



**USAID**  
FROM THE AMERICAN PEOPLE

# TROPICAL FOREST AND BIOLOGICAL DIVERSITY ANALYSIS

SUMMARY REPORT FOR EASTERN AND SOUTHERN CARIBBEAN COUNTRIES

ANTIGUA AND BARBUDA – BARBADOS – DOMINICA – GRENADA – GUYANA  
ST. KITTS AND NEVIS - ST. LUCIA - ST. VINCENT AND THE GRENADINES  
SURINAME - TRINIDAD AND TOBAGO



September 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by The Cadmus Group, Inc. and Sun Mountain International

Photo credit: Charles Hernick. Reef in Barbados.

# TABLE OF CONTENTS

INTRODUCTION.....	1
METHODOLOGY .....	2
GENERAL DESCRIPTION OF THE REGION AND ECOSYSTEM AND SPECIES DIVERSITY.....	2
POLICY AND INSTITUTIONAL FRAMEWORKS.....	3
LEGISLATION .....	4
INSTITUTIONS.....	5
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	6
PROTECTED AREAS.....	6
THREATENED AND ENDANGERED SPECIES .....	9
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	12
TYPES OF FOREST.....	12
ECONOMIC IMPORTANCE.....	12
MANGROVES.....	12
STATUS AND MANAGEMENT STRUCTURE .....	13
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	15
DIRECT THREATS .....	15
INDIRECT THREATS (ROOT CAUSES) .....	15
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	16
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS .....	17
CONCLUSIONS AND RECOMMENDATIONS .....	18
REFERENCES.....	20
ANNEX A: TERMS OF REFERENCE FOR THE FAA 118/119.....	21
ANNEX B: BIO-SKETCHES OF TEAM MEMBERS.....	27
FAA 118/119 IN-COUNTRY TEAM COMPOSITION.....	27
HOME OFFICE SUPPORT.....	29
ANNEX C: STRATEGIC ENVIRONMENTAL REVIEW.....	30

## LIST OF ACRONYMS

ADS	Automated Directive System
CBD	Convention on Biological Diversity
CCI	Caribbean Challenge Initiative
CELOS	Center for Agricultural Research
CITES	Convention on Trade in Endangered Species of Wild Fauna and Flora
DO	Development objective
ESCRAA	Eastern and Southern Caribbean Regional Country Analysis on Tropical Forest and Biological Diversity and Assessment on Climate Change Vulnerability
ESS	Environmentally Sensitive Species
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agricultural Organization
GEMS	Global Environmental Management Support
GIS	Geographic information systems
IUCN	International Union for the Conservation of Nature
MEA	Multilateral Environmental Agreement
MMA	Marine management area
MPA	Marine protected area
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental organization
NTFP	Non-timber forest products
OECS	Organization of Eastern Caribbean States
OPAAL	OECS Protected Areas and Associated Livelihoods
PA	Protected area
PAC	Protected Areas Commission
PEPFAR	President's Emergency Plan for AIDS Relief
RDCS	Regional Development Cooperation Strategy
RoSTI	Rosalie Sea Turtle Initiative
SIDS	Small island developing states
SMMA	Soufriere Marine Management Area
TNC	The Nature Conservancy
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The legal requirements for a Biodiversity and Tropical Forest Assessment are found in USAID's Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures. These requirements are derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended; the requirements are specified by FAA Section 118 "Tropical Forests" and Section 119 "Endangered Species," which require that all country plans include:

- An analysis of the actions necessary to conserve tropical forests and biodiversity; and
- The extent to which current or proposed USAID actions meet the needs.

Therefore, as part of the documentation for its new Regional Development Cooperation Strategy (RDCS), USAID's Mission to Barbados and the Eastern Caribbean (BEC) commissioned this Assessment to update the previous analysis of tropical forests and biological diversity prepared in 2008.

The purpose of the regional report is to compile the findings of the 10 accompanying country reports. To the extent possible, this regional report identifies common findings and challenges among the countries assessed. Countries assessed as part of the update for the new RDCS are the following:

1. Antigua and Barbuda
2. Barbados
3. Dominica
4. Grenada
5. Guyana
6. St. Kitts and Nevis
7. St. Lucia
8. St. Vincent and the Grenadines
9. Suriname
10. Trinidad and Tobago

During the period 2014 to 2018, the USAID Regional Program will have four focus areas: Global Climate Change, Economic Growth, Citizen Security, and HIV/AIDS. The following information is from the USAID website (USAID, 2013) and is supplemented by interviews with the USAID/BEC Mission, which provided information on future direction of the USAID program.

*Global Climate Change:* The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations (NGOs), and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

*Citizen Security:* The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

*Economic Growth:* Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

*HIV/AIDS:* Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

## METHODOLOGY

Two Assessment Sub-teams conducted the country-specific FAA 118/119 Assessments (see Annex A for the Terms of Reference for the Assessment); each Assessment Team covered five countries. Bio-sketches of Assessment Team members are in Annex B. For each country, the Assessment Team reviewed data and reports, including national reports to the Convention on Biological Diversity (CBD), the National Biodiversity Strategy and Action Plan (NBSAP), Forest Resource Assessments prepared by the Food and Agricultural Organization (FAO) of the United Nations, legislative summaries, and biological inventories. The Assessment Teams also held in-country stakeholder consultations and convened focus groups to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. In addition, the Assessment Teams also conducted a broad range of site visits, including habitat restoration sites, youth engagement programs, and economic development projects, among others.

*Information Gaps:* Significant information gaps exist related to the status and condition of marine biodiversity, wetlands, and forests. Data availability for biological resources was uneven across countries. For example, data are scarce in many of the national reports on the status and condition of wetlands, fisheries, and coral reefs. Data are lacking on the effectiveness of international donor funded programs and the status of implementation of pertinent international agreements and conventions.

## GENERAL DESCRIPTION OF THE REGION AND ECOSYSTEM AND SPECIES DIVERSITY

Most of the Eastern and Southern Caribbean countries highlighted in this assessment are part of an arc of volcanic and limestone islands, with the exception of Guyana and Suriname, which are continental to South America (Figure 1). Many of these island countries are mountainous with biologically diverse tropical rainforests, while others are low-lying limestone and coral islands. These diverse elevations contribute to high micro-climatic variability, particularly in the mountainous island countries.

A number of plant and animal species found in the region are endemic to the islands. Terrestrial wildlife on the Eastern Caribbean islands is limited to monkeys, bats, and several small mammals, such as rats and opossums, many of which are introduced species. Bird life is highly diverse, with some of the most important resting and wintering areas for migratory birds that nest in North America. The islands' freshwater fish



populations are also limited, but marine life is diverse, and supports a broad range of livelihoods, from tourism to commercial fishing. Unlike the island countries included in this assessment, Suriname and Guyana have diverse terrestrial wildlife populations. For example, Suriname has approximately 192 species of mammals, including the globally endangered giant otter, tapir, spider monkey, manatee, and giant armadillo. One hundred sixty-eight regionally endemic tree species and numerous endemic flowering plants are found in Dominica, St. Lucia, Barbados, St. Vincent and the Grenadines, and Grenada.

Historically, the marine environments of these islands were characterized by healthy fringing reefs on a narrow continental shelf. The reefs in the region support up to 60 important coral species, including elkhorn and staghorn corals as well as reef-building corals, such as mountain star coral. Coral reefs in the Caribbean represent about 9 percent of the world's mapped reefs; however most of the reefs in the southern Caribbean region are under high threat (WRI, 2013). The reefs are subject to significant stressors, including sediment runoff, rapid development, nutrient pollution, overfishing, hurricanes and storms, and climate change. Since the 1980s, algal cover on reefs has increased while coral coverage has decreased.

Figure 1: Map of Eastern and Southern Caribbean Countries Assessed



## POLICY AND INSTITUTIONAL FRAMEWORKS

The institutional and legislative frameworks for biodiversity and forest resources in the Eastern and Southern Caribbean evolved from the Stockholm, Rio, Barbados, and St. Georges Declarations as well as Agenda 21. The 1994 Barbados Declaration focused attention on the inter-dependence of environment and development in small island developing states (SIDS). It characterized the context of SIDS with respect to their vulnerable economies, small resource bases, reliance on international trade, and their vulnerability to natural disasters and the effects of climate variability and change.

Conservation of the countries' rich biodiversity is hampered by the competing forces of economic growth and national development, which are often at odds with the goals of environmental conservation and protection, especially in Caribbean countries with small land areas, where land use plans and zoning are often lacking. Shifting jurisdiction of environmental portfolios and lack of harmonization or gaps in jurisdictions further exacerbate the situation. For example, the management of mangrove areas can be complex if

management is jointly held between the forestry department and the department in charge of coastal/marine affairs, as it is in several of the countries assessed.

## LEGISLATION

Environmental legislation in the region ranges from comprehensive to completely absent. Legislation is often outdated or passage of new legislation has been delayed in the legislative body. Much legislation is not harmonized and Agency jurisdictions are unclear, as is implementation measures. Forest Acts often date back to the colonial period and in many countries, the Assessment Team notes in the country-specific reports, in need of amendment or review. Management of marine protected areas (MPA) is often hindered by lack of legislation, zoning, and management plans. The Assessment Team also frequently cited lack of national land use policies and plans as a primary barrier to biodiversity protection and forest management in the countries analyzed. For each country, the table below presents highlights of key environmental legislation and policy.

Table 1. Status of Environmental Legislation and Policy

COUNTRY	LEGISLATION AND POLICY
Antigua and Barbuda	<ul style="list-style-type: none"> <li>• Fisheries Act and Regulations were recently updated.</li> <li>• Environmental Protection and Management Bill remains in draft.</li> <li>• Marine Areas (Preservation and Enhancement) Act and Regulations (1972/1973)</li> <li>• Turtle Ordinance (1927)</li> </ul>
Barbados	<ul style="list-style-type: none"> <li>• Environmental Management Act, drafted in the 1990s, has never been approved by Parliament.</li> <li>• Coastal Management Act and the Marine Pollution Control Act have been enacted, but regulations have not been written.</li> </ul>
Dominica	<ul style="list-style-type: none"> <li>• Main challenge is the lack of a national land use policy and national development plan.</li> <li>• Legislative and policy framework for biodiversity conservation, including sustainable forest management, water, and national parks, require updating and an implementation mechanism.</li> <li>• Sustainable development is at the core of both the Growth and Social Protection Strategy and the Tourism 2010 Policy.</li> <li>• Lack of coastal zone management legislation hampers management of coastal resources.</li> </ul>
Grenada	<ul style="list-style-type: none"> <li>• Enabling legislation to implement the signed and ratified Multilateral Environmental Agreements (MEAs) is lacking.</li> <li>• A draft Environmental Bill seeks to address critical legislative gaps.</li> <li>• No integrated national land use policy or coastal zone management or its enabling legislation exist.</li> <li>• The NBSAP has only been partially implemented since its publication in 2000.</li> </ul>
Guyana	<ul style="list-style-type: none"> <li>• In 2011, the Ministry of Natural Resources and the Environment was established to consolidate responsibility for natural resources management under one ministry.</li> <li>• Under the 2009 Forest Act, the National Forest Policy and National Forest Plan of 2010, the Guyana Forestry Commission protected 16 million ha of public forest.</li> <li>• A National Land Use Plan will shortly be sent to Parliament for approval. The plan is intended to avoid conflict over land use, particularly between logging and mining industries.</li> <li>• New regulations for the import and export of wildlife have been drafted for</li> </ul>



COUNTRY	LEGISLATION AND POLICY
	<p>consideration by Parliament. If approved, Guyana would fulfill its obligations under Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES).</p> <ul style="list-style-type: none"> <li>• The Protected Areas Act (2011) provides for the establishment of a Protected Areas Commission (PAC), the creation of a national protected areas system and the establishment of a protected areas trust fund.</li> </ul>
St. Kitts and Nevis	<ul style="list-style-type: none"> <li>• National Physical Development Plan, drafted 2006, has not yet been approved</li> <li>• Master Drainage Plan passed, but not implemented</li> <li>• Fisheries Act and Regulations (updated 2002)</li> </ul>
St. Lucia	<ul style="list-style-type: none"> <li>• Department of Forestry was recently reassigned to the Ministry of Sustainable Development, Energy, Science, and Technology.</li> <li>• Implementation of the Coastal Zone Management Strategy and Action Plan (2008) is lacking because of staff shortages.</li> </ul>
St. Vincent and the Grenadines	<ul style="list-style-type: none"> <li>• An Environmental Management Act drafted in 2009 has not yet been approved by cabinet.</li> <li>• Agencies often have environmental policies in place, but they have never been approved at cabinet level, restricting their effectiveness.</li> <li>• The National Environmental Advisory Board was created to coordinate multi-sector environmental activities among government agencies, but does not meet regularly.</li> </ul>
Suriname	<ul style="list-style-type: none"> <li>• Legislation related to management of natural resources and the environment is non-existent or outdated. Where legislation exists, there is limited enforcement.</li> <li>• No coastal zone or marine management acts exist; none have yet been proposed.</li> <li>• The following policies and/or agencies are currently in draft or planning phases: <ul style="list-style-type: none"> <li>• National Strategy on Biodiversity</li> <li>• National Environmental Action Plan</li> <li>• Methodology for Ecological Economic Zoning</li> <li>• Environmental Management Agency</li> <li>• Forest Management Authority</li> </ul> </li> </ul>
Trinidad and Tobago	<ul style="list-style-type: none"> <li>• New policies include the Protected Areas Policy (2011), the National Forest Policy (2011), and the Manifesto of the People's Partnership Government (2010).</li> <li>• Marine Areas (Preservation and Enhancement)</li> <li>• Biodiversity Strategy and Action Plan for Trinidad and Tobago (2011)</li> <li>• A wildlife policy is in development.</li> </ul>

The majority of the 10 countries assessed in this report are signatories to the principal international conventions related to the conservation of biodiversity, tropical forests, and protected areas. The management of obligations under these MEAs and the degree of implementation vary widely by country, as dictated by country-specific legislation. Generally, responsibilities for management and reporting are divided among ministries of environment, planning divisions, and wildlife divisions.

## INSTITUTIONS

The presence and authority of environmental management institutions (i.e., ministries, divisions, and agencies) vary greatly among the 10 assessed countries. Countries with greater foreign direct investment, such as Trinidad and Tobago and Suriname, have more developed institutional frameworks. Trinidad and Tobago and Suriname both have established sustainable environmental funding mechanisms. Antigua and Barbuda is in the process of establishing an environmental fund. Countries participating in The Nature Conservancy's

(TNC) Caribbean Challenge Initiative are also in the process of establishing National Conservation Trust Funds (see below).

The strength of the NGO community also varies among the 10 countries, however, for most countries, the national NGO community is fairly weak and the number of local NGOs is low. For example, in Antigua and Barbuda, stakeholders noted the existence of only one biodiversity-oriented NGO. In Suriname, the strong presence of international environmental NGOs raises the visibility and strength of the sector in general; international NGOs in Suriname have helped to build a vibrant local NGO community.

While a number of institutions exist to advance biodiversity and forest conservation goals across the region, technical capacity needs to be strengthened for implementation and drafting new policies and plans; and in the NGO sector, for conceptualizing and implementing projects. Where policies are in place, the Assessment Team cites the lack of financial resources and adequately trained staff as major obstacles to implementation (see individual country reports).

## STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

### PROTECTED AREAS

Challenges for management of protected areas (PA) were common across the region. Some countries do not have management plans for all their PAs, or, where plans do exist, they are out of date (Table 2). Others, such as Antigua and Barbuda and St. Kitts and Nevis, have plans but due to lack of funding have no staff to implement them. In some cases, technical capacity of staff to implement management plans is limited. In St. Lucia the deficiencies were even more basic—some marine PAs have never been mapped or physically delineated, and the actual number of PAs is unclear. In many countries, inventories of the species present within each PA do not exist, or had not been updated in years.

In the past few years, several countries proposed new PAs; however, no progress has occurred on those proposals in St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines. Meanwhile, two new PAs totaling 1 million ha were declared in Guyana. In most cases, budget constraints already limit the management and protection of existing PAs, and funding for any additional PAs is likely to continue to constrain good management.

Direct threats to the biodiversity of the terrestrial PAs generally include poaching, illegal logging, agriculture and associated pesticide and fertilizer pollution, squatting, and erosion exacerbated by deforestation and extreme weather events as a result of climate change. Direct threats to marine PAs include overfishing, coastal development, sedimentation of coastal ecosystems, pollution, human impacts from tourism, and climate change impacts including increasing sea surface temperatures, ocean acidification, coral bleaching, sea level rise, increasing storm surges, and invasive species. Erosion contributes to sedimentation of the coral reefs (in marine PAs), which are also affected by bleaching. Gold mining was a problem specifically in Guyana and Suriname. Dominica cited invasive species as a serious issue to the country's PAs. Marijuana cultivation is a threat in St. Vincent and the Grenadines.

Despite these deficiencies, some countries have reported positive results. Dominica, for instance, has implemented two community-based programs to encourage support of national parks. Local businesses have funded a program to bring schoolchildren to the parks every year. In St. Vincent and the Grenadines, education and enforcement have been instrumental in implementing a no-catch zone, which has helped to preserve reefs important for the scuba diving industry. In St. Lucia, fish populations have actually increased since the establishment of the Soufriere Marine Management Area (SMMA).

Five of the countries included in this assessment, Antigua and Barbuda, Grenada, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines are participants in the Caribbean Challenge Initiative (CCI), supported by TNC. The CCI aims to expand MPA systems to include at least 20 percent of the participating countries' nearshore area by 2020; develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for national PA systems; and develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and over-use.

Table 2 illustrates key issues, status, and challenges of the PA system in each country.

Table 2. Protected Areas: Highlights and Issues

COUNTRY	HIGHLIGHTS AND ISSUES OF THE PA SYSTEM
Antigua and Barbuda	<ul style="list-style-type: none"> <li>• Antigua and Barbuda's MPAs have management plans but no staff.</li> <li>• Two national parks have management plans (one is a draft, the other is outdated). The rest have no plans.</li> <li>• There are no forest reserves; however, building is restricted on land above 1,000 feet in elevation. Several forest reserves are proposed as part of the draft Environmental Management Bill.</li> <li>• Nelson Dockyard is the flagship national park. Little data on the biodiversity of the park exists. A resort is proposed at the western side of the park.</li> <li>• No data have been collected on areas of Barbuda and Redondo Island that should be included in the PA system.</li> </ul>
Barbados	<ul style="list-style-type: none"> <li>• Barbados has six types of open space: Barbados National Park, natural heritage conservation areas, undeveloped coastlines, public beaches and urban parks, national attractions, and national forest candidate sites. There is only one MPA.</li> <li>• Marine areas are divided into three zones; the protection/management status of each zone is not clear.</li> </ul>
Dominica	<ul style="list-style-type: none"> <li>• Management plans exist for the three national parks, except for the marine component of Cabrits NP (funding has been obtained from Organization of Eastern Caribbean States (OECS) Protected Areas and Associated Livelihoods (OPAAL) for this plan).</li> <li>• No data on management plans for forest reserves</li> <li>• A community-based approach to managing Cabrits and a marine reserve have been implemented. For the marine reserve, local businesses and the Dominica Water-Sports Association team up with the Fisheries Division and the local management of the reserve to host schools from across the island each year.</li> <li>• Dominica is interested in establishing a biosphere reserve as part of a United Nations Educational, Scientific, and Cultural Organization (UNESCO) program.</li> <li>• Threats to PAs include agrochemicals, illegal timber cutting, development, poor practices for harvesting gommier sap, erosion and landslides, and invasive species, e.g., lionfish and seagrass (<i>Halophila stipulacea</i>). Seagrass coverage has increased from 5 percent to 90 percent in 2 to 3 years.</li> </ul>
Grenada	<ul style="list-style-type: none"> <li>• No assessments of the PA system have been undertaken to determine whether the integrity of the outstanding features or ecosystems has been maintained.</li> <li>• Four PAs and one MPA are pending. Additionally, there are approximately 50 proposed PAs.</li> <li>• Regional and global initiatives such as OPAAL form the backbone of PA management.</li> </ul>

COUNTRY	HIGHLIGHTS AND ISSUES OF THE PA SYSTEM
	<p>Without them low levels of management, lack of planning, and informal stakeholder participation arrangements would be the norm.</p>
Guyana	<ul style="list-style-type: none"> <li>• Two new PAs (1 million ha) were established under the Protected Areas Act in October 2011.</li> <li>• Two conservation areas are owned by indigenous communities under the 2006 Amerindian Act.</li> <li>• Iwokrama Forest Reserve includes intact rainforest. It is divided into two zones, the Wilderness Preserve and the Sustainable Utilization Area. Native communities within and adjacent to the reserve have access through “customary forest rights.”</li> </ul>
St. Kitts and Nevis	<ul style="list-style-type: none"> <li>• Currently, 13 PAs are proposed and one declared (Southeast Peninsula National Park).</li> <li>• Management Plan for Central Forest Reserve has been developed but not yet implemented.</li> <li>• St. Kitts and Nevis has a goal to increase the land in protected status from 5.5 percent to 10 percent.</li> <li>• Constraints to effective management of the PA system are lack of adequate management plans and staff to implement management; limited capacity in PA management; lack of supplies and equipment needed to implement management; and lack of inventories of biodiversity resources.</li> <li>• In 2010, USAID and TNC implemented a project (not yet complete) on marine zoning to recommend areas for a Marine Management Area (MMA), which would extend 2 miles out to sea. It includes an MPA, where some species can be taken and a no-take zone in the Narrows, a nursery area for lobster and conch.</li> </ul>
St. Lucia	<ul style="list-style-type: none"> <li>• The number, locations, and types of PAs have not been clearly documented. Most of the 24 MPAs have not yet been mapped in detail or delimited physically.</li> <li>• The population of reef fish within the Soufriere Marine Management Area (SMMA) has increased since it was established, suggesting that prohibition of fishing within its boundaries is working.</li> <li>• In the 2009 draft of a Systems Plan for Management of Protected Areas the National Heritage Trust proposed 24 PAs; however, no action has been taken to declare these PAs.</li> </ul>
St. Vincent and the Grenadines	<ul style="list-style-type: none"> <li>• In 2009, National Park and Protected Areas System Plan for 2010 to 2014 proposed the consolidation of existing and proposed PAs within a new PA system. The new proposed system includes 75 PAs, almost twice the present number. No new parks have been established.</li> <li>• The plan provides guidelines for effective multi-stakeholder involvement in PA system and site management. However, many currently declared sites lack the involvement of institutions, oversight, and finances to carry out proper site management.</li> <li>• St. Vincent and the Grenadines requested that UNESCO declare the proposed Soufriere National Park a World Heritage site because it contains pre-Colombian archeological sites.</li> <li>• The Forestry Department carried out reforestation and natural resource management work with citizens living within the Richmond Forest Reserve, but no formal co-management mandate has been established between the department and the parks authority.</li> <li>• Illegal marijuana cultivation poses a threat to the health of the forest ecosystems within</li> </ul>

COUNTRY	HIGHLIGHTS AND ISSUES OF THE PA SYSTEM
	<p>three of the terrestrial PAs.</p> <ul style="list-style-type: none"> <li>• The Tobago Cays Marine Park has some of the most pristine reefs and due to education and enforcement programs a no-catch zone has been successfully established. The park generates significant annual revenue from ecosystem goods and services (e.g., tourism).</li> </ul>
Suriname	<ul style="list-style-type: none"> <li>• Four new PAs are proposed.</li> <li>• As of 2002, very little data were available on the species present within the existing PAs.</li> <li>• Management plans developed in the 1990s are outdated.</li> <li>• Direct threats to the PAs are illegal gold mining, hunting, logging, farming and associated pesticide and fertilizer pollution, and turtle egg poaching.</li> </ul>
Trinidad and Tobago	<ul style="list-style-type: none"> <li>• Trinidad and Tobago is establishing a new Forestry and Protected Areas Authority to manage the PA program. This new authority should eliminate problems of jurisdiction.</li> <li>• Threats to PAs include illegal logging, illegal agriculture, poaching, fire damage, sedimentation of reefs caused by development and logging, and coral bleaching.</li> </ul>

## THREATENED AND ENDANGERED SPECIES

Many of the countries use the Red List published by the International Union for the Conservation of Nature (IUCN) as their national list of threatened species (e.g., vulnerable, endangered, critically endangered). Several countries, such as Antigua and Barbuda, Barbados, St. Vincent and the Grenadines, and Dominica, noted that data on the populations or even species present within their countries are lacking. Table 3 summarizes some of the key issues associated with managing threatened species in each country.

With regard to protecting and monitoring threatened species, some countries stated that funding is a constraint. In Suriname, the university and Tropenbos (an NGO) have conducted biological inventories, but no plans exist for regularly monitoring biodiversity; funding and technical capacity constrain implementation of a biodiversity database, which was conceptualized by a US Embassy-supported advisor. Trinidad and Tobago cited problems with jurisdiction over species. For example, manatees are under the jurisdiction of the Forestry Division when they are in river swamp, yet when they move up the coast they are under Fisheries. New policies (see Legislation section) should correct these deficiencies.

