Giant Swallowtail, *Pterourus homerus*

CONVENTION ON BIOLOGICAL DIVERSITY

Fifth National Report

FOR JAMAICA

National Environment and Planning Agency

Fifth National Report for Jamaica

2010-2013

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ANNEX 1

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Document Title: Fifth National Report for the NBSAP Project

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List of Acronyms/Abbreviations

AnGRFA	Animal Genetic Resources for Food and Agriculture
APCAR	Action Plan for Corals and Reefs
BOD	Biochemical Oxygen Demand
BRIT	Botanical Research Institute of Texas
CARDI	Caribbean Agriculture and Research Development Institute
CASE	College of Agriculture, Science and Education
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CCA	Climate Change Adaptation
CCAM	Caribbean Coastal Area Management Foundation
CEPF	Critical Ecosystems Partnership Fund
CHM	Clearing-House Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMC	Cays Management Committee
DRR	Disaster Risk Reduction Project
EIA	Environmental Impact Assessment
ENACT	Environmental Action Programme
ESSJ	Economic and Social Survey for Jamaica
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FD	Forestry Department
4NR	Fourth National Report
GDP	Gross Domestic Product
GEF	Global Environment Facility
HACCP	Hazard Analysis Critical Control Points
IABIN	Inter-American Biodiversity Information Network
I3N	IABIN Invasives Information Network
IAS	Invasive Alien Species
IPM	Integrated Pest Management
IOJ	Institute of Jamaica
IUCN	International Union for Conservation of Nature
JCDT	Jamaica Conservation and Development Trust
JCF	Jamaica Constabulary Force
JCRMN	Jamaica Coral Reef Monitoring Network
JDF	Jamaica Defence Force
JET	Jamaica Environment Trust
JHTA	Jamaica Hotel and Tourist Association
JIRG	Jamaica Iguana Recovery Group

JNEAP	Jamaica National Environment Action Plan
JNHT	Jamaica National Heritage Trust
KHEMP	Kingston Harbour Environmental Management Programme
LFMCs	Local Forest Management Committees
LICJ	Land Information Council of Jamaica
LMO	Living Modified Organism
MBMP	Montego Bay Marine Park
MGD	Mines and Geology Division
MTIASIC	Mitigating the Threats of Invasive Alien Species in the Insular Caribbean
MTF	Medium Term Policy Framework
MOU	Memorandum of Understanding
MOAF	Minister of Agriculture and Fisheries
MYPOW	Multi-year Programme of Work
NBC	National Biosafety Committee
NBSAP	National Biodiversity Strategy and Action Plan
NCU	Northern Caribbean University
NEEC	National Environmental Education Committee
NEPA	National Environment and Planning Agency
NFMCP	National Forest Management and Conservation Plan
NHMJ	Natural History Museum of Jamaica
NIASSAP	National Invasive Alien Species Strategy and Action Plan
NGO	Non-Government Organisation
NPAS	National Protected Areas System
NPF	Nature Preservation Foundation
NRCA	Natural Resources Conservation Authority
PGRFA	Plant Genetic Resources for Food and Agriculture
PIOJ	Planning Institute of Jamaica
RADA	Rural Agricultural Development Authority
SFCA	Special Fishery Conservation Area
SMU	Squatter Management Unit
SoWBFA	State of the World's Biodiversity for Food and Agriculture
STRAP	Sea Turtle Recovery Action Plan
SRC	Scientific Research Council
TEF	Tourism Enhancement Fund
TESI	Tourism Environmental Stewardship Initiative
TNC	The Nature Conservancy
TPD	Town Planning Department
TPDCo	Tourism Product Development Company
TRIPS	Trade Related Intellectual Property Rights
UDC	Urban Development Corporation
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UTECH	University of Technology
UWI	University of the West Indies
WMU	Watershed Management Unit
WRC	Windsor Research Centre

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Executive Summary

The Fifth National Report provides a summary of the Government of Jamaica's implementation of the objectives of the United Nations Convention on Biological Diversity (CBD) for the reporting period 2010 – 2013.

Introduction

1. Introduction

Jamaica became a party to the CBD on April 06, 1995. The objectives of the Convention are:

- the conservation of biological diversity;
- the sustainable use of its components; and
- the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Fifth National Report has been prepared in accordance with Article 26 of the Convention which states; "*Each Contracting Party shall, at intervals to be determined by the Conference of the Parties, present to the Conference of the Parties, reports on measures which it has taken for the implementation of the provisions of this Convention and their effectiveness in meeting the objectives of this Convention*". It reports on measures which have been taken since the Fourth National Report (2005 – 2009), to implement the provisions of the Convention and their effectiveness in meeting the objectives of the Convention. It also provides information for a mid-term review of progress towards the implementation of the Strategic Plan for Biodiversity (2011-2020), and progress towards the Aichi Biodiversity Targets. The report will also serve as an important communication tool for biodiversity planning at the national level, with information on the state of implementation between 2010 and 2013.

The report comprises three main parts as proposed in the CBD guidelines for the Fifth National Report; and outlines the following:

- Part I – An update on Biodiversity Status, Trends, Threats and Implications for Human Well-being;
- Part II – The National Biodiversity Strategy and Action Plan (NBSAP), its Implementation and the Mainstreaming of Biodiversity; and
- Part III – Progress towards the 2015-2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals.

2. Biodiversity Status, Trends and Threats

Status and Trends

On-going research on Jamaica's biodiversity revealed new records, re-classifications and changes in the status of species in various ecosystems. Changes in species' numbers include a revision in the number of indigenous seed plants where recent studies revealed that there are approximately 3,175 species in Jamaica (of which 32.4% are endemic compared to 27.9% reported in 2009). Increases in the number of endemic bromeliads (from 22 to 26) and orchid species (from 60 to 62) are also listed. The total number of indigenous butterfly species rose to 136 (with 38% endemism), including the discovery of a species and genus new to science. There were reported reductions in species numbers; for example, cacti, where the number of endemic species reported was reduced from ten (10) to four (4). Anecdotal findings suggest that the reduced numbers resulted from the loss of species in the wild, due to infrastructural developments. Several Species Recovery Action Plans and monitoring activities were implemented. This included the protection of the critically endangered Jamaican Iguana (*Cyclura collei*), through the regional project on Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MTIASIC), 2009-2014; which focused on the removal of a predator, publication of the Sea Turtle Recovery Action Plan for Jamaica in 2011, and on-going monitoring of the survival of the threatened American Crocodile (*Crocodylus acutus*).

Jamaica's beaches continued to experience a net erosion of approximately 20.8m throughout the period, while the status of corals and reefs remained unfavourable. The re-designation of Fish Sanctuaries to Special Fishery Conservation Areas (SFCAs) in 2012 enabled the conduct of

research and the removal of the Lionfish; whereas, the previous designation did not allow any fishing.

Threats

Habitat loss, climate change, resource overexploitation, Invasive Alien Species and pollution are the main threats to biodiversity in Jamaica. Conservation constraints include: lack of political will, limited public awareness, conflicting policy/limited inter-Agency collaboration, unwillingness to share data/information, limited scientific information, limited information on biological resources and natural heritage, low revenue/funding, limited expertise in areas such as taxonomy, poor socio-economic planning and weak law enforcement

3. National Biodiversity Strategy and Action Plan (NBSAP), its implementation and Mainstreaming of Biodiversity

Further assessment of the implementation of the National Strategy and Action Plan on Biodiversity in Jamaica (NBSAP 2003) since 2010, revealed that 22 of the 37 project profiles had either been completed, were on-going, or had commenced. Jamaica's inability to achieve 100% success in implementation of projects resulted from factors such as the absence of a national tracking system, limited human and financial resources to execute projects, competing national and international commitments and limited knowledge of Project Profiles in the Policy document (among new/successive staff); hence, a shift in focus. The restructuring of some organizations including the Institute of Jamaica (IOJ), National Environment and Planning Agency (NEPA) and Forestry Department (FD), where capacity building and/or organizational restructuring was done, or where additional departments were created, resulted in strengthening the abilities of these Institutions to successfully implement projects.

The development of a Medium Term Socio-Economic Policy Framework (MTF) for Vision 2030, Jamaica's National Development Plan, resulted in a three year tracking system for the implementation of national goals. Several of the national strategies were aligned with the strategies of Jamaica's NBSAP for biodiversity conservation, which helped to strengthen the

commitment of many institutions to implement projects. Additional national projects were implemented during the review period to include the Global Environment Facility (GEF) funded National Protected Areas System (NPAS) (2010-2016), the European Union (EU) funded Climate Change Adaptation and Disaster Risk Reduction (CCA & DRR) (2001-2013), and the GEF funded pilot projects under the regional MTIASIC project (2009-2014). These projects were implemented among Agencies across various sectors and allowed for several of the NBSAP strategies and related activities to be realised.

Legislative Framework

New legislation and amendments were made to existing Acts during 2010-2013. New legislation included, the Plant Genetic Resources Act (2013), the Natural Resources Conservation (Wastewater and Sludge) Regulations (2013) and the Special Fishery Conservation Area (SFCA) Regulations which came into force in 2012. Under the Wastewater and Sludge Regulations (2013), the Wastewater Management Unit was established in 2013 (at NEPA), for the monitoring of Wastewater Treatment Facilities.

The Fishing Industry Act was amended in 2011 to include a ban on the construction of fish traps using certain types of materials; including mesh wire and nets that have a mesh size less than one and a half (1½) inches. The amendment also banned fishing at nights during the hours of 6:00 p.m. and 5:00 a.m., using any impaling device (e.g. spear guns, Hawaiian sling, etc.).

Following two years (2011-2012) of extensive consultations, a new Draft Forest Policy was presented in 2013. This new policy will provide the basis on which the necessary changes to the legislative and management framework can be made.

Mainstreaming of Biodiversity

Vision 2030 identifies the priority outcomes, strategies and actions (every three-years), for the life of the Policy from 2009 to 2030, to achieve implementation of the National Vision Statement; "*Jamaica, the place of choice to live, work, raise families and do business*". The MTF for 2009-2012 implemented activities which supported amongst other things the further

development of the Protected Areas System Master Plan (PASMP); preparation of the State of the Environment Report 2011; preparation of Jamaica's second National Communication to the United Nations Framework Convention on Climate Change in 2011; implementation of the Adaptation Fund and the Climate Change Adaptation and Disaster Risk Reduction projects, and completion of Development Orders for six parishes. This represents the integration of biodiversity and related activities into the national planning processes and sectoral and cross-sectoral activities.

4. Progress on National Implementation of Biodiversity Conservation Activities aligned with the Strategic Plan 2011 – 2020, including Aichi Targets and the relevant 2015 Millennium Development Goals

In the absence of national biodiversity targets, a detailed overview of actions taken in assessing Jamaica's progress towards the Aichi Targets and the relevant Millennium Development Goals is outlined, along with proposed indicators. Activities undertaken across sectors towards Jamaica's implementation of the CBD and how these contribute to the Aichi Targets for the updated Strategic Plan for Biodiversity 2011-2020 are outlined for each target. The activities indicate that Jamaica is making good progress in some areas, while further steps need to be taken for achieving others. Jamaica has been able to surpass Aichi Target 11 which states: *By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes*. Recent data indicate that Jamaica's Protected Areas cover approximately 18% of the country's land area and 15% of its archipelagic waters.

Chapter1. An Update on Biodiversity Status, Trends, Threats and Implications for Human Well-being

1.1 Introduction

Jamaica's Fourth National Report to the Convention on Biological Diversity (CBD) provided a summary of Jamaica's implementation of the Convention's objectives for the reporting period May 2005 – March 2009. In outlining the status and trends, the total number of marine and terrestrial species (based on available information from research and inventories), was presented. Data gaps identified included fungi, lower plants and the status of some endemic species. Reported threats to Jamaica's biodiversity include habitat loss, overexploitation, invasive alien species, weak law enforcement, poor spatial planning, pollution and climate change.

For the 2010 to 2013 period, steps were taken towards protecting Jamaica's natural environment; including the development of the Protected Areas System Master Plan (PASMP), preparation of the State of the Environment Report (SOE) 2011, preparation of Jamaica's 2nd National Communication to the UN Framework Convention on Climate Change in 2011, and implementation of major climate change projects.

1.2 Biodiversity

1.2.1. Terrestrial

Information on Jamaica's richness in terrestrial diversity continues to grow, as on-going research activities on various taxa revealed new records, taxonomic reclassifications and changes in species status since 2010. Table 1 lists the number of indigenous terrestrial plant and animal species diversity in Jamaica, along with revised data on some species. Changes in species numbers include a revision in the number of indigenous seed plants, where recent studies revealed that there are approximately 3,175 species in Jamaica (of which 32.4%[1] are endemic, compared to a 27.9% level of endemism reported in 2009). Increases in the number of endemic Bromeliads (from 22 to 26) and Orchid species (from 60-62) are also listed. The total

[1] Catalogue of seed plants of the West Indies, Pedro Acevedo-Rodriguez and Mark T. Strong, 2012.

number of indigenous butterfly species rose to 136 (with 38% endemism), including the discovery of a species and genus new to science. Turner's Gold Striped Skipper, *Troyus turneri* (Figure 1), was discovered in 2012 by researchers from the McGuire Centre for Lepidoptera Biodiversity at the Florida Museum of Natural History, University of Florida in the United States, along with a local field naturalist. The reclassification of bat species also resulted in a change in the number of endemic species, which rose from two (2) in 2010 to five (5) in 2013.

Table 1. Terrestrial Species Diversity in Jamaica

Terrestrial Fauna/Flora	2009		2013	
	Number of Indigenous species	Number of Endemic species	Number of Indigenous species	Number of Endemic species
Terrestrial Fauna				
Rotifers	211	21	211	21
Land Snails	561	505	514	499
Grapsid Crabs	9	9	9	9
Jumping Spiders	26	20	26	20
Fireflies	48	45	48	45
Butterflies	133	20	136	38
Amphibians	22	22	21	21
Reptiles	43	33	43	33
Shore and Sea Birds	39	1	39	1
Land Birds	67	30	67	30
Bats	21	2	21	5
Other Mammals	2	2	2	2
Terrestrial Flora				
Bromeliads	60	22	60	26
Orchids	230	60	219	62
Ferns	579	67	579	67
Cacti	20	10	20	4
Palms	12	7	12	7
Grasses	200	1	200	1

Figure 1. **Male skipper (*Troyus turneri*)**

Florida Museum of Natural History photo by Jeff Gage

In other cases, there were reductions in species numbers; for example, cacti, where the number of endemic species reported was reduced from ten (10) to four (4). The changes in numbers were due to ongoing research to include revisions in taxonomic classifications, discovery of new localities, and genetic research.

Jamaica's continued strategy towards conserving biodiversity benefited from several research activities between 2010 and 2013 to include, the publication of Endemic Trees of Jamaica[2] in 2010, which revealed that Jamaica has three hundred and sixteen (316) endemic trees (Table 1), and the sighting of *Turnera campaniflora* in Quaco Rock, Clarendon in 2013, the only known location for this endemic species. This rare species, along with *Euphorbia alata* (also endemic to Jamaica), was collected for propagation at the Nature Preservation Foundation's (NPF's) plant nursery and the Scientific Research Council's greenhouse. A comprehensive floristic survey of the Hellshire Hills, Manatee Bay and Goat islands was undertaken in 2012 through a partnership arrangement among local scientists from the University of the West Indies, Urban Development Corporation (UDC) and the Botanical Research Institute of Texas (BRIT). The study showed that three hundred and seventy six (376) plant species were growing in the area; two hundred and twenty nine (229) of which were previously known and eight (8) of which were recorded as new endemic plant species.

[2] Endemic Trees of Jamaica', 2010, Institute of Jamaica

1.2.2. Marine and Coastal Areas

1.2.2.1 Marine and Coastal Biodiversity

There is no updated information to indicate changes to the numbers of marine species since the fourth report which outlined estimates of species in Jamaican shallow, shelf, or shore waters. Warner and Goodbody's (2005) estimate of three thousand, five hundred and two (3,502) species of marine plants and animals (not including bacteria, viruses and fungi) remains unchanged. The appearance of Invasive Alien Species, including the Lionfish and Green Mussel into Jamaica's marine waters has changed the overall landscape of species diversity over the last ten years.

The Sea Turtle Recovery Action Plan for Jamaica was developed in 2011 in order to determine the status and trends among nesting and foraging populations and to increase public awareness of the endangered status of sea turtles. Sea turtle monitoring activities are conducted by NEPA and several Non-Government Organizations (NGOs) across the island. The main nesting species is the Hawksbill Turtle (*Eretmochelys imbricata*), followed by the Green Turtle (*Chelonia mydas*), Loggerhead Turtle (*Caretta caretta*) and Leatherback Turtle (*Dermochelys coriacea*). The Kemp's Ridley (*Lepidochelys kempii*) has been recorded in Jamaica's waters'; however, there is no record of them nesting on the beaches[3]. Data on sea turtle nesting activities between 2007 and 2013 revealed a fifty percent (50%) increase in nesting activity in 2013 over the past year, similar to that of 2007. The number of nesting females was estimated to be between four (4) and eight (8). In previous years the number was between three (3) and six (6).

The nesting females were estimated to be between eight (8) and eighteen (18) individuals in 2011, while it was estimated between three (3) and five (5) for 2010, and between eight (8) and twelve (12) for 2009. Marine turtles nest on a minimum two year cycle, suggesting that the set of turtles that nested in 2009 also nested in 2011.

