (Thematic Area 5).

6.4 Action Plan and Responsible Agencies

The Action Plan for Thematic Area 3 is detailed in ***Table 13***. There are sixteen (16) actions identified, coordinated by the following three lead agencies: Forestry Department (FD), National Environment and Planning Agency (NEPA) and the National Land Agency (NLA).

Supportive partner organisations in the implementation of these actions are: Ministry of Economic Growth and Job Creation (MEGJC) and its Climate Change Division (MEGJC/CCD), Ministry of Local Government and Community Development (MLGCD), Ministry of Science, Energy and Technology (MSET), various Non-Governmental Organisations (NGO), Office of Disaster Preparedness and Emergency Management (ODPEM), University of the West Indies (UWI), University of the West Indies/ Climate Studies Group (UWI/CSG), Water Resources Authority (WRA), Institute of Jamaica (IOJ), Urban Development Corporation (UDC), National Solid Waste Management Authority (NSWMA), Private Sector Organisation of Jamaica (PSOJ),UN Environment, United Nations Environment (UNEP), Social Development Commission (SDC), Local Forest Management Committees (LFMC) and the Jamaica Fire Brigade.

Table 13. Actions for Thematic Area 3: "Capacity for Sustainable Forest Management"

	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
3-1	Develop a comprehensive reforestation programme for forest estates.	2017-2019	**FD**	Availability of a procedure for identifying or prioritizing lands for reforestation within LFMPs (*Yes/No*)	**RISK:** Insufficient data. Inaccuracy of data.
3-2	Develop three (3) Cluster Forest Management Plans.	2017-2019	**FD**	Number of Cluster FMPs developed	**RISK:** Insufficient data. Lack of capacity
3-3	Conduct watershed vulnerability assessment and use the findings to develop and implement a watershed restoration plan(s).	TDB/2017	**ODPEM, NEPA, FD, WRA, UWI, MEGJC/ NSDMD,** local groups	Number of watershed plans implemented (NEPA)	
3-4	Evaluate and strengthen the Agency's nursery operations and determine efficiency levels and costs.	2016-2019	**FD**	Proportion of seedlings produced that are distributed. Status of implementation of recommendations from nursery programme evaluation: (0) *Not Applicable or not addressed;* (1) *Highly Unsatisfactory: Less than 25% of the recommendations implemented;* (2) *Unsatisfactory: Between 25% and 50% of the recommendations implemented;* (3) *Satisfactory: Between*	Data availability, accuracy and efficiency

	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
				50% and 75% of the recommendations implemented; (4) *Highly Satisfactory: More than 75% of the recommendations implemented*	
3-5	Collaborate in the development of a mangrove forest and swamp management plan.	TBD	**NEPA, FD**, **UDC** MEGJC/ ERMD, UWI/CSG, IOJ, NGOs	Number of mangrove forest and swamp management plans developed.	**RISK**: Length of time taken to revise legislation. Final process outside Agency control
3-6	Develop guidelines for management practices for riparian forests along rivers and streams within forest estates.	2018-2019	**FD**, NEPA, WRA	Number of best management practices developed for riparian forests along rivers and streams within forest estates	**RISK:** Unavailability of spatial data for riparian forests. Unfavourable climatic conditions. Insufficient data
3-7	Collaborate with support agencies to develop appropriate guidelines for the establishment and maintenance of trees in urban settings; for use in cultural, aesthetics and shade purposes.	2019-2022	**FD, NSWMA, PSOJ, MLGCD**	Number of guidelines developed for the establishment and maintenance of trees in urban settings and for use in cultural, aesthetics and shade purposes.	**RISK:** A key assumption is that there would be an established urban forestry programme in Jamaica. A risk identified is the absence of a precedent on urban forestry programmes.
3-8	Create and maintain a database of private forest landowners; to facilitate effective communication regarding the management and availability of incentive programmes for broadleaf, mangrove, swamp, and open short dry forest types.	2017-2020	**FD**, NLA	Number of identified private forest landowners whose profiles are included in database	**Risk:** Failure of Agency's ICT hardware. Corruption of data. Unreliability and unavailability of corroborating data from NLA
3-9	Review the existing forest inventory approach and revise where necessary in order to meet the needs of Carbon Stock	2017-2019	**FD, MSET,** UWI, MEGJC/CCD	Forest inventory approach revised (*Yes/No)*	**RISK:** Lack of human and technical capacity

	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
	Monitoring (CSM) and potential carbon trading agreements.				
3-10	Facilitate consultations and support activities for preparation of project document to fund REDD+ readiness	2017-ongoing (throughout the life of the Plan)	**FD**, MEGJC/CCD, UNEP, NEPA, UNDP	Rate of implementation of REDD+ *[*(0) *Not Applicable or not addressed;* (1) *Highly Unsatisfactory: Less than 25% of the REDD+ initiatives implemented;* (2) *Unsatisfactory: Between 25 and 50% of the REDD+ initiatives implemented;* (3) *Satisfactory: Between 50 and 75% of the REDD+ initiatives implemented;* (4) *Highly Satisfactory: More than 75% of the REDD+ initiatives implemented]*	**Risks**: Lack of technical capacity and funding
3-11	Activity 1 REDD+ readiness –analyse the drivers for deforestation/forest degradation	2017-2019	**FD**, MEGJC/CCD, UNEP, UNDP		**Risks:** Lack of technical capacity and funding
3-12	Activity 3 REDD+ establish Forest Reference Emission Level (contribution to INDC	2019-2022	**FD**, MEGJC/CCD, UNEP, UNDP		Risks: Lack of technical capacity and funding
3-13	Activity 4 REDD+ preparedness – develop information system, environment and social safeguards	2020-2022	**FD**, MEGJC/CCD, UNEP, UNDP		**Risks**: Lack of technical capacity and funding
3-14	Facilitate access to funding to LFMCs and CBOs by providing support for project management training for the development of alternative livelihoods, community development, and conservation projects.	2017-2026	**FD**, SDC, NGOs	Number of LFMCs and CBOs benefiting from project development support initiatives	**Risk**: Unavailable funding