Suriname uses an additional system to protect species. Under the Game Act, all species are fully protected except for game, caged birds, and “predominantly harmful” species. Some species categorized as caged birds, such as the *twa twa*, are on the IUCN list; although experts told the Assessment Team that the bird should be considered protected, more information is needed to present the case to move it to the fully protected category; thus it remains in the caged bird category.

Marine species such as sea turtles and elkhorn and staghorn coral are found in most of the countries; each country has multiple threatened endemic species as well. Guyana and St. Lucia do not currently have policies to manage threatened species.

Several countries have developed programs and activities to conserve and recover select species, including protection of critical habitat. For instance, a conservation strategy implemented by Grenada includes delineation of new areas to protect nesting beaches for sea turtles. Environmental education in schools and within the tourism sector increases awareness about the species and their importance. In Trinidad and Tobago, the Environmentally Sensitive Species (ESS) Rules allow the Environmental Management Authority to protect threatened species with special measures; three species have so far been granted ESS designation. The country aims to declare 10 more ESSs and to develop and implement management plans for them. Candidate species for ESS designation include five species of sea turtle and the ocelot.

Table 3. Country-specific Threatened Species Management Issues

COUNTRY	THREATENED SPECIES MANAGEMENT ISSUES
Antigua and Barbuda	<ul style="list-style-type: none"> <li>• Constraints include a limited human resource pool to implement protection measures, monitoring, and research; limited financial resources; and a lack of reliable data.</li> <li>• Recently, however, a project funded by USAID supported a vegetation survey used to produce a field guide to vascular plants for the islands. The field guide was used to produce the Red List of Threatened Plant Species for the country.</li> <li>• Although the Environment Division has the mandate for coordination of Multi-lateral Environmental Agreements (MEAs), including CITES, the division is not yet statutorily authorized (Legislation is currently in draft and expected to be passed in 2013.)</li> </ul>
Barbados	<ul style="list-style-type: none"> <li>• Both elkhorn and staghorn corals are listed as critically endangered as there has been 80 percent reduction in the populations over the last 30 years.</li> <li>• Although an online database was developed in 2007 containing information on all known plant species in Barbados, according to the 2011 report to the CBD, no official national biodiversity or endangered species database has been prepared.</li> <li>• Additionally, there are gaps in the current knowledge of biodiversity classification, location and extent, pattern of distribution, and quantity in Barbados.</li> </ul>
Dominica	<ul style="list-style-type: none"> <li>• In general, data on threatened species are deficient, including information on numbers, habitats, and other characteristics.</li> <li>• Staghorn and elkhorn corals are critically endangered but populations are currently stable.</li> <li>• Rosalie Bay Resort funds the Rosalie Sea Turtle Initiative (RoSTI), which engages locals and guests in helping the recovery of sea turtles on the island. The program includes night patrol during nesting season, clean up on nesting beaches, education programs, and data collection. In 2003, there were just seven leatherback nests; by 2010, there were 69 nests of three sea turtle species, and 100 percent survival of all nesting turtle species (green, hawksbill, and leatherback). This initiative has now expanded throughout Dominica.</li> </ul>
Grenada	<ul style="list-style-type: none"> <li>• Measures to protect threatened nesting sea turtles in Grenada include protection of healthy seagrass communities and nesting beaches while prohibiting egg hunting via the inclusion of nesting areas in MPA policies and management.</li> <li>• TNC's National Protected Areas Gap Analysis in 2006 revealed that 5 percent of leatherback and 4 percent of hawksbill nesting sites were protected; while future conservation planning protected an additional 19 percent and 22 percent, respectively.</li> <li>• Conservation of the endemic Grenada dove includes legal protection from hunting and egg-collecting, and environmental education in schools as well as through ecotourism. The 2008 revised conservation and recovery plan recommended specific mitigation actions in each of the habitat patches around the country. These have been included in the development and management plans of proposed hotel and resort construction projects.</li> </ul>
Guyana	<ul style="list-style-type: none"> <li>• Data specific to Guyana are lacking on many species.</li> <li>• New regulations for import and export of wildlife are still pending thus trade in endangered/threatened species is unregulated.</li> <li>• Lack of an approved national land use plan limits biodiversity conservation</li> <li>• The Environmental Protection Agency lacks capacity in monitoring, compliance, and</li> </ul>



COUNTRY	THREATENED SPECIES MANAGEMENT ISSUES
	enforcement.
St. Kitts and Nevis	<ul style="list-style-type: none"> <li>• The Department of Marine Resources staff in Nevis conducts most of the turtle monitoring for the country. The St. Kitts and Nevis Turtle Monitoring Network collaborates with the Department of Marine Resources.</li> <li>• Critical habitats include white mangrove forests, salt ponds, and coral reefs. Coral reefs are not monitored, so status is largely unknown.</li> </ul>
St. Lucia	<ul style="list-style-type: none"> <li>• Three threatened turtles are known to nest in the island: the hawksbill turtle and the leatherback, both listed as critically endangered, and the green turtle, listed as endangered.</li> </ul>
St. Vincent and the Grenadines	<ul style="list-style-type: none"> <li>• The only special effort to conserve a threatened species is the St. Vincent parrot, one of the Lesser Antilles four surviving Amazon parrots, whose population has been reduced by capture for sale. The Cumberland and Vermont Forest Reserves provide habitat for the parrot, and biennial censuses indicate that its population may be increasing.</li> <li>• One of Union Island's few remaining intact secondary subtropical/tropical dry forests in Chatham Bay provides habitat for endemic threatened reptile species including the critically endangered Grenadines clawed gecko, endangered Grenada bank blindsnake, and vulnerable Grenadines sphaero. The Forestry Department lacks resources to enforce protection measures.</li> <li>• Coastal development and feral animals threaten IUCN-listed species.</li> </ul>
Suriname	<ul style="list-style-type: none"> <li>• The Game Act fully protects all mammals, birds, sea turtles, and two caiman species, except those designated as game animals, caged birds, and predominantly harmful species. The Act is only applicable in the western and northern part of the country.</li> <li>• Of the fully protected species, many are internationally threatened, and are on the IUCN Red List for Suriname; data specific to Suriname are lacking on many species.</li> <li>• A 2002 report cites the species most in danger of extinction are the olive ridley sea turtle, South American rattlesnake, blue poison-arrow frog, harpy eagle, black spider monkey, Muscovy duck, giant river otter, and large-billed seed finch.</li> </ul>
Trinidad and Tobago	<ul style="list-style-type: none"> <li>• The ESS Rules (2001) allow the Environmental Management Authority to provide species that are threatened with extinction with special protection through the ESS designation.</li> <li>• To date, the West Indian manatee (<i>Trichechus manatus</i>), the Trinidad piping guan or pawi (<i>Pipile pipile</i>), and the white-tailed sabrewing hummingbird (<i>Campylopterus curvipennis</i>) have been granted ESS designation. Since their designation as ESSs in 2007, the level of awareness and protection, especially by involvement of local communities, is preventing further declines.</li> <li>• The Environmentally Sensitive Areas, Species and Biodiversity Work Plan aims to declare 10 ESSs and to develop and implement management plans for them. Candidate species for ESS designation include five species of sea turtle and the ocelot.</li> <li>• Several gaps and overlaps in responsibilities for threatened species exist.</li> </ul>

# STATUS AND MANAGEMENT OF FOREST RESOURCES

## TYPES OF FOREST

The Eastern and Southern Caribbean region has several different types of forest and woodland cover. Guyana and Suriname are covered primarily by tropical rainforest. Some islands, such as Antigua, Barbados, and St. Vincent have little forest cover, while Dominica and Trinidad and Tobago have more than 60 percent coverage. Forest cover in most countries has decreased over the past 20 years: in Dominica it is decreasing at 0.5 percent per year and in Trinidad and Tobago at 0.3 percent per year. In St. Kitts, forest cover may be decreasing but data are lacking on the extent of deforestation. On several islands, deforestation may be countered by new tree planting and natural regeneration on former agricultural land. This is the case on St. Lucia, St. Vincent, and Barbados. Many countries, including Antigua and Barbuda, Barbados, and St. Kitts and Nevis have little to no primary forest left, while in Guyana and Suriname, most forest is primary growth.

## ECONOMIC IMPORTANCE

Most countries in the region do not have a commercial timber industry. Two countries, Guyana and Suriname, have a sizable timber industry. Both countries follow sustainable practices such as selective logging and tracking of all wood as it moves through the supply chain. In some islands where logging previously occurred, it has declined due to poor quality of the wood and a renewed focus on forest preservation and restoration among the new generation of government forestry staff. Non-timber forest products (NTFP) are important for commercial, subsistence, and cultural reasons. In Suriname, especially, medicinal plants are harvested and are exported to Europe. Unfortunately, birds are a popular NTFP in Suriname, and are exported for the pet trade. Due to a lack of baseline information on the harvested species, the impact of such uses is unclear, although in Suriname the pet trade has significantly affected bird and reptile populations.

## MANGROVES

Mangrove forests are important transitional forests between terrestrial and marine ecosystems. They fulfill important functions in terms of providing wood and NTFPs, coastal protection, spawning and nursery grounds, and other habitat functions. Mangroves in the Caribbean are frequently converted for aquaculture and to construct tourism infrastructure. In general, the FAO (2005) reports that mangrove deforestation continues in the Caribbean (see Table 4). Jurisdiction over mangroves is often unclear because of their location in the transition zone between terrestrial and marine ecosystems. Many of the countries evaluated in this report recognize the importance of mangroves and restrict their removal for development. However, lack of capacity and enforcement seriously hinder effective mangrove management in the region.

Table 4. Status of Mangroves in Countries Assessed

COUNTRY	AREA (ha)	STATUS
Antigua and Barbuda	1,175 (1991)	Decreasing
Barbados	10 - 64 (1999)	Decreasing
Dominica	10 (1991)	Decreasing
Grenada	230 (2000)	Decreasing, but more stable cover since 1990
St. Kitts and Nevis	75 (2000)	Decreasing, but more stable cover since 1990
St. Lucia	200 (2002)	Stable
St. Vincent and the Grenadines	45 (2000)	Decreasing

COUNTRY	AREA (ha)	STATUS
Trinidad and Tobago	6,600 (2000)	Decreasing
Guyana	76,000 (2000)	Decreasing
Suriname	96,300 (2000)	Stable

Source: FAO, 2003.

## STATUS AND MANAGEMENT STRUCTURE

The Assessment Team reviewed FAO Global Forest Resources Assessment reports and found major information gaps, in particular in forest management and legal status, forest characteristics (primary, secondary, and planted), and breakout data on forest functions, forest ownership and rights, and value of timber and NTFPs. This suggests a lack of capacity (human, technical, or financial resources) to capture and process the data. Table 5 provides key aspects of the forestry sector in each country.

Table 5. Summary of the Status and Management of Forest Resources

COUNTRY	FOREST COVER AND MANAGEMENT
Antigua and Barbuda	<ul style="list-style-type: none"> <li>• Forest cover is 22 percent. None is primary growth.</li> <li>• There is no commercial use, but there is some subsistence use and use for NTFPs.</li> <li>• The forests are nominally managed by the Forestry Unit under a forestry ordinance, but except for the ban on logging on steep slopes, the ordinance is not enforced due to lack of staff.</li> <li>• There is some overlap in jurisdiction over mangroves; these are jointly managed by the Fisheries Division and Forestry Unit.</li> </ul>
Barbados	<ul style="list-style-type: none"> <li>• Forest cover is minimal. Most forests have been cleared for development and agriculture. Only 3 percent of forests outside of Barbados National Park are protected.</li> <li>• Only 20 ha of primary growth forest are left; only 7 ha of mangroves remain.</li> <li>• Some forest may return with the recent decline in the sugar industry.</li> </ul>
Dominica	<ul style="list-style-type: none"> <li>• Forest cover is 66 percent but decreasing at 0.5 percent per year. Sixty percent of forest is primary growth.</li> <li>• Timber industry is currently minimal. Government has the authority to allow timber activity on government land as timber activity is not outlawed.</li> <li>• Caribs harvest NTFPs. The Carib Council manages indigenous-owned land.</li> </ul>
Grenada	<ul style="list-style-type: none"> <li>• Forest cover did not change significantly from 1990 to 2010, although Hurricanes Ivan and Emily caused damage.</li> <li>• Cloud forest is currently relatively well protected; proposed PAs would protect 90 percent.</li> <li>• Mangroves are only 5 percent protected; proposed PAs would protect 21 percent.</li> <li>• The government owns 69 percent of all forest/woodland.</li> <li>• Logging is declining; NTFP use is increasing and baseline data are limited.</li> </ul>
Guyana	<ul style="list-style-type: none"> <li>• Forest cover is 85 percent, primarily tropical forest. Guyana has a low-carbon development strategy supported by an agreement with Norway.</li> <li>• Logging is regulated by the Code of Practice for Timber Harvesting.</li> <li>• Guyana hopes to enter into a voluntary partnership agreement with the European Union (EU) under the Forest Law Enforcement Governance and Trade program. This</li> </ul>

COUNTRY	FOREST COVER AND MANAGEMENT
	<p>program requires tracking of each log and verification of sustainable practices in order to be allowed to sell timber in the EU. The tracking requirement helps deter illegal logging.</p>
St. Kitts and Nevis	<ul style="list-style-type: none"> <li>• Forest cover is about 42 percent. Little change has occurred in cover since 1990; however, this may be due to a lack of data. Little old growth remains.</li> <li>• There are no forest reserves; thus, unsustainable logging and grazing occur. Construction above 1,000 feet is prohibited, however.</li> <li>• There is no commercial forestry; some subsistence use occurs.</li> <li>• In addition to the Department of Agriculture and the Department of Physical Planning and Environment, two NGOs also manage some forest land.</li> </ul>
St. Lucia	<ul style="list-style-type: none"> <li>• No information on forest cover percentage in the FAO country report. There has been a slight gain in forest cover due to reforestation of agricultural land.</li> <li>• Seasonal forests are more diverse than rainforests, but they are not well protected and are at risk from invasive species. Forested swamps are also at risk.</li> <li>• Timber harvests on state land have declined as new staff focus on restoration.</li> <li>• Private forests are used for charcoal.</li> </ul>
St. Vincent and the Grenadines	<ul style="list-style-type: none"> <li>• Forest cover is 29 percent. Very little mangrove forest exists. Some forest growth has occurred recently as banana and sugar plantations revert to forest.</li> <li>• St. Vincent has one of the largest tracts of contiguous primary forests in the Lesser Antilles. It includes forests from sea level to 1,200 m.</li> </ul>
Suriname	<ul style="list-style-type: none"> <li>• Forest cover is 90 percent to 95 percent. Most of it is tropical rainforest. Only 5 percent is secondary growth. There has been little decrease since 1990.</li> <li>• The government owns 99 percent of forests.</li> <li>• Indigenous groups and maroons claim community rights, although the Constitution does not allow it. Some community forests have been designated, however.</li> <li>• Suriname uses the Center for Agricultural Research (CELOS) management system, a sustainable forest management system.</li> <li>• NTFPs, particularly medicinal uses and wildlife (birds), represent a significant economic value of forests.</li> <li>• Ecosystem services include carbon sequestration, water, food, fiber, and building materials.</li> </ul>
Trinidad and Tobago	<ul style="list-style-type: none"> <li>• Forest cover is 44 percent. The government owns 80 percent of forest. Fifty-four percent is in forest reserves. About 0.3 percent is lost per year.</li> <li>• Primary forest makes up 28 percent of the forest.</li> <li>• Trinidad and Tobago has a commercial timber industry. There is a certification program which requires adherence to guidelines issued by the International Tropical Timber Organization.</li> <li>• NTFPs are important for commercial, cultural, and subsistence uses.</li> </ul>

# MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

## DIRECT THREATS

This section is compiled from the country-specific reports; for details of the threats, see the individual country reports. Direct threats to tropical forests and biological diversity in Eastern and Southern Caribbean countries vary due to the range of ecosystems, size of the countries and extent of remaining habitat, and different levels of development, monitoring, and protection.

In most of the countries, poorly planned development and weak land use planning constitute some of the primary threats; lack of enforcement capacity is a common root cause of the direct threats. In Suriname and Guyana, mining and poorly planned development are the main threats. Overfishing and uncontrolled coastal development, including destruction of mangroves, negatively impacts coral reefs in almost all of the countries. In Antigua and Barbuda, Tobago, Grenada, St Lucia, and Barbados, infrastructure development related to tourist facilities exerts pressure on coastal resources. Finally, agricultural expansion in some countries, notably Antigua and Barbuda and St. Vincent and the Grenadines, threatens tropical forests. Poaching of wildlife for international trade is particularly problematic in Suriname and Guyana. The Indo-Pacific lionfish (*Pterois volitans*) has become widely established in Caribbean island coral reef ecosystems and poses a significant threat to reef biodiversity and commercially important fish species.

Direct threats to the biodiversity of the terrestrial PAs generally include poaching, illegal logging, agriculture and associated pesticide and fertilizer pollution, squatting, and erosion exacerbated by deforestation and extreme weather events as a result of climate change.

Direct threats to marine PAs include overfishing, coastal development, sedimentation of coastal ecosystems, pollution, human impacts from tourism, and climate change impacts including increasing sea surface temperatures, ocean acidification, coral bleaching, sea level rise, increasing storm surges, and invasive species.

## INDIRECT THREATS (ROOT CAUSES)

The following is compiled from the country-specific reports, which provide more detail on indirect threats (root causes). Indirect threats to tropical forests and biological diversity in Eastern and Southern Caribbean countries vary due to the range of institutional capacity and development in each country. However, several common themes related to indirect threats emerged from the country assessments, including the following:

- (1) Lack of a legally-enforceable land use framework and a land use policy and marine spatial planning framework and policy.
- (2) Insufficient institutional, technical, and financial capacity for enforcement of biodiversity-focused legislation.
- (3) Lack of systematic data collection across all sectors relating to biodiversity protection.
- (4) Economic development incentives work against biodiversity conservation.
- (5) Ecological goods and services provided by critical ecosystems are not typically valued (by politicians and other decision makers, and often by the public, as well) and they are not considered in national accounting and decision-making.

Table 6 summarizes the root causes of threats discussed in each of the country reports.

Table 6. Root Causes of Threats to Biodiversity and Tropical Forests

ROOT CAUSES	COUNTRIES
<ul style="list-style-type: none"> <li>• Lack of financial support for managing PAs and conserving biodiversity</li> <li>• Lack of technical capacity in and/or financial resources of government entities involved in biodiversity conservation; Lack of communication between these agencies.</li> </ul>	Barbados, Grenada, Guyana, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago
Limited systematic data collection and management of, e.g.: <ul style="list-style-type: none"> <li>• Terrestrial and aquatic biodiversity</li> <li>• Invasive species</li> <li>• Capacity of the country to manage impacts from climate change</li> </ul>	Barbados, Dominica, Grenada, Guyana, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago
<ul style="list-style-type: none"> <li>• Lack of land use planning and enforcement (and marine spatial planning)</li> <li>• Development is unplanned.</li> </ul>	Barbados, Dominica, Grenada, Guyana, St. Kitts and Nevis, St. Lucia, Suriname
Outdated legislation, slow approval process, and limited enforcement of environmental policies and regulations	Barbados, Grenada, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago
Lack of information on and awareness of socioeconomic value of ecological goods and services, importance of biodiversity;	Grenada, Guyana, St. Kitts and Nevis, Suriname, Trinidad and Tobago
Lack of political will to conserve biodiversity	St. Vincent and the Grenadines, Suriname, Trinidad and Tobago
Lack of economic development incentives (e.g. user fee system, subsidies)	Grenada, Guyana
Land tenure that does not favor conservation	Dominica, Trinidad and Tobago

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

For long-term sustainable conservation of tropical forests and biodiversity, the root causes must be addressed. This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity. Country-specific reports describe the “actions necessary” for the particular country. Generally, the following actions are applicable to most, if not all, of the countries assessed:

- Improve coordination between agencies, increase personnel, provide more funding.
- Raise awareness of politicians and decision makers, and strengthen capacity of government employees/agencies on biodiversity conservation, climate change, and environmental management.
- Perform socioeconomic and/or ecosystem services studies, establish user-fee systems, raise awareness of potential impacts.
- Develop permanent, reliable databases to house/analyze data and method for collecting data.



- Develop comprehensive land use plans and guidance for sustainable use of land and marine resources, and provide training on implementing, monitoring, and enforcing land use and marine management plans.
- Accelerate approval and implementation of/update environmental laws and regulations.
- Establish baseline data and monitor endangered species, reefs, and forests (priority species/ecosystems).
- Support alternatives to hunting, overfishing, and other activities that damage natural resources and increase threats to biodiversity.
- Require environmental review (strengthen/implement EIA procedures) and mitigation for projects.

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the RDCS was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program described in the Introduction to this report. A brief strategic environmental review is included in Annex C.

Table 7. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED USAID ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Improve coordination, including clarification of jurisdiction among key governmental agencies</li> <li>• Provide funding, training, and capacity-building for employees of governmental agencies charged with environmental management and protection;</li> <li>• Strengthen capacity of local/national NGOs and CBOs.</li> </ul>	Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.
Perform studies of the socioeconomic value and ecological goods/services of natural resources (reefs, etc.) to tourism, real estate, and fisheries	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.
Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., geographic information systems (GIS) and satellite imagery), especially for reefs and forests	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.
Develop a comprehensive land use and coastal management plan to control coastal development and protect biodiversity and important ecosystems	Focus Area 1 will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.
Acceleration of approval and implementation of/ update environmental laws and regulations	No proposed USAID focus areas meet this need.
Establish baseline data and monitor endangered species, reefs, and forests (priority species/ecosystems)	No proposed USAID focus areas meet this need.
Support alternatives to hunting, overfishing and other activities that damage natural resources and increase threats to biodiversity	<ul style="list-style-type: none"> <li>• Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and</li> </ul>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED USAID ACTIONS MEET THE NEEDS
	vocational training, business skills development, internships, and assistance with job placements. <ul style="list-style-type: none"> <li>• Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement</li> </ul>
Establish rigorous environmental review/impact assessment for projects. Ensure that fair and transparent EAs are conducted and that mitigation is implemented and monitored.	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the region’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing conservation of biodiversity and tropical forests in the region.

Under Focus Area 1, Global Climate Change, the following are priority actions. USAID should consider integrating the following into its strategic approach:

- (1) Support robust studies of the socioeconomic value and ecological goods/services of natural resources (reefs, mangroves, etc.) to tourism, real estate, and fisheries, and for cultural purposes, water provision, etc. This would contribute to conservation of these resources, which are important for mitigating the effects of climate change.
- (2) Support development of a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for reefs and forests, including training for long-term use as well as dissemination and sharing of data. The database would help guide climate-wise development, would help evaluate climate-related impacts, and could serve as early warning for impacts to biodiversity.
- (3) Develop a land use plan (LUP) to control coastal development and protect biodiversity and important ecosystems and strengthen collaboration on land use guidance and implementation. Implementation of the LUP could be part of climate change demonstration projects.
- (4) Support the development of effective marine spatial planning and marine protected areas to safeguard marine biodiversity, coral reefs, fisheries and mangroves, and to strengthen institutional capacities and collaboration in implementation and enforcement (This recommendation is consistent with a key Climate Change Vulnerability Assessment (CCVA) recommendation.)

(5) In the Caribbean, biodiversity conservation, climate change adaptation, and economic growth are tightly linked. Biodiversity is a critical foundation for tourism (e.g., coral reefs, tropical forests). Yet tourism and other economic sectors (agriculture, and hence, the region's food security) are threatened by climate change. As shown in the CCVA, climate change effects can be mitigated through biodiversity conservation. Therefore, USAID should consider aligning climate change program initiatives with biodiversity conservation efforts, particularly when climate change vulnerabilities overlap with and compound biodiversity threats. USAID should consider providing support for countries to improve management and regulation of coastal and marine ecosystems, which, in turn, will protect the natural resources that are a critical foundation for economic growth.

Under Focus Area 2 Citizen Security and Focus Area 3 Economic Growth, USAID should consider integrating the following into its strategic approach:

(1) Support for an internship program for at-risk youth to supplement staff at governmental agencies charged with environmental management and protection. Interns could help government personnel perform monitoring and enforcement for biodiversity-related agencies. Support internships and on-the-job training for at-risk youth in environmental NGOs and CBOs to help strengthen the NGO sector.

The following are broad-action areas for USAID intervention:

(1) Institutional capacity: Support a sustainable system for across the board human capacity strengthening, including supporting opportunities for training and career advancement (Country-specific FAA 118/119 Assessments recommend specific areas for capacity strengthening).

(2) Data collection and management: Support a comprehensive, reliable system to obtain, process, and analyze data on the location, extent, and condition of species and habitats. Resources should be committed to make the system accessible to the public and to translate the information to the perspectives and values of different stakeholders (Country-specific FAA 118/119 Assessments describe data gaps, recommend areas of focus for data collection, and describe possible uses of a data collection and management system.)