The status of the American Crocodile (*Crocodylus acutus*) population in Jamaica is not fully understood, however, six (6) localities on the south coast of the island have been identified as having the largest crocodile populations.

[3] Sea Turtle Management Activities 2013 Report

Thirteen (13) species of seabirds, with a significant percentage of the total species, nest on mainland Jamaica and its offshore cays. Jamaica is therefore regionally important for species such as the Masked Booby (*Sula dactylatra*) which represents over 50% of the Caribbean's nesting birds, Sooty Tern (*Sterna fuscata*) 30%, Brown Noddy (*Anous stolidus*) 30% and Brown Booby (*Sula leucogaster*) 20%.

1.2.2.2 Beach Erosion

Thirty-six (36) sites at the seven (7) locations are evaluated annually by NEPA to collect data on the erosion and accretion of selected beaches in Jamaica. Using data collected on a quarterly basis, comparisons are made with the trends observed in previous years. The 2013 data showed chronic erosion trends (>25% loss) at five (5) sites; three (3) sites on the east coast and two (2) on the south and west coasts, compared to 2012 (Figure 2). Ten (10) of the sites monitored showed evidence of accretion (> 1% gain), with one (1) site in Negril undergoing an increase in beach width by 4.58m, which represents an 18.93 percentage increase since 2012. The average rate of beach loss exceeded the average gain; where the average beach loss ranged between 0.26m to 10.34m while the average gain in beach ranged from 0.36m to 4.58m. A majority of the sites monitored in Negril continued to display a net loss in beach width with the maximum change being 6.8m. All but two (2) sites within the Palisadoes-Port Royal Protected Area displayed an erosion trend when compared to the previous year[4]. When considering the status of the country's beaches using the sites monitored, there was a net erosion of about 20.8m.

[4] Beach Erosion: Status and Trends 2013. NEPA, 2014.

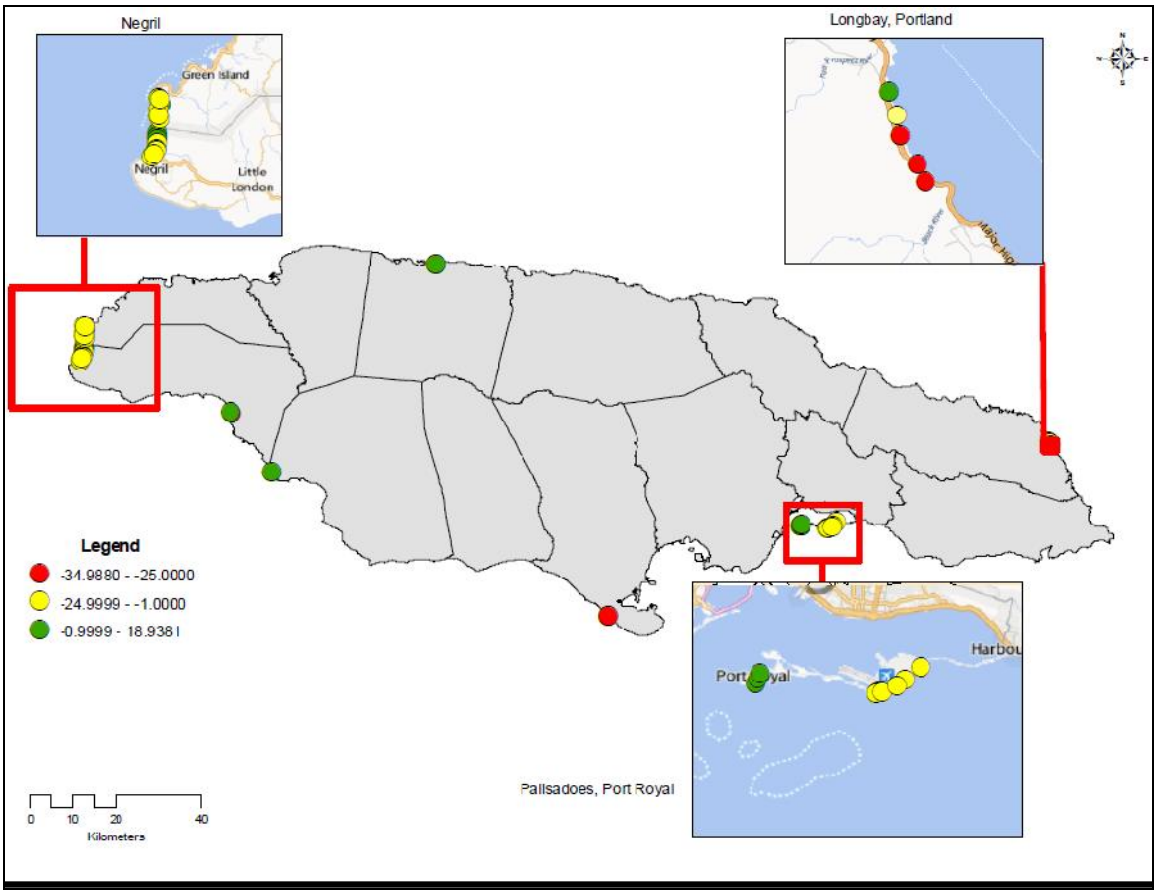

Figure 2. Erosion trends for 2013 - change in mean beach width compared to 2012

1.2.2.3 Coral Reefs

Jamaica is home to sixty-five (65) species of corals and thirty-eight (38) species of gorgonians.

A minimum of twenty (20) coral reef sites are monitored annually and reports generated.

Between 2010 and 2013, the average coral cover per site was approximately 18.1% and 32.2% for macroalgae (Figure 3).

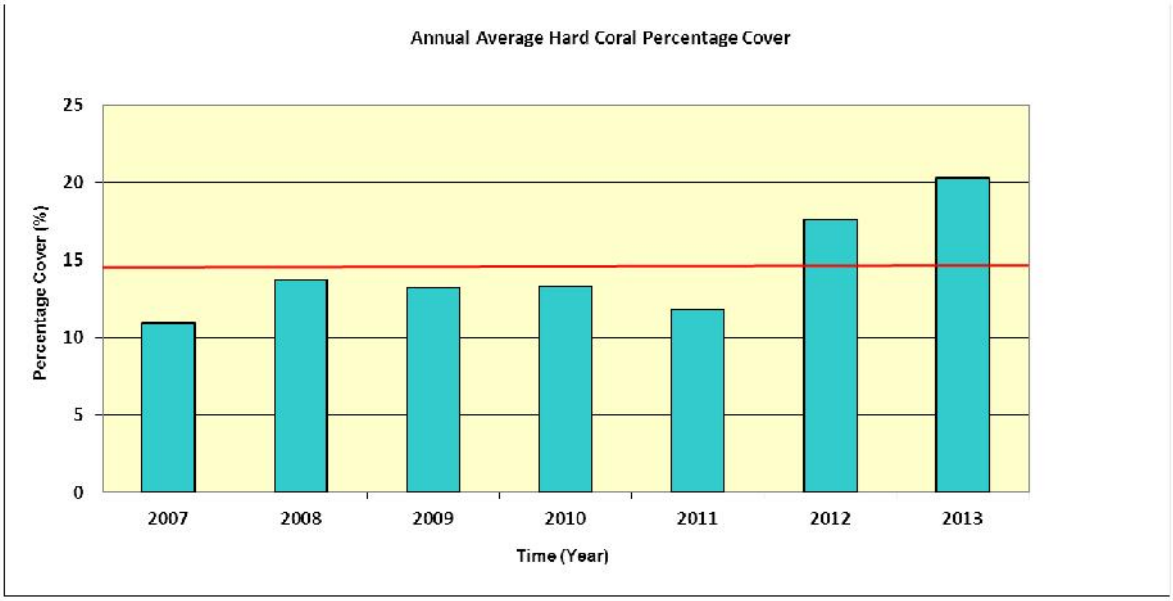

Figure 3. Average Coral Cover for 2007 - 2013

Jamaica's Coral Reef Health Index (CRHI) report card was first prepared in 2012 based on 2011 data and is a holistic approach to tracking and improving the coral reef ecosystem's health. CRHI is conducted every two years and comprises the coral index and reef biota index. Using indicators such as percentage and macro-algae cover, herbivorous and commercial fish abundance (g/100m^2), the report card gives an overview of the general status of reefs and a basis for the implementation of strategies from the APCAR, 2010-2015.

During 2013, the coral index (hard coral cover and recruits) was monitored at twenty three (23) sites in nine (9) locations, and the reef biota index at twenty (20) sites in seven (7) locations. The latter involved monitoring of Nutrient Indicating Algae (NIA), herbivorous and commercial fish and the presence of the black sea urchin *Diadema antillarum.* Sixteen (16) or seventy percent (70%) of the sites were ranked as poor, six (6) or twenty-six (26%) as critical, and one (1) or four percent (4%) as fair (Figure 4). The overall coral index showed that hard coral cover was good, but the recruits were at a critical level. Herbivorous and commercial fish quantities were at a critical level while those for NIA and the black sea urchin were fair. An overall CRHI score of 2.1 across all sites signals that the country's coral reefs are in poor condition for 2012.

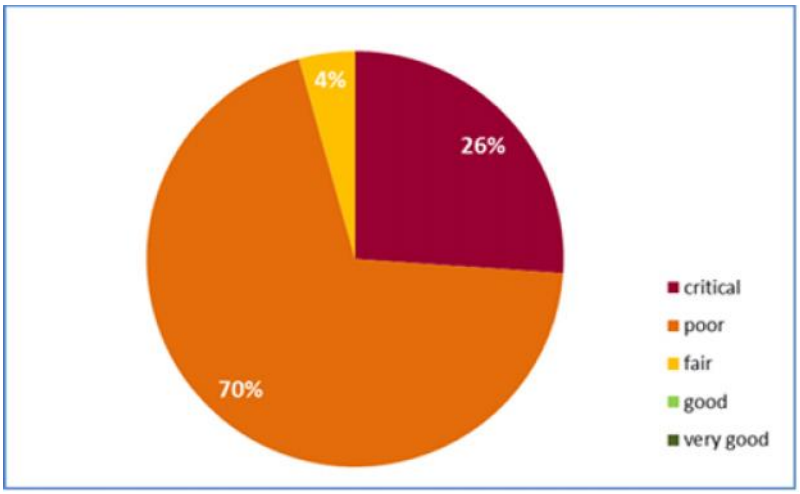

Figure 4. Health status of coral reefs 2013 (23 sites assessed)

It is therefore expected, that with increased collaborations, enforcement and education, there should be a gradual improvement in the health of the marine ecosystem and retention of the provision of services provided by coastal ecosystems.

1.2.3. Status of Endangered/Threatened Species

Jamaica's State of the Environment Report, 2013 provides a comparison of the status of endangered species listed by the International Union for the Conservation of Nature (IUCN) (for Jamaica), between 2010 and 2013. The report showed an increase in the number of threatened species for groups including birds and plants, while other groups such as amphibians, reptiles and mammals saw a reduction in numbers (Table 2).

Table 2. Status of Endangered Species in Jamaica on the IUCN Red List (2010 & 2013)

Species Group	Critically Endangered		Endangered		Vulnerable		Near Threatened		Data Deficient		Total	
	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
Mammals	1	1	0	0	4	2	0	0	x	0	5	3
Birds	2	2	1	1	7	7	x	11	x	0	10	21
Reptiles	3	1	1	0	1	0	x	1	x	0	5	2
Amphibians	5	0	1	2	x	0	x	0	x	1	6	3
Freshwater Fish	x	0	X	0	x	0	x	0	x	0	x	-

Species Group	Critically Endangered		Endangered		Vulnerable		Near Threatened		Data Deficient		Total	
	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
Molluscs (land)	x	0	X	X	x	x	x	x	x	X	x	-
Arthropods/ Invertebrates	x	0	X	0	x	0	x	0	x	0	x	-
Plants	x	0	X	1	x	1	x	1	x	X	x	3
Total											26	32

Source: State of the Environment Report 2013

1.2.4. Agriculture and Agricultural Ecosystems

The agricultural industry continues to contribute to Jamaica's Gross Domestic Product (GDP), showing a general increase of the industry's share from 5.8% in 2010 to 6.8% in 2012, due to an increase in the output of the sub-industries. There was however a slight decline in 2013 to 6.7%, due to the impact of hurricane Sandy in 2012 which reduced productive activities (PIOJ Annual Report, 2013). When compared to other sectors such as forestry and tourism, agriculture employs the highest number of skilled workers at 25%. The number of employed males remains at four (4) times that of females in the industry, where one hundred and sixty four thousand (164,000) males were employed in 2012 compared to forty thousand (40,000) females; with a similar trend in 2013 showing one hundred and sixty five thousand (165,000) employed males and thirty thousand (30,000) females[5].

1.2.5 Forests and Mountain Ecosystems

Jamaica's forests cover approximately three hundred and thirty-six thousand (336,000) hectares of land which represents roughly 30% of the entire island (Forestry Department, 2015). The seven (7) forest types include Closed Broadleaf (closed primary forest with broadleaf trees with minimal human disturbance), Disturbed Broadleaf (forest with broadleaf trees and species-indicators of disturbance), Tall Open Dry (open natural woodland or forest with trees at least five (5) metres tall and crowns not in contact), Short Open Dry (open scrub, shrub or brushland and crowns not in contact), Bamboo Forests (*Bambusa vulgaris*), Swamp (edaphic forest, soil waterlogged, with species indicators such as *Symphonia globulifera* and *Roystonea*

[5] Labour Force Survey, 2012, 2013: Statistical Institute of Jamaica (STATIN).

princeps - Royal Palm), and Mangrove forests (edaphic forests with brackish water composed of trees with stilt roots or pneumatophores, species-indicators such as *Rhizophora mangle* - Red Mangrove)[6].

The forests are home to a wealth of diverse endemic and indigenous plant and animal species. While approximately 35% of all forests and 73% of Closed Broadleaf Forests are protected, more than 65% are under private ownership with no comprehensive legislative framework to govern their protection. The Forestry Department (FD), which is mandated to ensure the protection and conservation of forests on Crown lands, established an Enforcement Branch in 2013 with a full complement of staff, thereby increasing the Agency's enforcement and monitoring capabilities. In 2013 monitoring and enforcement activities yielded varied levels of success. Thirty (30) Permits and Licences were issued for harvesting lumber in Forest Reserves and estates, up from fourteen (14) in the previous year. The FD also served one hundred and seven (107) 'Notices to Quit and Notices of Contraventions' during 2013. Compliance was approximately 35.5%, showing an improvement relative to the previous period, and necessitating a reduction in the number of court cases pursued.

1.2.5.1. Blue and John Crow Mountains National Park (BJMNP)

With elevations ranging between 1,000m – 2,256m, the Blue Mountains include the only tropical montane, cloud forest in the island. Most of the National Park is also classified as Forest Reserve and a Protected National Heritage site. It is also valued for its cultural and ecological significance, and during 2010-2013, a submission was made to UNESCO for the area to be nominated as a World Heritage Site. The forest has over 1,357 flowering plants with over 25% being endemic. All of Jamaica's twenty-nine (29) breeding bird species can be found here, including the Black-Billed Parrot (an endemic species). Among the three hundred and fifty-eight (358) known insect species is the endemic Giant Swallowtail Butterfly.

1.2.5.2. Cockpit Country Forest

The Cockpit Country's forest is defined by high levels of floral and faunal endemism. The Nature Conservancy' 'Parks in Peril' Project revealed that the forests are estimated to contain one thousand five hundred (1,500) vascular plant species, of which four hundred (400) are endemic;

[6] Draft Forest Policy for Jamaica, 2015

with many individual hilltops displaying local/niche endemism. Most of Jamaica's five hundred and fifty (550) native fern species are found in Cockpit Country, and relative to its area, more species of ferns are found here than in any other tropical forest in the world. The diverse vegetation and topography create ideal habitats for all twenty eight (28) of Jamaica's endemic land birds. The Cockpit Country also has the highest local diversity of amphibians and reptiles on the island, with four (4) new endemic species discovered in 2004. Thirteen (13) of Jamaica's twenty-one (21) bat species are obligate cave dwellers, including three (3) of the four (4) endemics. Their colonies occupy fewer than 17% of documented caves island-wide, and nearly one third of these bat caves are recorded in the environs of the Cockpit Country's forest, with some sheltering over fifty thousand (50,000) individuals[7]. This forest ecosystem is valued for its cultural and ecological significance, including high levels of endemic flora and fauna, timber and fuel-wood resources, and 40% of Jamaica's exploitable water resources. It is also a historic site, where a population of Maroons was able to force the British into signing a Peace Treaty in 1738.

The Forest Reserve is gazetted as the Cockpit Country Forest Reserve, but it has not been without controversy in the last couple of years, as there has been public outcry against the provision of licences for prospecting and bauxite mining in areas surrounding the Forest Reserve and the historical and cultural area called 'Ring-Road'. A study was commissioned in 2013 to conduct public consultations in defining the boundaries of the Cockpit Country. Most persons living within the Cockpit Country would like it to be declared a Protected Area and National Park, an Ecotourism site and a World Heritage site. Communities are vehemently opposed to bauxite mining, and limestone quarrying in the area. There was full agreement that the defined boundary should ensure watershed protection and the protection of the natural resources and ecosystems[8].