	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
3-15	Implement the recommendations of the 'Review of the role and function of Local Forest Management Committees' study commissioned in 2015 to strengthen the governance and decision-making processes as it relates to LFMCs.	2017-2018	FD	Number of recommendations from the 'Review of the role and function of Local Forest Management Committees' implemented	**RISKS:** Delays with submission from consultant. Report which was due from 2015 has not yet been received
3-16	Establish, train and equip fire suppression teams in the following high priority/high risk areas: (i) Petersfield FR, (ii) Bellevue Heights FR, (ii) Bull Head FR and (iv) Stephaney Johns-Vale FR.	2018-2019	**FD,** JFB, LFMCs	Number of fire suppression personnel trained in high priority/high risk areas. Number of high priority/high risk areas in which fire suppression teams are established	**RISK:** Lack of equipment to conduct training. Low participation of community members.

7 Education, Training and Awareness

7.1 Problem Statement

The conservation of the island's forest resources is dependent on all the direct and indirect stakeholders becoming involved in its protection and sustainable use. These stakeholders include the public and private sector interests that own or manage forested areas. The knowledge and awareness of all parts of Jamaican society of the value of forests and trees as part of Jamaica's cultural, economic and ecological heritage as well as the importance of forests to climate resilience needs to be nurtured continuously.

Although the National Schools curriculum already includes information on forestry and forests, access to pertinent information and options for participation by all school children is inadequate. All Jamaicans from the very young to the aged, should be encouraged to actively participate in the decision-making process about forested areas.

Forest owners are insufficiently committed to the preservation or sustainable management of their forest areas. As key stakeholders, they need to recognise the importance of the services provided by forests to the social and economic fabric of Jamaica.

The cadre of professionals in Jamaica trained to carry out Natural Resource Valuations (NRV) or Carbon Stock Monitoring is too small for the task at hand. There is also a lack of capacity at the Agency of staff sufficiently trained in silviculture and forest ecology.

7.2 Expected Outcomes

The expected outcomes of the Thematic Area 4, Education, Training and Awareness, are:

Outcome 4.1: Forest communities, the general public as well as targeted groups have increased capacity regarding sustainable forest practices.

Outcome 4.2: Strengthened capacity for natural resource valuations, carbon stock monitoring and silviculture.

7.3 Strategies

Under Thematic Area 4, an expanded public educational programme will be developed to be carried out at schools, in community meetings and through appropriate expos/events; and an outreach programme for private forest owners. A specific module for education and awareness on forest fires will also be designed and implemented..

Various training programmes for targeted groups will be conducted over the life of NFMCP.

7.4 Action Plan and Responsible Agencies

The Action Plan for Thematic Area 4 is detailed in ***Table 14***. There are just seven (7) actions identified, all coordinated by the Forestry Department (FD).

Supportive partner organisations in the implementation of these actions are: National Environment and Planning Agency (NEPA), Ministry of Education (MOE), Climate Change Division (MEGJC/CCD), Rural Agricultural Development Authority (RADA), Planning Institute of Jamaica (PIOJ), University of Technology (UTech) and the University of the West Indies/ Department of Life Sciences (UWI/DLS).

Table 14. Actions for Thematic Area 4: "Education, Training and Awareness"

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
4-1	Design an education programme to strengthen the public's understanding of the benefits of forests and their resources, the importance of sustainable forest management and conservation practices.	2017-ongoing (this would run throughout the life of the Plan)	**FD,** in collaboration with other agencies	Number of public education/awareness sessions delivered (by type)	**RISK:** Inadequate resources to execute programme; Competing/Conflicting Public Education Messages
4-2	Evaluate and update the school education and awareness programme, including, where applicable, the school curricula and ensure that the programme highlights the benefits and value of healthy forests, and explains the importance of forests to building climate change resilience.	2017-ongoing (throughout the life of the Plan)	**FD,** NEPA (which funds JET School Programme), MOE, CCD	Number of participants in revised school awareness programme (disaggregated by schools, parish, age and sex of children)	**Risks:** Inadequate resources to execute programme; competing public education messages
4-3	Design and implement a public awareness and education programme on sustainable forest management, the related risks of forests and its	2016	**FD**, RADA	Number of fire awareness and education programmes conducted. Number of persons participating in fire awareness and	

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
	impact on forest health and preventative methods in relation to forest fires.			education programmes	
4-4	Develop outreach programme for private forestry programme participants and evaluate the programme on an ongoing basis.	2017-2026	**FD**	Number of private forestry participating in outreach programme. Status of implementation of private forestry outreach programme	Support for programme not sufficient
4-5	Build the capacity of the Agency and its partner organisations to conduct natural resource/ecosystems valuations for all types of forests.	2018-2021	**FD**, PIOJ, UWI, UTECH, NEPA	Number of individuals trained to conduct NRVs	**Risk:** Inability to identify suitable consultant to conduct trainings
4-6	Increase silvicultural capacity within the Agency.	2017-2019	**FD**	Number of persons trained in silviculture	**RISK:** Limited qualified personnel available to provide silviculture skill sets
4-7	Build the capacity of the Agency and its partner organisations to conduct Carbon Stock Monitoring.	2018-2021	**FD**	Number of individuals trained to conduct CSM	**Risk:** Inability to identify suitable consultant to conduct trainings

8 Monitoring and Information Management

8.1 Problem Statement

To ensure the sustainable management of Jamaica's forests, decision making must be informed by evidence. Spatial data in particular are vital for communicating issues around forest management. However, data and pertinent information often are not readily available. The capacity for adequate monitoring, impact assessments and research is insufficient.