(3) Communication and collaboration: Strengthen community conservation buy-in and resource management through stronger education campaigns, greater collaboration (technical and financial support), and strengthening of environmental NGOs (Country-specific FAA 118/119 Assessments describe awareness raising campaigns and needs of the environmental NGO sector.)

## REFERENCES

See country-specific reports for country-specific references.

Food and Agricultural Organization of the United Nations. FAO. 2003. Status and Trends in Mangrove Area Extent Worldwide. Forest Resources Assessment Working Paper – 63. Available on the Internet at: <http://www.fao.org/docrep/007/j1533e/J1533E00.htm#TopOfPage>.

United States Agency for International Development (USAID). 2013. Barbados. Available on the Internet at: <http://www.usaid.gov/where-we-work/latin-american-and-caribbean/barbados>.

# ANNEX A: TERMS OF REFERENCE FOR THE FAA 118/119

## STATEMENT OF WORK

*Eastern and Southern Caribbean Regional*  
Tropical Forest and Biological Diversity Analysis and  
Rapid Climate Change Vulnerability Assessment  
for  
USAID/*Barbados and Eastern Caribbean's*  
Regional Development Cooperation Strategy (2013-2017)

### I. Background

The U.S. Agency for International Development (USAID) is a major partner in the U.S. Government's assistance efforts in the eastern and southern Caribbean region. Since 2005, USAID/Barbados and the Eastern Caribbean (BEC) has managed more than \$125 million in assistance designed to achieve a wide-ranging set of development results including: strengthening systems responding to HIV/AIDS, supporting improvements in the economic enabling environment, reforming juvenile justice systems and education policies, advancing country responses to climate change, enhancing democracy and accountable governance, and creating opportunities for youth. Throughout its operations, USAID/BEC has stressed the importance of reliable performance information to support effective and informed decision-making.

As part of the documentation for its new 5-year Strategic Plan, USAID/Barbados and Eastern Caribbean is required by Sections 118 and 119 of the Foreign Assistance Act to update the existing analysis of tropical forests and biological diversity in the eastern and southern Caribbean, a region comprised of the following 10 countries:

1. Antigua and Barbuda,
2. Barbados,
3. Dominica,
4. Grenada,
5. Guyana,
6. St. Kitts and Nevis,
7. St. Lucia,
8. St. Vincent and the Grenadines,
9. Suriname, and
10. Trinidad and Tobago.

In addition, USAID/BEC intends to take advantage of the technical and programmatic synergies between tropical forest and biological diversity and climate change to conduct rapid climate change vulnerability assessments for all of the 10 partner countries in the Mission's portfolio. The regional assessment will include the compilation, review, analysis and synthesis of existing information on tropical forests and biological diversity and climate change across the eastern and southern Caribbean, coupled with corroboration and feedback from key stakeholders. A list of reference documents is appended to the SOW.

Summary of relevant parts of FAA Sec 118 and 119:

From Sec 118 Tropical Forests:

*(e) COUNTRY ANALYSIS REQUIREMENTS. Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of—*

- (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and*
- (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.*

From Sec 119 Endangered Species:

- (d) COUNTRY ANALYSIS REQUIREMENTS. Each country development strategy, statement or other country plan prepared by the Agency for International Development shall include an analysis of—*
- (1) the actions necessary in that country to conserve biological diversity, and*
  - (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.*

## **II. Statement of Work**

Through the Global Environmental Management Support (GEMS) contract, an Assessment Team will conduct an Eastern and Southern Caribbean Regional Country Analysis on Tropical Forest and Biological Diversity and Assessment on Climate Change Vulnerability (ESCRAA) of Antigua and Barbuda, Barbados, Dominica, Grenada, Guyana, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

The ESCRAA will be comprised of two discrete activities and specific discrete deliverables for each activity. One is a Tropical Forest and Biological Diversity Analysis (consistent with FAA Sections 118 and 119), and the other is a rapid assessment of vulnerability to climate change in each of the 10 countries supported by USAID/BEC.

In conducting work under this contract, it is expected that the Assessment Team will engage and include input, technical contributions, and other pertinent experience and information from relevant local stakeholders. These stakeholders will be selected in accordance with their knowledge of topics within the scope of the two assessments, generally including mid to high level officials and employees of partner governments, NGOs, civil society organizations, academic institutions, religious leaders, employers, international and local donors, United Nations Agencies, intergovernmental organizations (e.g., the Organization of Eastern Caribbean States (OECS), CARICOM) and other public or private individuals and organizations active in working and/or supporting initiatives to promote tropical forest and biodiversity conservation and/or address climate change. Special attention should be paid to opinion makers, youth, and women to the extent possible.

**A. Tropical Forest and Biological Diversity Analysis (FAA Sections 118 and 119).** The Assessment Team will conduct an overall review of the current status of tropical forests and biological diversity in each of the 10 countries of the eastern and southern Caribbean covered by USAID/BEC (indicated above). This analysis will require the Contractor to:

1. Compile succinct information to describe the tropical forests and biological diversity of each of the 10 indicated countries and the region as whole, particularly their current status and trends, at both the country and regional levels. This analysis should cover tropical forests and biodiversity at the ecosystem, species and genetic level, including terrestrial, aquatic and marine diversity. This should include the identification of ecosystems, species and genetic resources that are particularly threatened, to the extent possible based on interviews and secondary sources.

The assessment should evaluate the economic and social (i.e., ecosystem service) dependency and importance of forests, and the ecological importance of forests and biodiversity to each country. It



should also describe existing resource management structures, and assess the status of forest certification programs in each country and their impacts (if any) on each country's forests.

2. Describe the factors affecting the management of these natural resources, including the principal threats and impediments to conservation and sustainable management of tropical forests and biodiversity in each of the 10 indicated countries, and identify commonalities and contradictions, if any exist, across the eastern and southern Caribbean region. This section of the assessment should provide a summary of the major issues requiring attention in order to improve the conservation of biological diversity and forest resources. It should include the principal threats and impediments to sustainable management of tropical forests and conservation of biodiversity in each country.
3. Review, on a country and regional basis, the current institutional infrastructure for the management of tropical forests and biodiversity, including a description of major organizations, both public and private, which have a role in this process. Interview key personnel of key institutions. A description should be provided of each country's governmental institutions responsible for tropical forest and biological diversity issues, and management of all natural resources, within each country. It should assess the interest and commitment of the government to the conservation of biological diversity and tropical forests, and summarize whether environmental profiles or national conservation strategies have been produced or are currently underway. The institutional assessment should also include a description of other donors and international organizations, both indigenous and external, which have a role in conserving biological diversity (including tropical forests). Their relationship with the government, membership, and principal programs should be identified.
4. Review the legislative basis, both national and relevant regional (i.e. Regional international agreements and/or standards set by the Organization for Eastern Caribbean States (OECS), CARICOM, etc.), for the protection of biological resources, including tropical forests, in each of the 10 countries (including the ratification of international treaties and agreements, and the effectiveness of national implementation). The text should also specify the environmental review and permitting requirements of the each government as they concern major donor-funded projects.
5. Identify the actions necessary to achieve sustainable management of tropical forests and the conservation of biological diversity in each of the 10 countries and by regional institutions (i.e., OECS, CARICOM, 5 Cs, etc.). Identify and recommend which of these actions are (1) the most cost effective and easiest for USAID/BEC to implement, and (2) consistent with USAID's existing strategic plan.
6. Identify the extent to which the actions proposed for support by USAID/BEC, and ongoing actions of USAID/BEC meet the needs thus identified, and recommend any further actions not described or outlined in existing or planned projects. Analyze the effects of USAID/BEC's entire proposed strategy (FY 2013 – FY 2017) on tropical forests and biodiversity in each of the 10 identified countries. Regional impacts should also be identified. In particular, the Mission's proposed program areas should be carefully reviewed. This analysis will be contingent upon USAID/BEC providing a written description of ongoing actions, and "actions proposed for support", including their geographic scope, early on during assessment and field work activities.

**B. Rapid Regional Climate Change Vulnerability Assessment** occurred simultaneously with the Tropical Forests and Biological Diversity FAA 118/119 assessments.

### **III. Timing, Schedule, USAID/BEC Engagement, Progress Reporting and Deliverables**

**Completion Deadline.** The existing strategic plan for USAID/BEC (2013-2017) aims to increase partner countries ability to adapt to climate change. The ESCRAA will re-examine and expand upon research done to inform the existing strategic plan and support the development and implementation of the Mission's Regional

Development Cooperation Strategy (RDCS) for FY 2013-2017. ESCRAA deliverables should be completed in time to inform and contribute to the draft RDCS, due by the end of September 2013. USAID/BEC anticipates the creation of a specific Development Objective (DO) to address the region's vulnerabilities to climate change.

In order to meet RDCS deadlines, the ESCRAA must conclude on or about July 19, 2013.

**Schedule.** USAID anticipates a schedule similar to the following, to be finalized in the workplan (see "deliverables," below):

- A. Desk review of assessments and other available materials, and development of a draft assessment tool; initial teleconferences with USAID/BEC staff; preparation of draft report sections in conjunction with local partners, based on secondary information (3-4 weeks)
- B. Meet with USAID/BEC in Bridgetown, Barbados and conduct Barbados assessment field work (1.5 weeks).
- C. Travel to each of the remaining nine countries covered by the Mission (Antigua and Barbuda, Dominica, Grenada, Guyana, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago) to conduct assessments. (Two concurrent field teams each covering 4-5 countries for approximately a week each, plus a one-week break period.)
- D. Post-fieldwork out-briefing with USAID/BEC and team meetings in Barbados to compare results and coordinate analysis. (0.5 weeks)
- E. Deliverable preparation/finalization and remote consultations with USAID/BEC (4 weeks)

To meet the completion deadline, this schedule requires initiating desk review work on or about 1 April.

Note: USAID does not anticipate that all members of the Team will be required for the entire estimated ~16 week performance period.

**Mission engagement/USAID commitments.** USAID/BEC staff will assist the Team with suggesting organizations and individuals for participation in the assessment, introductions, and arranging meetings. The Mission may also offer advice as to accommodation and travel options for the Team.

Note: The organizations and individuals identified by the Mission should not be considered to be an all-inclusive list of those that should inform the assessment or be consulted by the Team.

USAID acknowledges that timely and successful completion depends on USAID:

- Obligating USAID/BEC buy-in funds to GEMS on a timeline consistent with the work schedule/completion deadline.
- Providing timely feedback on draft deliverables, and making USAID/BEC staff members available for the kick-off and end-briefing
- Facilitating stakeholder contacts as described above

The Assessment Team and/or the GEMS Team Leader/designee, as appropriate, is expected to be in regular contact with the USAID/BEC activity manager to advise of and resolve any questions or issues that may arise.

Verbal status updates, in person or by teleconference, will be held with the Mission upon request throughout the project, and are not expected to last more than 30 minutes.

**Deliverables.** GEMS will submit the following deliverables for this activity.

1. **Workplan.** GEMS will submit a draft workplan no later than 15 working days after OAA obligation of the USAID/BEC buy-in to GEMS. The draft workplan must (1) cover the entire period of performance, including a timeline for drafting and finalizing all deliverables; (2) include a data collection and drafting plan; and (3) provide detailed outlines for the two deliverables specified below. The workplan is subject to review and approval by the COR.
2. Report: Regional and Country-Specific Tropical Forest and Biological Diversity Analyses consistent with FAA Sections 118 and 119. This report will contain one regional and 10 country-specific tropical forest and biological diversity analyses, fulfilling the requirements set out in section II.A of this SOW.

Note that the expected length of each country-specific assessment within the regional report is expected to be approximately 10 pages.

3. **Report: Regional and Country-Specific Rapid Climate Change Vulnerability Assessment.** This report will contain one regional and 10 country-specific rapid climate vulnerability assessments, documenting the requirements set out in section II.B of this SOW.

Note that USAID does not anticipate the regional or country-specific climate change vulnerability reports to be longer than 3-4 pages.

For both deliverables 2 & 3:

- Draft reports will be submitted on/about the last working day of Week 13. USAID will return comments at the beginning of week 15, and GEMS will submit revised, final reports 10 working days after receipt of USAID comments. (I.e. the end of week 16, if USAID provides comments as scheduled.) Final timing for these milestones will be established by the workplan.
- The regional analysis/assessment chapter of each report should follow the same general format as the country-specific analyses. It should include a comparative summary of the findings in each country and regionally, and describe commonalities and inconsistencies (if possible) among the countries assessed. As the regional analysis represents an abridged synthesis summary of the 10 constituent reports, USAID/BEC anticipates that the regional report will be significantly shorter than the country-specific analyses.

#### IV. Team Composition, Coordination and Qualifications

To enable the ESCRAA to be completed by deadline, with adequate time for desk research and preparation in order to make the most of field time, GEMS is expected to field two sub-teams which, following the initial assessment in Barbados, will undertake the remaining 9 country assessments concurrently. Each team would spend an average of one week per country, each visiting 4-5 countries. Each team will undertake *both* the biodiversity/tropical forest analyses and the climate vulnerability assessments for the countries they cover. The sub-teams are expected to have 3 members, **including at least one in-region (and, as practicable, host country) expert**. Each team must include both strong biodiversity/tropical forest and climate change expertise.

To assure coordination and consistency:

- There will be an overall lead for biodiversity/tropical forests analysis and an overall lead for climate vulnerability assessment. These leads will have responsibility for integration and consistency of the respective reports, and for assuring consistency of the field work across the two sub-teams. These technical leads will each also serve as the operational lead for one of the sub-teams.
- The sub-teams, represented at least by their leaders, will jointly (1) participate in kick-off meetings with USAID/BEC; (2) undertake the first country assessment in Barbados; and (3) convene briefly after the country assessment field work to debrief and coordinate production of the final report.

- Beyond logistics support, GEMS must provide home-office technical backstopping to assure coordination of the teams, and consistency and quality control of the resulting reports.

All team members must be fluent in English, including speaking, reading and writing. (Note: GEMS should make arrangements for Dutch language support for work to be conducted in and regarding Suriname, if needed.)

## **V. GENDER CONSIDERATIONS**

This assessments, and any surveys, studies, and reports used to support the findings, must include gender-disaggregated data, where feasible. As far as practicable in various locations and as applicable to the analyses/assessments conducted, the Contractor shall include specific assessments of perceptions, attitudes, and values of women and men and the impact of activities on both women and men in target areas.

The Contractor shall pay attention to – and highlight – gender-based constraints and issues in connection to the conduct of all deliverables. The contractor should also identify any gender trends that materialize from evaluations and assessments.

## ANNEX B: BIO-SKETCHES OF TEAM MEMBERS

### FAA 118/119 IN-COUNTRY TEAM COMPOSITION

**Karen Menczer** served as overall Team Leader for the FAA 118/119 Assessment. She has over 20 years of experience working with USAID, first in USAID/Latin America and Caribbean Bureau/Environment Office (1991 to 1997), then in USAID/Uganda as a Natural Resources Advisor, and since 2000, as an independent consultant. She has prepared over 20 FAA 118/119 Assessments, and has served as Team Leader for many of them. Ms. Menczer has designed, implemented, and evaluated USAID biodiversity and natural resources/environment projects in Latin America, the Caribbean, Africa, and Eastern Europe. She also has significant experience conducting environmental reviews of complex projects for USAID. Ms. Menczer has a B.S. in Biology, an M.S. in Ecology, and did research for a PhD in Galapagos, Ecuador.

**Thera Edwards** has worked in the environment and agriculture fields in varying capacities. Her areas of professional specialization include watershed management, vegetation ecology, biodiversity and teaching. She has written and co-authored a number of technical papers for presentation at conferences and symposia. She holds an M.Sc. degree in Environmental Management from the University of London and a B.Sc. in Environmental Sciences from The University of the West Indies. She is pursuing a Ph.D. in Landscape History at The University of the West Indies.

**Bruce Kernan** led the Sun Mountain FAA 118/119 Team. He has a master's degree in Forest Science from Yale University, School of Forestry and Environmental Studies and a Masters of Professional Studies from Cornell University in natural resources management and policy, as well as a forestry technician's degree from the New York State Ranger School, College of Forestry and Environmental Science, State University of New York. He has lived in Ecuador since assigned there as a USAID Foreign Service Officer in 1983, when he was the Project Officer for the Forestry Sector Development Project and the Integrated Rural Development Project. He was the USAID Regional Environmental Advisor for South America from 1994 to 1998. He has prepared numerous environmental assessments, project evaluations, and project designs for USAID. He has led over 20 teams of consultants, including for the preparation of FAA 118 and 119 studies for USAID in Mexico (2013), Bolivia (2013, 2002), Panama (2010), Paraguay (2009), El Salvador (2009), Colombia (2008), Ecuador (2006) and Peru (2004).

**Scott Solberg**, Executive Director of SMTN, has over 34 years of experience in agricultural systems, natural resource management and risk management, program design, implementation and evaluation, as well as in adult learning, diffusion of innovation and technology transfer. He has worked within the NGO community designing and implementing USAID-financed agricultural, food and livelihood security and economic growth projects for over 17 years, and another 15 years with private organizations. For SMTN, he has led over 120 environmental, risk management, climate change adaptation and/or development projects and training initiatives in Latin America, Asia and Africa, of which 64 have been USAID environmental compliance/ESDM- focused. Mr. Solberg holds Masters Degrees in Agricultural Development and in Community Development (emphasis in NGO management). He is near completion of a PhD in Administration of Environmental and Risk Management Systems.

**Reynold Murray** holds a PhD in Biological Sciences from Clark Atlanta University with concentrations in Environmental Resource Management and Eco-Toxicology. Between May 2004 and July 2012 he served as the Program Manager for Energy, Environment and Climate Change at UNDP, Barbados and the Eastern Caribbean. Prior to joining UNDP in 2004, he worked as the Environmental Services Coordinator in St. Vincent and the Grenadines for 8 years. In 1992, CNN captured his research on pesticide in the banana industry in St. Vincent in a documentary called Sweet Fruit Bitter Harvest. Mr. Murray has served as a visiting lecturer at Cave Hill Campus of the University of the West Indies, and has recently worked on several projects in the Eastern Caribbean including, the Review of the National Biodiversity Strategy and Action Plan

in Dominica; St. Lucia's Third National Communication to the UNFCCC; PAHO SMART hospital project for St. Kitts and St. Vincent; and the flood risk reduction for North and Central Windward Watershed for the Government of St. Vincent and the Grenadines.

**Vanessa Benn's** forestry experience includes forest management and chain-of-custody audits of logging and wood-processing operations for Forest Stewardship Council certification in Guyana and Suriname; research in alternative propagation methods of selected commercial tropical forest species, recovery rates of wood processing mills and socio-economic issues related to the chainsaw logging sector; and review and advice on forest management plans and policies. In recent years Vanessa has worked extensively for the Iwokrama International Centre for Rain Forest Conservation and Development, where she coordinates and provides technical oversight of multiple EU-funded research projects implemented by universities, government agencies, NGOs, and individuals in Guyana and Suriname as part of an Africa, Caribbean and Pacific (ACP) forestry network. She graduated with a degree in Agriculture from the University of Guyana and received post-graduate training in Forest Biology and Sustainable Forest Management.

**Mike Seager** is the Technical Coordinator at Sun Mountain International and has extensive experience in USAID Regulation 216 environmental compliance processes and procedures. He has developed and reviewed over twenty Initial Environmental Examinations (IEEs), Environmental Mitigation and Monitoring Plans (EMMPs), Environmental Assessments (EAs), and Pesticide Evaluation Reports and Safer Use Action Plans (PERSUAPs) for USAID-funded international development programs in Latin America and Africa. He was a key team member for the 2013 Tropical Forest and Biodiversity Assessment in Mexico. He also led a 2-year initiative to improve environmental management, and monitoring and evaluations systems for a multi-year USAID development program in Haiti and developed environmental management systems for three emergency response/recovery programs following the 2010 earthquake in Haiti. He graduated from Connecticut College with a degree in International Relations with a focus on International Environmental Policy.

**Hans Eysenbach** has significant field data collection, environmental impact assessment, and analysis experience in USAID programs in Latin America and around the world. He has been team leader and/or a key technical resource in several environmental management and impact assessment technical assistance contracts to USAID earthquake response and recovery programs in Haiti as well as USAID Title II food aid program partners in Guatemala, Africa and Asia. Mr. Eysenbach is the Sun Mountain International point person for environmental compliance support to the USAID DCHA Bureau's Office of Food For Peace as part of an ongoing USAID Global Environmental Management Support (GEMS) contract. Mr. Eysenbach has also carried out field work, data collection and analysis for a published ethnobotany study that took place in Manu National Park with the Matsigenka people.

**Toby Carter** is the Agricultural Ecology and GIS Associate at Sun Mountain International. Mr. Carter has taken part in the preparation of various USAID environmental compliance evaluations for diverse partner organizations in Latin America and Africa. He led the field data collection, research and development of a Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) for a USAID Food for Peace program in Burkina Faso and carried out training on field data collection of crop disease infestation for remote sensing monitoring for a USAID Food for Peace project in the Democratic Republic of the Congo. His resource management experience includes planning and implementing projects in federal, state, and privately managed conservation areas, working independently and in teams to improve the sustainability and low-impact of recreational resources in the backcountry and producing project management and property boundary monitoring reports. He holds a B.A. in Biology from Earlham College.

## HOME OFFICE SUPPORT

**Kathleen Hurley**, MS, MA, is an environmental management professional with extensive experience assessing impacts to a broad range of ecosystems, including coastal areas and tropical marine habitats. Additionally, she has worked in environmental planning, permitting, and environmental policy. Her experience in the Caribbean includes characterization of the state of coastal ecosystems in the Turks and Caicos Islands, the Dominican Republic, Florida Keys, Mexico, and the Commonwealth of Dominica. She is the supervisory scientist for a shipwreck removal and reef restoration project on Palmyra Atoll and Kingman Reef in the U.S. Pacific Remote Islands. In this role, Ms. Hurley wrote the supporting environmental documentation and will oversee monitoring and compliance during the wreck removal. In addition, she is experienced in writing IEEs, 118/119 documents, technical review of ESIA's for NEPA/CEQ and multilateral development bank compliance, and environmental impact assessment.

**Charles Hernick** (The Cadmus Group, Inc.) has over 7 years of experience addressing high profile issues affecting natural resources by informing environmental policy changes, improving program implementation, and through effective project management. He also has over 6 years of ecology field- and laboratory-based research experience. He is an expert on USAID environmental compliance requirements. He has conducted environmental impact assessments and led associated stakeholder consultations. Building off of an environmental assessment in Tanzania, this year Mr. Hernick presented the poster "Implications of an Ecosystem Services Review for the Kilombero Valley, Tanzania" at the IAIA Biodiversity & Ecosystem Services Symposium. He is also an expert on mitigating the financial risks associated with environmental liabilities (i.e., polluter pays principle/financial assurance). Mr. Hernick has a B.S. in Ecology from the University of Minnesota and a M.A. in International Relations and Environmental Policy from Boston University.

**Tara Fortier** has provided research and analysis support for USAID Bureau Environmental Officers. She has 5 years of experience in assisting USAID, USEPA, and other clients, on research and analysis of current practices and regulations, coordination with experts and clients for external document review and workshop support, and development of regulations, guidance, and reports for target audiences including federal, state, and municipal decision makers, stakeholders, or the general public. She has experience in a variety of topics including climate change vulnerability, energy and water efficiency in water systems, federal drinking water contaminant regulations, and underground injection control. Ms. Fortier has a B.A. in Environmental Studies from Allegheny College.



## ANNEX C: STRATEGIC ENVIRONMENTAL REVIEW

*Global Climate Change:* The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

*Potential Environmental Impacts:* Demonstration projects may have environmental impacts, in particular projects that involve infrastructure development or rehabilitation and projects involving alternative energy. Each demo project needs to be evaluated based on site-specific and other project-specific features.

*Citizen Security:* The Citizen Security focus area under the new RDCS will also be similar to the focus under the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce recidivism rates among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

*Potential Environmental Impacts:* This focus area is unlikely to have environmental impacts; the technical assistance and training supported by this focus area have no direct effects on the environment.

*Economic Growth:* Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in curriculum-building relative to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

*Potential Environmental Impacts:* As above, the technical assistance and training supported under this focus area will have no direct environmental impacts.

*HIV/AIDS:* Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

*Potential Environmental Impacts:* This focus area does not support direct service delivery, and therefore, is not expected to result in the production of health care waste (HCW). However, if any activity supported by this focus area results in the production of HCW, USAID shall ensure that HCW is treated and disposed of in accordance with country-specific legislation and in the absence of such, in accordance with World Health Organization guidelines.