[7] Forest Management Plan Cockpit Country Forest Reserve and Surrounding Forest Estates Jamaica, November 2012

[8] Public Consultations on Defining the Boundaries of the Cockpit Country, Technical Report, September 2013

1.2.5.3. Deforestation and Reforestation

The Forestry Department has embarked on several reforestation activities since 2010 and has reported that on average; approximately one hundred and twenty (120) hectares of land have been planted (per annum), during the period under review. The FD's thrust towards sustainable management of forests was supported through the Government of Jamaica (GOJ)/ European Union /United Nations Environment Programme Climate Change Adaptation Disaster Risk Reduction Programme (GOJ/EU/UNEP CCADRP) 2010-2013, which involved the rehabilitation of fifty (50) hectares of land in 2013, completion of a Forest Fire Management Plan to guide the FD and other key stakeholders in planning for, preventing and managing forest fires, and the implementation of an agro-forestry programme whereby seedlings (fruit and timber trees), were issued to the public. The JCDT conducted reforestation of thirty-six (36) hectares of land in the Blue Mountains (with native trees), between 2010 and 2013. Results of reforestation activities by the FD versus deforestation between 2010 and 2013 indicate that deforestation rates exceeded reforestation activities during the period (Table 3.)

Table 3. Land Area showing Reforestation by FD and Deforestation during the period 2010-2013

Action	2010	2011	2012	2013	Total
Reforestation (A) (hectares)	200	274	163	50	**687**
Deforestation (B)*	337	337	336	-1,437	**925**
Balance (A-B)	**-137**	**-63**	**-173**	**1,487**	**-238**

*Includes an upward revision of forest cover in 2013 following the Land Use Cover Assessment in 2013 in Jamaica.

1.2.6. Inland Waters

1.2.6.1 Freshwater Biodiversity

Information on biodiversity status and trends in Jamaica's freshwater ecosystems remain limited. Research on freshwater species continues at the University of the West Indies, as well as periodic assessments by NEPA in regards to the preparation of Development Orders for selected parishes. Jamaica's component of the regional project MTIASIC included a freshwater pilot project that looked at the impacts of the invasive alien plant species *Alpinia allughas* on the biodiversity of the Lower Black River Morass, and on regeneration of the swamp forest and

determination of the most effective management treatment for the Paperbark Tree *Melaleuca quinquenervia.*

Of significance, is the inclusion of inland fisheries in the revised Fisheries Bill in 2011.

There is, however, a need for a more integrated approach to gathering data on freshwater species to include species diversity, and continuous monitoring of the impacts of pollution and other threats to biodiversity in rivers and other freshwater systems.

1.2.6.2 Watersheds

NEPA continues to conduct water sampling exercises from several sites within Jamaica's twenty six (26) Watershed Management Units (WMUs) and marine sites, using indicators including Faecal Coliform, Nitrates, Phosphates, Biochemical Oxygen Demand (BOD), pH and Total Dissolved Solids. Water monitoring for the period 2012-2013 involved sixteen (16) WMUs, on the basis that they were of highest priority in terms of watershed degradation. The main findings were[9]:

- nine (9) WMU's showed that flooding, improper solid waste disposal and soil erosion were prevalent;
- seven (7) WMU's experienced landslides, deforestation, clearing of wetland, stream bank erosion and informal settlement;
- flooding, improper disposal of solid waste and soil erosion were the most common issues facing the 16 WMU's monitored;
- the most degraded WMU's were found in eastern Jamaica and included the Hope River, Pencar-Buff Bay, Oracabessa-Pagee, Rio Grande, Wag Water River and Yallahs River; and
- the least affected WMU's included Deans Valley River and Lucea River.

The report summarized that water quality trends in Jamaica had mainly improved over the five (5) year period from 2009 -2013; however, these improvements could still be made better so that all locations would have values falling within the 2009 NRCA Jamaica National Ambient Water Quality Standard for freshwater.

[9] State of the Environment Report, 2013

1.2.6.3 Watershed and Coastal Rehabilitation

NEPA implemented a community based water quality First Responders Programme in 2010 whereby communities collected samples in response to pollution incidents and passed them on to NEPA for testing. First responders included the Port Royal Brotherhood First Responders who assisted NEPA to rehabilitate the Kingston Harbour after the 30 December 2010 pollution incident. There is on-going training of stakeholders in environmental awareness; to include community members, including fisher-folk, and persons from Watershed Management Units and Protected Areas. Under the Regulations for Wastewater and Sludge, a focal point for wastewater management was established in 2013 in NEPA for the monitoring of Wastewater Treatment Facilities. All facilities are required to be licensed by 2014, and these licensed facilities must report to NEPA on their effluent discharges. The prospect for even greater improvement in the implementation of measures to curtail pollution events is high, with a greater regional and integrated approach to water quality.

1.2.7. Dry and Sub-humid Lands

The Hellshire Hills and Portland Ridge in southern Jamaica are the island's most extensive dry limestone forests. In 2012, the Critical Ecosystem Partnership Fund (CEPF) provided a Grant to the Caribbean Wildlife Alliance for a project entitled *Floristic Survey of the Hellshire Hills, Manatee Bay, and Goat Islands, Jamaica: A Contribution to Improved Protection and Management of the Jamaican Iguana*. The survey resulted in the identification of four hundred and fourteen (414) plant species in the Hellshire area, of which, three hundred and seventy nine (379) voucher specimens were collected and deposited at the Natural History Museum of Jamaica-Institute of Jamaica and the University of the West Indies. Of the species identified, two hundred and thirty-six (236) had already been reported by Woodley during his 1970 survey of the Hellshire Hills (CEPF Final Project Report, 2013), and one hundred and forty-three (143) species were not previously published as recorded. The species included not only new records of invasive weeds (generally from coastal habitats), but also native and non-weedy species. Endemic and IUCN Red Listed endangered species not previously recorded for Hellshire were also recorded, including West Indian Mahogany (*Swietenia mahagoni)* and *Bursera hollickii*. The

project resulted in a 52% increase in the known floral species of the Hellshire Hills and Goat Islands.

One of the pilot projects for the MTIASIC enabled an increase in the population of nesting females of the critically endangered Jamaican Iguana (*Cyclura collei).* The project involved the removal of Invasive Alien Species such as the Indian Mongoose (*Herpestes javanicus*), that threatened the survival of the Iguana; through the use of a trapping mechanism. By the close of the project, there was a six-fold increase in the number of nesters over 1991. Figure 5 shows the trends in the number of nesting females between 1991 and 2013[10].

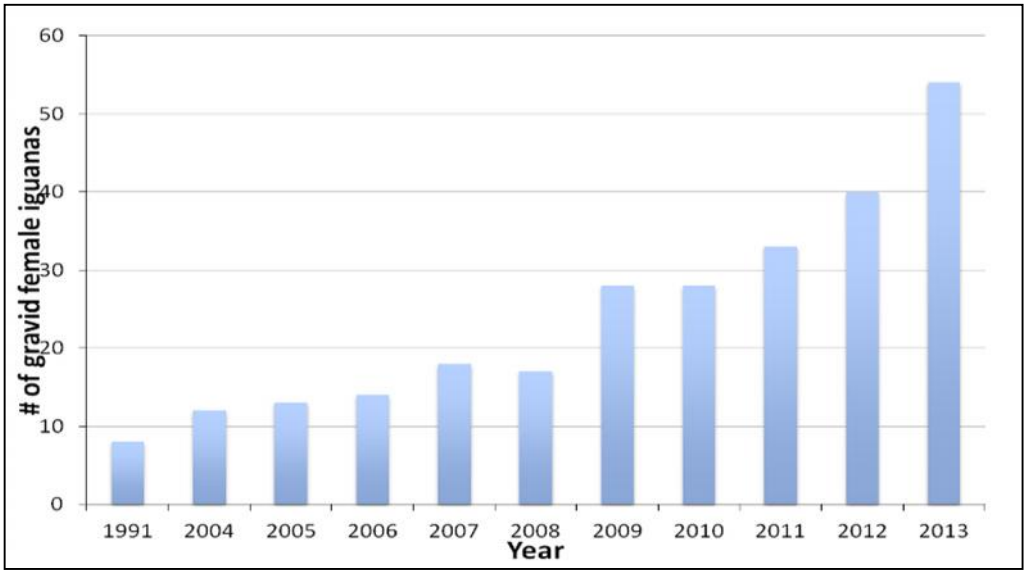

Figure 5. Number of females recorded as nesting in the monitored, communal nesting areas, Hellshire Hills

[10]The Jamaican Iguana: from 're-discovery' to recovery? Presentation to: MTIASIC Closeout Ceremony. Byron Wilson and Kimberly Stephenson, 2014.

Case Study 1

Recovering populations of the critically endangered Jamaican Iguana

Recovering the critically endangered Jamaican Iguana was one of the three pilot projects under the regional MTIASIC project which commenced in 2010.

The project objectives included :

- **a continuous IAS predator removal trapping programme in the Hellshire Hills;**
- **expansion of the existing trapping grid, by the addition of mongoose/cat traps and the deployment of dog/pig traps in core iguana areas;**
- **collection of DNA samples for determining the genetic structure and variability of the Iguana population; and**
- **location of new Iguana nesting sites and, if possible, collection of new genetic material to invigorate the existing captive population.**

Image showing the Jamaican Iguana and a constructed artificial nest site

Results:

- **the trapping programme for 2010 - 2013 yielded the capture of 426 mongooses, 33 cats and 53 pigs;**
- **loops were expanded and new traps installed;**
- **154 confirmed nests yielded 53 nesters in 2013 representing a 6-fold increase in the number of nesters over 1991 and an almost 2-fold increase over 2010, the beginning of the MTIASIC project.**

<u>Hatchling Season 2010-2013</u>

- **958 hatchlings were enumerated and sampled for DNA.**
- **170 were brought to Hope Zoo for a headstart**
- **320 were collected & processed in 2013 representing a 50% increase over the previous recorded amount (219), which was obtained during the first year of the MTIASIC project.**

<u>Headstart and Repatriation</u>

- **>40 hatchlings were harvested annually for the Hope Zoo.**
- **88 headstarters were released between 2010 and 2013.**
- **Recorded release in 2013: – 52 headstarters were returned to Hellshire.**
- **the total number of repatriations since the beginning of the Headstart Programme was 226. (now 255.)**

1.2.8. Islands

1.2.8.1. Cays

The majority of Jamaica's cays are off the south coast of the island. Most of the cays are small, often less than 0.8 hectares in size and are mainly of a coralline formation. The largest cays are the Goat Islands and the most populous of the cays are the Middle and Top Cay on the Pedro Bank. Manatees, dolphins, sea birds, a variety of fish species and crustaceans (finfish and shellfish, including commercial fish species, conch and lobster) form part of the ecosystems of the cays. Coral reefs and associated invertebrates and vertebrates such as sea turtles; mangroves and associated fauna such as shrimp and oysters; seagrass beds and associated fauna such as invertebrates; and other wildlife are also found on the cays. There has been a noticeable decline in these resources in both quantitative and qualitative terms over the years[11].

Nesting birds include the Magnificent Frigatebirds (*Fregata magnificens*), Brown Boobies (*Sula leucogaster*) and Masked Boobies (*Sula dactylatra*). Other birds such as the Peregrine Falcon (*Falco peregrines*), Palm Warbler (*Dendroica palmarum*) and American Redstart (*Setophaga ruticilla*) are also known to roost on some cays or are stopover migrants.

The Pedro Bank is the largest cay ecosystem and presents the greatest challenges in terms of the threats to its sustainable use and management. The bank comprises a variety of marine habitats such as sand, coral reefs, deep reefs, seagrass beds, and four coral cays known as the Pedro Cays. Based on its size and distance from mainland Jamaica and its relatively intact biological systems, it is one of the country's last remaining healthy marine ecosystems. The Pedro Bank is recognized as an important commercial, biological and historical area regionally and nationally. It represents Jamaica's main commercial and artisanal fishing ground and serves as the primary harvesting area for the largest stock of Queen Conch in the Caribbean region. The Pedro Cays are also regionally important seabird nesting and roosting areas (Masked Boobies, Roseate Terns and others), and they act as foraging and nesting areas for the several endangered turtle species, such as the Hawksbills (*Eretmochelys imbricata*), Green Turtle

[11] Draft Cays Policy, 2013

(*Chelonia mydas*) and the Loggerhead (*Caretta caretta*). The bank may also be a potential refuge and source of larvae for several regionally-threatened *Acropora* species. With an estimated 99% of mainland Jamaican reefs in danger, the coral reefs on the Pedro Bank are vital to long-term reef conservation in the country.

1.3. Main Threats to Biodiversity

Habitat loss, climate change, resource overexploitation, Invasive Alien Species and pollution are the main threats to biodiversity in Jamaica (Table 4). Terrestrial ecosystems are at significant risk; indicated by varying instances of habitat loss or degradation that face them, and associated services.

CORAL REEF HEALTH INDEX IN JAMAICA

Coral reef assessments at 35 sites conducted by the National Environmental and Planning Agency along Jamaica's coastline indicated that the overall Coral Reef Health Index (CRHI) in Jamaica is poor (2.4). The CRHI is based on coral cover, rugosity index, macroalgae cover, herbivores and commercial fish abundance. The majority of sites located in the northern and western parts of the island were in either poor or critical health. Coastal development is one of the main factors leading to degradation of these ecosystems and loss of productivity in ecosystem services such as fisheries.

1.3.1. Habitat Loss

There are several examples of anthropogenic disturbance of biodiversity by way of habitat degradation or loss[12]. This pressure on biodiversity appears to be linked to economic activities. For example, multimillion dollar investments by TransJamaican Highway Limited and China Harbour in 2006 and 2010 respectively, to construct multilane highways throughout the country, have resulted in significant clearing of terrestrial biodiversity; even in ecologically sensitive areas such as mangrove and dry limestone forest[13].

Tourism continues to represent one of Jamaica's main sources of foreign exchange[14]. Increases in new constructions and cruise ship arrivals have resulted in habitat fragmentation, increased land run-off and waste, which are believed to have negative impacts on mangrove and coral reef communities found in and around hotels and ports. There has been 0.2% and 7.2% annual decline in Broadleaf and Open Dry Forests from 2010 to 2013

[12] Tole, Lise. "Habitat loss and anthropogenic disturbance in Jamaica's Hellshire Hills area." *Biodiversity & Conservation* 11, no. 4 (2002): 575-598.

[13] EnviroPlanners Limited. "The Environmental Impact Assessment for Highway 2000, the Mount Rosser Bypass, Linstead to Moneague." 2007.

[14] Jamaica Tourist Board. Annual Travel Statistics. http://www.jtbonline.org/statistics/Annual%20Travel/Annual%20Travel%20Statistics%202012.pdf. Accessed December 17, 2015.

respectively.[15] This is mainly due to development on the island. According to consultations with experts, commercial and residential developments are also believed to be linked to losses in biodiversity.

1.3.2. Overexploitation

The unregulated harvesting of plants and animals by Jamaicans, (particularly for food), is another significant pressure on the island's biodiversity. Several instances of exploitation in aquatic ecosystems were noted during consultations with national experts. For example, protected species such as the American Crocodile and West Indian Manatee are still illegally exploited in Jamaican waters. Fish landings contracted by 0.7 % in 2014.[16] Trends in the value of fish landings indicate that there is a gradual decline in the value of fish landed. For example, the value of total fish catch in 2009 was higher than in 2013, even though fish landings were higher in 2013. One possible explanation is that as fish stocks dwindle, fishermen may be catching less economically valuable fish varieties, such as Wenchman (Pristipomoidis aquilonaris), and Grunt (Haemulon album), which fetch lower prices.[17]

The Fisheries Division has declared approximately 11 areas as Special Fishery Conservation Areas (SFCAs) /Fish Sanctuaries[18]. This has allowed for protection and rehabilitation of remaining fish stocks and protection of large fish, on the grounds that they produce and fertilise many more eggs than smaller fishes. This activity to protect and enhance the Fish Stock has thereby assisted in promoting increased biodiversity. The State of Environment (2013) report outlined that:

1) total fish biomass had increased for four fish types; confirming that fish are breeding successfully and that their protection in the SFCAs is supporting this development;

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[15] ESSJ Selected Economic Indicators 2010- 2014. http://www.pioj.gov.jm/Portals/0/Economic_Sector/ESSJ%202014%20Selected%20Indicators%202010%20to%202014.pdf. Accessed December 18, 2015

[16] 2014 Economic and Social Survey of Jamaica (ESSJ) Selected Economic Indicators 2010- 2014. Plahttp://www.pioj.gov.jm/Portals/0/Economic_Sector/E SSJ%202014%20Selected% 20Indicators%202010%20to%202014.pdf . Accessed December 18, 2015

[17] A Reefs at Risk assessment conducted by the WRI and The Nature Conservancy (TNC) as part of the Coastal Capital project (2010-13) confirmed the pressure from over-fishing affects approximately two-thirds of reefs, and watershed-based sources threaten over 60%.