There is an acknowledgement that in general, forest research in developing countries has been unable to provide adequate information and responses to the challenges of sustainable forest management in a

rapidly changing world.[67] Forest researchers[68] have argued that this places developing countries at a significant disadvantage due to insufficient understanding of the link between national forestry research capacity and the resolution of the broader development issues. Main barriers to forest research in developing countries is the inadequacy and somewhat ad hoc nature of political and financial support and insufficient research management capacities, in particular at the inter-institutional level.

Also Jamaica performs insufficient forest-related applied research to enhance understanding of the ecological, economic, and social aspects of forests and trees. Partly resulting from this, scientific knowledge is insufficiently used to inform decision making by policymakers, practitioners, and other stakeholders. Forest research and managing the resulting knowledge for policy making are vital for sustaining healthy forests. In particular, joint research capability through various alliances are currently too weak for generating the data and applied information decision makers need.

In order to integrate spatial data into maps and provide monitoring data which contribute to measuring the overall impact of NFMCP (e.g. the status of the island's forest -inventory, changes in forest cover or deforestation, forest carbon content, percentage of GDP, changes in public perceptions), repositories of discrete sets of data need to be coordinated and brought together.

Data collection, storage and interpretation will include but not be limited to the following areas: (a) Analysis of the ecosystem services provided by the forest estates, including the determination of the economic value provided by these services; (b) Biophysical attributes and species inventory on priority sites; (c) Compliance with the no-net-loss of forest cover policy on Crown lands; and (d) Vulnerability assessments of forested areas detailing the risk of flooding, run-off, soil erosion, and fire.

8.2 Expected Outcomes

The expected outcomes of the Thematic Area 5, Monitoring and Information Management, are:

Outcome 5.1: Improved availability of spatial data for sustainable forest management practices, promoting investment, and assessing vulnerabilities and risks in the forest sector.

Outcome 5.2: Strengthened capacity for impact and vulnerability assessments and for management of research and knowledge systems.

Outcome 5.3: Improved collaborative monitoring of forest resources.

8.3 Strategies

A number of mapping initiatives will be supported by the NFMCP, including those related to forest estates, mangroves and swamps forest, risks and vulnerabilities towards climate hazards and recreational use.

[67] Krishna P. Acharya, The Challenges of Forestry Research in Developing Countries, the case of Nepal (Ministry of Forest and Soil Conservation, Forest Research Division).
[68] Ibid.

With regard to mangrove forests across the island, there is Insufficient monitoring to prevent or reduce conversion.

The NFMCP will also begin to dismantle the barriers to forest research and promote collaboration with and between academia and other interested parties, through conducting various assessments and establishing research working groups in the areas deemed most important at this stage. These areas are: (i) management of mangrove forests, swamp forests and short limestone forests; (ii) improving knowledge on the impact of climate change on all forest types; and (iii) non-timber forest products. Additionally, a number of inter-institutional joint forest monitoring and biodiversity initiatives will be supported.

8.4 Action Plan and Responsible Agencies

The Action Plan for Thematic Area 5 is detailed in ***Table 15***. There are thirteen (13) actions identified, coordinated by the following lead agencies: Forestry Department (FD), National Environment and Planning Agency (NEPA), Office of Disaster Preparedness and Emergency Management (ODPEM), University of the West Indies/ Department of Life Sciences (UWI/DLS), University of the West Indies/ Climate Studies Group (UWI/CSG),

Supportive partner organisations in the implementation of these actions are: Jamaica National Heritage Trust (JNHT), Ministry of Economic Growth and Job Creation (MEGJC) and its Climate Change Division (MEGJC/CCD), Ministry of Transport and Mining (MTM), Social Development Commission (SDC), Jamaica Conservation and Development Trust (JCDT), Ministry of Tourism (MOT), National Land Agency (NLA), Non-gov. Organisations (various), Tourism Product Development Company (TPDCo), National Emergency Response GIS Team (NERGIS), Rural Agricultural Development Authority (RADA), Mines and Geology Division (MGD), United Nations Development Programme (UNDP), United Nations Environment, Jamaica Business Development Corporation (JBDC), Northern Caribbean University (NCU), Private Sector, Scientific Research Council (SRC), University of Technology (UTech), University of the West Indies (UWI), academia, Meteorological Service of Jamaica (MSJ) and the Institute of Jamaica.

Table 15. Actions for Thematic Area "Monitoring and Information Management"

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
5-1	Develop spatial representation of disturbance within broad leaf category and use assessment to target protection efforts.	2017	**FD**	Number of initiatives developed to protect broadleaf categories	
5-2	Assess and map disturbance within Broad Leaf forests including mangrove forests and swamp forests, rate the condition of the areas and identify and map	2017	**UWI/DLS,** NEPA, FD and NGOs managing protected areas	Number of mangrove forests and swamps that are mapped	**RISK**: Unavailability of funds.

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
	other areas likely to provide suitable habitats for these species in the likelihood of sea level rise.				
5-3	Conduct gap analysis and identify spatial data and other information to better describe risks and vulnerabilities of forests and communities to climate change and related hazards (e.g., fire, floods, landslides)	TBD	**ODPEM,** FD, SDC, MEGJC/ NSDMD	Availability of data (spatial and other information) to better describe risks and vulnerabilities of forests and communities to climate change and related hazards —e.g., fire, floods, landslides (*Yes/No*)	
5-4	Verify and map private lands in the reforestation programme.	2017-2019	**FD**	Hectares verified in private land reforestation programme. Hectares mapped in private land reforestation programme	
5-5	Map existing recreational trails, and identify and map other potential recreational trails.	2017-2026 (ongoing for the life of the plan)	**FD, JNHT,** Ministry of Tourism, NLA, TPDCO, JCDT and other NGOs	Number of new recreational trails identified. Number of recreational trails mapped (existing, newly identified)	**Risks**: Human capacity to conduct trail assessments. Inability to source funding for consultants to do feasibility studies.
5-6	Establish working groups, one focused on research that improves knowledge regarding the management of mangrove forests, swamps, and short limestone forests (in collaboration with UWI Life Sciences and other interested partners locally and overseas), another focused on improving knowledge	2018-2026	**UWI/DLS, UWI/CSG, FD, NEPA**	Existence of functional working group focused on research to improve knowledge on management of mangrove forests, swamps and short limestone forests established (*Yes/No*) Existence of functional working	**RISK:** Insufficient funding.