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSES

ANTIGUA AND BARBUDA

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
LEGISLATION .....	2
GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS .....	4
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS .....	4
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	5
PROTECTED AREAS.....	5
THREATENED AND ENDANGERED SPECIES.....	8
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	12
TYPES OF FOREST .....	12
MANAGEMENT STRUCTURE .....	13
ECONOMIC IMPORTANCE.....	13
CONSERVATION OUTSIDE OF PROTECTED AREAS .....	14
MANAGED NATURAL ECOSYSTEMS .....	14
EX-SITU CONSERVATION .....	16
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	16
DIRECT THREATS .....	16
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	17
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS .....	18
FOCUS AREA 1.....	18
FOCUS AREA 2.....	19
FOCUS AREA 3.....	19
FOCUS AREA 4.....	19
CONCLUSIONS AND RECOMMENDATIONS .....	20
REFERENCES.....	22
ANNEX A: LIST OF CONTACTS.....	24
TABLE A1. CONTACTS.....	24
ANNEX B: MAPS .....	26
FIGURE B1. ANTIGUA AND BARBUDA.....	26
FIGURE B2. FOREST TYPES OF ANTIGUA.....	27
FIGURE B3. BODY PONDS WATERSHED .....	28
FIGURE B4. DISTRIBUTION OF MANGROVES IN ANTIGUA.....	29
FIGURE B5. DECLARED AND PROPOSED PROTECTED AREAS.....	30
ANNEX C: THREATENED SPECIES OF ANTIGUA AND BARBUDA.....	31
TABLE C1. IUCN RED LIST FOR ANTIGUA AND BARBUDA .....	31

## REPORT FINDINGS

The natural vegetation of Antigua and Barbuda was largely decimated during the years of intense sugar cultivation. At present, most vegetative cover is secondary growth, with only a few areas of original growth. Notwithstanding this, the country has a rich biodiversity. It boasts one of the rarest and smallest racer snakes (*Alsophis antillensis antiguae*) in the world and also has one of the largest frigate bird (*Fregata magnificens*) nesting grounds in the Caribbean.

According to the Fourth National Report to the Convention on Biological Diversity (2010), Antigua and Barbuda has 54 vegetation communities; 1,158 species (149 families) of plants; 45 species of ferns (five families); four species of gymnosperms (three families); and 1,109 species of angiosperms (141 families). Of these, 16 are listed as rare, 26 as uncommon and 12 as common. There are 197 species of flowering plants of which 22 are identified as endemic to the Lesser Antilles (one of which, *Pectis ericifolia* is endemic to Barbuda). Seventy-three are classified as rare, including several that are believed to be extinct.

Twenty terrestrial reptile species and sub-species have been recorded, four of which are extinct. One, the racer snake (*Alsophis antiguae*), exists only on Great Bird Island (Redonda), and is considered one of the rarest snakes in the world. The only marine reptiles known to nest in Antigua and Barbuda are three species of endangered turtles: the hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*).

According to International Union for the Conservation of Nature criteria, 38 animal and four plant species are considered threatened. Most species on the list have declining populations with the exception of three corals described as stable and the racer snake listed as increasing. There are 36 mangrove sites with four main species: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia nitida*), white mangrove (*Laguncularia racemosa*), and button mangrove (*Conocarpus erectus*).

The condition and status of Antigua and Barbuda's marine environment and remaining forested areas are not well known. This lack of baseline information hampers efforts for evidence-based policy making, protection of biodiversity, and management of natural resources.

A key deficiency in the legislative framework for the protection and management of biological resources is a lack of clear delineation of jurisdiction among natural resource management agencies. The National Environmental Management System is designed to clarify roles, however it has not been fully implemented.

The Assessment Team noted the following direct threats to biodiversity and forests: inappropriate development practices, soil erosion, tourism and urban development, invasive species, overfishing, and climate change.

The following are the root causes of the threats:

- Lack of land use planning
- Lack of political will to improve policy framework for biodiversity conservation
- Lack of implementation of EIAs
- Lack of systematic data collection
- Lack of institutional capacity
- Threatened biodiversity is not sufficiently represented within its system of protected areas

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

CBD	Convention on Biological Diversity
CCVA	Climate Change Vulnerability Assessment
CEPF	Critical Ecosystem Partnership Fund
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COTS	Caribbean Open Trade Support
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
DCA	Development Control Authority
DEFRA	Fauna and Flora International and the UK Government
DfID	Department for International Development
EAG	Environmental Awareness Group
ED	Environment Division
EIA	Environmental Impact Assessment
EIMAS	Environmental Information Management and Advisory System
EN	Endangered, as designated by the IUCN Red List of Threatened Species
GEF	Global Environment Facility
GOAB	Government of Antigua and Barbuda
IBA	Important Bird Area
MEA	Multilateral Environmental Agreements
MMA	Marine Management Area
MPA	Marine Protected Area
NBSAP	National Biodiversity and Action Plan
NCSA	National Capacity Needs for Self-Assessment
NEMMA	North East Marine Management Area
NEMS	National Environmental Management Strategy
NTFP	Non Timber Forest Product
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
PA	Protected Area
PAHO	Pan American Health Organization
PEPFAR	President's Emergency Plan for AIDS Relief
POPs	Persistent Organic Pollutants
RDCS	Regional Development Cooperation Strategy
SGP	Small Grants Program
SIRMM	Sustainable Island Resource Management
SPAW	Specially Protected Areas and Wildlife
TNC	The Nature Conservancy
UNDP	United Nations Development Program
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
USAID	United States Agency for International Development
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species
WIDECAST	Wider Caribbean Sea Turtle Network

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Antigua and Barbuda component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* The Assessment Team held in-country stakeholder consultations on May 23, 24, and 29, 2013 (Annex A contains the List of Contacts), and convened a focus group on May 23 (the List of Contacts shows focus group participants) to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. To prepare this FAA 118/119 Assessment, the Assessment Team also reviewed a range of documents (See References section).

*Information Used and Gaps:* The Assessment Team relied heavily on the Fourth National Report to the Convention on Biological Diversity (CBD) and information from Birdlife International's website and reports on Antigua and Barbuda. Antigua and Barbuda produced its National Biodiversity and Action Plan (NBSAP) in 2001, and its Fourth National Report to the CBD in 2010. According to the Fourth National Report, "The document [the NBSAP] is considerably outdated and does not reflect the advances made by the negotiations at the international level. These advances include the 2010 targets and the new Island Biodiversity Program of Work. There is a need to review and update the NBSAP to reflect these as well as future 2010 targets."

Other information gaps include:

- Forestry gaps: Data are outdated and there is no systematic collection of data.
- Significant information gaps related to status and threats to marine biodiversity, species, and ecosystems.
- Gaps in legislation: There is no operating legislation for the Environment Division (ED), which is responsible for coordination of Multilateral Environmental Agreements (MEA). The legislation is currently in draft and is expected to be passed in 2013.
- Although the Environmental Action Group has produced recommendations on areas in need of protection in Antigua, no data exist to identify areas in need of protection in Barbuda and Redonda.

*General Country Description and Description of Ecosystem and Species Diversity:* The nation of Antigua and Barbuda is comprised of three islands, Antigua, Barbuda, and Redonda, all at the northern end of the Lesser Antilles (Annex B, Figure B1). Antigua is the largest island, about 14 miles long and 11 miles wide, encompassing 108 mi<sup>2</sup>. Its highest point is Boggy Peak (1319 ft.), located in the southwest corner of the island. Barbuda, a flat coral island, is 68 mi<sup>2</sup> and lies approximately 30 miles due north of Antigua. Redonda, at 0.6 mi<sup>2</sup>, is notable for its resident burrowing owl (*Speotyto cunicularia*) population, a species which became extinct on Antigua after

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

introduction of the mongoose. The human population of Antigua and Barbuda is approximately 68,000 and its capital is St. John's on Antigua.

Most of Antigua's land area (up to 92 percent) was under sugarcane cultivation for 300 years (the industry closed in the 1960s). The abandonment of sugar (and cotton) has resulted in a large increase in livestock on the island especially cattle, but also free-roaming sheep and goats. Tourism is currently the country's main industry.

The natural vegetation of Antigua and Barbuda was almost decimated during the years of intense sugar production. Now, most vegetative cover is secondary growth, with only a few areas of original growth. Notwithstanding this, the country has a rich biodiversity. It boasts one of the rarest and smallest racer snakes (*Alsophis antillensis antiguae*) in the world and also has the largest frigate bird (*Fregata magnificens*) nesting ground in the Caribbean.

According to the Fourth National Report to the CBD (2010), in Antigua and Barbuda there are 54 vegetation communities, 1,158 species (149 families) of plants; 45 species of ferns (five families); four species of gymnosperms (three families) and 1,109 species of angiosperms (141 families); of which 16 are listed as rare, 26 as uncommon, and 12 as common. There are 197 species of flowering plants of which 22 are identified as endemic to the Lesser Antilles (one of which, *Pectis ericifolia* is endemic to Barbuda). Seventy-three are classified as rare, including several that are believed to be extinct.

There are 36 mangrove sites with four main species: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia nitida*), white mangrove (*Laguncularia racemosa*), and button mangrove (*Conocarpus erectus*).

Twenty terrestrial reptile species and sub-species have been recorded, four of which are extinct. One, the racer snake (*Alsophis antiguae*), exists only on Great Bird Island (Redonda), and is considered one of the rarest snakes in the world.

The only marine reptiles known to nest in Antigua and Barbuda are three species of endangered turtles: the hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*).

Of the 182 species of birds, 20 are considered endemic to the West Indies sub-region, and in some cases, are restricted to the Lesser Antilles. Two bird species are endemic to Antigua and Barbuda: the broad-winged hawk (*Buteo platypterus insulicola*) and Adelaide's warbler (*Dendroica adelaidae*). One mammal, the pig-faced or rat bat (*Brachyphylla cavernarum*) is endemic to the country.

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

Since 2002, Antigua and Barbuda has been moving toward developing an overarching coordinating legislation on the environment; this, in part, has been driven by the need to fulfil obligations under various international environmental agreements. The existing legislative framework consists of over 40 pieces of legislation that govern distinct components of the environment. As a result, environmental management responsibilities are dispersed over several institutions. In some cases, the institutional structure is such that agencies who are the principal resource users have the power to regulate themselves, rendering the environmental legislation weak, at best. Furthermore, the legislation lacks criteria, whether environmental, social, economic, or otherwise, on how, when or in what cases resources may be exploited. As a result of this fragmentation, the Government of Antigua and Barbuda (GOAB) created a new coordinating mechanism, the National Environmental Management Strategy (NEMS) and Action Plan, to coordinate existing and future legislation. The National



Land Use Plan will provide further guidance to NEMS and integrate environmental policy into national plans, programs, and the budgetary process.

The legislative and policy framework for biodiversity conservation and sustainable forest management is briefly summarized in Table 1. Since the last FAA 118/119 Assessment, landmark legislation has been approved, and some bills are still awaiting approval. In particular, the NEMS, the Environmental Protection and Management Bill (not yet approved) and the National Land Use Plan are recent developments in the country's legislative framework.

Table 1. Policy and Legislative Framework for Biodiversity Conservation

ENABLING LEGISLATION	OBJECTIVES
National Environmental Management Strategy	Incorporates development objectives and adapts Rio Principles and other international agreements into Antigua and Barbuda's environment policy
National Parks Act (1984)	Provides for the establishment of National Parks and a National Parks Authority and provides for the preservation, protection, management, and development of the natural physical and ecological resources and the historical and cultural heritage of Antigua and Barbuda
The Environmental Protection and Management Bill (2011) (draft)	Establishes powers of Department of Environment; delineates Environmental Impact Assessment (EIA) procedures; and includes management of ozone, hazardous substances, data collection, and public education, water and air quality, resource management, biodiversity conservation, and national parks management
Physical Planning Act (2003) National Land Use Plan (2012) Sustainable Island Resource Management and Zoning Plan (2011)	Establishes policies for sustainable development of the country and lists the development objectives for the country
Forestry Act (1941)	Sets out regulations for forest management, including grazing, burning, forest fires, timber, and permitting
Maritime Areas Act (1986) Marine Areas (Preservation and Enhancement) Act and Regulations (1972/1973) Fisheries Act (2006) Turtle Ordinance (1927)	Protection and management of marine areas, including fisheries, protected areas (PAs), and target species.
Plant Protection Act (1941)	Currently under revision
Barbuda Local Government Act (1976)	
Fisheries Act (1990, 1991)	Regulations related to licenses, restrictions, and lobster, turtle, conch, coral, and aquarium fish harvest
Wild Birds Protection Act (1913)	Regulations for protection of specific bird species; defines the closed season for birds
Land Development Regulations (interim)	Regulates development and associated permissions

Antigua and Barbuda is a signatory to the principal international conventions related to the conservation of biodiversity and tropical forests. The following are the main MEAs to which Antigua and Barbuda is a signatory.

- Convention on Biological Diversity (1993)
- The Convention on Wetlands of International Importance (2007)
- Cartagena Protocol on Bio-safety (2003)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1997)
- UN Convention on the Law of the Sea (1982)
- Protocol concerning Specially Protected Areas and Wildlife (SPA) (1990)
- UN Framework Convention on Climate Change (1993)
- Convention on Migratory Species (2007)
- Kyoto Protocol (1998)
- UN Framework Convention to Combat Desertification (1997)

The NEMS and Action Plan 2004 to 2009 was developed to align the country strategy with the principles of the St. George’s Declaration and sustainable development. The Department of the Environment is the principal agency responsible for implementing the act and units within the department are responsible for various aspects of environmental management. These units also support the implementation of international environmental agreements. The National Coordinating Mechanism on Environmental Conventions reports to the Minister responsible for foreign affairs and is responsible for the management and implementation of MEAs. For example, implementation of CITES, UNCCD, and UNFCCC is the responsibility of the Environment Department, while management of invasive species under the Cartagena Protocol is under the jurisdiction of the Agriculture Department. The Agriculture Department is restructuring the regulations around plant management. Challenges related to the implementation of MEAs include, weak or non-existent regulations, limited availability of data, and limited staff to implement and monitor the requirements.

## GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

The Environmental Management Strategy and Action Plan articulates the need for sustainable development. To continue implementation of the plan, several areas require strengthening. Staff numbers of key institutions must increase, staff members need to be trained in areas such as enforcement, data collection and monitoring, and science-based decision-making, and Government must develop fiscal policies to stimulate corporate environmental stewardship. In particular, specific agencies and divisions charged with environmental management lack authority and where they have authority, often there are no regulations.

Several divisions under the Ministry of Agriculture are responsible for management and conservation of biological resources (Table 2). Specifically, the Fisheries Division, the Environment Unit, and the Forestry Unit have jurisdiction over natural resources. Implementation of regulations is hampered by lack of funding, training, and staff capacity. The National Coordinating Mechanism is intended to help mainstream natural resource management in all sectors and support coordination among agencies.

Table 2: Institutions Involved in the Management and Conservation of Biological Resources

INSTITUTION	KEY ROLE(S)
Min. of Agriculture, Lands, Housing and Environment	<ul style="list-style-type: none"> <li>• Promote environmental conservation measures</li> <li>• Sustainable development</li> </ul>
Environment Unit, Antigua and Barbuda National Parks Authority	<ul style="list-style-type: none"> <li>• Assess, conserve, and manage natural resources of PAs</li> </ul>
Environment Division, Min. of Agriculture	<ul style="list-style-type: none"> <li>• Coordinate policies</li> <li>• Support Sustainable Island Resource Management and Zoning Plan</li> <li>• Coordinate the implementation of national commitments to</li> </ul>

INSTITUTION	KEY ROLE(S)
	<ul style="list-style-type: none"> <li>MEAs</li> <li>Develop and implement projects related to the rehabilitation and protection of the environment</li> <li>Coordinate the development of environmental legislation and the process of conducting EIAs</li> </ul>
Development Control Authority	<ul style="list-style-type: none"> <li>Investigate environmental concerns in particular in environmentally sensitive/important areas <ul style="list-style-type: none"> <li>Cades Bay</li> <li>NE Marine Area</li> <li>Codrington Lagoon, Barbuda</li> <li>Jolly Beach</li> </ul> </li> <li>Stop and enforcement notices</li> </ul>
Forestry Department, Min. of Agriculture, Lands, Housing and Environment	<ul style="list-style-type: none"> <li>Manage terrestrial biological diversity including wildlife</li> <li>Manage forests and woodlands</li> <li>Reforestation</li> </ul>
Fisheries Division, coordinates with Forestry Department and Development Control Authority and Environmental Health	<ul style="list-style-type: none"> <li>Oversight of coastal and marine systems</li> <li>Manage commercial fish resources</li> <li>Manage coastal habitat</li> </ul>
Plant Protection Unit, Min. of Agriculture, Lands, Housing and Environment	<ul style="list-style-type: none"> <li>Protect plants (horticultural, agricultural, native, etc.) from pests and alien invasive species</li> <li>Issue notices for notifiable pests</li> <li>Issue Protection Orders</li> </ul>
Barbuda Council	<ul style="list-style-type: none"> <li>Agriculture, Land, Forestry, Fisheries, Coastal/Marine Protection Committee of the Council oversees internal affairs related to the thematic areas</li> </ul>
National Solid Waste Management Authority	<ul style="list-style-type: none"> <li>Store, collect, transport, treat, and handle all solid waste</li> </ul>

The Environmental Awareness Group (EAG) is the most active NGO focused on environmental issues in Antigua and Barbuda. The organization works to conserve wildlife and natural resources in partnership with the government, the general public, private companies, and overseas organizations. Other NGOs focus on recycling, waste management, awareness programs for boaters, and conservation of the marine and coastal environment (Table 3).

Table 3. Key NGO-implemented Biodiversity Conservation Projects

ORGANIZATION	PROJECT DESCRIPTION	FUNDING SOURCE
Environmental Awareness Group	Fern Project ( <a href="http://www.eagantigua.org/page525.html">http://www.eagantigua.org/page525.html</a> )	Rufford Small Grants Programme and The Mohamed bin Zayed Species Conservation Fund
	Offshore Islands Conservation Programme ( <a href="http://www.eagantigua.org/page557.html">http://www.eagantigua.org/page557.html</a> )	BBC Wildlife Fund, the Disney Worldwide Conservation Fund and the US Fish and Wildlife Service. Collaborators: Fauna and Flora International, the Durrell Wildlife Conservation Trust, Black Hills State

ORGANIZATION	PROJECT DESCRIPTION	FUNDING SOURCE
		University, the Island Resources Foundation and the Government of Antigua and Barbuda
	Christian Valley Birding Trail Project ( <a href="http://www.eagantigua.org/page527.html">http://www.eagantigua.org/page527.html</a> )	Sponsored by the Ministry for Foreign Affairs of Finland
	Livestock reform initiative ( <a href="http://www.eagantigua.org/page558.html">http://www.eagantigua.org/page558.html</a> )	USAID
	Body Ponds Nature Park ( <a href="http://www.eagantigua.org/page524.html">http://www.eagantigua.org/page524.html</a> )	GEF Small Grants Programme GARD Centre
	Mount Obama ( <a href="http://www.eagantigua.org/page560.html">http://www.eagantigua.org/page560.html</a> )	
	Plant Conservation Project ( <a href="http://www.eagantigua.org/page559.html">http://www.eagantigua.org/page559.html</a> )	USAID Caribbean Open Trade Support (COTS) project, UWI St Augustine and National Herbarium Trinidad
	Caribbean Waterbird Census ( <a href="http://www.eagantigua.org/page516.html">http://www.eagantigua.org/page516.html</a> )	Society for the Conservation and Study of Caribbean Birds initiative
	Turtle Conservation Project ( <a href="http://www.eagantigua.org/page561.html">http://www.eagantigua.org/page561.html</a> )	Fauna and Flora International and the UK Government (DEFRA), Wider Caribbean Sea Turtle Network (WIDECAST), Jumby Bay Hawksbill Project
	Watershed Management as a response to climate change	Proposal to CCDRM Fund
The Gilbert Agricultural & Rural Development Center	Nature Centre with trail, ethno-medicinal herbal garden, children's corner, display gardens, maze, exhibition area, demo wattle in daub hut, banana grove, handicraft workroom and display area linked to a turtle conservation project to use broken bottles on the beach and craft them into jewelry	The Gilbert Agricultural & Rural Development Center
Antigua & Barbuda Waste Recycling Corp	Assists in bulk waste reduction and removal of non-biodegradable materials through recycling; distribution of recycling bins	Partnership with the National Solid Waste Management Authority, the Environment Division, and Central Board of Health
Antigua Conservation Society	Non-profit marine conservation organization with a goal to protect and preserve coastal and marine ecosystems of Antigua and Barbuda Disseminates information on lionfish sightings and supports efforts to manage this invasive fish	

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

The following is a list of current projects financed by donors; where available, the funding amount is reported (Table 4). The major source of external funds for environmental projects in Antigua and Barbuda is the Global Environment Facility (GEF). In addition, Antigua and Barbuda has participated in several regional initiatives funded by Canadian International Development Agency (CIDA), Pan American Health Organization (PAHO), Organization of American States (OAS), World Bank, Department for International Development (DFID), European Community, Inter-American Development Bank, United Nations Economic Commission for Latin America and the Caribbean (UNECLAC), Organization of Eastern Caribbean States (OECS) Secretariat, AusAid, and United Nations Development Program (UNDP). US\$43 million is earmarked for the Caribbean Biodiversity Fund under Caribbean Challenge Initiative; Antigua and Barbuda is one of the original participating countries.

Table 4. Key Bilateral, Donors, and International Organizations and Biodiversity Conservation Projects

ORGANIZATION	ACTIVITY	VALUE
GEF	GEF-5 programmed funds. None of the funds used, no projects pending up to February 2012	US\$4.44 million
GEF-Small Grants Program (SGP)	15 projects	US\$429,971
GEF – Sustainable Island Resource Management (SIRMM)	Rehabilitation of the Body Ponds Watershed	US\$3 million
	Environmental Information Management and Advisory System (EIMAS).	
	Integrated Planning and Management for the Sustainable Use of Codrington Lagoon (Barbuda)	
EU	10th EDF	EU€3.4 million
GEF/UNDP	Support to produce the National Biodiversity Strategy and Action Plan, and report to the COP	US\$139,000
	Clearing House Mechanism Enabling Activity	US\$14,000
	Assessment of Capacity Building Needs and Country Specific Priorities	US\$212,000
	Enabling Antigua & Barbuda to Prepare its First National Communication in Response to its commitment to UNFCCC	US\$162,000
	Climate Change Enabling Activity (Additional financing for capacity building in Priority Areas)	US\$100,000
	Demonstrating the Development and Implementation of a Sustainable Island Resource Mechanism in a Small Island Developing State	US\$3.2 million
GEF/UN Environment Programme	National Capacity Needs for Self-Assessment (NCSA) for Global Environmental Management	US\$193,000
	Enabling activities for the Stockholm Convention on Persistent Organic Pollutants (POPs): The Development of a National Implementation Plan for Antigua and Barbuda	US\$397,000
USAID	The USAID climate change program assists the six OECS countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and	

ORGANIZATION	ACTIVITY	VALUE
	resilience, and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.	
TNC	Caribbean Challenge Initiative works with 10 countries in the region to address the growing threats to the sea and its resources via establishment of new marine protected areas (MPAs) and creation of National Conservation Trust Funds.	

Source: UNEP, 2010.

The main agency responsible for land use planning is the Development Control Authority (DCA) which ensures Environmental Impact Assessments (EIA) are performed prior to development projects that are likely to have negative effects on the environment. The ED receives the application, performs the site visit, while DCA monitors mitigation. The developer is responsible for hiring a consultant to perform the assessment. When the EIA is completed, it is submitted to the ED for review, consultation, and a determination. The ED also determines level of mitigation. The DCA has final approval authority and relies upon other government departments for input. A list of projects that typically require an EIA is available via the ED or DCA. Donors are expected to comply with EIA procedures.

## STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

### PROTECTED AREAS

With the passing of the National Parks Act (1984) the National Parks Authority was entrusted with the responsibility to preserve, protect, manage and develop the natural, physical, ecological, historical, and cultural heritage of Antigua and Barbuda. The Fourth National Report states that protected area (PA) management progressed slowly, but since 2001 (when the NBSAP was prepared) Government has provided protection status to some of the most important wetlands and coastal ecosystems, exhibiting government will to protect Antigua and Barbuda's biodiversity. According to the Fisheries Officer interviewed by the Assessment Team, the four Marine Protected Areas (MPAs) cover the priority marine ecosystems. The Fisheries Division has yet to develop regulations for the MPA system; user fees and other specific management needs are not yet addressed in legislation.

The established parks and PAs, covering almost 21,000 ha, are important areas for protection and conservation of biodiversity (Annex B, Figure B5). Nelson Dockyard Park was declared a national park due to its historical and ecological resources, including Signal Hill and Sugarloaf Mountain, the highest points in Antigua. It includes moist forest, dry semi-deciduous forest, coastal vegetation, and mangrove swamps, important for shorebirds, in particular, *Catesbaea melanocarpa*, native to five islands including Antigua and Barbuda. The national park also has turtle nesting beaches; however, some are under threat. Rendezvous Beach is a major leatherback nesting beach, and is threatened with development of resort villas.