[18] Draft 2013 State of Environment Report. National Environment & Planning Agency

2) fish biomass averages have increased for all types except Snapper. This indicates that fish are developing within the SFCAs, which has important implications on the future production of fish eggs and the development of the "spill-over effect", given that larger fish produce more eggs;
3) there was a small increase in the total biomass of Snapper, but a reduction in their biomass average and density total suggests that they are breeding at the monitoring sites, but are either migrating as they grow bigger, or the bigger fish are still being illegally caught; perhaps at nights when there are no Wardens on patrol;
4) the increase in average biomass and density of Parrotfish (576% and 633% respectively) is a very positive development, and indicates that this important reef cleaner is settling within the monitoring sites. The increased presence of Parrotfish is also a positive sign that supports the coral reef rehabilitation initiatives being promoted under the APCAR mentioned earlier in this Chapter, which includes reef rehabilitation programmes at the country's Marine Parks;
5) SFCAs are achieving their main objectives and represent a positive contribution to the country's efforts to recover fish stocks and promote a healthier marine environment.

Examples of overexploited species in Jamaica; left to right: West Indian Manatee, American Crocodile, Parrot Fish

Table 4. Biodiversity Threats, Drivers and Associated Ecosystems and Services based on Expert Consultations

THREAT CATEGORY	DRIVERS		ECOSYSTEMS			ECONOMIC SECTOR(S) IMPACTED
	DIRECT	INDIRECT	T	M	F	
Habitat Loss	Construction of Cell Sites	Increased demand in communication	X			Agriculture
	Laying of Highways/Pipelines	Population Increase, Increase in accessibility	X			Agriculture, Fisheries, Tourism
	Bauxite Mining	Major Economic Revenue	X		X	Agriculture, Fisheries, Housing
	Coastal Development	Major Economic Revenue	X	X	X	Tourism

THREAT CATEGORY	DRIVERS		ECOSYSTEMS			ECONOMIC SECTOR(S) IMPACTED
	DIRECT	INDIRECT	T	M	F	
	Informal Settlement	Demographic Change	X		X	Agriculture, Fisheries, Tourism, Housing
	Forest Fires	Cultural Practices	X			Agriculture, Housing
	Quarrying	Major Economic Revenue		X	X	Agriculture, Housing
	Agriculture	Economic Revenue, Increased Consumption, International Trade	X	X	X	Fisheries, Tourism
	Beach Erosion			X	X	Fisheries, Tourism
	Beach Fragmentation	Economic Revenue	X			Fisheries, Tourism
	Harbour Development	Economic Revenue		X		Fisheries, Tourism
Overexploitation	Consumption of Native/Protected Species	Cultural Practices		X	X	Agriculture, Fisheries, Tourism
	Overfishing	Cultural Practices, Consumption Patterns		X	X	Fisheries, Tourism
Climate Change	Increasing Drought (Intensity/Duration)	---	X	X	X	Agriculture, Housing, Health
	Change in Pest Range	---	X			Agriculture
	Change in Vector Range	---	X			Health, Agriculture
	Storm/Hurricane Activity	---	X	X	X	Agriculture, Fisheries, Tourism, Housing
Invasive Species	Expanding Range of IAS	Increase in Ornamental Trade, Consumption Patterns, Climate Change	x		x	Agriculture, Tourism
	Introduction of IAS	International Trade		X		Fisheries, Tourism
Pollution	Nutrient Loading	Economic Activities (Factories)		X	X	Fisheries, Tourism
	Land Run Off	Economic Activities (Construction, Mining)		X	X	Fisheries, Tourism
	Solid Waste	Consumption Patterns, Cultural Practice	X	X	X	Fisheries, Tourism, Agriculture
	Liquid (Sewage Waste)	Economic Patterns, Cultural Practice	X	X	X	Fisheries, Tourism, Agriculture

Key: *T: Terrestrial, M: Marine, F: Freshwater)*

1.3.3. Climate Change

Increased land temperatures, altered rainfall patterns, sea level rises, increased sea temperatures and altered intensity of storm activities are the main mechanisms by which climate change could negatively affect the island's biodiversity. The following are climate projections that will occur in Jamaica by the end of the 21st century (Table 5)[19].

[19] Ministry of Water, Land, Environment and Climate Change, Government of Jamaica. "Climate Change Policy Framework and Action Plan." 2013.

Table 5. End of 21st Century Climate Change Projections for Jamaica

VARIABLE	PROJECTION
Annual Temperature	+1.1 °C to +3.2 °C
Sea Surface Temperature	+0.9 °C to +2.7°C
Rainfall	-44% to +18%
Sea Level	+0.18 m to 0.59 m

Coral reefs, highland forests and mangroves are the most vulnerable to climate change. The following species have also been identified as being most at risk to climate change:

- Portland Ridge Frog (*Eleutherodactylus cavernicola*);
- Cricket Lizard (*Sphaerodactylus parkeri);*
- White Ibis (*Eudocimus albus);*
- Clapper Rail (*Rallus crepitans*);
- Loggerhead Turtle (*Caretta caretta*);
- Jamaican Iguana *(Cyclura collei*);
- Glossy Ibis (*Plegadis falcinellus*);
- Caribbean Coot (*Fulica caribaea*);
- Hawksbill Turtle (*Eretmochelys imbricata*);
- Blue-tailed Galliwasp (*Celestus duquesneyi*);
- Whistling Duck (*Dendrocygna arborea*);
- Bridled Tern *(Onychoprion anaethetus)*
- Green Turtle (*Chelonia mydas*);
- Jamaican Boa (*Epicrates subflavus*);
- Masked Duck (*Nomonyx dominicus*);
- Fish-eating Bat *(Noctilio leporinus mastivus*);
- Jamaican Slider Turtle (*Trachemys terrapin*);
- Jamaican Thunder Snake (*Trophidophis stullae*)

- Black Rail (*Laterallus jamaicensis);* and
- Jamaican Hutia (Coney) (*Geocapromys brownie*).

Marine, freshwater and agriculture biodiversity resources face potential degradation due to climate change such as[20]:

- beach erosion;
- reduced fish production, due to increase in sea temperature and levels;
- lower species richness in reef and calcareous species;
- fish kills;
- coral bleaching;
- distribution of marine species nurseries by severe storm activity;
- contamination of aquifers due to sea water intrusion;
- soil erosion;
- greater sedimentation;
- loss in agricultural productivity due to severe droughts; and
- change in agricultural pest range.

Lionfish in Jamaica

The Lionfish (*Pterois volitans/miles*) is native to the Indo-Pacific oceans and was first introduced to the Atlantic in the 80s through the aquarium trade. The first sightings in Jamaica were in 2007. It is believed to have been introduced to Jamaica via ballast water. Due to the potential risk of the species to fisheries, ecosystem resilience, human health and tourism the species became the focus on one of four pilot projects of the MITISIC programme. In Jamaican waters lionfish is a generalized piscivore consuming important reef cleaning, algal grazing and commercially important species. A major public education campaign, titled 'Eat It to Beat It' yielded very successful eradication results. Sightings over a four year period dropped by more than 60%. Island wide tracking and adaptive management policy development are currently being developed for the species.

1.3.4. Invasive Alien Species

Invasive Alien Species continue to pose significant threats to the island's biodiversity. The 4-year project 'Mitigating the Threat of Invasive Alien Species in the Insular Caribbean' was aimed at minimizing the risk posed by these non-natives, by increasing capacity within stakeholder organizations, promoting regional

[20] Ministry of Water, Land, Environment and Climate Change, Government of Jamaica. "Climate Change Policy Framework and Action Plan." 2013

cooperation, improving information accessibility and fostering environmental advocacy through public awareness campaigns.

For the reporting period, the following IAS's were identified as significant to Jamaica's biodiversity:

- Wild Ginger (*Alpinia allughas*);
- Bottle Brush (*Melaleuca quinquenervia*);
- Small Indian Mongoose (*Herpestes javanicus*);
- Feral Cats (*Felis catus*);
- Lionfish (*Pterois volitans/miles*);
- White Tailed Deer (*Odocoileus virginianus*); and
- Bamboo (*Bambusa vulgaris*).

1.3.4.1. Agricultural pests

Agricultural pests continue to pose a significant threat to the biological resources in Jamaica. The following are significant agricultural pests and diseases in Jamaica, as described by the Caribbean Agriculture Research and Development Institute.

Table 6: Major Agriculture Crops and Pests in Jamaica (Sinha, 2011)[21]

Economic Crop	Major Pest and Diseases
Banana	Black Sigatoka
Coffee	Coffee Berry Borer Coffee Leaf Rust
Citrus	Asian Citrus Psyllid/Citrus Greening
Papaya	Citrus Root Weevil
Hot Pepper	Broad Mite Pepper Gall Aphids
Sweet Potato	Leaf Spot/Alternaria
Onion	Beet Armyworm
Tomato	White Flies Curly Leaf Virus
Cabbage	Diamond Back Moth

1.3.4.2. IAS Socio-Economic Impacts

The socio-economic impacts of Lionfish remain largely un-quantified. Vulnerable sectors include fishing and tourism, which are heavily dependent on marine ecosystems and the resources, and are critically important to the island's economy. Lionfish impacts on tourist recreational activities have also been observed. It is unknown whether increasing Lionfish densities will reduce recreational activities and cause economic hardship. Notwithstanding, Jamaica's 'Eat it to Beat It' campaign throughout the MTIASIC project introduced a potentially economically viable mechanism for management of the Lionfish.

1.3.5. Constraints

As reported in the Fourth National Report to the Convention on Biological Diversity, Jamaica continues to face the same constraints as it relates to biodiversity conservation. The main constraints articulated during consultations were:

- lack of political will;
- limited public awareness;
- conflicting policy/limited inter-Agency collaboration;

[21] Sinha, Anil. 2011. Major Pests and Diseases of Economic Crops in Caribbean – Belize, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, Trinidad & Tobago. Regional Workshop on Weather, Climate and Pests and Diseases. Caribbean Institute for Meteorology and Hydrology. Barbados. 4-5 April 2011.

- unwillingness to share data/information;
- gaps in scientific information/data;
- limited information on biological resources and natural heritage;
- low revenue/funding;
- limited expertise;
- poor socio-economic planning; and
- weak law enforcement.

1.4. Enforcement

During 2010 to 2013, NEPA's Enforcement Branch increased its staff complement to include staff with other skills, such as a Sewage Engineer and a Marine Biologist to undertake enforcement activities. This resulted in an increase in the number of enforcement activities during the period (See Table 7). The Branch currently has twenty-three (23) field officers who monitor wildlife protection by administering provisions of the Wildlife Protection Act 1945. Persons with protected species were reportedly caught occasionally. Enforcement staff continues to work closely with Forest Rangers. The Branch also continues to support and collaborate with other monitoring Branches (in NEPA), to include; the Wastewater Management Unit, the Pollution Monitoring and Assessment Branch and the Pollution Prevention Branch.

The Forestry Department established an Enforcement Branch between 2010-2011 comprising a staff complement of forty-five (45) persons islandwide; to include additional Forest Rangers. The Department has also been able to benefit from capacity building through training of staff in 2011-2013 in Enforcement and Environmental Laws. This was done through the support of NGOs, the Police Force and the Judiciary.

Table 7. NEPA Enforcement Actions Taken for the Period April 2009 to March 2013

Operational Year	Enforcement Notices	Cessation Orders	Stop Notices	Notice Of Intention To Revoke it Or Licences	Notice of Intention to Suspend Permit or Licences	Suspension Notice & Air Quality Warning Notices	Breach Notices	Warning Letters	Summons Served	Bird Shooting (Prosecutions)	Total Enforcement Actions
April 2009 to March 2010	33	13	6	0	1	0	256	30	13	7	359
April 2010 to March 2011	70	13	13	0	2	0	307	60	13	15	493
April 2011 to March 2012	29	10	2	1	10	0	496	51	7	0	606
April 2012 to March 2013	76	12	27	0	18	0	385	102	13	5	638
Total	***208***	***48***	***48***	***1***	***31***	***0***	***1, 444***	***243***	***46***	***27***	***2, 096***

1.4.1. Stakeholder Consultations

Stakeholders identified the following areas of concern regarding monitoring and enforcement in major ecosystem service areas:

- illegal, unreported and unregulated fishing and overfishing;
- coastal developments which lead to habitat degradation;
- increased costs of production (e.g. fuel, security), poaching, poor fishing practices and a high prevalence of illiteracy among fishers;
- praedial larceny, theft, squatting (illegal settlements) and grazing fires continue to impact Jamaica's forested areas;
- impact of de-forestation in Watersheds and reduction of natural habitat (flora and fauna) continue to impact the agricultural industry; and
- more prolonged droughts and less predictable rainfall, resulting in notable shifting of traditional crop planting seasons and inability to apply best crop production practices during periods of drought. Also, impacts of increased pressure from pests.

Chapter 2. Jamaica's National Biodiversity Strategy and Action Plan, its Implementation and the Mainstreaming of Biodiversity

2.1. Current Status the NBSAP, 2003

Since 2010, further assessment of the implementation of the National Strategy and Action Plan on Biological Diversity in Jamaica (NBSAP) into organisations' Work Plans and activities revealed that twenty-two (22) of the thirty-seven (37) project profiles had either been completed, were on-going or had commenced. This represents an increase of nine (9) projects since 2010. Projects were implemented mainly through external funding sources such as GEF.

A recent stocktaking exercise of the NBSAP revealed that the inability of some lead Agencies to execute many of the project profiles within the given timeframe might have resulted from factors which included:

- the absence of a National Tracking System;
- limited human and financial resources to execute projects;
- competing national and international commitments; and
- limited knowledge of NBSAP projects among new/successive staff.

Despite these limitations, some organizations such as NEPA and FD (where organisational restructuring to create additional Departments/Divisions resulted in the strengthening of the ability of these institutions), were able to successfully implement projects. Several sector strategies under the 2012-2015 Medium Term Socio-Economic Policy Framework for Vision 2030 were aligned with the strategies of the NBSAP in biodiversity conservation, thereby strengthening the commitment of many entities to implement projects. Table 8 provides updates on the status of implementation of projects and activities undertaken since the publication of the Fourth National Report in 2010.

Table 8. Status of NBSAP Project Profiles

Goal	Project title	Status of Implementation
Conserve Biodiversity	Establishment of the National Biodiversity Secretariat as a supporting mechanism to implement and monitor the NBSAP	Established, but existed for 1.5 years; due to lack of funding for staff.
	Financial Sustainability of Protected Areas	Several outputs have been achieved to include: • Development of an Operations Manual in 2014 to include the mandate of the National Conservation Trust Fund of Jamaica (NCTFJ) formerly the Jamaica National Parks Trust Fund (JNPTF). • The implementation of the National Protected Areas System (NPAS) project 2010-2016; an output of the Protected Areas System Master Plan. • Development of a Management Planning Framework and Guidelines for the management of Protected Areas under NPAS. • Development of a user fee framework; not yet implemented. • Submission of a Conservation Easement Proposal as a prospective incentive scheme; not yet implemented. • The administering of several public and stakeholder consultations, protected areas management and financial planning workshops.
	Involvement of Private Land Owners in Protected Areas Management	• Specific outputs of projects were not achieved; however, the Forestry Department offers tax remissions to private land owners as a form of incentive for conservation once land is declared a Forest Reserve. • Legal instruments are currently being

Goal	Project title	Status of Implementation
		developed under the NPAS project.
	Preparation for the declaration of Protected Areas: Black River, Mason River, Dolphin Head, Cockpit Country and Roselle/Roselle Falls	• Mason River declared Protected Area (2005-2009). • Black River PA declaration to be recommended. • <u>Additional Activities:</u> -A section of the Pedro Bank is to be recommended for declaration. -Definition of the boundaries for the Cockpit Country to be done.
	Declaration of Forest Reserves	• FD submission in 2013 to Minister of Water, Land, Environment and Climate Change for declaration of 13 Forest Reserves and 11 Forest Management Areas under the EU Climate Change Adaptation and Disaster Risk Reduction Project (EU-CCA & DRR).
	Rehabilitation of Degraded Forests	• FD reforestation of 400 hectares of degraded land 2010-2013 under EU-CCA &DRR project. • JCDT reforestation of 36 hectares of forest in the BJMNP between 2010 and 2013. • UDC reforestation of 8990 m^2 of mangrove forests in Hellshire between 2010 and 2013.
	Rehabilitation of Coral Reef Ecosystems	• Some outputs achieved through the CCA & DRR project to include placing of artificial reefs, mooring and marker buoys. • NEPA training workshop for tourist interests/citizen scientists in 'bleach watch' 2011 • On-going coral reef monitoring by NEPA since 2007. Detailed Annual Reports submitted.