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
	on the impact of climate change on all forest types (in collaboration with UWI CSG and other interested parties)			group focused on improving knowledge on the impact of climate change on all forest types established (*Yes/No*)	
5-7	Conduct forest fire vulnerability assessment and fire damage assessments including the effectiveness of post fire restoration treatment and map the areas.	2017-2022	**FD**, ODPEM, MEGJC/ NSDMD, RADA, SDC, NERGIS, JFB	Number of forest fire assessments (by type) conducted	**RISK:** Unfavourable climate conditions. Lack of coordination between partners to source data. Human capacity, lack of sufficient implementation.
5-8	Collaborate with Ministry of Transport and Mining, and the Mines and Geology Division (MGD) to assess impacts of mining and other permitted activity on forest resources, services, and value over time.	2017-2018	**FD**, MGD, MTM, NEPA, UNDP	Number of impact assessments conducted	**RISK:** Lack of collaborative efforts from key partners
5-9	Improve the availability of data for driving growth and investment in the forest sector. Include in the database information regarding growth and yield curves for primary commercial species and the related return on investment (ROI).	2018-2023	**FD, JBDC, SRC, Utech, UWI, NCU and private sector**	Availability of data for driving growth and investment in the forest sector (including information on growth and yield curves for primary commercial species and the related return on investment) (*Yes/No*)	**RISK:** Lack of human and technical capacity. Insufficient data
5-10	Activity 2 REDD+ preparedness – strengthen forest monitoring systems	2019-2022	**FD**, NEPA, MEGJC/CCD, UNEP, UNDP		**Risks**: Lack of technical capacity and funding
5-11	Collaborate with the Meteorological Service's climate data collection network to	2016	**MSJ**, FD, MEGJC	Number of weather stations placed in strategic locations by Met	

Action #	Action	Start and End Date	Responsibility	KPI Link	Risks/Assumptions
	place weather stations in strategic locations within forested areas in order to garner additional data to support sustainable forest management practices.			Service climate data collection network	
5-12	Establish a forest monitoring system using Permanent Sample Plots (PSPs) to investigate and determine how the forested ecosystems are being impacted by climate change and develop adaptation strategies over time.	2016-2019	**FD,** UWI Academia	Existence of forest monitoring system using PSPs to investigate and determine how climate change impacts the forested ecosystems *(Yes/No)* Number of climate change adaptation strategies with respect to forested ecosystems developed	**RISK**: Unavailability of funds. Loss of PSPs due to unforeseen changes in Land use
5-13	Survey and map populations of endangered species (giant swallowtail, yellow-and-black-billed parrot, water mahoe, and bitter wood).		NEPA, FD, IOJ	Population of targeted species by type	

SECTION C
Management of the Plan

9 Management Framework

9.1 Two Phased Approach

The NFMCP will be implemented in two phases. The first five years of implementation represent the first phase after which there will be a mid-term evaluation. This mid-term evaluation, as well as the lessons learnt in the first five years may lead to the modification of the actions planned and potentially the introduction of new actions

9.2 Adaptive Management

The need to align all the elements of the plan with the required resources within specified time frames, while being able to respond to changes within the task environment, makes the successful implementation of the NFMCP a complex undertaking. Therefore, an adaptive management approach has been adopted. The management framework being used for the execution, monitoring and evaluation, and continuing improvement of the NFMCP is derived from a tried and proven management practice, which had its early beginnings from the Shewhart cycle and the Deming cycle,[69] both of which were developed from international evaluation of management practices and quality assessments. Its four components are Plan, Do, Check and Act (PDCA). The NFMCP Technical Advisory Committee (TAC) coordinates the appropriate execution of each of these components at all levels during the implementation of the Plan.

During the Planning phase (P), the goal of NFMCP was identified, along with the strategic objectives, outcomes and main actions, grouped into Thematic Areas. Each action will need to planned in detail as well, through work plans developed by each of the Primary Implementing Entities including those actions under their coordination. The work plans are to be aligned to the respective Medium Term Socio-Economic Frameworks for 2015-2018, 2018-2021, 2021-2024 and 2024-2027. Alignment is also required to the other policy frameworks listed in the logic model (see ***Table 9***).

In the Do (D) stage, the actions are operationalised by the primary implementing entities (see ***Table 10***), in collaboration with many other actors, in order to achieve the stated outputs. Baselines and (mostly) annual targets are to be set. In this phase, monitoring of progress in achieving the outputs as well as towards the outcomes will be implemented at regular intervals, using key performance indicators (KPIs).

In the Check phase (C), changes in the KPIs will be reported and some evaluative actions will be performed to facilitate an understanding of the progress in implementing the NFMCP, its successes and problems. This may result in rethinking and revising particular actions within the plan and its thematic areas, including potentially scaling up.

The Act phase (A) of this iterative management framework focuses on learning from the implementation process. This will be integrated into various levels of the NFMCP in order to strengthen the ongoing

[69] C.N. Johnson, 'The Benefits of PDCA', *Quality Progress* (2002). Accessed January 2016, www.qualityprogress.com.

activities and facilitate appropriate adaptation in management. The PDCA cycle will subsequently be run again, guiding the detailed implementation of the NFMCP by all the collaborating organisations.

9.3 Establishment of a Collaborative Implementation Framework

There are many parties which have a role in the implementation of the NFMCP: Governmental agencies and statutory bodies, academia, private landowners, the private sector and their associations, local authorities, non-governmental organisations, community based organisations and international development partners. The Agency is the lead organisation, having the responsibility for coordination and overall reporting. It is assisted by nine other primary implementing agencies, which have responsibilities for executing some of the key actions and for delivering important outputs towards the achievement of the NFMCP outcomes. Further, there are a number of secondary partners, which contribute to the implementation of specific actions.