Threats to marine ecosystems, marine biodiversity, and MPAs include overfishing, coastal development, sedimentation of coastal ecosystems, pollution, human impacts from tourism, and climate change impacts. Climate change impacts include rising sea surface temperatures, ocean acidification, coral bleaching, sea level rise, increasing storm surges, and invasive species. MPAs are essential for protection of ecologically and

economically important ecosystems, however their effectiveness is constrained by limited staff resources (number and capacity) to manage the MPAs, limited financing to operate PAs, and limited public outreach, education, and marketing is needed to build advocates for the PA system.

The North East Marine Management Area (NEMMA) includes offshore islands; this is the most recently declared and the largest MPA. It incorporates seagrass, wetlands, reefs, and mangroves ecosystems. NEMMA is also recognized as a globally significant research and conservation site because of its role as a refuge for endemic, rare, and globally important wildlife including the critically endangered Antiguan racer snake, the hawksbill turtle, and the vulnerable West Indian whistling duck. Codrington National Park, located in Barbuda, holds one of the largest nesting populations of frigate birds worldwide. Declared and proposed PAs are summarized in Table 5.

Table 5. Protected Areas

PROTECTED AREA	DECLARED/PROPOSED	MANAGEMENT AUTHORITY & PARTNERS
<b>MARINE PROTECTED AREAS</b>		
Diamond Reef MPA (100 percent marine)	Declared in the 1970s	<ul style="list-style-type: none"> <li>• Designated and administered by Fisheries Division</li> <li>• Has a Management Plan, but no staff</li> </ul>
Palaster Reef MPA (south of Barbuda; 100 percent marine)	Declared in the 1970s	<ul style="list-style-type: none"> <li>• Designated and administered by Fisheries Division</li> <li>• Has a Management Plan, but no staff</li> </ul>
Cades Bay Marine Reserve	Declared	<ul style="list-style-type: none"> <li>• Designated and administered by Fisheries Division</li> <li>• Has a Management Plan, but no staff</li> </ul>
NEMMA: includes offshore islands	Declared	<ul style="list-style-type: none"> <li>• Designated and administered by Fisheries Division</li> <li>• Has a Management Plan, but no staff</li> </ul>
<b>NATIONAL PARKS</b>		
Nelson Dockyard National Park	Declared: This was the first National Park in Antigua and Barbuda, created in 1984.	<ul style="list-style-type: none"> <li>• National Parks Authority (Environment Unit)</li> <li>• Management Plan was developed in 1984, it is outdated.</li> </ul>
Devil's Bridge NP	Declared	<ul style="list-style-type: none"> <li>• National Parks Authority (Environment Unit)</li> <li>• Has a Draft Management Plan</li> </ul>
Ft. Barrington NP	Declared	<ul style="list-style-type: none"> <li>• National Parks Authority (Environment Unit)</li> <li>• No management plan</li> </ul>
Green Castle Hill NP	Declared	<ul style="list-style-type: none"> <li>• National Parks Authority (Environment Unit)</li> <li>• No management plan</li> </ul>
Codrington NP	Declared	Declared under the NP Act, but intended to be administered by Barbuda Council under Barbuda Land Act.
Mt Obama NP (formerly Boggy Peak)	Gazettelement has been announced but the status has not yet been made official.	<ul style="list-style-type: none"> <li>• Management authority has yet to be determined.</li> <li>• No Management Plan</li> <li>• Vegetation surveys conducted on Mt. Obama identified several plants of interest, especially near the summit.</li> </ul>

In addition to the established PAs, Antigua and Barbuda has 12 Important Bird Areas (IBA) totalling 196 km and covering about 20 percent of the country's land area. No formal protection status is accorded to these unless they are already in a declared PA. Codrington Lake and Lagoon is an IBA within a previously declared PA. The entire island of Redonda is an IBA, notable for its breeding seabirds. The draft Fisheries Act states that the Minister may, by notice published in the Gazette, declare any area of Antigua and Barbuda waters, and as appropriate, any adjacent or surrounding land, to be a marine reserve (MPA) where "special measures are required to afford special protection to the flora and fauna of such areas, to protect and preserve the natural breeding grounds and habitats of aquatic life, with particular regard to flora and fauna in danger of extinction, to allow for the natural regeneration of aquatic life in areas where such life has been depleted or threatened, to promote scientific study and research in respect of such areas, or to preserve and enhance the natural beauty of such."

As part of The Nature Conservancy's Caribbean Challenge Initiative, which is an effort to protect marine and coastal ecosystems in the Caribbean, Antigua and Barbuda has committed to:

- Expand the MPA system to include at least 20 percent of its nearshore area by 2020.
- Develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for the national PA system.
- Develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and overuse.

According to stakeholders consulted by the Assessment Team, Antigua and Barbuda has the framework and processes in place for PA management, but threats to the PA system remain significant. Briefly, the main threats, according to stakeholders are:

- (1) Free-roaming livestock.
- (2) Habitat loss due to development on privately held land within the PA system.
- (3) Invasive plants and animals: lemongrass, Cuban tree frog, fire ants (they attack turtle hatchlings).
- (4) Climate change: related to lemongrass spread, watershed issues (erosion, degradation of hillsides).

Other issues affecting the sustainability and overall management of the PA system are:

- Limited staff resources to manage the PAs (including MPAs): More staff is needed and capacity of staff needs to be strengthened.
- Limited financing is available to operate PAs.
- Public outreach, education, and marketing is needed to build advocates for the PA system and to attract local and international tourists.

A key concern for the country's PA system is that much of the PA estate is held in private ownership, and is subject to development at the land owner's behest (with the clearance of and mitigation required in an EIA). Another concern is that, as noted above, Barbuda and Redonda have not been adequately studied to determine important ecosystems that should be protected. Yet a Critical Ecosystem Partnership Fund (CEPF) report from 2009, *Caribbean Islands Biodiversity Hotspot* notes that Antigua and Barbuda's offshore islands are "Wholly Irreplaceable Sites in the Caribbean Islands Hotspot." Clearly, additional study is warranted.



Several areas in Antigua and Barbuda have been identified as important for habitat and/or species conservation. These areas are currently unprotected, but some are proposed to become PAs. The draft Environmental Management Bill (2011) proposed the following six reserves:

- Christian Valley: biodiversity value
- Body Ponds: aquatic resources (Annex B, Figure B3)
- Redonda: wildlife
- Sugar Loaf: biodiversity value
- Black Ghaut Gaynors: wetland
- Wallings: biodiversity value

Furthermore, EAG research identified additional endangered habitats that currently lack protection in Antigua’s mainland.

- All remaining mangrove coastal areas
- Body Ponds
- Fig Tree Drive and Wallings
- Sugar Loaf
- Forest on Stones
- Fitches Creek
- Rendezvous and Doigs
- Ayers Creek and Black Ghaut
- Rooms and Seatons coast
- Shekerley Mountains (Mount Obama, Christian Valley and surrounding hills)
- Sleeping Indian (Saddle Hill and two surrounding hills)

## THREATENED AND ENDANGERED SPECIES

According to the IUCN Red List of Threatened Species, species listed as critically endangered (CR), endangered (EN), and vulnerable (VU) are considered threatened. Thirty-eight animal and four plant species meet these criteria as shown in Annex C. Table 6 provides a breakdown of the numbers of plants and animals in each category. Most species on the list have declining populations with the exception of three corals described as stable and the racer snake listed as increasing. The success of racer snake conservation can most likely be attributed to conservation efforts by groups such as the EAG.

Table 6. Summary of Threatened Animals and Plants based on IUCN Red List

RED LIST STATUS	ANIMALS	PLANTS
CR	7	-
EN	9	3
VU	22	1

Endemic species in Antigua and Barbuda are:

- Antigua racer snake (*Alsophis antiguae*) is found on outlying islands and is one of the rarest and most endangered snake species in the world. Only 60 to 80 adults are believed to remain in the wild.
- Two bird species, the broad-winged hawk (*Buteo platypterus insulicola*) and Adelaide’s warbler (*Dendroica adelaidae*).
- One mammal, the pig-faced or rat bat (*Brachyphylla cavernarum*), is endemic to the country.

Three species of endangered turtles are found in Antigua and Barbuda: the hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*).

Codrington NP is significant for its importance as habitat for the largest magnificent frigatebird (*F. magnificens*) colony in the Caribbean, the only IBA where the globally threatened (and endemic) Barbuda warbler (*Dendroica subita*) occurs, and also the only IBA in the country where the restricted-range Lesser Antillean flycatcher (*Myiarchus oberi*) is found.

An EAG project (2009 – 2010), funded by USAID and COTS project, conducted a vegetation survey and produced a Field Guide to Vascular Plants of Antigua and Barbuda. The field guide was used to produce the Red List of Threatened Plant Species of Antigua and Barbuda. This filled a significant knowledge gap.

According to stakeholders interviewed by the Assessment Team, a constraint to managing and conserving Antigua and Barbuda's endangered species is the limited human resource pool to implement protection measures, monitoring, and research, limited financial resources, and a lack of reliable data.

Another constraint to managing Antigua and Barbuda's endangered species is that the ED has the mandate for coordination of MEAs including the CBD and CITES, yet the ED has no operating legislation (the legislation is currently in draft and expected to be passed in 2013).

Marine ecosystems provide important habitat for many threatened and endangered species; these species are often important economically. Healthy coral reef ecosystems are a source of food, provide coastal protection, provide jobs and income to local economies from fishing, recreation and tourism, and are a source of new medicines. WRI (Burke, 2004) notes that nearly two-thirds of the Caribbean region's reefs are directly threatened by human activities, and estimates future economic losses from diminished coral reef fisheries, dive tourism, and shoreline protection services at between US\$350 and US\$870 million per year. In 2000, coral reefs provided annual net benefits in fisheries, dive tourism, and shoreline protection services, Caribbean-wide with an estimated value between US\$3.1 to 4.6 billion. For Antigua and Barbuda, which is largely dependent on tourism, conservation of coral reefs is critical to the country's economy.

## STATUS AND MANAGEMENT OF FOREST RESOURCES

### TYPES OF FOREST

Antigua and Barbuda's forest covers approximately 22 percent of land area, while other wooded land comprises 35 percent of the land area (FAO, 2010). Since colonization, estimates have placed deforestation at 95 to 99 percent of the original forest, with the exception of mangroves. Between 1990 and 2000, forest cover declined 0.3 percent, while from 2000 to 2005 cover declined 0.4 percent. The subtropical dry forest zone covers most of the country, while subtropical moist forest zone covers about 20 percent of the country, however both zones have been significantly altered.

Current estimates of mangrove cover are lacking, but surveys from the 1980s and 1990s measured a total of 5,506 ha of mangroves in the country, including six distinct species, of which red mangrove predominates (See Annex B, Figure B4). More recent estimates indicate a precipitous decline of mangrove cover, from 1,175 ha to 700 ha between 1980 and 2005. In Antigua and Barbuda, mangroves are threatened by infrastructure development on the coast (e.g., marinas, hotels, and harbors) and extractive use.

Regions with volcanic soils originally supported a form of tropical rainforest, which has been altered by development. Forests above 150 meters (500 ft.) in altitude are similar to moist forests on neighboring islands, while forests below this elevation are dry forests. The most intact examples of higher elevation forests with evergreen and deciduous species are found on Boggy Peak, Sugar Loaf Mountain, and Waiting's Hill. The best example of evergreen bushland is found on Weatherall Hill. Riparian woodland (pond and fresh water swamp vegetation) is found only along ghauts in northern and eastern Antigua. A recent assessment was conducted of forest types and their distribution, but the Assessment Team was unable to obtain the map.

Therefore, the map previously presented in the 2008 FAA 118/119 Assessment remains the most recent available spatial information on forests (Annex B, Figure B2).

## MANAGEMENT STRUCTURE

The Forestry Unit has responsibility for managing Antigua and Barbuda’s forest and woodland areas and reforestation efforts. The Forestry Unit lacks staff and a supportive policy to enforce the forestry ordinances. According to stakeholders interviewed for this report, the main threat to Antigua’s forests is charcoal making. According to the Fourth National Report to the CBD, other major threats to forests are unplanned development, unmanaged livestock grazing, unsustainable agricultural practices, poor watershed management, fire, drought, and lack of an enforced land management strategy. Stakeholders indicated that in Barbuda, uncontrolled grazing is the key threat to forests.

Antigua and Barbuda has no registered Forest Reserves, however a restriction on development above 1000 feet creates *de facto* forest reserves above this elevation. Some designated PAs contain forests, which provide additional protection status to these areas. However, registering these areas as actual Forest Reserves would offer more substantive protection and resources.

As mentioned, according to the Forestry Unit, the most valuable forest stands in the country are considered to be Mount Obama (formerly Boggy Peak), Sugar Loaf (part of the area is within Nelson Dockyard NP), and Mill Reef Area, which is currently privately held property with dry forest. In addition, there are a number of abandoned plantations overgrown into secondary forest, which provide habitat for birds and reptiles.

## ECONOMIC IMPORTANCE

Economically, forests are important for wood products (timber), non-timber forest products (NTFP), tourism, and ecosystem services (water, clean air, erosion control). The monetary value of some of these services such as tourism and timber can be easily calculated while the value of others, such as NTFPs and water provision, are more difficult to determine. Forests in Antigua are not commercially used for timber; rather timber is harvested for subsistence purposes. As a result, there is no monetary or other valuation of the country’s forests. NTFPs include plants, such as anthuriums and orchids for the ornamental plant market, rosettes from the screw pine used to make hats and wild pineapples and wild yams in the latter part of the year with the former being a traditional Christmas product (Table 7). Subsistence uses include harvesting for charcoal kilns and wattle made from *Leucaena* and *Acacia*. No forests in the country are certified.

Table 7. Uses of Forest Products

PRODUCT/SERVICE AREA	IMPORTANCE/CONTRIBUTION
Wood	No commercial harvesting
Non Timber Forest Products (NTFP)	Screw pines for hats, ornamental plants
Subsistence	Some use of trees for charcoal
Tourism	Wildlife viewing (birdwatching, tours to nesting turtle sites), hikes and forest walks, etc.
Ecosystem Services	Erosion control, water provision (Forests on slopes of Body Ponds area important as the ponds provide potable water.)

# CONSERVATION OUTSIDE OF PROTECTED AREAS

## MANAGED NATURAL ECOSYSTEMS

Antigua's coastline is distinctly indented with numerous islands, creeks and inlets with associated sandbars; this is a vast contrast to Barbuda's more uniform coastline, whose main coastal feature is the Codrington Lagoon along its northwestern coast and extensive coral reef systems. The twin island nation's benthic environment is characterized by several reef beds, submerged vegetation consisting of seagrass and algal beds, sand, mud, and rock. Each of these habitat types has associated with them a range of species which hold both ecological and commercial value.

### *Agricultural Systems*

Antigua and Barbuda's agriculture sector contributes 3 to 4 percent overall to GDP and is expected to increase to 5 to 6 percent. The government has targeted the sector for growth and as such, is focused on increasing productivity and competitiveness. Initiatives are focused on expanding the sector into agroforestry, biotechnology products, and specialty natural products. Crop and vegetable farming occurs throughout the islands, where soils, moisture, and topography allow. Bananas, pineapples, mango, sugar cane, cotton, coconut, yams, sweet potato, maize, fruit trees, and vegetable crops are cultivated in Antigua.

On Barbuda, the agricultural sector is characterized by slash and burn agriculture. Coconuts are grown in sandy soils and other crops grown in Antigua are also cultivated in Barbuda. Livestock populations decreased from 1984 to 2001, however untethered livestock remains an issue on both islands.

### *Freshwater*

The Body Ponds area (Annex B, Figure B3) is the major watershed on Antigua and provides freshwater for St. John's, the primary urban area. The water collected in the watershed drains into Big Creek and enters the sea between Seaforth and Cooks. In addition to providing important services for water supply, the area possesses a high level of biodiversity. Primary issues threatening the watershed are loss of forest cover, erosion, and sedimentation, invasion by lemongrass, and improper agricultural practices. Agroforestry using fruit trees as permanent cover is being promoted as a two-fold benefit to watershed functioning and reduction in sediment transport.

Watershed health is critical in Antigua and Barbuda which has an extremely limited water supply. Almost 60 percent of the island's water supply is provided through desalination, with surface water (30 percent) and underground (10 percent) sources contributing the smaller proportion. Desalination costs on average US\$10 million per year, thus maintenance of watershed health provides an important ecosystem service with the potential to reduce future desalination costs.

### *Mangroves and Wetlands*

Mangroves and wetlands are inextricably linked ecosystems in Antigua and Barbuda; often mangroves are a transitional vegetation type between lagoons and upland areas. Red, white, and black mangrove species are found in the low-lying coasts of Antigua (Annex B, Figure B4). The largest area of mangroves in Antigua is in Hanson's Bay swamp. In Barbuda, fringing mangroves are found around salt flats and lagoons; the largest stand in Barbuda is Codrington Lagoon.

Wetland habitats in Antigua and Barbuda are home to the vulnerable West Indian whistling-duck (*Dendrocygna arborea*) and the near threatened Caribbean coot (*Fulica caribaea*) and are important resting sites for migratory birds. Threats to wetland habitats include conversion to other uses (e.g., human settlement, tourism,

agriculture); degradation from clear-cutting of mangroves, pollution with sewage and other liquid waste and pesticides, and destruction by natural catastrophes.

## Seagrass

Extensive seagrass beds exist in the shallow waters around the coasts of Antigua and Barbuda. While seagrass beds have not been extensively monitored, declines have been observed on the northern coast of Antigua since the 1980s. The three main seagrass species found in the islands' shallow waters are turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), and shoal grass (*Halodule wrightii*). Seagrass beds are an important nursery area for juvenile fish and invertebrate species, including queen conch (*Strombus gigas*); they are a source of food for marine herbivores, such as turtles. Additionally, they bind together highly mobile sands and sediments, allowing sediment to settle before reaching coral reefs. Finally, seagrass beds play an important role in protecting shorelines by reducing currents and wave energy. The decline of seagrass beds around Antigua and Barbuda is particularly alarming because it could be associated with loss of ecosystem services, habitat for important fisheries species, and storm protection.

## Beaches

Antigua and Barbuda is famous for its extensive white sandy beaches; these beaches are a primary attraction for tourists and have an important ecological function. Many of the beaches are critical nesting habitat for endangered marine turtles. Turtle nesting season begins in the summer months and extends into October/November. Forty-three beaches on Antigua were identified as turtle nesting beaches, while 13 on Barbuda were nesting habitat (UNEP, 2010). Between 1996 and 2001, 25 beaches were monitored on Antigua and Barbuda, and of those, 12 demonstrated signs of erosion. Eleven of the beaches were located on Antigua and several are important sea turtle nesting habitat. Coastal development, tourism, beach erosion, and sand-mining all pose significant threats to sea turtle nesting habitat.

## Coral Reefs

Antigua and Barbuda's coastline is protected by approximately 25.45 km<sup>2</sup> of reefs. These include barrier reefs near the southern shore; bank barrier reefs predominantly on the northeast and southwest of Antigua; patch reefs found mainly on Barbuda, and fringing reefs around both islands. The coral reefs around Antigua and Barbuda are particularly important to the country's fisheries and tourism sectors. Several studies have been conducted and chronicle the decline of coral reef health through the years. In the Fourth National Report to the CBD, Weiss (1990) outlined drastic changes in the health of Antigua's reefs from 1941 to 1981, including decline of number, area, and abundance of coral in fringing reefs along the north and northeast coasts. By comparing aerial photographs from the two periods he demonstrated marked losses from the tops of coral patch reefs over half of the area surveyed along with associated losses of seagrass beds on reef flats, particularly on the north coast of Antigua. According to the Fourth National Report to the CBD, a 1996 study by Multer recorded damage on reefs after Hurricane Luis; the study documented a dramatic decline of coral cover, physical breakage, increased sediment loads associated with anthropogenic and naturally induced stresses among the reasons for the decline. The three sites Multer surveyed showed drastic declines in coral coverage ranging from 8 to 22 percent when compared to data from the previous decade.

Coral reef ecosystems in Antigua and Barbuda form the basis of the fisheries industry in Antigua and Barbuda. According to the FAO, total landings in Antigua in 1999 were 1,322 tonnes, while lobster landings in Barbuda amounted to 38 tonnes in the same year (FAO, 2002). Finfish landings average 2200 tonnes/year (FAO, 2002). The fisheries sector provided direct employment to approximately 900 individuals, however the number of vessels tripled between 1995 and mid-2000. This may be a sign that fishing pressure in the country is increasing and declines in average fish size and catch along with algal overgrowth in some areas indicate the nearshore reef fishery may be overexploited in Antigua. The fishery is regulated by size restriction and on mesh size for traps and nets. Per FAO, fish stocks are highly vulnerable to overexploitation because of the type of fishing gear used and locations of fisheries resources. "Ghost fishing" from abandoned traps and gear

is a primary threat, in addition to lack of diversification within the fishery. The Fisheries Division and the Coast Guard are responsible for enforcement of fisheries regulations and prevention of illegal fishing. However, limited staff and resources are a constraint to effective management of fisheries.

## EX-SITU CONSERVATION

*Ex-situ* conservation in Antigua and Barbuda includes several efforts related to conservation of biodiversity. The collection of germplasm of local foods and crops (e.g. black pineapple) is a national strategy for climate change resilience as local plants are more tolerant of adverse weather conditions than commercial imported seed varieties. Antigua Barbuda Horticultural Society educates, teaches and conserves plant knowledge.

Table 8. Conservation Outside of Protected Areas & *Ex-Situ* Conservation

LOCATION	ORGANIZATION(S)	ACTIVITY/IMPORTANCE
Island of Antigua	CARDI	Partner to conserve germplasm of local crops and foods
Body Ponds	EAG	Arboretum project
Botanical Gardens, Victoria Park, St Johns (Established 1838)	Forestry Department	Very small and run down with a few large trees extant from early days when it was maintained Used to be used for propagation of plants

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

### DIRECT THREATS

Focus group participants and other key contacts described a variety of threats to conservation and improved management of biodiversity in Antigua and Barbuda. This section describes the threats that were most frequently cited by stakeholders and described in the NBSAP and/or the Fourth National Report to the CBD.

**(1) Inappropriate development practices**, such as uncontrolled coastal development and lack of land use management. In particular, minimum enforcement of building codes and lack of planning regulations allow for ad hoc development in or adjacent to wetlands, mangroves, coastal areas, and forests, which puts these ecosystems at risk. The coastal zones (beaches, mangroves, seagrass beds, coral reefs) are highly vulnerable as they are frequently developed for the tourism industry.

**(2) Soil erosion:** Uncontrolled grazing by livestock and improper land use practices has caused serious degradation and loss of soils. This is of particular concern in Antigua and Barbuda, a country subject to drought, as soil loss impacts hydrology and water retention. Furthermore, soil erosion negatively impacts water quality and the marine environment.

**(3) Tourism and urban development:** Rapid growth in the tourism sector has resulted in rapid coastal development, damage to coral reefs, mangroves, and beaches, and uncontrolled boating activities around coral reefs. Contacts indicated tourism exceeds the carrying capacity of sites, which, in turn, threatens biodiversity.

**(4) Invasive species:** In particular, lemongrass, initially introduced to control erosion, has spread extensively throughout the islands. Due to the oils in lemongrass, it quickly spreads fire, and because it is highly fire-



adapted, it soon outcompetes native plants and trees. Fire ants, lionfish, and the Cuban tree frog are other invasive species that threaten native biodiversity.

**(5) Overfishing:** All of Antigua and Barbuda’s reefs are threatened by human activities, however overfishing is the most pervasive threat and all reefs are negatively impacted by this activity. The shallow reef fishery is overexploited around Antigua, based on declining fish size and catch, while Barbuda’s nearshore fishery appears to be in better condition (FAO, 2002). Queen conch is targeted for local consumption, while spiny lobster is fished for both local and export markets.

**(6) Climate Change:** Climate change and increased climate variability manifest in more frequent and intense rains and fires. This, in turn, results in land and coastal degradation. A 1-meter rise in sea level with the 1-in-100-year storm surge will impacts coastal environments, including mangrove forests, resorts, and infrastructure.