Goal	Project title	Status of Implementation
	Regulation of collection and harvesting of Wild Fauna and Flora	• Orchid Conservation Policy for Jamaica; draft revised in 2013. • Preparation of draft Plant Conservation Strategy 2012. • Management Plans containing guidelines for fishing of Queen Conch, lobsters and reef fish. Plans include Annual Catch Quotas for conch, strict processing plant standards, (HAACP); inspection of plants by the EU, and every 3 years there is a scuba survey of the Pedro Bank's abundance of conch.
	Reduction of Pollutants in Freshwater and Marine Environments	• Weekly monitoring of ambient water quality conducted by NEPA's Pollution Monitoring and Assessment Branch. • Effective 2013, quarterly monitoring of several watershed areas based on 1990 ranking of severe degradation. • Establishment of Water Quality monitoring programme with annual reports by the PMA Branches • Preparation of Draft National Water Quality Management Plan in 2011s • Collaboration of PMA Branch with Pesticides Control Authority and UWI to monitor and measure pesticides content of rivers. • Establishment of Kingston Harbour Environmental Management Programme (KHEMP) 2010 to monitor effluent entering the Kingston Harbour from companies operating along the rim of the coastline. There is on-going monitoring to ensure compliance of industries.
	Establishment of three Plant	• Not achieved; however, a small

Goal	Project title	Status of Implementation
	Rescue Centres (Cinchona Botanical Gardens, Hope Botanical Gardens, Mason River Scientific Reserve)	Greenhouse was established at the Mason River Reserve. • Conservation Greenhouse established at the Hope Botanical Gardens to house plants from the Cockpit Country.
	Preparation of an Alien Invasive Species Management Strategy	• Regional MTIASIC project implemented in 2009 – 2014 resulted in the development of a Management Plan for the Lionfish, development of a National Invasive Alien Species Strategy and Action Plan (NIASSAP) and a Pet Trade Pathway Toolkit. • Pilot projects addressed some outputs to include: Reduction of IAS in the Hellshire Hills as a result of trapping mechanisms installed and removal of *Melaleuca quinquenervia* and *Alpinia allughas* from the Black River Lower Morass. • Detailed assessments of the White-tailed Deer and impact on native ecosystems were not carried out.
	Implementation of the Ocho Rios Marine Park Management Plan	• Not implemented.
	Implementation of recovery strategies for critically endangered species.	• On-going implementation by NEPA to include Sea Turtle Recovery Plan 2011 prepared by Wider Caribbean Sea Turtle Conservation Network (WIDECAST), Bat Management Plan for Jamaica (2011), Iguana Recovery Plan 2006-2013 by IUCN, Jamaican Hutia Management Plan 2010. • Additional outputs include the development of Distribution Maps for the West Indian Manatee and Turtle nesting sites, Rapid Ecological Assessments of freshwater ecosystems towards the preparation of Development Orders for select

Goal	Project title	Status of Implementation
		parishes.
	Development and implementation of Criteria for Sustainable Use of Resources	• No updates.
	Development of Sustainable Fisheries	• Catch limits and quota determined for Queen Conch. • Enforcement of regulations in collaboration with JCF Marine Police, JDF Coastguard and actions of fishers. • The new Fishing Bill provisions the development of Management Plans which will include co-managed arrangements and strategies.
	Development of Sustainable Forestry	• Outputs achieved include: Increased enforcement of regulations by NEPA and FD, through increased staff contingents and orchids and habitat surveys towards the development of the Orchid Conservation Policy. • Additional Activities: The FD has undertaken activities to include reforestation and Sustainable Livelihoods Initiatives with Local Forest Management Committees (LFMCs) under the EU-CCA & DRR project and revision of the Forest Policy. • FD and NEPA administered several public awareness and education programmes. These included: The celebration of International Year of the Forest in 2011 and Increased campaigning in communities in close proximity to forest reserves on the value of forests and the need for greater compliance with forest laws. • FD reported more than 12 community meetings between 2012 and 2013.

Goal	Project title	Status of Implementation
Sustainable Use of Biological Resources	Sustainable Management of Game Bird Populations	NEPA has successfully implemented several of the project outputs outlined to include: • Annual stock assessments of game bird species. • Regulating hunting season under the Wild Life Protection Act. • Continued monitoring to include activities during the hunting season. • Bird surveys and bird banding in the North Coast Forest Key Biodiversity Area, on lands leased by the Trelawny Gun Club (TGC). • Financial support provided by WRC to TGC for restoration tree planting in pastures, 2009-2010; tracking of the Bald-pate.
	Sustainable Management of Bat and Dolphin Species	Outputs achieved for bats and dolphins to include: **1. Dolphins** The draft Dolphin Policy is currently a Green Paper and the public consultation process has since been completed. The draft policy has since been revised as a White Paper. **2. Bats** • A five year Bat Management Plan for Jamaica (2012-2017) was developed in 2011 by the Ecosystems Management Branch of NEPA. • Guidelines for cave tours were developed by the Ministry of Tourism, 2012-2015. • There are on-going bat surveys towards completion of Parish Biodiversity Assessments for Development Orders.

Goal	Project title	Status of Implementation
	Preparation of Ecological Zonation Plan and Land Use Plans for Declared Protected Areas	• Marine Spatial Plan developed for the Pedro Cays under the NPAS project (2010-2016). • Coral Spring-Mountain Spring Protected Area Zonation Plan (Draft): WRC collaborated with NEPA to include convening a 2-day workshop to define ecosystem services on the Zonation Plan, to ensure protection of ecosystem services and ecological connectivity, 2013-2014.
	Promotion of Sustainable Tourism Practices	• Ecotourism Guidelines for the Cockpit Country commenced during the 2012-2013 period. • The development of Ecotourism Guidelines represents the synergy between sector strategies of the Medium Term Policy Framework 2012-2015 of Vision 2030 and the Protected Areas System Master Plan 2013-2017 • Tourism Ministry to embark on the development of a Green Tourism and Ecotourism Policy.
	Development of a Sustainable, Community Based Management Plan for the Yallahs Lagoon Ecosystem	
Facilitate Access To Biological Resources to Promote Developments in Biotechnology and Benefit Sharing	Development of Natural Products Industry, Sustainable Use of Medicinal and Aromatic Plants and the Establishment of *In-situ* and *Ex-situ* Collections	**SRC Cultivar Introduction and Conservation:** • Participated in an exchange of *in vitro* tuber germplasm program under the • CARDI 'Roots and Tuber' Project in 2011. • Cassava varieties received from CIAT (Columbia) via MOAF (Bodles Research Station) in 2011. • *In vitro* Musa varieties imported from Biodiversity ITC (Belgium) for

Goal	Project title	Status of Implementation
		conservation and research purposes (2011). *All *in vitro* plants imported had the relevant phytosanitary documents attached. ***Plant Breeding Conservation*** • SRC, MOAF and International Atomic Energy Agency (I.A.E.A.) collaborated on a plant breeding project in 2007-2011. The project was aimed at developing irradiated tissue culture ginger and sweet yam plants that were resistant to ginger rhizome rot and anthracnose respectively. Currently, irradiated plants are being screened for resistance to mentioned pathogens under greenhouse conditions. • SRC continues to maintain an *in vitro* genebank that hosts plants of economical, medicinal and cultural importance, and those endemic to Jamaica.
	Preparation of Policies and Legislation to facilitate access to Biological Resources and Equitable Benefit Sharing	• Little progress made, as there was no substantial legal framework.
	Protection of Traditional Knowledge and creation of a Traditional Knowledge Register/Library	• No updates.
Safe Transfer, Handling and Use of the Living Modified Organism	Public Education on the Safe Handling and Use of Living Modified Organisms(LMO)	• Jamaica ratified the Cartagena Protocol in 2012. • Distribution of biosafety brochures to entities of the National Biosafety Committee commenced in 2010. • National Biosafety Committee inactive during the period outlined.
	Institutional Capacity Building for Risk Assessment and Management of Living Modified Organisms (LMOs)	• No updates.

Goal	Project title	Status of Implementation
	Development of Regulatory and Administrative Measures to Control the Safe Handling and Use of Living Modified Organisms (LMOs)	• No updates.
Enhance Resource Management Capacity	Human Resource Development in Identification, Conservation and Sustainable Use of Genetic Resources	• No updates.
	Expansion of the National Clearing-House Mechanism	• National CHM Steering Committee with representatives from Government, NGOs and Academia remains active. • Activities completed since the Fourth National Report (2009) include: Data providers and data identified from within the CHM Steering Committee, as well as from various multi-Agency project workshops and national forums between 2010 and 2013. ArcGIS 9.3 purchased subsequent to closure of EFJ project workshops. A few Species Distribution Maps have been created by NHMJ staff including the CHM officer. • New interface and design for I3N-JA database developed. It was posted online by late 2013.
	Establishment of the Jamaica Protected Areas Biological Database	• Based on mutual agreement between the Institute of Jamaica and NEPA, this project was implemented by NEPA. NEPA received a Grant of US$10,000 through the Inter-American Biodiversity Information Network (IABIN) in 2010. • Management information system Developed.
	Repatriation of Indigenous	• Dedicated web-page providing access to

Goal	Project title	Status of Implementation
	Biodiversity Information	data and information housed overseas was created in 2011 with continuous updates to pages on the Jamaica-CHM website. See http://jamaicachm.org.jm/ioj_wp/data-and-conservation-networks/ • Page on JA-CHM website • (www.jamaicachm.org.jm) provides a link to data and information portals including Birdlife International Data Zone, Caribbean Regional Fisheries Mechanism and Global Biodiversity Information Facility (GBIF) which houses species and specimen data from member institutions including museums and universities worldwide.
	Development of increased Resource Management Capacity	• No update since Fourth National Report.
Public Awareness and Education and Community Empowerment	Protected Areas Public Education/Information Programme	Outputs achieved: • Several public education and awareness programmes on Protected Areas implemented by Agencies responsible for Protected Areas, including: • NEPA, IOJ, JCDT, JNHT, C-CAM, Forestry Department, Fisheries Division. • Current implementation of community awareness programmes also implemented through funding from NPAS project and EU-CCA & DRR project. • Development of Forest Fire Management Plan in 2013 though EU- CCA & DRR project. • Forestry Department conducted more than 12 community consultations between 2012 and 2013.

Goal	Project title	Status of Implementation
		• JCDT continues to actively engage communities in the Blue and John Crow Mountains National Park. Commencing in 2013 WRC Sensitized and mobilized communities of the Catadupa Key Biodiversity Area (western Cockpit Country), which led to the community members establishing their "Cockpit Communities for Conservation" group and to the creation of a *Catadupa Conservation Action Plan*: the plan will guide activities to abate critical threats (esp. proposed bauxite mining), and to maintain or restore the functional health of conservation targets (esp. forest, freshwater, and cave ecosystems)
	Sensitisation of the Judiciary and training for Customs and Immigration Officers and the Constabulary	Outputs attained include: • Customs Department continues to conduct training of front-line officers on biodiversity related areas (regularly), to include agriculture and species identification as part of its orientation exercise. • Customs officers have also received training in Lionfish identification and removal, in ballast water. • Judicial symposium held in 2011 to raise awareness among Judiciary about Environmental Laws. • Training workshops on Environmental Laws conducted for Law Enforcement Officers.
	Develop and expand existing Environmental Education Programmes and Exhibits in the Royal Botanical Gardens, including the Hope Zoo	Outputs attained include: • Overall improvement to the wildlife exhibit at the Hope Zoo with 17 new species added since 2012

Goal	Project title	Status of Implementation
		Additional Activities: • Funding through Small Grants Programme of GEF has led to the development of a Conservation Zone that holds the Jamaican Iguana Headstart Programme, and animals in the National Rescue Programme.
• Promote Local and Regional Cooperation and Collaboration • in implementing the CBD and the NBSAP	• Build on existing Regional Data and Information Exchange Mechanism	• **Jamaica CHM:** • Received publications from resource entities and persons and these were used to develop an online catalogue of publications. • Developed online directory of organizations and networks, as persons change over time. Directory includes national, regional and international entities. • Produced brochures on Invasive Species and Protected Areas (with Jamaica Conservation and Development Trust), and on Biosafety Clearing-House (with National Biosafety Committee & CHM Steering Committee). • Other Activities • NHMJ developed IABIN database on zoology specimens; available online, in fulfilment of IABIN objectives to include data sharing and exchange in the region. Project commenced in 2010. • NHMJ developed an online common names database on Jamaican Flora. • NHMJ collaborated with the University of the West Indies in publishing a Virtual Herbarium in September 2009. • Information exchange done through national and regional networks, including Caribbean IAS Network.

2.2. Lessons Learned

1. The successful implementation of the NBSAP 2003 in Jamaica is dependent on the institutionalization and mainstreaming of the project profiles into the organizational, strategic and operational plans and budgets of lead Agencies. Further progress was made in the 2010-2013 period through the implementation of funded projects that were cross-sectoral. This process should be strengthened if success of the revised NBSAP is to be achieved.

2. A similar reporting mechanism employed by Vision 2030 could be adopted, whereby regular and timely updates on the status of projects are given every two years. This will ensure the commitment and accountability of stakeholders through the preparation of progress reports. This approach would also provide the opportunity for stakeholders to share best practices, and communicate challenges and constraints towards making the necessary adjustments ahead of project deadlines.

3. NEPA was unable to effectively coordinate and monitor the implementation of the NBSAP 2003, due to the absence of a unit dedicated to oversight of the projects. A fully operational oversight body must be in place to monitor and oversee the implementation of the revised NBSAP in order to ensure its successful implementation.

2.3. Actions taken to implement the Convention

2.3.1. Biodiversity Projects

A number of projects were undertaken during the period outlined and these resulted in strengthening the capabilities of many Agencies to mitigate against the threats to biodiversity. There was also increased cooperation among institutions across sectors in fulfilling the objectives of many projects. The MTIASIC regional project is one such activity that involved the combined efforts of several Government and Non-Government Agencies in achieving the project's objectives (Table 9). For the first time, pet-shops were engaged in consultation towards the development of a pet-trade toolkit, (one of the project's deliverables). Section 1.2.8. (Case Study 1) outlines the success of using trapping mechanisms for the removal of IAS, towards increasing the population of the threatened Jamaican Iguana (*Cyclura collei).*

Table 9. Biodiversity Projects and Funding Sources

Project Title	Year/s	Funding Source Budget	Project Partners/Agencies	Outputs
Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MTIASIC Regional Project)	2009 – 2013 (Extended to 2014)	GEF/CABI/UNEP US $1,738,978	NEPA/UWI	• Increased national capacity to address potential risks posed to biodiversity of global significance from Invasive Alien Species. • Increased regional cooperation to reduce risk posed to biodiversity of global significance from Invasive Alien Species. Access to data and best practice established, and public awareness of IAS strengthened.
Adaptation to Climate Change & Disaster Risk Reduction	2010-2013	EU €4.13M	PIOJ UNEP NEPA FD MET Service	• Improved database for monitoring changes in Coastal Ecosystems. • Rehabilitated sand dunes, beaches and restored mangrove forests in degraded coastal regions. • A Management Plan for Marine Protected Areas (MPAs) developed and delineated activity zones in three (3) MPAs. • Alternative livelihoods identified, assessed for feasibility, and Grants awarded for the development of these livelihoods.
Strengthening the Operational and Financial	2010-2016	GEF US$7,820,585 (Cash US$2.2M)	NEPA, FD	• Strengthened the financial planning and revenue generation of

Project Title	Year/s	Funding Source Budget	Project Partners/Agencies	Outputs
Sustainability of the National Protected Area System				Protected Areas. • Rationalized and integrated the National System of Protected Areas (NSPA).
Adaptation Fund Project – Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and Improve Food Security	2013-2015	US$5.6M	NEPA , National Works Agency, Ministry of Agriculture, and Fisheries, Ministry of Tourism	• Installed breakwater structures. • Trained local communities and entities in • Disaster Risk Reduction • (DRR) and Natural Resources Management. • Developed Adaptation Plans for the most vulnerable areas along the Negril coastline.

2.3.2. Legislative Framework

The period 2010 – 2013 saw the passing of new legislation and amendments which were made to existing Acts. New legislations included, the Plant Genetic Resources Act (2013), the Natural Resources Conservation Wastewater and Sludge Regulations (2013) and the the Special Fishery Conservation Areas (SFCAs) Regulations which came into force in 2012. Under the Wastewater and Sludge Regulations (2013), the Wastewater Management Unit was established in 2013 at NEPA for the monitoring of Wastewater Treatment Facilities.

The Fishing Industry Act was amended in 2011 to include a ban on the construction of fish traps, using certain types of material, including mesh wire and nets that have mesh sizes less than one and a half (1 ½) inches. The amendment also banned fishing at nights during the hours of 6 p.m. and 5 a.m. using any impaling device (e.g. spear guns, Hawaiian sling, etc.).

Several recommendations were made to amend the Wild Life Protection Act (1945). The Schedules in the Endangered Species (Protection, Conservation and Regulation) Act (2000) were updated to include new CITES listings. Recommendations were also made to the Endangered Species (Protection, Conservation and Regulation) Act.

The status of several biodiversity-related policies as of 2013 is listed in the Government of Jamaica's Policy Development Programme[22] (Appendix III).

Following two years (2011-2012) of extensive consultations, a new Draft Forest Policy was presented in 2013. This new policy will provide the basis on which the necessary changes to the legislative and management framework can be instituted. The policy will address crucial activities for the sector, to include the need for development of Forest Management Plans, mechanisms governing forest management data collection, demarcation of jurisdictional boundaries and the regulation of (1) activities on Crown and privately owned lands, (2) the forest sector and (3) forest-based industries. The policy will also capture the importance of a wide stakeholder involvement in the management of the island's forests, to include Public and Private Sectors, Non-Government Organizations, Community Based Organizations, Local Forest Management Committees (LFMCs) and special interest groups. It is expected that amendments will be made to the Forest Act upon completion of the Forest Policy legislative process.

The Draft Watershed Policy for Jamaica underwent a series of reviews in 2012. The policy is intended to guide all watershed management activities, strategies and programmes as well as legislative and institutional reforms related to watershed management, to be undertaken over the next three (3) years by Government Departments and Agencies, private land owners and donor Agencies; and includes recommendations to amend the Watershed Protection Act (1965).