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

Forestry Department. FD provides overall coordination of planning and implementation of all actions across all Thematic Areas, monitoring, evaluation and reporting. It enables a Technical Advisory Committee (TAC) of all primary implementing agencies, which provides oversight for the NFMCP, communicates progress and setbacks of NFMCP implementation and makes recommendations for and seek solutions to issues.

National Environment and Planning Agency (NEPA). NEPA is engaged in roles across all Thematic Areas. It coordinates the actions related to biodiversity management. It also coordinates the development of management plans for watersheds and mangrove/swamp forests and supports relevant mapping.

Further, it contributes to a strengthened governance and legislative framework, in particular through support to the preparation of Parish Development Orders and the conduct of environmental impact assessments. It assists in developing regulations for permits and the use of best management practices, as well as the promotion of sustainable management initiatives for the environment and the development of payment mechanisms for ecosystem services. NEPA plays also a central role in implementing and monitoring the REDD+ readiness strategy. Additionally, it is engaged in environmental education at schools and certain training programmes. It participates in scientific working groups.

Ministry of Economic Growth and Job Creation (MEGJC). MEGJC coordinates the multi-stakeholder coordination mechanism for policy dialogue on the forest sector, the amendment of Forest Legislation & Polices.

It supports NEPA in the development of management plans for watersheds and mangrove/swamp forests, is involved in certain data management initiatives. Its Climate Change Division (CCD) supports all aspects of the REDD+ readiness strategy and relevant education in schools.

University of the West Indies Mona. Like MEGJC, UWI also supports NEPA in the development of management plans for watersheds and mangrove/swamp forests, their mapping, and plays an important role in data collection and forest monitoring. The **UWI Climate Studies Group (UWI/CSG)** leads a working group on the impact of climate change on forests, collaborates in Carbon Stock Monitoring and the development of potential trading agreements. The **UWI Department of Life Sciences (UWI/DLS)** leads a working group on evaluating management knowledge for mangrove forests and swamps, as well as short open dry limestone forests. It supports NEPA in developing appropriate management for species and

ecosystems and the control of invasive species. It participates in assessing the economic viability of wood products, training in natural resource valuations.

National Land Agency (NLA). NLA coordinates the transfer of pertinent crown lands to the FD in order to establish sustainable management. It will also coordinate a database of private forest land owners.

Further NLA supports the increase of FD's enforcement capacity and the mapping of various sites for JNHT.

Jamaica National Heritage Trust (JNHT). JNHT prepares guidelines for the use of cultural and heritage sites on forests reserves and forest management areas, and supports the mapping of these sites and pertinent trails.

Ministry of Transport and Mining (MTM). MTM together with its **Mines and Geology Division (MTM/MGD)**, is engaged in the revision of the Mining Act to better reflect forest sector considerations and relevant impact assessments.

Office of Disaster Preparedness and Emergency Management (ODPEM). ODPEM coordinates the conduct of analyses which risks and vulnerabilities of forest management of forest communities in the scope of climate change and related hazards. ODPEM also participates in forest fires assessments and supports NEPA in developing watershed restoration plans,

Meteorological Service of Jamaica (MSJ). MSJ coordinates the placing of weather stations in strategic locations within forested areas to support relevant data collection.

The specific actions of a number of other organisations, involved in the implementation of NFMCP are being coordinated by the primary implementing entities. The secondary implementing institutions included in various roles of the Plan are: Bureau of Standards Jamaica (BSJ), Cabinet Office, Chief Parliamentary Council (CPC), Institute of Jamaica (IOJ), Jamaica Business Development Corporation (JBDC), Jamaica Conservation for Development Trust (JCDT), Jamaica Fire Brigade (JFB), Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF), Ministry of Education (MOE), Ministry of Finance and Planning (MFP), Ministry of Local Government and Community Development (MLGCD), Ministry of Science, Energy and Technology (MSET), Ministry of Tourism (MOT), National Emergency. Response GIS Team (NERGIS), National Solid Waste Management Authority (NSWMA), Northern Caribbean University (NCU), Parish Councils (PC), Parish Development Committees (PDC), Petroleum Corporation of Jamaica (PCJ), Planning Institute of Jamaica (PIOJ), Private Sector Organisation of Jamaica (PSOJ), Rural Agricultural Development Authority (RADA), Scientific Research Council (SRC), Social Development Commission (SDC), Tourism Product Development Company (TPDC), United Nations Development Programme (UNDP), United Nations Environment (UNEP), University of Technology (Utech), Urban Development Corporation (UDC) and Water Resources Authority (WRA).

Additionally, the Local Forest Management Committees (LFMC) will participate, as well as at times various other Non-Governmental Organisations (NGOs), other academia, the Private Sector related to pertinent actions and security agencies.

The effective implementation of the NFMCP must also take into account many challenges ranging from lack of financial or other resource constraints, conflicts related to land use, political considerations, and failure to communicate effectively.

Within and across public and private organisations, the environmental, agriculture, water, tourism, mining, and energy sectors and the NGOs, local forest owners and communities, each participant (whether at the institutional or individual level) is driven by different mandates and interests. The success

of the collaborative process depends on the strengths and diversity of the groups involved in the implementation of the plan, while minimizing the tendency of working in silos and promoting self-interest.

The GoJ is aware that strategies for effective collaboration are associated with an increase in transaction costs: more people, more meetings, and more time. There could also be difficulties agreeing on operational procedures and the ability to achieve cooperation with the working groups. Nevertheless, under the leadership of the Ministry of Economic Growth and Job Creation (MEGJC), the participatory decision making and problem solving tools will be developed. This will require building the coordination and harmonisation among stakeholders, a cross-cutting issue of the NFMCP.