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119 d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats, stakeholder consultations, and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 9: Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of land use planning	<ul style="list-style-type: none"> <li>• Support implementation of the National Environmental Management Strategy (NEMS) and the National Land Use Plan to integrate national plans, programs, and the budgetary process.</li> <li>• Disseminate information on Antigua and Barbuda’s biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts).</li> <li>• Awareness raising campaign regarding the importance of proper planning, assessment, and land use.</li> </ul>
Lack of political will to improve policy framework for biodiversity conservation	<ul style="list-style-type: none"> <li>• Conduct ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on Antigua and Barbuda’s biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts).</li> <li>• Strengthen the NGO sector.</li> </ul>
Lack of implementation of EIAs	<ul style="list-style-type: none"> <li>• Promote a transparent EIA process, including enforcement of mitigation actions.</li> <li>• Strengthen capacity (staff numbers and technical capacity) in monitoring and enforcement of EIA requirements.</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of systematic data collection	<ul style="list-style-type: none"> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data (i.e., GIS, baseline data, satellite imagery), especially for reefs, invasives (e.g., lemongrass) and land use maps.</li> <li>• Delineate and map all existing marine reserves and PAs.</li> <li>• Conduct routine ecosystem health assessments (particularly for marine environments which have not been assessed regularly).</li> <li>• Conduct carrying capacity study of tourism sites.</li> </ul>
Lack of institutional capacity The Fourth National Report to the CBD for Antigua and Barbuda (2010) evaluated biodiversity management and the implementation of the targets and programs of work under the CBD from 2001 to 2010. The reports found, “the lack of capacity and legal framework suitable for small island states is a severe limiting factor.” While efforts have targeted university students to work in biodiversity management, there is still an urgent need for trained professionals.	<ul style="list-style-type: none"> <li>• Enhance capacity of personnel for monitoring and enforcement in biodiversity-related agencies.</li> <li>• Expand the pool of trained professionals available in biodiversity conservation and sustainable development.</li> <li>•</li> </ul>
Threatened biodiversity is not sufficiently represented within its system of PAs	<ul style="list-style-type: none"> <li>• Accelerate approval and implementation of NEMS and regulations that are currently not in place or are outdated.</li> <li>• Accelerate approval of proposed PAs.</li> <li>• Expand the pool of trained professionals to monitor and manage PAs.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119 d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 10 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.



## FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

## FOCUS AREA 3

Economic Growth: Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

## FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 10. Proposed Actions Related To Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Support implementation of the NEMS and the National Land Use Plan to integrate national plans, programs, and the budgetary process</li> <li>• Disseminate information on Antigua and Barbuda's biodiversity value</li> <li>• Awareness raising campaign regarding the importance of proper planning, assessment and land use</li> </ul>	<p>Focus Area 1, Global Climate Change, will assist countries with adaptation measures to prepare for and mitigate the effects of climate change integrating the private sector, non-governmental organizations, and local communities.</p>
<ul style="list-style-type: none"> <li>• Conduct ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on Antigua and Barbuda's biodiversity value</li> <li>• Strengthen the environmental NGO sector</li> </ul>	<p>Focus Area 1, Global Climate Change, will assist countries with adaptation measures to prepare for and mitigate the effects of climate change integrating the private sector, non-governmental organizations, and local communities.</p> <p>Focus Area 3 emphasizes at-risk youth, and will support life skills development, basic education assistance, technical and vocational training,</p>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
	business skills development, internships, and assistance with job placements.
<ul style="list-style-type: none"> <li>Promote a transparent EIA process, including enforcement of mitigation actions</li> <li>Strengthen capacity (staff numbers and technical capacity) in monitoring and enforcement of EIA requirements.</li> </ul>	Focus Area I will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, non-governmental organizations, and local communities. An EIA process will support adaptation planning.
<ul style="list-style-type: none"> <li>Develop a permanent, reliable system and database to obtain, process, and analyze data (i.e., GIS, baseline data, satellite imagery), especially for reefs, invasives (e.g., lemongrass) and land use maps</li> <li>Delineate and map all existing marine reserves and PAs</li> <li>Conduct routine ecosystem health assessments (particularly for marine environments which have not been assessed regularly)</li> <li>Conduct carrying capacity study of tourism sites</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, non-governmental organizations, and local communities.
<ul style="list-style-type: none"> <li>Enhance capacity of personnel for monitoring and enforcement in biodiversity-related agencies.</li> <li>Expand the pool of trained professionals available in biodiversity conservation and sustainable development.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, non-governmental organizations, and local communities.</p> <p>Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance healthy lifestyles, obtain quality education and training.</p>
<ul style="list-style-type: none"> <li>Accelerate approval and implementation of environmental laws and regulations that are currently not in place or are outdated</li> <li>Accelerate approval of proposed PAs</li> <li>Expand the pool of trained professionals to monitor and manage PAs</li> </ul>	No actions meet these needs.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Antigua and Barbuda’s conservation of biodiversity and tropical forests.

Under Focus Area 1: Global Climate Change, the following is a recommended priority action for USAID's strategic approach in the region:

- (1) Support implementation of the NEMS and the National Land Use Plan to integrate national plans, programs, and the budgetary process; and in conjunction with this, support an awareness raising campaign on the importance of proper planning, assessment, and land use. This activity could combine the need to disseminate information on Antigua and Barbuda's biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts), as well.
- (2) Develop a permanent, reliable system and database to obtain, process, and analyze data (i.e., GIS, baseline data, satellite imagery), especially for reefs and land use maps.

Under Focus Area 3: Economic Growth, USAID should consider integrating the following into their strategic approach:

- (1) Expand the pool of trained professionals available in biodiversity conservation and sustainable development via workshops, scholarship programs, and technical training. This could be linked to USAID support in Focus Area 1, Climate Change, and could also involve training in EIA and encouraging a transparent EIA process. Support for demonstration projects could illustrate EIA best practice. The Antigua and Barbuda Climate Change Vulnerability Assessment (CCVA), a USAID-commissioned report, conducted simultaneously with the FAA 118/119 Assessment, recommends that USAID support the establishment of a mechanism for attracting capital to the Sustainable Island Resource Financial Plan on an on-going basis; this would also contribute to building an expanded pool of trained professionals.
- (2) Strengthen the environmental NGO sector, in particular focus on NGOs that involve youth in environmental projects and advocacy. The Antigua and Barbuda environmental NGO sector is particularly weak, and as noted, the number of trained biodiversity professionals is low. Involving youth in environmental NGOs could be a way to get them involved and interested in conservation, early in life, with the hope that some will follow on with university training in the field.
- (3) Conduct a carrying capacity study of tourism sites, with the intention of strengthening the tourism sector's contribution to the economy by diversifying from highly visited (and highly impacted) sites to less visited sites.

The CCVA for Antigua and Barbuda recommends the following that would also contribute to biodiversity and forest conservation:

- (1) As part of the recommendation above to implement NEMS and the National Land Use Plan, USAID should consider providing assistance to develop a procedure for the design and implementation of a series of local area plans incorporating demonstration projects for climate change. This would be supported within the established framework of the Sustainable Island Resource Management Mechanism (SIRMM).
- (2) USAID should consider support of the further development of the Sustainable Island Resource Financial Plan, which is expected to assist with financing climate change management.
- (3) USAID should consider supporting the design and implementation of a broad-based public education and awareness program to improve water resources management in the context of climate change.

## REFERENCES

- Antigua and Barbuda Environment Division. Undated. Mangroves and Mangrove Swamp. Available on the Internet at: <http://www.environmentdivision.info/?q=node/76>, accessed 07/28/13.
- Antigua and Barbuda Environment Division. 2001. National Biodiversity Strategy and Action Plan (NBSAP) for Antigua and Barbuda. April. UNDP Project # ANT/97/1G/99. Available on the Internet at: <http://www.environmentdivision.info/?q=node/237>.
- Antigua Nice. 2012. Clubs and Non-Profit Organisations in Antigua. <http://www.antiguanice.com/v2/islandguide.php?cat=56>, accessed 07/26/13.
- Birdlife International. 2013. Available on the Internet at: <http://www.birdlife.org/>.
- Burke, L. and J. Maidens. 2004. Reefs at Risk in the Caribbean. World Resources Institute. Available on the Internet at: <http://www.wri.org/publication/reefs-risk-caribbean>, accessed 07/28/13.
- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org.lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- Cesar, H.J.S., Burke, L., and Pet-Soede, L. 2003. The Economics of Worldwide Coral Reef Degradation. Cesar Environmental Economics Consulting, Arnhem, and WWF-Netherlands, Zeist, The Netherlands. 23 pp.
- Critical Ecosystem Partnership Fund (CEPF). 2009. Ecosystem Profile: The Caribbean Islands Biodiversity Hotspot. Available on the Internet at: [http://www.cepf.net/Documents/Finaldraft\\_Caribbean\\_EP.pdf](http://www.cepf.net/Documents/Finaldraft_Caribbean_EP.pdf).
- Environment Division of Antigua and Barbuda. 2013. Environment Law. Available on the Internet at: <http://www.environmentdivision.info/?q=taxonomy/term/6&page=1>, accessed 07/26/13.
- Food and Agriculture Organization of the United Nations (FAO). 2010. Global forest resources assessment 2010: Main report. Rome. Available on the Internet at: <http://www.fao.org/docrep/013/i1757e/i1757e00.htm>.
- FAO. 2002. Information on Fisheries Management in the Antigua and Barbuda. Available on the Internet at: <http://www.fao.org/fi/oldsite/FCP/en/ATG/body.htm>.
- Francis, Janil Gore, Dr. 2010. Fourth National Report to the Convention on Biological Diversity: Antigua and Barbuda. March. Available on the Internet at: <https://www.cbd.int/doc/world/ag/ag-nr-04-en.pdf>.
- Global Environment Fund. Undated. Capacity Building for Environmental Management in Antigua and Barbuda: Strategy and Action Plan 2007 – 2012. Available on the Internet at: <https://www.thegef.org/gef/sites/thegef.org/files/documents/document/ncsa-antigua%20barbuda-fr-ap.pdf>, accessed 07/26/13.
- International Union for Conservation of Nature and Natural Resources (IUCN). 2012. IUCN Red List of Threatened Species. Available on the Internet at: <http://www.iucnredlist.org/about>.

Organization of American States and USAID. 2001. Drought Hazard Assessment and Mapping for Antigua and Barbuda: Post-Georges Disaster Mitigation Project in Antigua & Barbuda and St. Kitts & Nevis. April. Available on the Internet at: <http://www.oas.org/pgdm/>, accessed 07/28/13.

United Nations Environment Programme (UNEP). 2010. National Environmental Summary Antigua and Barbuda. Available on the Internet at: <http://www.pnuma.org/publicaciones/FINAL%20NES%20Antigua%20Barbuda%20Nov%202010-%20edited.pdf>, accessed 07/26/13.

United Nations Sustainable Development Knowledge Platform. 2012. Stock Taking Report Rio +20: Antigua and Barbuda. Available on the Internet at: <http://sustainabledevelopment.un.org/index.php?page=view&type=6&nr=125&menu=172>, accessed 07/28/13.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Antigua and Barbuda.

USAID. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment, Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines. Available on the Internet at: <http://www.usaid.gov/documents/1862/faa-118119-tropical-forest-biodiversity-assessment>.

## ANNEX A: LIST OF CONTACTS

### TABLE A1. CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM
Astley Joseph	Deputy Director	Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:astleyj2@gmail.com">astleyj2@gmail.com</a>	(268) 764-1271	FG
Sharod James	Deputy Director	National Office of Disaster Services	<a href="mailto:nodsanu@gmail.com">nodsanu@gmail.com</a>	(268) 562-2144	FG
Ruleta Camacho	Senior Environment Officer	Environment Division, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:rcamacho@environmentdivision.info">rcamacho@environmentdivision.info</a>	(268) 562-2568	FG
Ivan Rodrigues	Water Business Unit Manager	Antigua Public Utilities Authority	<a href="mailto:iuan@apua.ag">iuan@apua.ag</a>	(268) 480-7170/7139	FG
Jedidiah Maxime	Director of Agriculture	Environment Division, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:jeddi59@gmail.com">jeddi59@gmail.com</a>	(268) 754-1259	FG
Roberto Isaac	Permanent Secretary	Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:robertoisaac@yahoo.com">robertoisaac@yahoo.com</a>	(268) 462-1213	FG
Maudvere Bradford	Senior Research Officer	Cotton Division, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:maudvere@hotmail.com">maudvere@hotmail.com</a>	(268) 462-3871 or 764-1256	FG
Gregory Bailey	Project Coordinator	Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:agroproject@yahoo.com">agroproject@yahoo.com</a>	(268) 764-1262	FG
Diane Black-Layne	Chief Environment Officer	Environment Division, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:dcblacku@gmail.com">dcblacku@gmail.com</a>	(268) 464-6410	FG
Fitzmaurice Christian	Consultant	Environment Division, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:fitzmaurice.christian@gmail.com">fitzmaurice.christian@gmail.com</a>	(268) 720-3489	FG
Morrison Burns		National Solid Waste Management Authority		(268) 725-6790	
Krishna Primus		Plant Protection Unit, Min. of Agriculture,	<a href="mailto:krishnaprimus@yahoo.com">krishnaprimus@yahoo.com</a>		

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM
		Lands, Housing and Environment			
Janil Gore-Francis	Director, Plant Protection Officer	Plant Protection Unit, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:janilg@yahoo.com">janilg@yahoo.com</a>	(268) 764-1255 or 562-2776	
Angela Fields	Malaacologist	UWI - Cave Hill	<a href="mailto:angela.fields@cavehill.uwi.edu">angela.fields@cavehill.uwi.edu</a>		
Frederick Southwell	Chief Town and Country Planner	Development Control Authority			IM
Brian Cooper	Unit Coordinator	Environment Unit, Antigua and Barbuda National Parks	<a href="mailto:brian.cooper@nationalparksantigua.com">brian.cooper@nationalparksantigua.com</a>	(268) 481-5034/22/23	IM
Adriel Thibou	Forestry Assistant 1	Forestry Unit, Min. of Agriculture, Lands, Housing and Environment	<a href="mailto:athibou@gmail.com">athibou@gmail.com</a>		IM
Tricia Lovell	Senior Fisheries Officer	Fisheries Division	<a href="mailto:trilov@hotmail.com">trilov@hotmail.com</a> & <a href="mailto:fisheriesantigua@gmail.com">fisheriesantigua@gmail.com</a>	(268) 462-1372	IM