In 2010, the Cays Management Committee (CMC), a multi-Agency body comprising Agencies that have some degree of jurisdiction over matters pertaining to cays, commenced the drafting

[22] http://www.cabinet.gov.jm/files/docs/Policy_Development_Programme___December_2013_0.pdf

of a Cays Management Policy. The primary objective of the CMC was to examine issues militating against the sustainable management of the cays and the ecosystems of which they form a part, and to make recommendations for the formulation of a new policy and legislative framework for the management of cays.

In the agriculture sector, the National Plant Health Policy Implementation Plan was drafted in 2013 and provides the road map for achieving the objectives of the Policy, thus improving Jamaica's plant health. In addition, the Implementation Plan will provide for the revision of existing legislation, building of institutional capacity, scientific systems, quarantine capacity, surveillance systems, emergency response for pest outbreaks and increased public awareness.

A draft of the Food and Nutrition Security Policy was developed during 2012. The goals are as listed below:

1. Ensure that sufficient quantity of nutritious food of appropriate quality is available to all people in Jamaica through increased domestic production and a sustainable level of imports (Food Availability).
2. Ensure that all individuals in Jamaica have access to adequate resources to acquire appropriate foods for a nutritious diet (Food Access).
3. Ensure that all individuals in Jamaica reach a state of nutritional well-being through food choices and consumption that reflect Recommended Dietary Allowances (RDAs) (Food Utilization).
4. Ensure that all people in Jamaica have access to adequate safe and nutritious food at all times, are not at risk of losing access to it due to external economic shocks and natural hazards, and consume foods that reflect physiological needs (Stability of Food Supply).

2.3.3. Cartagena Protocol on Biosafety

Jamaica ratified the Cartagena Protocol on Biosafety on September 25, 2012. The Jamaica Clearing House Mechanism for the Protocol is currently hosted by the Institute of Jamaica and commenced distribution of brochures on biosafety to various institutions/organisations. The Committee is currently inactive.

2.4. Sectoral and Cross-Sectoral Mainstreaming of Biodiversity

2.4.1. Introduction

Vision 2030, Jamaica's National Development Plan, developed in 2009, seeks to make Jamaica a developed country by 2030.

It is implemented through a series of Medium Term Socio-Economic Policy Frameworks (MTFs), which identify the priority outcomes, strategies and actions for each three-year period from 2009 to 2030. The MTF is an operational document designed to achieve realistic, specific, high priority national outcomes and targets towards the achievement of longer-term goals, using a results-based management approach. The MTF summarizes national priorities and targets for the country and identifies the key actions to achieve those targets over each 3-year period. The MTF 2009-2012 implemented activities which support further development of the Protected Areas System Master Plan (PASMP); preparation of the State of the Environment Report 2010; preparation of Jamaica's Second National Communication to the UN Framework Convention on Climate Change in 2011; the Adaptation Fund Project and the Climate Change Adaptation and Disaster Risk Reduction Project and completion of Parish Development Orders for six parishes. This represents the integration of biodiversity and related activities into national planning processes and sectoral and cross-sectoral activities.

2.4.2. Tourism Sector

The tourism sector through the Tourism Enhancement Fund (TEF) continues to provide funding across various sectors, including the environment. The Medium Term Socio-Economic Framework 2012-2030 outlines activities geared towards mitigating the impacts of tourism on the natural environment, with particular focus on biodiversity conservation. The Sector Strategy states: *Ensure that the activities of the tourism industry support biodiversity conservation objectives as well as ecosystems management objectives; with the Key Action* being d*evelopment of national ecotourism guidelines aligned to the Protected Areas System Master Plan*.

2.4.3. Energy Sector

The Energy Division of the Ministry of Science, Technology, Energy and Mining (MSTEM) introduced a number of responses to reduce the country's energy dependency on oil. At the policy level, the Ministry produced the Draft National Renewable Energy Policy 2009-2030, the National Biofuels Policy 2010-2030 and the Draft National Policy for Trading of Carbon Emissions (2010); all of which have been in operation since 2011.

2.4.4. Mining and Quarrying Sectors

The highlights of performance of the industry during 2009-2011 include the preparation of a draft National Minerals Policy 2011–2030, which aims to create "a modern, diversified, integrated, efficient and attractive Minerals Industry which protects environmental integrity and socio-cultural values…". Jamaica's National Energy Policy 2009–2030 also addresses the industry and presents solutions for reducing energy consumption and costs, and promoting competitiveness.

Under MTF 2012-2015, the priorities for the mining and quarrying industry include: the finalization and approval of the National Minerals Policy; amendment and updating of relevant legislation in the Minerals Industry; development of cost-effective energy solutions for the industry; and strengthening of land-use planning for lands containing valuable mineral deposits.

In 2013 a bill to amend the Quarry Act was submitted to Cabinet. The amendment calls for improving the relationship between quarrying and other forms of land use and promulgating legislation and regulations to improve controls on the illegal transportation, storage and trade of minerals.

In the Bauxite/Alumina Industry, a Memorandum of Understanding (MoU) was updated and signed between the NRCA and the Jamaica Bauxite Institute in 2013 to replace the original MoU signed in 1994. The MoU delegates environmental monitoring of the industry to the JBI. In addition, the MoU allows JBI to play a technical role on a number of committees, including the Air Quality Evaluation Committee and the Technical Review Committee, to deliberate on the process of Development Approvals. The issuing of mining permits by MGD represents an

important means to regulating the Bauxite/Alumina Industry where the production of red mud waste is a problem.

2.4.5. Environmental Sector

2.4.5.1. Marine Ecosystems

NEPA continues to be the lead organization for the regular monitoring of the status of Jamaica's coral reefs. A multi-sectoral action plan for corals and reefs (APCAR) was developed in 2011 as a guide to enhance the effective management of corals and reefs. APCAR contains nine conservation strategies under two main themes:

i. understanding Coral Reef Ecosystems;
   - map Coral Reefs;
   - monitor, Inventory and Assess Reef Status; and
   - conduct Strategic Research;

ii. understanding the Human Dimension;
   - reduce anthropogenic impacts on the sea;
   - create an optimal network of Marine Protected Areas (MPAs);
   - reduce pollution and habitat destruction and degradation;
   - restore Reefs;
   - create an informed public; and
   - facilitate alternate livelihoods.

2.4.5.2. Protected Areas

In 2010 Jamaica began the implementation of a GEF funded national project entitled 'Strengthening the Operational and Financial Sustainability of the National Protected Area System (NPAS)'. With a duration period of six years, the project's main goal was to safeguard Jamaica's globally significant biodiversity with an objective to consolidate the operational and financial sustainability of Jamaica's National System of Protected Areas. Expected outcomes of the project include, revision of the legal framework governing Protected Areas, development of a User Fee Framework, strengthening of financial planning and revenue generation to include

the development of a Trust Fund, and increased management effectiveness. Achievements include the development of Management Plans towards improved management of Protected Areas; increase in the number of PAs with Business Plans that reflect NPAS standards; and on-going implementation of the Communication Strategy for the NPAS which was developed under the project.

The Protected Areas System Master Plan (PASMP) was completed in 2013 as one of Jamaica's commitments to the CBD. The Master Plan, developed by a multi-Agency Protected Areas Committee, includes an Ecological Gap Analysis to assess where the nation's current Protected Areas fall short of protecting all biodiversity; the plan assesses the management effectiveness of existing Protected Areas and includes institutional arrangements, challenges to Protected Areas management as well as goals and activities; and, assesses the financial gap and planning for long-term financial sustainability of these areas. In 2010, the GOJ received a Grant of US$2.9M to implement a GEF/UNDP/GOJ project to strengthen the operational and financial sustainability of the National Protected Areas System and support the implementation of the PASMP.

Jamaica also began implementing an EU/GOJ funded project on CCA & DRR in 2010. With a duration period of three (3) years, the project's main objective was to increase the resilience and reduce risks associated with natural hazards in vulnerable areas through the implementation of adaptive measures to climate change, thereby contributing to the sustainable development of Jamaica. Achievements under the project include:

1. reforestation of 405 hectares in a number of Watershed Management Units including Yallahs River, Hope River, Buff Bay/Pencar and Rio Bueno Rivers;
2. establishment of four Local Forest Management Committees (LFMCs) namely in Dallas Castle and Constitution Hill (Hope River WMU), in Westphalia (Yallahs River WMU) and in Sawyers (Rio Bueno WMU). These communities are also participating in alternative livelihoods programmes;
3. development of a Draft Forest Fire Management Plan;
4. replanting of approximately 5 hectares of mangrove in Portland Bight, Clarendon;

5. installation of 23 mooring buoys in the Palisadoes-Port Royal, Negril and Montego Bay Marine Protected Areas. The installation of these buoys helps to protect the coral reefs and seagrass beds by providing safe places to anchor boats, and;
6. provision of funding towards alternative livelihood projects in the areas of beekeeping, organic farming and ecotourism.

Activities implemented by the JCDT towards the management of the BJCMNP during 2010 – 2013 are listed under Section 2.4.9, Table 10.

2.4.5.3. Ramsar Sites

NEPA continues as Jamaica's Administrative Authority responsible for the implementation of the Ramsar Convention. Jamaica's three (3) sites declared under the Convention have been the focal areas in a number of conservation projects during the period; to include, National Protected Areas System Project, 2010-2016, Regional Project on Mitigating the Threat of Invasive Alien Species in the Insular Caribbean, 2009-2014 and GOJ/EU funded project CCA & DRR, 2010-2013.

2.4.6. Fisheries Sector

2.4.6.1. Marine Fisheries Protection and Sustainable Use

In 2012, the Special Fishery Conservation Area (SFCA) Regulations came into force. This allowed for authorized fishing with Conditions, to take place in former "Fish Sanctuaries" and newly declared SFCAs, for instances such as research or to remove Invasive Species, for example Lionfish. Generally, no fishing is allowed within the declared boundaries of SFCA. The new Regulations effectively recognized fourteen (14) areas, to include two (2) Fish Sanctuaries declared in 1979 and 1986 and eight (8) that were declared in 2009. These include:

1. Three Bays SFCA
2. Galleon Harbour SFCA
3. Galleon (St. Elizabeth) SFCA
4. Salt Harbour SFCA
5. Bluefields Bay SFCA
6. Orange Bay SFCA

7. Montego-Bay Marine Park SFCA
8. Discovery Bay SFCA
9. Sandals Boscobel SFCA
10. Oracabessa Bay SFCA
11. Bowden Harbour SFCA
12. Bogue Islands Lagoon SFCA
13. Sandals Whitehouse SFCA
14. Bird Cay SFCA

The Fisheries Division does not have an Enforcement Unit and continues to experience constraints in carrying out enforcement measures. Enforcement is done jointly when possible with the Jamaica Constabulary Force (JCF) Marine Police and the Jamaica Defence Force (JDF) Coast Guard. Management Authorities of SFCAs also participate in protecting marine resources through the establishment of specific boundaries, provision of a co-management approach to decision making, and support funding to the partners. Management Authorities such as the Montego Bay Marine Park conduct enforcement activities and have reported that Rangers are gazetted Game Wardens and Park Rangers thereby giving the Park powers of arrest and confiscation under the select Acts. As a result, there have been incremental improvements in compliance rates and fluctuations in the number of offences.

There is a strategic effort by the Fisheries Division's extension team to carry out public awareness and sensitization of fishers as a proactive approach. This is done through; 'on the beach' group meetings, focus group meetings, public consultations, press releases, flyers and posters.

The 2011 amendment to the Fishing Industry Regulations has strengthened the Division's ability to effectively manage the Industry. The amendment has now imposed a ban on the construction of fish traps using certain types of material, including mesh wire and nets that have mesh sizes less than one and a half (1½) inches. The amendment also banned night fishing during the hours of 6:00 p.m. and 5:00 a.m. using any impaling device (e.g. spear guns,

Hawaiian sling, etc.). Closed Seasons were also established for sharks, sea urchins and sea cucumbers in 2013.

2.4.7. Agricultural Sector

The Ministry of Agriculture and Fisheries' Research and Development Division continued its initiatives to assist the growth of the farming sector through investigative and applied research activities. These include the establishment of a Centre of Excellence for Advanced Technology in Agriculture (CEATA) in 2010 at the Bodles Research Station. The aim was to drive research and training in agriculture, research towards improved pest management, more efficient propagation, and expand the value chain of selected agricultural crops and livestock in 2012.

Jamaica's Pesticide Control Authority (PCA) has made significant efforts in reducing the number of highly toxic pesticides used in agriculture. A number of insecticides/nematicides from Class Toxicity I and II had been phased out from use. The inter-Agency Pesticide Review Committee (with representatives from the Ministry of Agriculture and Fisheries, Rural Agricultural Development Authority, University of West Indies, University of Technology, PCA, Ministry of Water, Land, Environment and Climate Change, NEPA and the Ministry of Health) continues to review and evaluate pesticides 'of concern' (toxicity, impact on local flora and fauna and/or natural pollinators). During the period, there was an increase in registration of pesticides with lower toxicity and/or bio-rationals for use on crops.

2.4.7.1. Animal Genetic Resources for Food and Agriculture (AgGRFA)

Jamaica's country report towards the 2013 production of the second report on the State of the World's Animal Genetic Resources includes a number of activities implemented since the submission of the first report in 2007. Activities include the formation of the National Animal Genetic Resources (AnGR) Advisory Committee comprising governmental, industry, research and education stakeholders, entrusted with the task of ensuring a sustainable livestock sector.

There have been numerous efforts recently to revitalize the livestock subsector with considerable resources being committed to the expansion of meat production for food security

by the Government, in conjunction with multilateral Agencies. These efforts have included importation of exotic breeds and introduction of an artificial insemination programme. The Government embarked on the collection and preservation of semen from proven sires and bucks and provided these resources at a minimum cost to producers. This was done through the Ministry of Agriculture and Fisheries' Research and Development Division and the Veterinary Services Division at the Bodles Research Station. Additionally, the Research and Development Division conducted progeny testing on cattle and goat products, the results of which were distributed to farmers below prevailing market rates.

The flow of animal genetic resources in and out of the country include species such as the Jamaica Hope Dairy Cattle to Central America and the Caribbean; Jamaica Red Poll and Jamaica Black to Panama; and Barbados' Blackbelly to Jamaica. There was new importation of goats for meat production (semen and live animals) from North America; goats for milk production from the United States of America and sheep breed from North America. All these animals were previously only gotten from Australia, New Zealand and England. In addition layers and broilers (parents and grandparents) genetic lines are gotten from the United States of America.

In-situ and *Ex-situ* conservation programmes continue with *in-vitro* banks housing semen and embryos. A number of cattle and pig farmers utilize artificial insemination as part of their breeding programme. The use of artificial insemination was a recent introduction and is currently not widely used. Embryos of sheep were also imported but work has not yet been done in this area.

Barriers and obstacles to enhancing preservation of semen and embryos for the conservation of genetic resources include:

- lack of Government policy that deals specifically with conservation of all classes of animals
- lack of proper recording systems on farms
- lack of satellite breeding farms for the distribution of superior genetic stock for small remnant and cattle sectors, and

- praedial larceny of superior genetic stock.

2.4.7.2. State of the World's Biodiversity for Food and Agriculture (SoWBFA)

In 2013, the Food and Agriculture Organization of the United Nations (FAO) requested the submission of a Country Report on Jamaica's state of biodiversity in food and agriculture. Through the national focal point (MOAF), the report will focus on the interactions between the different sectors (plant, animal, aquatic and forest) and on cross-sectoral matters, and will use an ecosystem approach. It will specifically look at the contribution that biodiversity for food and agriculture as a whole makes to food security, livelihoods and environmental health, as well as to the sustainability, resilience and adaptability of production systems. Data will go towards the FAO Multi-Year Programme of Work (MYPOW).

2.4.7.3. Sustainable Agriculture

The following actions were taken towards maintaining a sustainable industry:

- farmer/stakeholder disaster awareness, and training in Agriculture Disaster and Risk Management (ADRM). Farmers were trained by the Rural Agricultural Development Authority (RADA) in areas of sustainable land husbandry (cultivation of crop/bamboo/trash barriers for retention of soil on hillsides; reforestation; construction of proper drainage and water channels, retention walls, cover crops, minimum tillage, gully plugs and individual basins).
- implementation of water harvesting strategies to include roof top water harvesting, construction of lined ponds, use of low energy demand gravity drip irrigation system, rehabilitation of community water tanks and installation of water tanks on farms.
- RADA's training of approximately 35,000 farmers annually on components of integrated crop/pest management.
- the use of an Integrated Pest Management (IPM) approach by farmers for a number of crops: banana, coffee, sweet potato, hot pepper, onion/scallion, cocoa and a number of vegetable crops, and
- development of an integrated system for the Beet Armyworm management in 2013 through the Technical Cooperation Programme, funded by FAO.

2.4.8. Agro-Forestry

Achievements of the Forestry Department, NEPA and the Ministry of Water, Land, Environment and Climate Change under National Strategy 13-2 which addresses the Development and Implementation of Mechanisms for Biodiversity and Ecosystems Management towards the promotion of sustainable livelihoods include:

- encouraging proper farming practices;
- reforestation of 400 hectares of degraded land;
- sustainable land management and water security within the Yallahs River and Hope River Watershed Management Units;
- registration of 400 farmers from LFMCs in Agro-Forestry programme; and
- successful community workshops in collaboration with NGOs and CBOs with LFMCs to promote agro-forestry and sustainable livelihood.