10 Monitoring and Evaluation

The review of the 2001 NFMCP (reported through the Gap Summary) highlighted the inadequacy of monitoring, evaluation and reporting. Specifically, the review called for the development of a comprehensive monitoring plan for the implementation of the revised NFMCP, and for the monitoring of climate change mitigation and adaptation measures.

In April 2016, the Forestry Department, with support from the United States Agency for International Development (USAID) in Jamaica, undertook the development of "an appropriate mechanism to measure progress made towards the attainment of NFMCP's Goal, strategic objectives and related outcomes."

A strategy[70] for Performance Monitoring, Evaluation and Reporting (PMER), as well as a detailed PMER plan[71] for the NFMCP have been prepared. In order to make them most useful to the involved officers of the implementing partners, they are presented as separate documents. The implementation of NFMCP and its progress towards achievements will be monitored at regular intervals (for most results monthly or quarterly). Evaluations of specific results and the overall Plan are to be done at the most advantageous moments. Reporting by the FD to various audiences is to be streamlined as much as possible.

11 Funding and Resources

11.1 Key considerations for the financing strategy

Although forests are one of the most important natural resources on earth, investments in forests have been disappointing almost everywhere.[72] In a policy study on this persistent problem, carried out with

[70] Strategic Framework for Performance Monitoring, Evaluation and Reporting (PMER) of the National Forest Management and Conservation Plan (NFMCP).

[71] Performance Monitoring, Evaluation and Reporting (PMER) Plan for the National Forest Management and Conservation Plan 2016-2026 (NFMCP).

[72] P. Kant, and S. Appanah, 'Guidelines for Formulating National Forest Financing Strategies' (FAO Regional Office for Asia and the Pacific, 2013).

the support of the FAO, the researcher concludes that where forests do not fetch adequate financial value or an opportunity cost that satisfies the forest landowners or important stakeholders, they tend to disappear. The central issue that faces forests in general and sustainable forests in particular is that earnings from existing forests are not competitive with other services that the land could provide.[73]

In 2007, in support the implementation of sustainable forest management (SFM), the UN Forum on Forests (UNFF) set up an Ad Hoc Expert Group on Forest Financing for implementing SFM in all types of forests. In 2015, UNFF established the Global Forest Financing Facilitation Network (GFFFN) consistent with its core objective of mobilising, catalysing and facilitating access to financial, technical and scientific resources to implement the UN Forest Instrument and SFM. Additionally, UNFCCC, through its REDD+ programme, is developing financial mechanisms for SFM, as are the UNCCD and UNCBD. Further opportunities to research forest financing are available through the Green Climate Fund.

Locally, the Tourism Enhancement Fund (TEF), the Environment Fund of Jamaica other foundations and the Global Environment Facility Small Grants Programme (GEF/SGP), along with bilateral donors, are also potential sources of funding for the forest sector.

The Agency is aware of these funding opportunities and is developing financing strategies for the sector based on the following considerations:

- **Role and policy prescriptions of the GOJ and its relevant entities –** The Government is committed to optimising the production of forest goods and services, providing equitable benefits to all stakeholders while ensuring the value of the forests are enhanced rather than diminished in economic and ecological terms. In this regard, the GoJ will create a well-coordinated, effective policy framework with the passage of the Forest Policy for Jamaica 2017 and the strengthening of legislations, which help to build financial sustainability for forest sector.

- **Safeguarding the interests of rural communities –** LFMC will be strengthened and continue to improve protection of forests, addressing land tenure issues and diversifying income earning opportunities through non-timber forest products, recreation activities and ecotourism. LFMCs are expected to develop the income earning potential of rural communities from forests, often as a supplement to their other incomes. In this respect, they will be assisted by the Agency in identifying finances for expanded forest utilisation in a sustainable way.

- **Incorporating Payment for Ecological Services in forest financing strategies –** Research on how to capitalise on **t**he ecological benefits of well-managed forests, such as biodiversity, water regulation and quality, soil conservation, and ecotourism is a central axis in the plan. Additionally, there are advantages in the new emerging marketplaces around carbon sequestration, biodiversity conservation, watershed protection and landscape value.

- **Private investment as a component of national forest financing –** Most of the country's forests are privately owned and as such there is an acknowledgement in the NFMCP of the importance of the private sector as a player in national forest financing. Private investment, however, does

[73] Van Dijk and Savenije 2009.

not play as yet an important role within the management of the forest sector in Jamaica but going forward, will be prioritised as a key requirement for sustaining healthy forests.

Considering these issues, the following strategies will be undertaken to secure sustainable financing for the forest sector.

Promote forest investments as engines for economic growth

- ✓ Initiate actions to bring forests under intensive management by assisting natural regeneration, soil and moisture conservation measures, protection against fire, weeds, pests and disease, building forest infrastructure, developing ecotourism, research, and monitoring. These activities generate jobs while being ecologically desirable.
- ✓ Give high priority to climate change mitigation and adaptation action in the forest sector to attract finance, technology, and management skills.
- ✓ Train forest staff and forest stakeholder communities in these activities.
- ✓ Raise awareness of the benefits of sustainable forest management for the local economy.
- ✓ Assess the conservation status of fauna and flora through capable organisations, for the promotion of medicinal use, research use, ecotourism etc.
- ✓ Assess the need for forestry professionals and encourage universities and specialised forest and forest-related institutions to conduct the right courses relating to locally relevant fields.
- ✓ Develop a long-term vision for the forest sector through a bipartisan political approach at the national and rural levels, and link forest-related policies to this long-term vision.

Make forest investments and programmes compatible with REDD+ and other international mechanisms

- ✓ Access the actual and promised funds under REDD+ for adaptation to climate change, enhancing renewable energy production and access to it, protecting biodiversity, combating desertification and in meeting their SFM objectives.
- ✓ Explore the possibility of insuring forests against fires and disease outbreaks under provisions of financial and technical assistance in international agreements for REDD+, adaptation to climate change, desertification control and biodiversity conservation, etc.