FG-Focus Group

IM-Individual Meeting

ANNEX B: MAPS

FIGURE B1. ANTIGUA AND BARBUDA

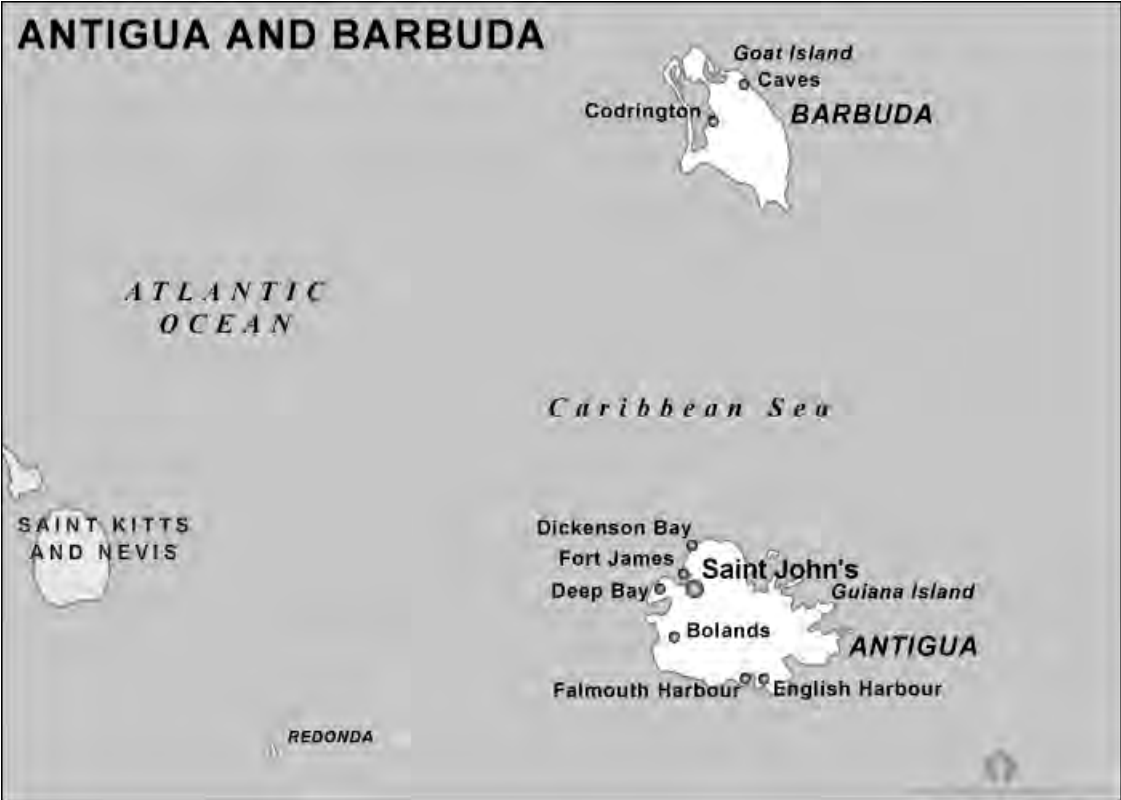




FIGURE B2. FOREST TYPES OF ANTIGUA

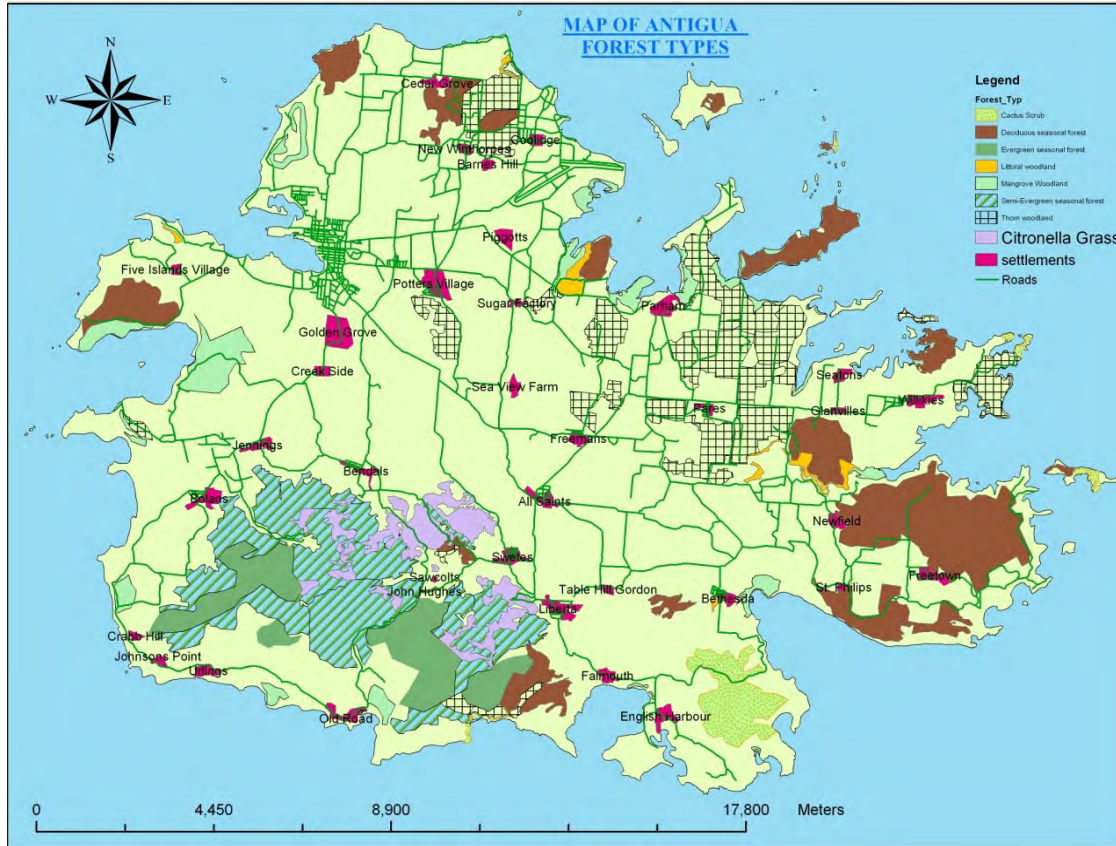


FIGURE B3. BODY PONDS WATERSHED

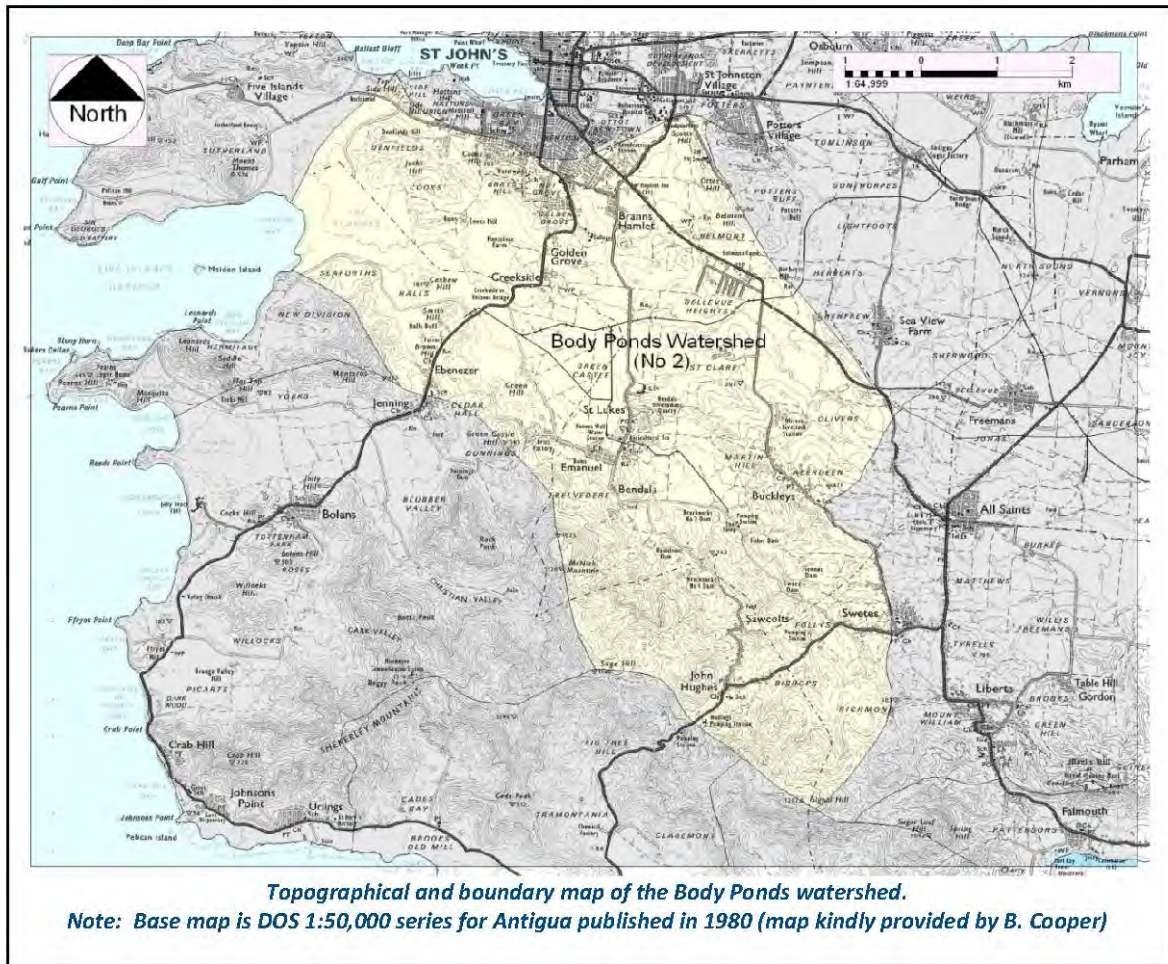


FIGURE B4. DISTRIBUTION OF MANGROVES IN ANTIGUA

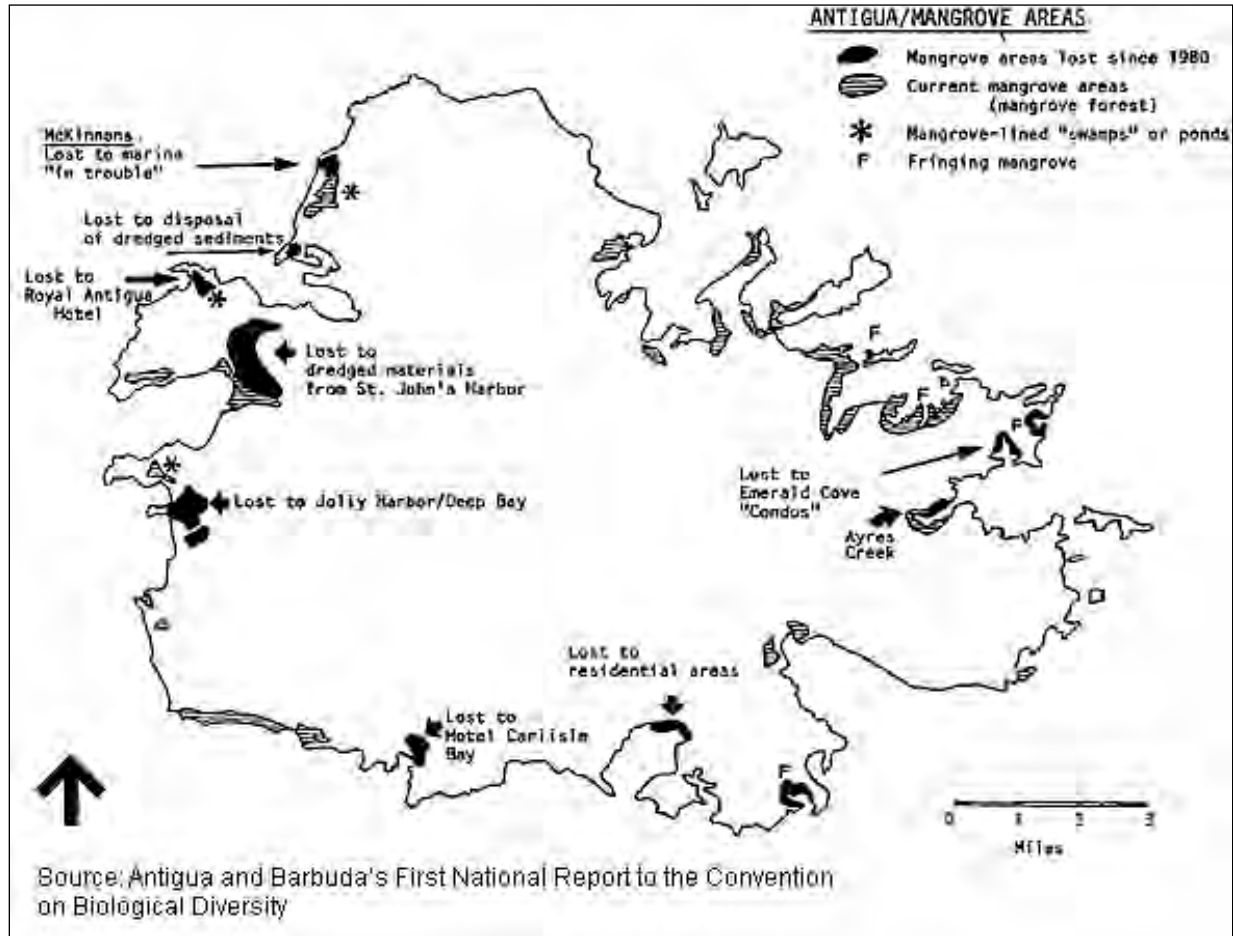
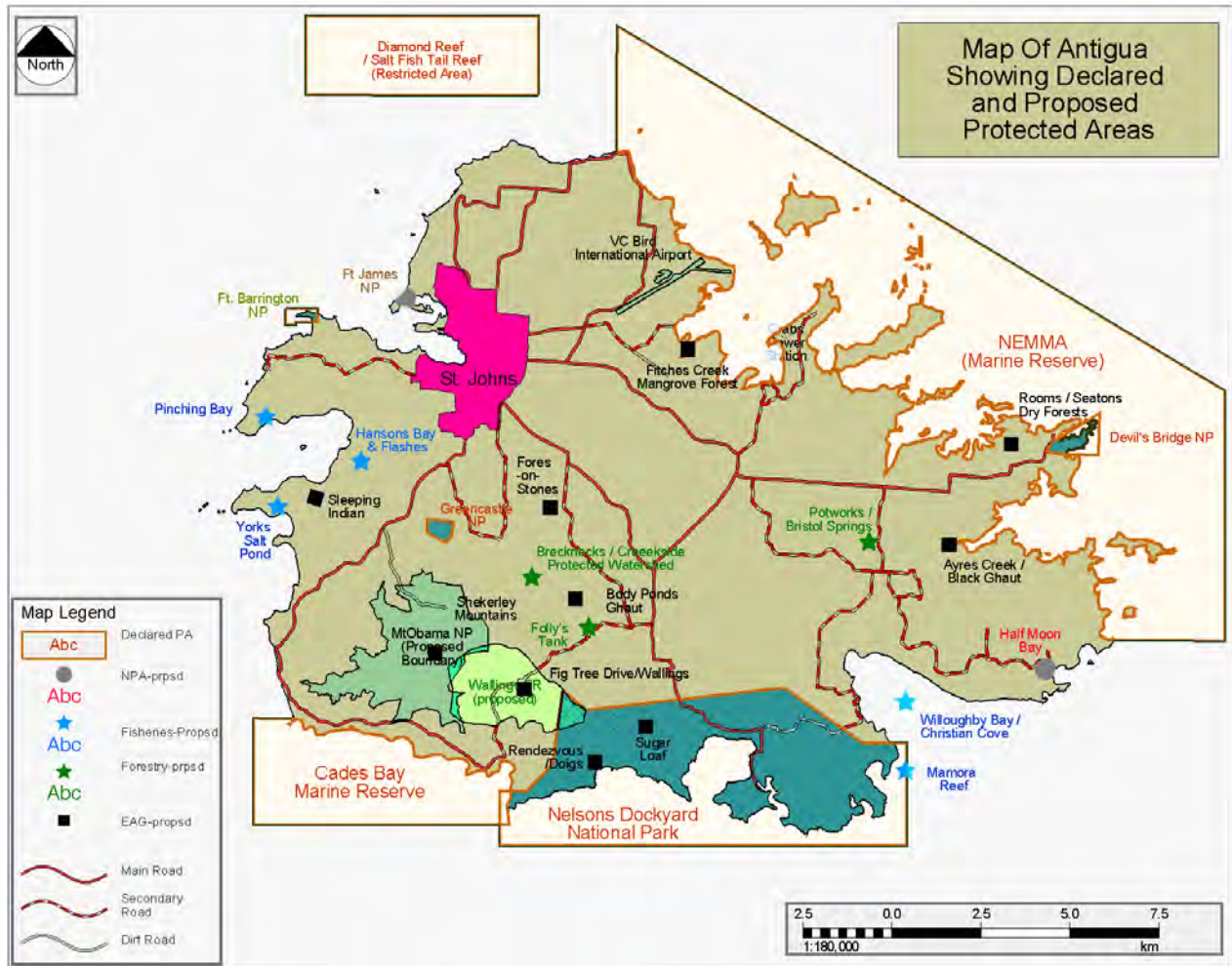




FIGURE B5. DECLARED AND PROPOSED PROTECTED AREAS



## ANNEX C: THREATENED SPECIES OF ANTIGUA AND BARBUDA

TABLE C1. IUCN RED LIST FOR ANTIGUA AND BARBUDA

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008	stable
Animalia	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008	stable
Animalia	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008	decreasing
Animalia	<i>Alsophis antiguae</i>	Antiguan Racer	CR	2010	increasing
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996	
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006	decreasing
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
Animalia	<i>Dendrocygna arborea</i>	Black-billed Wood-duck, Cuban Tree-duck, West Indian Tree-duck, West Indian Whistling-duck, West Indian Whistling Duck, West Indian Whistling-Duck	VU	2012	increasing
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008	stable
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000	decreasing
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008	decreasing
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011	unknown
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
Animalia	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR	2008	decreasing
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008	decreasing
Animalia	<i>Iguana delicatissima</i>	Lesser Antillean Green Iguana, West Indian Iguana	EN	2010	decreasing
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
Animalia	<i>Lepidochelys olivacea</i>	Olive Ridley, Pacific Ridley	VU	2008	decreasing
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996	
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011	decreasing
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
Animalia	<i>Millepora striata</i>		EN	2008	decreasing
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008	decreasing
Animalia	<i>Montastraea faveolata</i>		EN	2008	decreasing
Animalia	<i>Montastraea franksi</i>		VU	2008	decreasing
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008	unknown
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008	decreasing
Animalia	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008	unknown
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008	unknown
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013	decreasing
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007	decreasing
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008	decreasing
Plantae	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998	

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Plantae	<i>Guaiacum officinale</i>	Commoner Lignum Vitae, Guaiac Tree	EN	1998	
Plantae	<i>Nectandra krugii</i>		EN	1998	
Plantae	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998	



TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

BARBADOS

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
LEGISLATION AND INSTITUTIONS.....	2
NON-GOVERNMENTAL ORGANIZATIONS.....	2
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	2
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	3
PROTECTED AREAS.....	3
THREATENED AND ENDANGERED SPECIES.....	4
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	5
TYPES OF FOREST.....	5
ECONOMIC IMPORTANCE.....	5
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	6
MANAGED NATURAL ECOSYSTEMS.....	6
EX-SITU CONSERVATION.....	7
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	7
DIRECT THREATS.....	7
INDIRECT THREATS (ROOT CAUSES).....	9
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	10
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	11
FOCUS AREA 1.....	11
FOCUS AREA 2.....	11
FOCUS AREA 3.....	11
FOCUS AREA 4.....	12
CONCLUSIONS AND RECOMMENDATIONS.....	13
REFERENCES.....	15
ANNEX A: LIST OF CONTACTS.....	18
TABLE A1. CONTACTS.....	18
ANNEX B: MAPS.....	20
FIGURE B1. BARBADOS SYSTEM OF PARKS AND OPEN SPACE (2003).....	20
FIGURE B2. BARBADOS LAND COVER AND FOREST FORMATIONS CIRCA 2001.....	21
FIGURE B3. CORAL REEFS SURROUNDING BARBADOS.....	22
ANNEX C: THREATENED SPECIES OF BARBADOS.....	23
TABLE C1. IUCN RED LIST FOR BARBADOS.....	23

## REPORT FINDINGS

Approximately 700 species of native and naturalized flowering plants are found in Barbados. The terrestrial fauna of Barbados consists of nine mammal species, 261 species of birds, 10 extant terrestrial reptiles, two amphibians and approximately 1,320 species of insects and allied arthropods (Ministry of Environment and Drainage, 2011). Approximately 990 genera and 1,548 species have been identified in the marine and freshwater ecosystems of Barbados.

The following six Open Space designations comprise the terrestrial components of Barbados' park system:

- Open Space 1: Barbados National Park
- Open Space 2: Natural Heritage Conservation Areas (four)
- Open Space 3: Coastal Landscape Protection Zones
- Open Space 4: Public Park and Open Spaces
- Open Space 5: National Attractions
- Open Space 6: Barbados National Forest Candidate Sites (five)

The International Union for Conservation of Nature Red List for Barbados lists 44 threatened species. Within the marine environment there are 36 threatened animal species, including seven critically endangered, six endangered, and 23 vulnerable species. There are no threatened marine plant species. Within the terrestrial environment, there are eight threatened animal species, including two critically endangered, one endangered, and two vulnerable species. Additionally, three terrestrial plant species are threatened including one endangered and two vulnerable species.

Over the last four decades, urban zones have expanded across formerly agricultural land, mostly in the southwest, but also in other parts of the island. This urbanization trend is mainly related to increased affluence, which has resulted in acquisition of land parcels, and a less competitive agricultural sector.

Forest coverage may have increased in Barbados since 2008, particularly because of decreased activity in the sugarcane industry and agricultural activities. Forests cover 2 to 4 percent of Barbados and are mainly located in gullies and in coastal woodlands. The principal conservation activities outside of the protected areas occur in the northwest within the gullies that extend from the higher elevation areas to the western coast, and in areas where the forest has been less impacted.

The marine area of Barbados extends over approximately 48,800 km<sup>2</sup> with a shelf area of approximately 320 km<sup>2</sup>. Reefs occur off all of Barbados' coasts, except for the central east coast. The total reef area is estimated to be 90 km<sup>2</sup>. Wetlands and mangroves cover 64 ha of the island.

The Andromeda Botanic Gardens, the Flower Forest of Barbados, and the Barbados Wildlife Reserve are *ex-situ* sites for conservation of plant and animal species.

The principal direct threats to Barbados' biodiversity and tropical forests include inadequate provision of sewage treatment facilities, agro-chemical and soil sediment runoff, overharvesting of marine species, aggressive alien invasive species, and the effects of climate change.

The main root causes of the threats are a lack of:

- Land use planning and enforcement
- Government will to enact environmental legislation and regulations
- Systematic data collection and management of terrestrial and aquatic biodiversity
- Government financial support for biodiversity protection and management

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

ADS	Automated Directives System
CANARI	Caribbean Natural Resources Institute
CBD	Convention on Biological Diversity
CCBIC	Climate Change and Biodiversity in the Caribbean
CERMES	Centre for Resource Management and Environmental Studies
CZMU	Coastal Zone Management Unit
EED	Environmental Engineering Division
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
FAA	Foreign Assistance Act
FAC	Fisheries Advisory Committee
FAO	Food and Agricultural Organization
GEF	Global Environment Facility
IGEMP	Integrated Gully Ecosystem Management Plan
IUCN	International Union for Conservation of Nature
MAR	Ministry of Agriculture and Rural Development
MED	Ministry of Environment, Water Resources and Drainage
NBSAP	National Biodiversity Strategy and Action Plan
NCC	National Conservation Commission
NHD	Natural Heritage Department
NGO	Non-Governmental Organization
OS	Open Space
PDP	Physical Development Plan
RDCS	Regional Development Cooperation Strategy
UNCBD	United Nations Convention on Biological Diversity
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USAID	United States Agency for International Development
UWI	University of West Indies

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Barbados component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID/Eastern and Southern Caribbean Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

Barbados is the most easterly island of the Eastern Caribbean island chain. It has a total land area of approximately 432 km<sup>2</sup> (166 km<sup>2</sup>), and is nearly encircled by fringing and bank coral reefs. The total population of Barbados is estimated at 288,725 inhabitants as of July 2013 (CIA, World Factbook: Barbados); it is ranked as the 16th most densely populated country in the world, at approximately 622 persons/km<sup>2</sup>. The largest population centers are along the southern and western coasts.

Barbados has 92 km of coastline and an Exclusive Economic Zone of 167,000 km<sup>2</sup>. The Barbadian climate is classified as dry sub-humid with temperatures between 20 and 30° C. The dry season runs from December to May and the wet season from June to November. The country is generally quite low-lying with a maximum elevation of 340 meters above sea level at Mt. Hillaby. Barbados is predominately a coral limestone island, mostly covered by Pleistocene reef limestone averaging 70 m thick. The island's limestone formation has created gently rolling hills, which are interrupted by deep gullies and by a series of near-vertical cliffs with depths up to 30 meters. These cliffs and gullies form the basic drainage system of the island and harbor the majority of the island's remaining native flora and fauna (Brewster, 2001).

*Methodology:* The Assessment Team primarily used the following reports to prepare this FAA 118/119 Assessment: the Fourth National Report to the Convention on Biological Diversity (CBD) (Ministry of Environment and Drainage, 2011), the National Biodiversity Strategy & Action Plan for Barbados (Ministry of Physical Development and Environment, 2002), the National Physical Development Plan (Government of Barbados, 2003) and the Forest Resource Assessment for Barbados prepared by the Food and Agricultural Organization (FAO) of the United Nations (FAO, 2010). Additional information used in this report is in the References section.

The Assessment Team interviewed 15 participants in a focus group discussion and 17 individual stakeholders (See the List of Contacts in Annex A). The Assessment Team conducted site visits to:

- Beach stabilization and boardwalk projects within the Folkestone Marine Reserve, St. James Parish
- The boardwalk and seawall project in Hastings, Christ Church Parish
- Beach stabilization project at Worthing Beach, Christ Church Parish
- The Graeme Hall Nature Sanctuary, Christ Church Parish
- The Barbados Wildlife Reserve and the Welchman Hall Gully, St. Philip Parish

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

*Information Gaps:* The reports available to the Assessment Team lacked data on the extent and condition of Barbados' coral reefs, seagrass beds, beaches, dunes, and near-shore vegetation. As noted in the Assessment, gaps exist in the current knowledge of biodiversity classification, and in the location and extent, pattern of distribution, and quantity of biological resources in Barbados.

#### *General Description of Ecosystem and Species Diversity*

Five vegetative communities are found in Barbados: drought deciduous or semi-deciduous forest, seasonal evergreen and evergreen forest, forested and non-forested wetland, agricultural land, and rangeland, grassland, and shrubland. According to the Fourth National Report to the CBD, forest cover is estimated at 2 to 4 percent of land cover and is found mainly in gullies and coastal woodlands. Approximately 700 species of native and naturalized flowering plants have been described and approximately 100 of these are trees.

The terrestrial fauna of Barbados consists of nine mammal species, 261 species of birds, 10 extant terrestrial reptiles, two amphibians, and approximately 1,320 species of insects and allied arthropods (Ministry of Environment and Drainage, 2011). Approximately 990 genera and 1,548 species have been identified in the marine and freshwater ecosystems of Barbados; these include commercial fishery resources (Ministry of Environment and Drainage, 2011).

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION AND INSTITUTIONS

In 2005, the Government of Barbados established the Natural Heritage Department (NHD) as the lead public institution to conserve Barbados' biodiversity and to protect the quality and integrity of ecosystems including air, water, land, and animal components (Ministry of Environment and Drainage, 2011). The mandate of the National Conservation Commission (NCC), originally formed to provide public green space and beach management services, has been expanded to include re-vegetation of beaches, conservation of marine turtles, policing of beaches, reforestation in the Scotland District, and the management of Marine Museum Underwater Park and the Caves of Barbados. According to stakeholders, the NHD and NCC do not effectively fulfill their mandate due to a lack of technically trained staff in park management, natural resource management, and marine and terrestrial biology.

Within the Ministry of Environment, Water Resources and Drainage (MED) the Environmental Protection Department (EPD) regulates, controls, and monitors building developments, marine pollution, solid waste disposal, and water quality (Environmental Protection Department, 2013). The EPD's Environmental Engineering Division (EED) has principal responsibility for enforcing the Marine Pollution Control Act of 1998, which is intended to "prevent, reduce and control pollution of the marine environment..." and which sets the maximum permitted levels for contaminant discharges and fines (Government of Barbados, 1998).

The Coastal Zone Management Unit (CZMU), established by the Coastal Resources Management Act of 1998, advances "the knowledge, use, development, conservation and management of the coastal zone and its resources." It has three sections, Coastal Resource Management, Engineering, and Marine Research (CZMU, 2013). One contact said, "...the CZMU is an excellent organization. It stands out within Barbados and the region. Science drives its policies and plans. It has young, qualified, and trained professionals."

In the Ministry of Agriculture and Rural Development (MAR), the Fisheries Division, operating under the Fisheries Act 1998 and its Fisheries Management Regulations, regulates the capture of marine turtles, lobsters, sea urchins, ornamental fish, and yellow fin tuna (Ministry of Environment and Drainage, 2011) in collaboration with the Fisheries Advisory Committee (FAC) and the Coast Guard and Police (FAO, 2013). The Soil Conservation Unit, established in 1998 under the Soil Conservation Act, works to reduce soil erosion in the Scotland District of north central Barbados through the construction of gabions and other

structures and through reforestation and soil conservation (Ministry of Agriculture, 2012a). The Plant Protection Department's mandate is to "respond, identify and manage new pest incursions with a focus on strengthening existing laws and regulations as well as providing technical expertise and training to the quarantine staff involved" (Ministry of Agriculture, 2012a). The National Botanic Garden is a government agency responsible for conducting silvicultural and dendrological research on indigenous, naturalized, endangered, rare, and endemic plant species existing on open spaces across Barbados (Ministry of Environment and Drainage, 2011).

The Office of Town and Country Development Planning, established by the Town and Country Planning Act of 1968, has "...the responsibility for the orderly and progressive development of Barbados..." using the Physical Development Plan "...to chart settlement, growth patterns and the allocation of land to various uses" (Town & Country Development Planning Office, 2013). According to the Fourth National Report to the CBD, the Physical Development Plan (PDP) (Amended 2003) is used as a "guide to assess development applications that may affect biodiversity resources." The Environmental Impact Assessment (EIA) procedures have been another important planning tool since their introduction through the physical development planning process in the 1980s and formal adoption through amendments to the Town and Country Planning Act, Chapter 240 in 1998. Since then, EIAs have been prepared for major developments, as required by law.

According to several contacts at the focus group discussion, as well as the Fourth National Report to the CBD, the government has not prioritized biodiversity conservation or sound environmental management in its land use planning and development decisions. Barbados has a significant amount of environment-related legislation in draft that has not passed through Parliament, which, according to a contact is "due to a lack of political interest and will." For example, the Environmental Management Act, drafted in the 1990s has never been approved by Parliament, which weakens the legal basis for conservation of biodiversity and forests. Additionally, the Coastal Management Act and the Marine Pollution Control Act have been enacted, but their regulations have not been written. According to a contact working in the public sector, "the official reason they give reporters is that the capacity for drafting the regulations does not exist, but there is also an element... that the regulations will restrict the activities of a wide representation of the population and government, as well."

Barbados is party to the following international agreements related to the conservation of biodiversity and tropical forests:

- UN Convention on Biological Diversity (UNCBD)
- Convention on International Trade in Endangered Species
- UN Framework Convention on Climate Change and Kyoto Protocol
- UN Convention on the Law of the Sea
- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena)
- UN Convention to Combat Desertification
- UN Fish Stocks Agreement
- Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region
- FAO Compliance Agreement, International Commission for the Conservation of Atlantic Tunas
- The Protocol (to the 1983 Cartagena Convention) Concerning Specially Protected Areas and Wildlife in the Wider Caribbean
- Ramsar Convention on the Protection of Wetlands

The National Biodiversity Strategy and Action Plan (NBSAP), created under the UNCBD, is the guiding document that establishes the "priority actions to ensure [biodiversity] conservation and sustainable use within the framework of the socio-economic development of [Barbados]." According to the Fourth National



Report to the CBD (2011), although increased biodiversity research, conservation of some key target species, and the establishment of the NHD mark important steps towards achieving NBSAP objectives, no formal mechanism has been developed yet for monitoring the effectiveness of work carried out to meet NBSAP objectives.

## NON-GOVERNMENTAL ORGANIZATIONS

Non-governmental organizations (NGOs) that work in the environment sector include the Barbados National Union of Fisherfolk, whose goal is to improve "...the socio economic conditions of fisherfolk through the sustainable development of fisheries" (2013). The Barbados Sea Turtle Project, associated with the University of the West Indies Cave Hill Campus, "...works to restore local marine turtle populations to levels at which they can fulfill their ecological roles...through the use of scientifically-sound conservation measures and monitoring programmes, and through...training, education and public awareness tools and activities..." (Barbados Sea Turtle Project, 2010). The East Coast Conservation Organization has established the Lionfish Barbados Hotline, a public awareness campaign that provides information on how dive shops and divers can hunt lionfish, and encourages consumers to eat lionfish. The Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies performs research and trains graduate students on watershed management and marine conservation issues. Since 1954, the Bellairs Research Institute of McGill University has operated a research station on the edge of Folkstone Marine Reserve in Holetown and "... has broadened from primarily marine science to a wide spectrum of disciplines in the natural and social sciences, such as geology, geography, archaeology, climatology, biology, ecology, horticulture, agriculture, sustainability, and water management" (McGill University, 2013).

According to the Fourth National Report to the CBD, over the last decade, NGOs and academia have been involved to a greater degree in the policy making process through participation in stakeholder sessions/meetings/surveys and inclusion on government committees and have worked more closely with government departments on conservation projects than in the past. CERMES has become a regional leader in natural resource management studies and the Bellairs Research Institute has carried out important biological research in Barbados, including coral reef surveys every 5 years. However, according to a government stakeholder, much of the research carried out by the Bellairs Institute is not shared with the government of Barbados even though it could serve as an extremely useful source of information. Although funding information for NGOs was not made available to the Assessment Team, contacts within these organizations stated that their funding is not enough to cover their needs and many operate with funds from temporary projects with no plans for developing sustainable funding mechanisms.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

International donor agencies that support projects that directly or indirectly contribute to biodiversity conservation in Barbados include the Global Environment Facility (GEF), the United Nations Environment Programme (UNEP), and the United Nations Development Programme (UNDP). These organizations have coordinated effectively with the Government of Barbados on biodiversity conservation and management initiatives. Information on funding provided by these organizations was unavailable to the Assessment Team.

# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

Figure B1 in Annex B indicates Barbados' system of parks and open spaces and the surrounding marine areas in the National PDP, as amended and approved in 2003. In its terrestrial components, the system has the following six Open Space (OS) designations.

- Open Space 1 is for the Barbados National Park, which includes a terrestrial and marine component. The marine portion of the park lies off the north and northeast coast. The terrestrial portion of the park is in parts of St. Lucy, St. Andrew, and St Joseph and St. John Parishes. In 2007, both houses of Parliament approved the National PDP, including the Barbados National Park as indicated on Figure B1, legally establishing the park.<sup>2</sup> A contact described the park as "...a live-in national park or a protected landscape. In practical terms...the Physical Development Plan sets out the growth strategies for the area...and sets out various policies as related to land use, biodiversity, and reforestation. There are more restrictions on the use of private lands than in any other part of Barbados."
- Open Space 2 consists of four types of Natural Heritage Conservation Areas. The land type is dark green on the map and most of it is adjacent to the Barbados National Park. The marine type is shown in dark blue on the map and includes the Folkestone Marine Reserve on the east coast, the only legislated Marine Protected Area in Barbados, managed by the NCC with support from CERMES at the University of West Indies (UWI).<sup>3</sup> The Chancery Land Swamp includes a special escarpment, swamp, dunes and beach ecosystems on the southwest coast, and BirdLife International has designated it as an Important Bird Area. The Harrison's Cave Special Environmental Zone is an area surrounding the Harrison's Cave in the center of the island. The Graeme Hall Swamp has Barbados' largest area of red and white mangroves and is a Ramsar site managed by the Graeme Hall Nature Sanctuary. It has been closed to the public for the last 4 years to protest government mismanagement of a sluice gate that prevents saline brackish water from entering the mangrove forest and inaction to prevent pollution from entering the reserve (PR Newswire, 2013).
- Open Space 3 consists of Coastal Landscape Protection Zones, shown in medium blue on Figure B1. They are intended to protect undeveloped coasts. One of these areas lies between Maycock's Bay and Archer's Bay on the northwest coast. Another extends along the southeast coast to the south of Canset Bay. The Assessment Team was unable to obtain information on the status of management of OS3 landscapes.