2.4.9. Forestry Sector

The BJMNP is managed by the Jamaica Conservation and Development Trust (JCDT), a Non-Government Organisation. During 2010 to 2013, the organization has conducted several activities towards the continued protection of the forest and its resources to include, the reforestation of 36 hectares in the Blue Mountains with native trees, enforcement activities, community engagement and the establishment of the BJMNP Advisory Committee in 2013 (Table 10).

Table 10. JCDT Programmes and Achievements 2010-2013

Programme/Activity	2010	2011	2012	2013
Conservation of Natural Heritage				
# of native tree seedlings produced	4,724	5,579	6,606	6,570
# hectares reforested	8.5	2.4	15	10
# hectares' Invasive Alien Species controlled	2	0	1	1
Preservation of Cultural Heritage				
		Training of 4 community	JA$400,000 spent between 3	Assisted 3 communities in

Programme/Activity	2010	2011	2012	2013
		groups in Business Planning, First Aid & CPR.	communities to support business ventures and office furniture & equipment.	hosting their annual festivals and sought funds for Archaeological Surveys.
Enforcement & Compliance				
# of patrols	129	124	96	131
Education & Public Involvement				
# of community meetings	12	10	15	8
# schools visited	37	50	30	7
# schools' visits to the Park	41	7	22	39
Recreation & Tourism				
# of visitors	8,401	11,797	10,222	14,331
Increase/decrease in revenue over previous year	40%	38%	-7%	29%
Improvements	New Signage at Holywell.	-	Trail improvement at Holywell.	Infrastructural improvements at Holywell.
Community Benefits	Blue Mountain Sustainable Tourism Plan.	See Preservation.	See Preservation.	See Preservation.
Monitoring & Evaluation				
Photo-monitoring - # of sites out of 12	12	8	7	10
Stream monitoring	12 points in dry season.	12 points in wet season.	0	0
Bird monitoring	Peak Trail	Rio Grande Valley	Vinegar Hill Trail	House Hill
Governance & Administration				
				BJMNP Advisory Committee established.

2.4.9.1. Strategic Forest Management Plan

Under the Strategic Forest Management Plan (2010-2013), a number of the activities outlined in the Fourth National Report to the CBD were achieved. These include:

- increased participation of the Private Sector and Non-Government Organisations (NGOs);
- increased community participation and public awareness;
    - distribution of more than 70,000 tree seedlings to the public for use in several tree planting projects;
    - Forestry Department's collaboration with Agencies in 2011 in recognition of International Year of the Forest to produce publications and supplements, staging of an Agency Expo, and the introduction of Forest Trek (to encourage the public to hike through the forest while learning about its biodiversity and its value);
    - reach of the schools' programme continued to increase as more than 300 school visits were conducted during the period;
    - radio advertisements featuring various forest messages, and Agency programmes (such as the Private Planting and Community Forestry Programmes) which were developed and aired on national radio stations;
    - launch of social media pages on Facebook and Twitter continued to build a steady group of followers who receive increased information about forests and their value; and
    - community awareness through the introduction of an annual series of community meetings that target residents in communities adjoining or in close proximity to Forest Reserves. These involved the presentation of information about the value of the forests and how to comply with the forest laws. Between 2012 and 2013, more than a dozen community meetings were held;
- develop and implement Forest Management Plans;

  This was partially achieved, as three (3) Forest Management Plans were developed during the period;

- maintain and restore forest cover – (See Section 1.2.6.3. Deforestation and reforestation); and
- build the Forestry Department as an efficient and effective service delivery organisation;

2.4.9.2. Sustainable Forestry

The Forestry Department undertook the following actions for sustainable forestry during the period outlined:

- The Forest Management Plan for the Cockpit Country Forest Reserve was completed in 2012
- three additional Forest Management Plans were developed and partially implemented, and
- as of 2013, 13 Local Forest Management Committees were established.

Under the EU_CCA & DRR 2010-2013 the following activities were undertaken:

- encouragement of proper farming practices
- sustainable land management and water security within the Yallahs River and Hope River Watershed Management Units
- four hundred (400) farmers from all four LFMCs registered in Agro-forestry programme and
- a Forest Fire Management Plan was completed in 2013 to guide the Forestry Department and other key stakeholders in planning for, preventing and managing forest fires.

2.4.10. National Spatial Plan

National Outcome #15 of Vision 2030 focuses on Sustainable Urban and Rural Development with a national strategy to create a comprehensive and efficient planning system. Under the national strategy, the sector strategy outlines the development and adoption of mechanisms for better integration of spatial models and tools for decision-making. Actions include the review of planning instruments such as Density Guidelines, Green Development Standards and Settlement Strategy.

One priority area involves strengthening/improving the country's spatial data by identifying spatial data gaps in the current inventory. There is on-going data collection and verification as part of the National Spatial Planning Process. In addition, the National Spatial Data Infrastructure Development Process by the Land Information Council of Jamaica (LICJ)/National Spatial Data Management Division (NSDMD) continues.

Chapter 3. An Assessment of the Progress Towards Implementation of Biodiversity Conservation Activities aligned with the Strategic Plan 2011 – 2020 including Aichi Targets and the relevant 2015 Millenium Development Goals

3.1 Progress towards implementation

An assessment of Jamaica's progress towards the implementation of biodiversity conservation activities aligned with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets, and contributions to the relevant 2015 targets of the Millennium Development Goals (MDGs) is presented in Table 11. Using a coded traffic light system, Jamaica's progress in achieving the targets outlined is depicted using broad-based proposed indicators.

Information obtained from relevant stakeholders including Government Agencies and Non-Government Organisational sources provided the potential means to measure the level of progress for each target. Potential indicators are presented with guidance from the CBD indicator framework for the Strategic Plan and its Aichi Targets.

Table 11. Progress Towards the Aichi Targets and MDGs

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Millennium Development Goals:				
MDG 1 – Eradicate extreme poverty and hunger Target 1B – Achieve full and productive employment and decent work for all, including women and young people	• NEPA funded C-CAM: Alternative Livelihood Project – 2012-2013: The project entailed the provision of Grants to a bee farmer in Mitchell Town and C-CAM to implement projects which would provide alternative livelihoods that were less vulnerable to Climate Change. This included the training of young persons in bee farming and the establishing of 2 hives in Mitchell Town & Salt River, Clarendon (C-CAM had administrative responsibilities for that project). • The Ministry of Agriculture	Create opportunities for alternate livelihoods in communities that depend heavily on natural resources.		Number of alternate livelihood activities.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
		Good Progress	Slow Progress	No Progress/Insufficient information
	Implementation Actions	Key Outcomes	Progress towards Aichi Targets and MDGs	Potential Indicators
	and Fisheries' alternate livelihoods ventures have been supported in five marine communities inclusive of Marine Protected Areas:- (Negril, Montego Bay, Portland Bight, Westmoreland and St. Thomas) 2012-2015. The activities promoted include: Apiary, construction of Marker Buoys, establishment of a Palm Nursery, Sea Moss farms, and ecotourism activities.			
MDG 7 – Ensure Environmental Sustainability Target 7A – Integrate the principles of sustainable development into country policies and	• Since 2010 the FD has developed and implemented Forest Management and Strategic Plans. A Forest Management Plan for the Cockpit Country's Forest Reserve was completed	Policies developed towards the protection and sustainable development of environmental resources.		Number of policies and programmes implemented.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
programmes and reverse the loss of environmental resources	and approved in 2012. • A Forest Fire Management Plan was completed in 2013 to guide the Forestry Department and other key stakeholders in the planning for, preventing and management of forest fires. • The revision of the Forest Policy was done through a series of consultations, drafts and reviews. • A National Plant Conservation Strategy is being drafted. • A National Invasive Alien Species Strategy and Action Plan (is being drafted. • A Protected Areas System Master Plan (PASMP) has been drafted. • The Fisheries Policy is being reviewed.			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	• The Wildlife Trade Policy is in draft. • The Biosafety Policy is in draft.			
Target 7B – Reduce biodiversity loss; achieving, by 2010, a significant reduction in the rate of loss: • Protected ecosystems cover 15.2 per cent of land and 8.4 per cent of Coastal Marine Areas worldwide by 2014.	Jamaica's Protected Areas cover approximately 18% of the country's land area as well as 15% of its archipelagic waters.	Continued establishment of PAs to minimise habitat loss and associated ecosystems and species decline.		Number of Protected Areas established. Trends in land-use.
Aichi Biodiversity Targets:				
Target 1 – Awareness increased.	Ongoing outreach activities by several organizations such as the Natural History Museum of Jamaica (NHMJ), Environmental Government	Increased awareness of biodiversity conservation in schools and communities.		Trends in awareness and attitudes to biodiversity (KAPs and other survey outcomes).

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	and Non-Government Organizations. Biodiversity messages through the electronic media by way of time signals were ongoing. Public awareness programmes under Grant-funded projects such as MTIASIC to include: - Knowledge, Attitudes and Practices (KAPs) survey in 2012 on IAS in the Portland Bight Protected Area to guide the implementation of the public awareness and sensitization activities. - Lionfish 'Eat it to beat it' campaign, 2012-2013. - Black River Enviro Road Show, exposition and sports day, 2013. Other community activities:			Trends in public engagement.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	- Lower Martha Brae Watershed community sensitization: to sensitize communities in the Lower Martha Brae (Greater Falmouth, Salt Marsh, Coral Spring-Mountain Spring, Cooper's Pen, etc.) on environmental issues in coastal communities, 2013. - Public displays and exhibitions (by Environmental Agencies), in recognition of UN signature events such as Biodiversity Day, World Wetlands Day etc.			
Target 2 – Biodiversity Values integrated.	Government Officers trained in Natural Resources Valuation (NRV) Techniques (2010-2013). Ecosystem Service Valuation of the Cockpit Country, 2011-2012.	Increased priority to conduct Economic Valuation of Biodiversity and Natural Resources Valuation.		Application of economic appraisal tools. Increased NRV in protected areas.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 3 – Incentives reformed.	Forestry Department offers tax remissions to private land owners, (once land is declared as a Forest Reserve); a form of incentive for conservation and sustainable use of biodiversity.	Incentives created across sectors to promote biodiversity conservation and minimize or avoid negative impacts on biodiversity.		Establishment of incentives that reward positive contribution to biodiversity.
Target 4 – Sustainable Consumption and Production.	• In the Fisheries sector the Special Fishery Conservation Areas (SFCAs) Regulations came into force in 2012. • Closed seasons for sharks, sea urchins and sea cucumbers were established in 2013. • Regular monitoring of fishing quotas for Queen Conch by the Veterinary Services Division (VSD) and the Fisheries Division • Implementation of a	Steps taken to control the production and consumption of natural resources.		Establishment of limits/quotas for species including species in trade. Establishment of reserves and special conservation areas to regulate access for sustainable production.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	strategy or strategies under the National Socio-economic Policy Framework within Vision 2030, which includes taking steps to reverse unsustainable use of fisheries by enhancing monitoring, control, surveillance and enforcement of fisheries regulations. • Forestry Department's 2013 submission for the declaration of 13 additional Forest Reserves. Activities under the EU-CCA & DRR project during 2010-2013 include: - The Forestry Department's Reforestation Activities and Sustainable Livelihoods with Local Forest Management Committees (LFMCs).			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
		Good Progress	Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	- Increased community involvement to promote agro-forestry. - Sustainable land management and water security within the Yallahs River and Hope River Watershed Management Units.			
Target 5 – Habitat Loss Halved or Reduced.	• Reforestation of over 200 hectares of land in 2012 islandwide. • Reforestation activities under the EU-CCA&DRR project 2010-2013 to include 405 ha reforested; led by the Forestry Department. • Reforestation of 40 hectares in the Blue and John Crow Mountains National Park between 2010 and 2013 led by the Jamaica Conservation	Increased forest cover and repopulation of coral cover.		Trends in forest cover and coral reef condition.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
		Good Progress	Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	Development Trust. • Mangrove replanting in over 800 m^2 area in Hellshire between 2010 and 2013. • Additional artificial reef structures were installed in Bluefields Bay SFCA (Westmoreland) and Montego Point SFCA in 2011. • Under the GOJ/EU CCA &DRR project in 2013, there was the reforestation of 7.0 ha of mangrove forest and 1 000 m^3 of sea grass beds in Negril; and installation of an artificial reef in Negril Marine Protected Areas (NMPAs). Agricultural activities included: - Farmer/ stakeholder disaster awareness, and			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	training in Agriculture Disaster and Risk Management (ADRM) to include cultivation of crop/ bamboo/ trash barriers for retention of soil on hillsides; re-forestation; construction of proper drainage and water channels, retention walls, cover crops, minimum tillage, gully plugs and individual basins.			
Target 6 – Sustainable Management of Marine Living Resources.	• 2011 amendment of the Fishing Industry Act (1976) which imposed bans on: o construction of fish traps using any type of material; including mesh wire and nets that have mesh sizes less than one and a half (1 ½) inches o fishing at nights during the hours of 6 p.m.	Increase in size and biodiversity of fish and overall biomass.		Trends in catch per unit effort (Queen Conch). Trends in population and abundance of reef fish species. Development and implementation of recovery plans.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	and 5 a.m. using any impaling device (e.g. spear guns, Hawaiian sling, etc.). • Special Fishery Conservation Areas (SFCAs) Regulations came into force in 2012. • Regular monitoring of fishing quotas for Queen Conch by VSD and Fisheries Division.			
Target 7 – Sustainable Agriculture, Aquaculture and Forestry.	• Agriculture - The Rural Agricultural Development Authority (RADA) promoted best animal husbandry practices via farmer trainings and demonstration of drought adaptation technologies.	Improved farming techniques and strategies		• Trends in land use and PA coverage. • Type and extent of vegetative cover.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
		Good Progress	Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	- Water harvesting strategies are being widely implemented (roof top water harvesting, construction of lined ponds, use of low energy demand gravity drip irrigation systems, rehabilitation of community water tanks, installation of water tanks on farms). - Policy development in 2012 to include the Food and Nutrition Security Policy and the Animal Health and Welfare Policy. - I n 2012, the Climate Change Adaptation Fund Board approved the GOJ/Adaptation Fund			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	Programme - Enhancing the Resilience of the Agriculture Sector and Coastal Resources to protect Livelihoods and improve Food Security. • Aquaculture Aquaculture will for the first time be governed by provisions under the revised Fishing Industry Act. • Forestry - Since 2010 the FD has developed and implemented Forest Management and Strategic Plans. A Forest Management Plan for the Cockpit Country's Forest Reserve was completed and approved in 2012 - A Forest Fire Management Plan was completed in	To increase the overall climate resilience of the agricultural sector		

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:							
		Good Progress		Slow Progress		No Progress/Insufficient information		
	Implementation Actions		Key Outcomes		Progress towards Aichi Targets and MDGs		Potential Indicators	
\	2013 to guide the Forestry Department and other key stakeholders in planning for, preventing and managing forest fires. - Establishment of 13 Local Forest Management Committees (LFMCs) as of 2013. - Revision of the Forest Policy through a series of consultations drafts and reviews.							

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 8 – Pollution Reduced.	• National Water Quality Monitoring Programme established in 2011 in an effort to sustainably manage the island's watersheds and coastal areas. • The Kingston Harbour Environmental Management Programme (KHEMP) project was implemented in 2010 by NEPA for the regulation of companies that operate along the rim of the Kingston Harbour. This resulted in a reduction of the emission of effluent into the harbour thereby reducing pollution levels. • 2013 establishment of a community-based First Responder Initiative	Increased compliance by industries and wastewater facilities to reduce water pollution. Levels of pollution in critical ecosystems are contained and controlled.		• Trends in water quality in aquatic ecosystems. • Trends in pollution deposition rate. • Trends in emission of pollutants into the atmosphere. • Trends in fertilizer and agro-chemical imports.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:							
		Good Progress		Slow Progress		No Progress/Insufficient information		
	Implementation Actions		Key Outcomes		Progress towards Aichi Targets and MDGs		Potential Indicators	
	whereby community members collect water samples for testing in response to pollution incidents. • The Wastewater and Sludge Regulations of 2013 mandate all Wastewater Treatment Facilities to become licensed by 2014. • An Air Quality Unit was established at NEPA in 2010. The Unit continuously monitors emissions by industries which are required to submit monthly reports.							