Promote non-timber forest products as economically attractive investments

- ✓ Regulate access to forests estates for sustainable harvesting of non-timber forest products.
- ✓ Develop viable mechanisms for collection and dissemination of information regarding prices, import, export and domestic trade of non-timber forest products.

Integrate Payment for Ecosystem Services (PES) in the economics of forestry

- ✓ Initiate stakeholder consultations around the concept of payment for ecosystem goods and services across various ecosystems and communities.
- ✓ Develop valuation tools for ecological services through extensive research, and a wide stakeholder consultation process, to ensure their quality and market acceptability.
- ✓ Develop PES schemes through agreeing on environmental services targeted, the level of payments, and contract terms, with the assistance of trusted and neutral intermediaries for bringing sellers and buyers together.

Sourcing energy funds

- ✓ Align NFMCP with GOJ renewable biomass-based energy policy and identify wood resources for this purpose spread across the rural areas without harming the important task of biodiversity conservation. Seek assistance from the International Energy Agency (IEA) for this purpose if own resources are insufficient.

11.2 Budget for the Implementation of NFMCP

A draft budget for implementing NFMCP over the ten-year period has been developed through comprehensive costing of individual plan activities. The estimated minimum cost of implementing the NFMCP is approximately US$11.8 million or J$1.534 billion.[74] However, the financing of specific areas or activities within NFMCP is still being negotiated with identified as well as other donors.

11.3 Identification of Sources of Financing

Both domestic and international sources of financing have been identified for the NFCMP. The main sources are:

Domestic sources

- The Government of Jamaica (GOJ)
- National Housing Trust (NHT)
- Tourism Enhancement Fund (TEF)
- The Private Sector

International sources

- Green Climate Fund (GCF)
- Global Environment Facility (GEF-7)
- Overseas Development Assistance (e.g., USAID, EU, Global Forest Fund, International Climate Fund, etc.)

The financing instruments which have been identified include:

Budget allocation: GOJ must commit to allocate a percentage of the national budget to the development of the forest sector, beyond the recurrent expenditure allocation to the Forestry Department (FD). The allocation could be placed in a fund for the FD as well as municipalities, communities, and land owners to access for forest administration, conservation, natural regeneration and forest management. Revenue for the fund could be dedicated from existing funds, trusts, taxes and levies. The Tourism Enhancement Fund and the National Housing Trust have been specifically identified as sources of financing given prior support for activities aligned with the NFCMP. The bauxite levy, which represents a special tax on bauxite mining, is another instrument that the GOJ could use to provide funding for the NCFMP given the impact of bauxite on the forest sector. Payment for ecosystem services is not as yet developed in Jamaica but constitutes an area of focus in the NFCMP. Therefore, this is another potential source of finance for the

[74] At an estimated exchange rate of J$130=US$1.

NFCMP that the government should develop and promote as a means to achieve sustainable forest management.

Grants through international facilities. The role of Jamaica's forest sector could be enhanced in global climate change mitigation and adaptation, especially relating to addressing deforestation and forest degradation. Jamaica is currently preparing a Project Preparation Funding (PPF) application for REDD+ to the GCF. The current REDD+ application is centred on an integrated landscape management project with significant implication for Jamaica's forests. Thus, it is expected that many of the NFCMP activities will be covered under the project. The NFCMP activities relating to forest conservation and management, capacity building, and community awareness have been identified as those most relevant for funding by GCF.

The country also benefits from the GEF programme. The Seventh Replenishment of the GEF Trust Fund (GEF-7) is designed to focus on "Impact Programmes" with Landscape Restoration identified as one of these. Within the Landscape Restoration Impact Programme, GEF support will be provided in the following area:

- Planning for restoration
- Policy development
- Good governance
- Encouraging private sector investments
- Technical assistance
- Support for small landholders
- Capacity building
- Knowledge exchange
- Monitoring and information systems and targeted research (e.g., on impacts, trade-offs, costs-benefit analysis of restoration), and identifying incremental synergies.

Therefore, there is broad scope in leveraging GEF funds to finance NFCMP activities relating to surveys and database development; mapping and management information systems; baseline analysis and impact assessments; economic feasibility studies; and capacity building in general. To this end, the grant from GEF-7 is included as a funding source for the NFCMP.

Grants available through bilateral and multilateral Overseas Development Assistance are also available for specific purposes and have been included as additional sources of funding the NFCMP. In addition to the support provided by USAID in developing the NFCMP and expected for its implementation, organisations such as the International Climate Fund (ICF), the Global Forest Fund (GFF) and the Global Forest Financing Facilitation Network (GFFFN) should also be approached for seeking support. While the ICF represents the United Kingdom Government's commitment to assist developing countries in addressing the challenges of and benefitting from the opportunities posed by climate change, the GFF is a non-profit fund investing the majority of its financing in tree planting and CO2 compensatory efforts.

Donations: Both domestic and foreign entities with particular interest in an area of activity covered in the NFMCP could provide financial support through donations or sponsorship of such activities. These donations or institutional support could be material or in-kind in nature. The area that could be financed through donations and sponsorships include public awareness, communication and outreach, and capacity building. The domestic private sector should be specifically targeted to sponsor the NFCMP

activity that is directed at documenting and disseminating information on the economic viability of wood product species which could engender sustainable utilisation of forest products by the private sector.