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 9 – Invasive Alien Species prevented and controlled.	Implementation of the Regional Project on Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MTIASIC) in 2009-2014. Outputs during the 2010-2013 period include: - Drafting of a Pet-Trade Pathway Toolkit and the - Development of a National Invasive Aliens Species Strategy and Action Plan in 2013. - Removal of IAS from major ecosystems across the island (to include the Lionfish from marine ecosystems, melaleuca and alpinia from the Lower Black River Morass; and trapping of mongoose, feral cats and other predators of the native Iguana from the Hellshire Hills.	Steps taken towards the early detection, control and/or eradication of IAS and the implementation of measures to prevent introduction and establishment.		• Trends in abundance and distribution of IAS. • Trends in IAS pathways management.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	- Public awareness activities in communities surrounding the target sites of IAS removal. - Re-establishment of the National Invasive Alien Species Working Group (IASWG). - Drafting of the Lionfish Adaptive Management Plan for Jamaica. Jamaica Clearing House Mechanism (Ja-CHM) continued upgrading of IABIN Invasive Information Network (I3N) database to develop the National Invasive Alien Species database. In 2013 the Ja-CHM acquired an open source searchable IABIN invasive Species database template, scheduled to house data on species invasive to Jamaica, included fields for taxonomic			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	identification of invasive species and description of their pathways. See http://apps.licj.org.jm/jamaica-invasives.			
Target 10 – Pressures on vulnerable ecosystems reduced.	• A multi-sectoral Action Plan for Corals and Reefs (APCAR) was developed in 2011 as a guide to enhance effective management of corals and reefs. • Development of a Coral Reef Health Index Report Card in 2011 for monitoring the status of coral reefs through assessments. • National project on Climate Change Adaptation and Disaster Risk Reduction (Restoration of Coastal Ecosystems), 2010-	Steps towards reduction in anthropogenic pressures on vulnerable ecosystems.		Trends in coral reef conditions.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	2013 carried out by Government Agencies across sectors. The project's main objective was to increase resilience and reduce risks associated with natural hazards in vulnerable areas, as adaptive measures to climate change.			
Target 11 – Protected Areas increased and improved.	National Project on Strengthening the Operational and Financial Sustainability of the National Protected Area System (NPAS) started in 2010. The project aims at: - Strengthening financial planning and revenue generation. - Rationalizing and integrating the National System of Protected Areas. - Increasing the effectiveness of protected	1. Establishment of a Protected Areas Trust Fund and Revolving Fund. 2. Drafting of National Protected Areas Legislation and supporting legal framework. 3. Creation of a new and expanded PA network. 4. New and updated		• Trends in Protected Areas coverage. • Trends in management effectiveness of Pas.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	area management. - Declaration of Special Fishery Conservation Areas (SFCA) formerly Fish Sanctuaries under the 2012 Special Fishery Conservation Areas Regulations (See Section 2.4.6.1. p.52). - Submissions were made in 2013 for the declaration of 11 Forest Management Areas and 13 Forest Reserves.	Protected Areas Management Plans.		

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	Key Outcomes	Progress towards Aichi Targets and MDGs	Potential Indicators
Target 12 – Extinction prevented.	• Continuation of the Iguana Headstart Programme at the National Hope Zoo. • Recovery of populations of the critically endangered Jamaican Iguana yielded success (2010-2013) through Jamaica's pilot project for the regional MTIASIC project (See Figure 5, p.20). • Jamaica Environment Trust (JET) in collaboration with the Portland Environment Protection Association (PEPA), the Bluefields Bay Fishermen's Friendly Society, and the Treasure Beach Turtle Group implemented a Sea Turtle Monitoring Project[23] 2010-2011 in three parishes:	Increased populations of threatened species; conservation status improved and maintained.		Trends in abundance and distribution of threatened species.

[2323] http://www.jamentrust.org/conservation/jamaica-sea-turtle-project.html

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	Portland, St. Elizabeth and Westmoreland, through finding from the Environmental Foundation of Jamaica and the Canada Fund. • The Natural Resources Conservation Authority provided support to several NGOs in 2013 to conduct Sea Turtle monitoring activities.			
	• Completion and revision of Recovery and/or Management Plans for endangered and threatened species; including the American Crocodile (2011), Jamaican Hutia (2010) and Sea Turtles (2011).			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 13 – Genetic diversity maintained.	• Development of Plant Conservation Strategy for Jamaica in 2013 which represents the country's commitment to conserving and protecting its high plant diversity and endemism for the environmental and socio-economic well-being of its people.	Strategies in place to minimize genetic erosion.		Trends in the number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources.
	• The Scientific Research Council (SRC) maintains an *in-vitro* gene bank that hosts 135 species of plants of economical, medicinal and cultural importance and those endemic to Jamaica. • Development of irradiated tissue culture of ginger and sweet yam plants, that are resistant to ginger rhizome rot and anthracnose			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	Key Outcomes	Progress towards Aichi Targets and MDGs	Potential Indicators
	respectively. The project was a collaboration among SRC, Ministry of Agriculture and Fisheries and the International Atomic Energy Agency (IAEA) and ended in 2011. • Ministry of Agriculture and Fisheries' Bodles Research Station *in-situ* and *ex-situ* ongoing conservation programmes, with *in-vitro* banks housing semen and embryos. • The establishment of Forest Reserves to protect and preserve the genetic diversity that exists within those pre-defined areas			
Target 14 – Ecosystems and essential services safeguarded.	• 2013 development and implementation of a community based Water Quality First Responder Programme in response to	Increased community involvement in safeguarding ecosystems.		Trends in ecosystems restored or being restored.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	pollution incidents. Special areas targeted, include Ramsar sites such as the Black River Lower Morass and other Protected Areas, including the Montego Bay Marine Park, and watershed areas. Following the completion of the GEF funded project "Integrating Watershed and Coastal Areas Managemment (GEF-IWCAM)" in 2010, NEPA commenced the implementation of the Watershed Area Management Mechanism (WAMM). WAMM is aimed at providing watershed stakeholders, Government Agencies, NGOs, funding Agencies and ordinary citizens with a simple, practical			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
		Good Progress	Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	and flexible method of achieving sustainable watershed management. Reforestation activities by the FD are aligned with forest-dependent community involvement; gender equity is enforced to ensure that the social safeguards are addressed and respected.			
Target 15 – Ecosystems restored and resilience enhanced.	• Reforestation activities led by the Forestry Department focused on re-establishing degraded sites with the emphasis on carbon stock conservation and enhancement.			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 16 – Nagoya Protocol in force and operational.	• Limited information obtained on activities implemented during the 2010-2013 period.			
Target 17 – NBSAPs adopted as policy instruments.	During 2010 -2013, several activities were undertaken towards the implementation of activities outlined in the NBSAP 2003 (See table 8, Chapter 2). Updated NBSAP not developed during the period outlined.	Updated NBSAP to be developed as a policy document and implemented in a participatory manner.		Number of activities implemented under the updated NBSAP.
Target 18 – Traditional knowledge respected.	The development of Local Forest Management Committees (LFMCs) is to ensure that social and environmental safeguards are addressed and respected for the benefit of all. Six (6) LFMCs were established between 2010 and 2013.			

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
Target 19 – Knowledge improved, shared and applied.	• Continued activities of the Jamaica Clearing-House Mechanism through the guidance of the cross-sectoral CHM Steering Committee, in sharing biodiversity and related information including ongoing development of the Jamaica CHM Website, regular publication of CHM's electronic newsletter, responding to data and information requests, participation in national programmes and activities, CBD updates and periodic biodiversity related projects. • Active participation of research institutions including the University of the West Indies on several	Measures in place for research and knowledge creation and widespread sharing and application.		• Frequency of CHM updates. • Tracking of hits to the CHM website.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress		Slow Progress	No Progress/Insufficient information
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	biodiversity and related national Committees where research updates are shared. • Memoranda of Understanding between NEPA, and research Agencies and Institutions to include, the University of the West Indies, Institute of Jamaica, the Scientific Research Council and Northern Caribbean University.			
Target 20 – Financial resources from all sources increased.	Between 2010 and 2013, several biodiversity projects were either at the stage of commencement, implementation or completion. These include national projects where several Agencies across sectors partnered, and small Grants projects carried out by	Sustained financing mechanisms in place.		• Trends on donor funding. • Number of local and international financing options.

MDG/Aichi Biodiversity Target	Progress towards the Aichi Biodiversity Targets and contributions to the relevant Millennium Development Goals (MDG) Colour Code:			
	Good Progress	Slow Progress	No Progress/Insufficient information	
	Implementation Actions	**Key Outcomes**	**Progress towards Aichi Targets and MDGs**	**Potential Indicators**
	NGOs (See Table 10, Chapter 2: Biodiversity Projects) Funding sources include international facilities such as GEF and local funding facilities such as the NRCA and Tourism Enhancement Fund.			

.4. Conclusions

3.2.1 Contribution of Activities to Aichi Targets and relevant MDGs

Despite the absence of an updated NBSAP for Jamaica in 2013 and associated national targets, Jamaica has implemented a number of projects and activities that contribute to obtaining steady progress towards achieving the Strategic Goals and Aichi Targets, in addition to the relevant Millennium Development Goals. Major projects undertaken include the regional MTIASIC project, the GOJ/EU CCA & DRR project and the NPAS project. The combined efforts of several Government and Non-Government Agencies in the implementation of these projects at the national level resulted in the development of several policy instruments such as the National Invasive Alien Species Strategy and Action Plan (NIASSAP) and several Protected Areas Management Plans. Activities such as alternate livelihood projects in several communities, reforestation activities, increased enforcement and public awareness strategies yielded positive results and produced significant advancements towards achieving many of the targets.

Progress was slow in achieving targets related to the use of incentives, the Nagoya Protocol on Access and Benefit Sharing and the Cartagena Protocol on Biosafety. The implementation of these articles of the Convention will therefore require increased prioritization in the updated NBSAP for Jamaica. While several policy instruments have been developed in the 2010 to 2013 period, increased efforts to finalise several drafts such as the Biosafety Policy, and others relating to species management such as the Dolphin Policy will require increased attention in the updated NBSAP.

3.2.2. Future Priorities and Capacity-Building Needs

Based on the constraints identified by stakeholders, areas of priority will include:

- increase in financial resources;
- increase in training of Park Rangers for more effective monitoring and enforcement;
- increase in species monitoring mechanisms utilizing a citizen scientist approach;
- increase in cooperation among researchers in providing data;
- revised public awareness strategies with more effective messages;
- revised outdated legislation; and
- increased collaboration among Agencies across sectors in conservation efforts.

3.2.3. Suggested National Actions to Enhance Implementation of the Convention

Successful implementation of the Convention will require continued close collaboration among all stakeholders, the availability of a wide range of skills supported by adequate financial resources and reliable technology. Based on the lessons learned in the implementation of the first NBSAP for Jamaica, a number of significant changes in approach to the implementation of the Convention will have to be undertaken. The establishment of an entity with sole responsibility to monitor and promote the implementation of projects and activities is highly recommended.

The implementation of Medium Term Policy Frameworks in monitoring Jamaica's progress towards the National Goals in Vision 2030 will support the tracking of progress towards achieving biodiversity conservation targets that have been mainstreamed into sectoral and cross-sectoral plans and policies.

Appendix I – Information on the Reporting Party and preparation of the Fifth National Report

A. REPORTING PARTY

Contracting Party	Jamaica
NATIONAL FOCAL POINT	
Full name of the Institution	Ministry of Economic Growth and Job Creation
Name and title of contact Officer	Gillian Guthrie - Senior Director, Environment and Risk Management Division
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CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the Institution	
Name and title of contact Officer	
Mailing address	
Telephone	
Fax	
E-mail	
SUBMISSION	
Signature of Officer responsible for submitting National Report	
Date of submission	27.05.16

B. Process of Preparation of National Report

The preparation of the Fifth National Report was carried out by a series of consultation exercises with the relevant Ministry, NGO and CBO representatives with responsibilities for the management and protection of Jamaica's ecosystems and resources. Consultations were done

via a combination of face to face interviews, focus groups and stakeholder consultations on the Eastern and Western ends of the island. Information was also obtained via email correspondences to include the distribution of targeted questionnaires to stakeholders. A draft report was prepared based on literature reviews and information obtained. The draft report was reviewed by the project's Technical Working Group, a multi-sectoral Committee comprising representatives from Government and Non-Government Institutions.

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Appendix III - Additional Information

GOJ Policy Development Programme as at December 31, 2013

Key: 1. *Cabinet Office advised of intention to create policy* 2. *Initial Concept Paper drafted* 3. *Plan of Action prepared and submitted to Cabinet Office* 4. *Policy Document being prepared* 5. *Public Consultation in progress* 6. *Policy submitted for approval by Cabinet* 7. *Policy approved by Parliament*

Ministry	Policy	Purpose	Stage of Development
Agriculture and Fisheries	Animal Health and Welfare Policy	This Policy has been spearheaded in order to harmonize and strengthen the regulatory, legislative and institutional framework governing the animal health and welfare system, in keeping with the standards established by the World Organization for Animal Health and the CODEX Alementarius Commission – "the global reference point for consumers".	4
	Food Safety Policy	This policy aims to implement programmes that promote high standards of food hygiene and maintain systems of surveillance and control to ensure compliance with those Standards.	7
	National Organic Policy	This policy will cover organic food and farming systems. It will address accreditation of certification bodies, development of National Organic Standards and legislation that will govern the production and trade of organic food. It will also address Government's role in marketing, research and development and the provision of extension services and removal of fiscal disincentives to the Organic Agricultural Sector. Capacity building among farmers and Extension Officers will also be addressed by this policy.	4
	Food and Nutrition Security Policy	The Food and Nutrition Security Policy will: (i) Define the food and nutritional goals that are to be met so that the country's agriculture and food systems can deliver adequate and nutritionally appropriate quantities of food, especially to low-income and vulnerable groups; (ii) Make prescriptions for a structured food import	7

		replacement program and a re-orientation of food imports and the food distribution system, to increase the availability of good quality-nutritious foods in Jamaica.	
	Agricultural Land Utilisation Policy	The goals of the policy are to : (i) Ensure environmentally sustainable use of agricultural land resources; (ii) Create and maintain a diversified, dynamic and progressive utilization of agricultural land; (iii) Conserve, protect and manage forest lands that will lead to sustainable economic and social benefit; (iv) Enable and facilitate developmental/ welfare activities through infrastructure and support services; and (v) Maintain National Food Security	5
	National Fisheries and Aquaculture Policy	The proposed National Fisheries and Aquaculture Policy will provide a framework for the formulation of strategies designed to address important issues, challenges, and opportunities facing the Industry. The promulgation of the policy comes at a critical juncture for the Fisheries Division in its transition to an Executive Agency of Government and being given more autonomy to protect and develop the nation's fisheries. The policy is urgent and will be critical to the new Agency as it seeks to carve out its mandate and provide guidance to the new Agency's activities going forward.	4
Foreign Affairs & Foreign Trade	Cays Management Policy	To develop a well-defined Multi-Agency, Regulatory Framework for the effective management of the cays, in recognition of the number of activities which threaten the sustainability of the ecology and economy of the cays which are of significant ecological, economic and geo-political importance to Jamaica	4
Transport, Works and Housing	National Squatter Management Policy & Implementation Plan (proposed)	To provide a framework for the effective management of squatting in Jamaica.	2
Tourism and Entertainment	Water-Sports Policy for Recreational	This policy, which would be an accompanying document to the	4

	Areas	National Oceans and Coastal Zone Management Policy, should also engender environmental management and protection of the Marine and Riverine environment	
Water, Land, Environment and Climate Change	Beach Policy	To provide guidelines for the use of the foreshore, beach and floor of the sea. Addresses issues of public access, coastal erosion, cays and fishing beaches	4
	National Policy and Strategy on Environmental Management Systems	To establish the framework within which an organization (private or public) can improve its performance, by addressing the impacts of its products, processes, and services on the environment.	5
	Policy on Environmental Stewardship of Government Operations	To promote environmental stewardship principles within the operations of the Public Sector by setting out measures towards the reduction and elimination of unsustainable production and consumption patterns, with particular focus on resource conservation, pollution prevention, occupational health and safety, waste reduction, green procurement and more effective and efficient management of assets.	5
	Towards a Watershed Policy for Jamaica	To provide guidance towards the integrated management, protection, conservation, and development of land and water resources in watersheds for their sustainable use and for the benefit of Jamaica as a whole.	4
	Biosafety Policy	To provide an institutional framework for biosafety in Jamaica	4
	National Hazardous Substances and Hazardous Wastes Management Policy and Strategy	To reflect, inter alia, recommendations arising out of the Hazardous Wastes Management Policy Framework. The Policy will address priority areas for attention, institutional arrangements and guiding principles.	4
	Orchid Policy	Conservation and management of endangered orchids including those listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora.	6
	Policy Towards Dolphin Conservation	To provide for dolphin conservation and dolphin attractions management.	5

	Coastal Resources and Wetlands Policy (a combination of the Mangrove and Coastal Wetlands , Sea grass and Coral Reef draft Policies)	To establish guidelines for the protection and conservation of coral reefs, sea grass, mangroves and coastal wetlands.	4
	Mariculture Policy	To establish guidelines for mariculture.	2
	National Land Policy (Revision)	To review and update National Land Policy (1996).	4
	Hillside Lands Subdivision Policy	To prepare a national policy to guide the subdivision of lands in hillside areas.	4
	Wild Life Trade Policy	To provide guidelines for trade in wild flora and fauna.	4
	Water Sector Policy	i.To establish the current water supply needs and source availability; ii. To provide an indication of the short, medium and long term costs to provide total access to safe potable water; iii. Establish a new realistic timeframe for the provision of 'fill access' to the population; iv. Examine the effectiveness of other modalities noted in the current Policy. v. Other issues.	4
	Climate Change Policy and Action Plan	This Climate Change Policy Framework and Action Plan is intended primarily to support the goals of Vision 2030 by reducing the risks posed by climate change to all of Jamaica's sectors and developmental goals. It outlines the strategies that the country will employ in order to effectively respond to the impacts and challenges of climate change; through measures which are appropriate, for varying scales and magnitudes of climate change impacts.	5