Glossary

AFFORESTATION: Establishment of a forest or stand of trees in an area where there was no forest.
AGROFORESTRY: Integrated approach of using the interactive benefits from combining trees and shrubs with crops and/or livestock. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy, and sustainable land-use systems.
ALIEN INVASIVE SPECIES: Deliberately or accidentally introduced species to an area different from its native range.
BIODIVERSITY: Variability among living organisms; this includes diversity within species (genetic diversity), between species and of ecosystems.
CARBON SEQUESTRATION: Process of capturing and securely storing carbon dioxide emitted from the global energy system. In terrestrial storage, the carbon (a large amount) is stored in soils and vegetation, which are our natural carbon sinks. Increasing carbon fixation through photosynthesis, slowing down or reducing decomposition of organic matter, and changing land use practices can enhance carbon uptake in these natural sinks.
CLIMATE CHANGE: Significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. The term sometimes is used to refer specifically to climate change caused by human activity, as opposed to changes in climate that may have resulted as part of Earth's natural processes.
CLIMATE CHANGE ADAPTATION: Practical steps to protect countries and communities from the likely disruption and damage that will result from effects of climate change. For example**,** flood walls should be built and in numerous cases it is probably advisable to move human settlements out of flood plains and other low-lying areas.
CLIMATE CHANGE MITIGATION: Interventions to reduce the sources or enhance the sinks of greenhouse gases.
CONSERVATION: Integrative approach to the protection and management of biodiversity that uses appropriate principles from biological, social science and economic fields.
COVER (FOREST): Percentage of a fixed area covered by the crown of an individual plant or delimited by the vertical projection of its outermost perimeter.
CROWN LANDS: Land owned by the Government of Jamaica and held by the Commissioner of Lands.
DEFORESTATION: Long-term or permanent loss of forest cover.
ECOSYSTEM: Dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
ECOSYSTEM SERVICES: Provisioning services such as food, water, and energy; regulating services such as flood, air purification and disease control; cultural services such as spiritual, recreational; education, scientific and cultural benefits, and supporting services such as nutrient cycling and soil generation.
ECOTOURISM: Environmentally responsible travel to natural areas, to enjoy and appreciate nature (and accompanying cultural features, both past and present) that promote conservation, have a low visitor impact, and provide for beneficially active socio-economic involvement of local peoples.
ENDEMIC: Ecological state of being unique to a defined geographic location.
ENDANGERED SPECIES: Species has a very small population and is at a great, or greater risk of becoming extinct.
ENVIRONMENT: All land, area beneath the land surface, atmosphere, climate, surface water, ground water, seas, marine and coastal areas, seabed, wetlands and “natural resources”.
FORESTRY: Science, art, and practice of understanding, managing, and using wisely the natural resources associated with, and derived from forests.
FOREST: Ecosystem characterised by a more or less dense tree cover often consisting of stands varying in species, composition, structure, age, class, and associated process and includes land which was once completely covered by forests but has been otherwise degraded or damaged.
FOREST DEGRADATION: Changes within the forest which negatively affect the structure or function of the stand or site.
FOREST ESTATE: Any land managed by the Forestry Department.

FOREST MANAGEMENT: All measures and actions which determine the extent to, and conditions under which forest resources are conserved, accessed, used, transformed, and marketed.

FOREST PLANTATION: Forest stand established by planting or/and seeding in the process of afforestation or reforestation.

FUELWOOD: Wood used for conversion into a form of energy.

GREENHHOUSE EFFECT: Warming effect exerted by the atmosphere upon the earth because the atmosphere (mainly its water vapour and carbon dioxide) absorbs radiant energy from the earth and re-emits infrared radiation or heat.

HABITAT: Place where an organism or population naturally occurs.

LANDSCAPE MANAGEMENT: Integrated way of managing a landscape that brings together multiple stakeholders, who collaborate to integrate policy and practice for their different land use objectives, with the purpose of achieving sustainable landscapes.

LAND TENURE: Rules invented by societies to regulate how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land, as well as associated responsibilities and restraints.

LIVELIHOODS: Capabilities, assets and activities required for a means of living.

MANGROVE: Coastal wetlands found in tropical and subtropical regions. They are characterized by halophytic (salt loving) trees, shrubs and other plants growing in brackish to saline tidal waters.

NATIVE SPECIES: Plants, animals, fungi, and micro-organisms that occur naturally in a given area or region.

NATURAL RESOURCES: Living plants, animals, organisms and other biological factors within the environment and the geological formations, mineral deposits, renewable and non-renewable assets, and the habitat of the living plants, animals, organisms, and other biological factors.

NON-TIMBER FOREST PRODUCTS: Commodities obtained from the forest that *do not* always necessitate harvesting trees. It includes game animals, nuts and seeds, berries, mushrooms, oils, foliage, medicinal plants, peat, fuel wood, forage, etc.

PARTICIPATION: Process through which stakeholders' influence and share control over the decisions and resources which affect them.

PRIVATE LAND: Land other than land owned by the Crown.

PROTECTED AREA: Geographically defined area that is designated and managed to achieve specific conservation objectives.

REDD+: Effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. This includes the role of conservation, sustainable management of forests and enhancement of forest carbon stock.

REFORESTATION: Re-establishment of forest formations after loss of cover due to human-induced or natural perturbations.

SHORE PROTECTION: Measures aiming at protecting, preserving, or restoring the shore and the dynamic coastal landscape as well as protecting against coastline retreat to the extent possible.

SILVICULTURE: The practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.

SUSTAINABLE FOREST MANAGEMENT: Process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.

SUSTAINABLE USE: Use of biological diversity in a way and at a rate that does not lead to its long-term decline.

SUSTAINABLE DEVELOPMENT: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

SWAMP FOREST OR FLOODED FORESTS: Forests which are inundated with freshwater, either permanently or seasonally. They normally occur along the lower reaches of rivers.

TIMBER: Trees when they have fallen or been felled, and all wood whether cut up or fashioned for any purpose or not.

TREE: Woody perennial with a single main stem, or in the case of coppice with several stems (includes bamboos, plants, stumps, brushwood, and canes), having a more or less definite crown.

URBAN FORESTRY: Art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society.

WATERSHED: Specific land area that drains water into a river system or other body of water.

WILDLIFE: Wild fauna and flora as well as micro-organisms.

YAM STICKS: Pole, usually wood or bamboo, of 3 to 4 meters in length and 6 to 8 cm in diameter, used in yam growing to support the above ground plant biomass in an upright position to enable the plant to obtain maximum sunlight for photosynthesis.

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