---

<sup>2</sup> One contact from the Town and Country Planning Office stated "The Physical Development Plan sets out the national park, which was approved by both houses of Parliament in 2007...It has been declared legally a national park." However, according to the Fourth National Report to the CBD, the national park boundaries have been delimited and established, but the proposed Barbados National Parks Act, which would legally declare the protected area and establish the National Park Plan, has yet to pass through Parliament.

<sup>3</sup> The Reef Watchers program is a community-based coral reef monitoring regime that was implemented at the Folkestone Marine Reserve with assistance from CERMES at UWI to facilitate the development of a coral reef monitoring database. The program involves local divers who work with scientists to monitor reefs adjacent to the reserve.

- Open Space 4 is Public Park and Open Spaces, and includes Historic Urban Parks, Coastal Beach Parks and Recreational Parks, shown on the map in green, orange and light green respectively and which consist of about nine small areas in various parts of Barbados. The map does not indicate the locations of two other designations in Open Space 4, Shore Access Points, and Community Mini Parks.
- Open Space 5 is for National Attractions and Figure B1 shows them in dark red. They are the 15 main tourist attractions of Barbados, such as Harrison’s Cave, Flower Forest, and Andromeda Botanic Garden. The National Trust owns them and manages them.
- Open Space 6 is for the five Barbados National Forest Candidate Sites and Figure B1 shows their locations with red lines. All of them are located within the area of the Barbados National Park in the central-west area. As far as could be determined, these forests have only been designated in the PDP but are not actually delimited or managed.

The marine area of Barbados extends over approximately 48,800 km<sup>2</sup> with a shelf area of approximately 320 km<sup>2</sup>. Figure B1 indicates that the PDP divides the marine area immediately around the island into three different zones. The red dashed line off the northeast coast indicates the proposed boundary of the National Park Marine Boundary, which will be defined more concretely through the Integrated Coastal Zone Management Study. The dashed blue lines off the northwest and southwest coasts indicate the zones where additional Marine Natural Heritage Conservation Areas may be created once the study is complete. The solid blue line off the west and south coasts indicates the Coastal Management Area: South and West Coasts. The Assessment Team was unable to determine the exact status of these marine areas.

## THREATENED AND ENDANGERED SPECIES<sup>4</sup>

Although an online database was developed in 2007 containing information on all known plant species in Barbados (Broome et al, 2007), according to the 2011 report to the CBD, no official national biodiversity or endangered species database has been prepared. Additionally, there are gaps in the current knowledge of biodiversity classification, and location and extent, pattern of distribution, and quantity of biological resources in Barbados.

According to the International Union for Conservation of Nature (IUCN) Red List, there are 44 threatened species in Barbados. In the marine environment there are 36 threatened animal species, including seven critically endangered, six endangered and 23 vulnerable species. Both elkhorn (*Acropora palmata*) and staghorn (*Acropora cervicornis*) corals are listed as critically endangered as there has been an 80 percent reduction in the population over the last 30 years. There are no threatened marine plant species. In the terrestrial environment, there are eight threatened animal species, including two critically endangered, one endangered, and two vulnerable species. There are three threatened terrestrial plant species including one endangered and two vulnerable species. The Barbados thread snake, leaf-toed gecko, and Barbados skink are endemic but the status of their populations has not been determined (Ministry of Environment and Drainage, 2011). Annex C has a complete list of the 44 threatened species in Barbados.

---

<sup>4</sup> The IUCN Red List refers to species as ‘threatened’ if they fall within one of three ‘Red List Categories’: vulnerable, endangered or critically endangered. These Red List Categories indicate increasing degrees of threat for extinction of a species. The category ‘near threatened’ is applied to other species that, while not currently threatened may, given current trends, or without conservation efforts, soon become threatened. Least concern is assigned to those species that are not close to being in the near threatened category and are not likely to be soon however, this does not imply that species in this category are of no conservation concern. (IUCN, 2012)

# STATUS AND MANAGEMENT OF FOREST RESOURCES

## TYPES OF FOREST

Table 1 indicates the forest types of Barbados with their total area, area protected, and percentage protected.

Table 1. Forest Characteristics

FOREST TYPE	AREA (ha)	AREA PROTECTED <sup>5</sup>
Drought Deciduous Woodland	1,081	Unknown
Deciduous, Evergreen Coastal and Mixed Forest or Shrubland	2,913	83
Drought Deciduous Forest/Shrub	263	0
Semi-Deciduous and Drought Deciduous Forest on Limestone	2,864	138
Semi-Deciduous Forest (includes Semi-Evergreen Forest)	277	0
Seasonal Evergreen Forest	34	0
Mangrove	7	1
<b>TOTAL</b>	<b>7,439</b>	<b>222</b>

Source: (Helmer, 2008)

Much of Barbados' original forest cover has been cut down and converted for urban and agricultural use. The largest remaining tract of primary forest on the island is an informally protected reserve called Turner's Hall Woods containing around 20 ha of seasonal evergreen tropical forest. In 2008, there were only 7 ha of mangrove forest left, as most mangroves have been removed and filled in to create land for coastal development projects. A contact noted that the luxury hotels along the west coast near the Green Monkey Golf Course had been, "...full of mangroves and cost 25 cents a sq. foot and now is worth \$700 a sq. foot."

The areas of some forest types in Table 1 may have increased since 2008, related to the decline in the sugarcane industry and agricultural sector in Barbados. According to Helmer (2008), many former sugarcane plantations are now re-vegetating with grassland and/or secondary woodland growth, however no more current data are available regarding this trend. As the table indicates, less than 5 percent of these forest types were protected in 2008.

## ECONOMIC IMPORTANCE

Commercial timber harvesting is not a primary forest use in Barbados, but its trees and forests provide other economically important benefits. Trees, especially the exotic species casuarina, help to stabilize beaches, thereby reducing the rate of erosion and protecting infrastructure, such as roads and hotels. Forests help to reduce landslides and erosion, thereby reducing sedimentation into marine waters and impacts to adjacent reefs and seagrass beds. Forests provide habitat for a high percentage of Barbados' flora and fauna, many of which provide economic benefits, especially as attractions for tourism. .

---

<sup>5</sup> These figures do not take into the account the types of forests protected within the Barbados National Park.

# CONSERVATION OUTSIDE OF PROTECTED AREAS

## MANAGED NATURAL ECOSYSTEMS

### *Agricultural Land*

Patterns of land use remain similar to those shown in Figure B2, which is from 2000<sup>6</sup>. The map shows the area of the national park in green in the northeast. Urban areas, shown in gray, are concentrated along the south and west coasts. Agricultural land, shown in darker and lighter yellow, occurs across the southern half of the island and between the gullies in the northwest. Agriculture constitutes the largest single land use. The relatively small areas of pasture, shown in pink, are along the eastern coast. Since 1980, some former agricultural land has become urbanized or has been abandoned and is now covered with bushes and small trees. Over the last four decades, as people have become more affluent and obtained their own land parcels, and as agriculture has become less competitive, many larger houses have been built in formerly agricultural areas. Urban area has expanded across farm land, mostly in the southwest, but also in other parts of the island (Maynard, 2013). In 2009, agriculture and pasture still covered 44 percent of Barbados (Trading Economics, 2013).

### *Gullies*

The principal conservation interventions outside of protected areas are in the northwest in the gullies that run from the higher elevations to the western coast, and where the forest has never been completely eliminated. The government has implemented projects to protect the natural vegetation and diminish the rate of erosion, such as the Integrated Gully Ecosystem Management Plan (IGEMP)<sup>7</sup> and the Soil Conservation Unit's reforestation and soil conservation activities in the Scotland District. The island's gully ecosystems cover only 5 percent of the island's total area but contain as much as 35 percent of native plant diversity in Barbados (Austin, 2005). The green monkey, originally introduced from West Africa in 1627, lives in troops of up to 15 individuals and is typically found in gully ecosystems. As the natural drainage channels of Barbados, the gullies also perform an important role in aquifer recharge.

### *Coral Reefs*

As indicated on Figure B3, reefs occur off all of Barbados' coasts, except for the central east coast. The total reef area is estimated at 90 km<sup>2</sup> (Ministry of Environment and Drainage, 2011). The Bellairs Research Institute's surveys of reefs, as well as other studies, have revealed that in general, the health of coral reefs has deteriorated (Ministry of Physical Development and Environment, 2002) and contacts interviewed for this Assessment estimated that between 50 and 90 percent of the reefs are degraded or dead. However, the Fourth National Report to the CBD says that the reefs are healthy and continue to support a rich and diverse community of marine fauna (Ministry of Environment and Drainage, 2011). According to Bouchon et al. (2008) Barbados' inshore fringing reefs have been affected by poor water quality caused by coastal construction, tourism infrastructure, and inland agriculture; by storms; and by over-exploitation of fish and corals. The offshore bank reefs are relatively undamaged as they are far enough offshore to avoid the immediate effects of water pollution and overfishing (Bouchon, 2008). There is general agreement that coral

---

<sup>6</sup> According to a contact in Town and Country Planning, land use information is currently being gathered to prepare a new national land use map.

<sup>7</sup> The Integrated Gully Ecosystems Management Plan (IGEMP), already prepared for the north central part of Barbados, provides a basis to balance the need to protect biodiversity and the gullies' primary function of drainage with the development required for ecotourism and agricultural uses in this part of the country. The IGEMP sets out an overall policy framework which gives direction to the private sector, public sector and general public on the use and development of gully resources towards long-term sustainability of gully ecosystems. The plan is not currently being implemented (Contacts).

reefs of the Eastern Caribbean are subject to numerous stressors, including climate change, bleaching, sedimentation, and nutrient loading.

## Wetlands and Mangroves

According to the Fourth National Report to the CBD, wetlands and mangroves cover 64 ha of the island and are indicated on Figure B2 in purple and light blue. Remaining mangroves are found at Graeme Hall, Chancery Lane, St. Lawrence, Brighton, Holetown, Heywoods, and Long Pond (Ministry of Physical Development and Environment, 2002). Bird hunting has historically been a threat to the migratory birds that arrive at Barbados' emergent wetlands. BirdLife International has worked with a group of former hunters to agree to maintain an emergent wetland area year-round as opposed to only during hunting season in an effort to provide valuable habitats for shorebirds and other waterbirds. In 2009, two former hunters were instrumental in the creation of the Woodbourne Shorebird Reserve, a 4 ha land lease in Woodbourne, St. Philip Parish, which was formerly used as a hunting swamp (Burke and Wege, 2009).

## Freshwater Ecosystems

According to the NBSAP (2002), the permanent surface water catchments of Barbados include Bawdens, Long Pond, Green Pond, Hillaby, Bathsheba, Consett, Codrington, Three Houses, and Culpepper. These freshwater bodies support significant aquatic biodiversity including freshwater fish, crustaceans, and some species of aquatic flora, insects, and amphibians. Freshwater pools in Cole's Cave are currently the only location where the endemic *Atya brachyrhinus*, a freshwater crustacean, has been collected. Surveys of these freshwater pools were conducted in 1963 and 1972; currently it is unknown whether the species is still present at Cole's Cave and whether it occurs in neighboring cave systems and river catchments (De Grave et al, 2013).

## EX-SITU CONSERVATION

The Andromeda Botanic Gardens is a 6 acre tropical garden owned by the Barbados National Trust in the Parish of St Joseph that has a large collection of native and exotic plants, but observations there suggest that it does little to reproduce vulnerable, endangered, or rare species of plants from Barbados. The Flower Forest of Barbados has 53.6 acres with 7 acres of wild garden, but is more of a tourist attraction than a site for reproduction of endangered or rare native plants. The Barbados Wildlife Reserve has an abundance of the non-native Barbados green monkey, native red-footed tortoises, and some snakes and is operated more as a tourist attraction than for *ex-situ* conservation of endangered or rare animals.

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

The focus group discussion and contacts described a variety of threats to the conservation and improved management of biodiversity and forests. This section describes threats that were most frequently cited by stakeholders and described in the NBSAP and/or the Fourth National Report to the CBD.

## DIRECT THREATS

(1) **Inadequate provision of sewage treatment facilities** directly threatens the health of near shore coral reefs. There are currently two sewage treatment plants in Barbados – one serving a large portion of Bridgetown and the other serving the urban corridor along the south coast. The Bridgetown sewage treatment facility operates at less than full capacity because it cannot be connected to the urban areas along

the west coast, as pipes would have to be installed beneath the main coastal road and there is no alternative route to the hotels and houses along the western coast (Contacts). A contact said, “There has been discussion about a sewage plant on the west coast for the last 20 years but there are so many problems of accessibility that it is difficult. All the major hotels are there.” According to the Fourth National Report to the CBD, eutrophication caused by runoff containing a combination of sewage, fertilizers, and pesticides is considered to be the primary cause of coral reef degradation in Barbados.

(2) **Agro-chemical and soil sediment runoff** is a direct threat to seagrass and coral reef ecosystems. Tomascik and Sander (1987) demonstrated that agrochemical and industrial runoff changed the water chemistry along the coast so that a significant reduction in growth and recruitment of some of the main reef building corals was noted (Tomascik & Sander, 1987). The Assessment Team was unable to identify more recent research on the amounts of agricultural chemical loads in near shore waters and the impact upon reefs, however stakeholders noted that this is still a problem, and little has been done in Barbados to reduce pesticide use or capture agricultural runoff upstream. According to the World Resources Institute “Reefs at Risk” analysis, 60 percent of Barbados’ reefs are threatened by sedimentation (Burke, 2004). Acting Coastal Planner with the CZMU, Fabian Hinds, recently discussed these threats to coral reefs in a *Barbados Today* news article in which he said, “[Our coral reefs] are impacted by large volumes of storm water run-off that carry the soil and pollutants...including solid waste and bacteria from the soil into our marine environment.” (Barbados Today, 2013).

(3) **Overharvesting of marine species** is a direct threat to Barbados’ biodiversity. The shallow-shelf reef fishery targets hinds, parrotfish, grunts; and surgeonfish and triggerfishes, which are considered to be overfished. Fishermen have reported reduced catch per unit effort and fish size on the south and west coasts (Food and Agriculture Organization, 2005). In addition, the white sea urchin has been a commercially important species for over a century for its eggs. High demand has led to overexploitation of this resource and, at one point, the stock was considered to be in a collapsed state. Over the last 13 years, several harvesting moratoria, as well as additional recovery efforts, have been made by the Fisheries Division and CZMU to allow the depleted stock to recover. According to the Fourth National Report to the CBD, these management efforts have not lead to full recovery of the urchin population.

(4) A number of **aggressive invasive species** have competed with or preyed upon indigenous plant and animal species in Barbados and caused severe damage to crops. Species such as the giant African snail, the pink hibiscus mealybug, papaya mealybug, West Indian fruitfly, citrus leafminer, Asian citrus psylla, and chilli thrips have been a financial burden, costing the country hundreds of thousands of dollars as a result of crop damage and eradication campaigns (Ministry of Environment and Drainage, 2011). Over the last 1 to 2 years, the lionfish has become a concern in Barbados (Caribbean360, 2012). Lionfish are voracious predators of ecologically and economically important marine species (REEF, 2012), and controlling the spread of the population in the Caribbean region remains a challenge.

(5) The **effects of climate change** are a direct threat to biodiversity, most evident to Barbados’ reefs, where an increase in surface sea temperatures is correlated to coral reef bleaching. In 2005, Barbados, and much of the Eastern Caribbean region, suffered the largest recorded coral reef bleaching event in history. Studies showed that recovery from the bleached condition was slow and overall mortality was high on both deep and shallow reefs (Oxenford, 2008). Additionally, according to the Caribbean Natural Resources Institute (CANARI) Climate Change and Biodiversity in the Caribbean (CCBIC) reports, the principal climate change related hazards that have begun and are anticipated to threaten biodiversity include sea surface temperature increases, sea level rise, beach erosion, change in rainfall patterns, higher ocean carbon dioxide concentrations, and increased frequency of hurricanes (CANARI, 2008).



## INDIRECT THREATS (ROOT CAUSES)

(1) **Lack of land use planning and enforcement:** The lack of enforcement of land use regulations has caused environmental impacts and stresses upon terrestrial and marine biodiversity. Particularly, illegal dumping of construction materials and other wastes, as well as overharvesting of wooded scrub plants have threatened the island's gully ecosystems. Farmers are not required to capture agricultural runoff in settling ponds, therefore sediment and chemical runoff flows freely into near shore marine environments. One contact noted that "People need to realize that the whole island [affects what happens on the coast]... You cannot have them and us but must link the coast to the inland communities...I blame Town and Country Planning to a certain extent for that. There has never been a complete land use plan in Barbados. How much tourism can the economy sustain? Tourism has evolved [chaotically] so that different types of hotels are located side-by-side." Another contact indicated how difficult it has been to regulate land use in Barbados: "We try to mitigate now in the applications. You are allowed to put the building back in the same footprint as before, but are not allowed to go any further seaward. We are too small to prohibit building on the beach. A lot of this [building occurred] in the 60s before Town Planning existed, and there were already houses on the other side of the road."

(2) **The lack of Government will to enact environmental legislation and regulations:** The Fourth Report to the CBD cites "the inordinate length of time it takes for draft legislation to be finalized and enacted" and "the lack of enforcement of existing legislation," as key impediments to achieving the objectives of the NBSAP and biodiversity conservation and improved management. As discussed above, the Environmental Management Act, drafted in the 1990s has never been approved by Parliament, which weakens the legal basis for conservation of biodiversity and forests. One contact said "The Marine Pollution Control Act was put in place in the 1990s but its regulations have not been written, so the Environmental Protection Unit cannot enforce the law." According to the Fourth National Report to the CBD, efforts to protect the overfished white sea urchin have not succeeded due to "inefficient enforcement and lack of compliance, as well as a general reluctance by the judicial system to treat contravention of the fisheries regulations as a serious offence." These shortcomings in approving and enforcing environmental regulations appear to be principally the result of a lack of government will to support environmental protection.

(3) **Lack of systematic data collection and management system for terrestrial and aquatic biodiversity status and distribution** limits the ability of decision-makers and professionals to manage and protect Barbados' biodiversity based on scientific data. In particular, the lack of sufficient data on reef ecology and condition makes it impossible to adequately manage, monitor, and protect reefs. Likewise, there is a lack of up-to-date information about the area, characteristics, and trends of forests and urban trees. Although contacts noted that for several years, government and non-government organizations have collected hydro-meteorological, physical oceanographic, coastal and inland erosion data among other data sets, the inter-agency sharing of this data has been weak and systematic collection of this data into a database has not occurred. This has hampered conservation and management efforts and project implementation.<sup>8</sup>

---

<sup>8</sup> One contact said the following about the importance of collecting and using data: "There is a need for a comprehensive national environmental management database. There are things that are as simple as knowing all of the offices that are involved in something that is related or could be related to environmental management. Just knowing who they are, what data they collect and cataloging it and having a framework for the routine storage of that data regardless of whether they interpret it or not... We come looking for the data set and it is not there and it causes a lot of delays in project implementation and confusion down the road because as the project progresses without data... I see the strategic management and utilization of data as fundamental to the government of Barbados because otherwise you are planning and implementing in a vacuum. The most important thing would be to have the collection of data be connected to a systematic requirement for reporting.... For me the priority would be the data management. Until we get a handle on the data we cannot plan."



(4) **Lack of governmental financial support for biodiversity protection and management:** According to the Fourth National Report to the CBD, the Government does not always provide sufficient funds to the agencies whose work contributes to biodiversity conservation and management. For these agencies to be able to effectively achieve their mandates, funding is often sought from external, international donors. According to the Fourth National Report to the CBD, user fee systems for biodiversity resource users such as hoteliers, fisherfolk, SCUBA operators, and tour operators, have not yet been established.

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats, stakeholder consultations, and document review. For long-term, sustainable results, the root causes of the threats to biodiversity must be addressed.

Based on the information and perspectives gathered from meetings with 32 contacts, field visits to five coastal zone management and biodiversity protection project sites, and extensive literature review, the most urgent actions required to conserve Barbados' biodiversity are actions to conserve its coral reefs. The root causes of threats to biodiversity and the actions to conserve it are summarized in Table 2.

Table 2. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
(1) Lack of land use planning and enforcement	<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect important ecosystems (i.e., compile various existing plans, such as the Integrated Coastal Zone Management Plan, National Park Plan, Integrated Gully Ecosystem Management Plan).</li> <li>• Strengthen local and regional collaboration and participation to develop land use guidance.</li> <li>• Train in implementation, monitoring, and enforcement of land use plans.</li> </ul>
(2) Lack of Government will to enact environmental legislation and regulations	<ul style="list-style-type: none"> <li>• Accelerate approval and implementation of environmental laws and regulations that are currently drafted, awaiting approval, or need updating (i.e., Environmental Management Act, Barbados National Park Act, CZMA, Marine Pollution Control Act).</li> <li>• Strengthen the environmental NGO sector</li> </ul>
(3) Lack of systematic data collection and management on terrestrial and aquatic biodiversity distribution and status	<ul style="list-style-type: none"> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for reefs and forests.</li> <li>• Strengthen systems for inter-agency sharing of data.</li> <li>• Develop mechanism to monitor the effectiveness of work intended to meet National Biodiversity Strategy and Action Plan objectives.</li> <li>• Establish baselines and monitor migratory birds, reefs, and forests.</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
(4) Lack of government financial support for biodiversity protection and management	<ul style="list-style-type: none"> <li>• Provide adequate funding in the national budget for the protection and management of natural resources (i.e., reefs and National Forest Sites), biodiversity-related agencies, and soil conservation.</li> <li>• Perform robust studies of the socioeconomic value of reefs to tourism, real estate, and fisheries and establish user-fee systems for biodiversity resource users.</li> <li>• Communicate results of socioeconomic and scientific studies to different segments of the Barbados citizenry.</li> <li>• Raise awareness of the impact of land-based activities (e.g., coastal development, sewage, agriculture, deforestation) on marine biodiversity.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 3 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

**Global Climate Change:** The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

**Citizen Security:** The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

**Economic Growth:** Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

## FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID’s HIV/AIDS program will continue to be funded through the President’s Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 3. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect important ecosystems.</li> <li>• Strengthen local and regional collaboration and participation to develop land use guidance.</li> <li>• Train in implementation, monitoring, and enforcement of land use plans.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.</p>
<ul style="list-style-type: none"> <li>• A) Accelerate approval and implementation of environmental laws and regulations that are currently drafted, awaiting approval, or need updating.</li> <li>• B) Strengthen the environmental NGO sector.</li> </ul>	<p>A) No USAID actions meet this need B) Focus Area 1: Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</p>
<ul style="list-style-type: none"> <li>• Establish baselines and monitor migratory birds, reefs, and forests.</li> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for reefs and forests.</li> <li>• Strengthen systems for inter-agency sharing of data.</li> <li>• Develop mechanism to monitor the effectiveness of work intended to meet National Biodiversity Strategy and Action Plan objectives.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.</p>
<ul style="list-style-type: none"> <li>• Provide adequate funding in the national budget for the protection and management of natural resources (i.e., reefs and National Forest Sites), biodiversity-related agencies, and soil conservation.</li> <li>• Perform robust studies of the socioeconomic value of reefs to tourism, real estate, and fisheries and establish user-fee systems for biodiversity resource users.</li> <li>• Communicate results of socioeconomic and scientific studies to different segments of the Barbados citizenry.</li> <li>• Raise awareness of the impact of land-based</li> </ul>	<ul style="list-style-type: none"> <li>• Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.</li> <li>• Focus Area 2 will focus on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development,</li> </ul>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
activities (e.g., coastal development, sewage, agriculture, deforestation) on marine biodiversity.	internships, and assistance with job placements and could be linked to the awareness-raising actions necessary.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity noted in the previous sections, this section identifies priority actions most appropriate for USAID support. These are strategic recommendations and intended to provide general guidance to USAID/BEC in developing its strategic program. The recommendations reflect where USAID’s support could have significant impact in advancing Barbados’ protection of biodiversity and tropical forests.

Under Focus Area 1: Global Climate Change, the following priority actions are recommended:

(1) Support the development of a comprehensive land use plan that would integrate existing coastal and terrestrial plans. This action would include capacity-building and planning support with the aims of regulating coastal development, protecting important ecosystems, and applying climate change adaptation measures. As part of the process of developing a comprehensive land use plan, USAID should support strengthening of local and regional collaboration and participation in the process of developing land use guidance.

Demonstration projects under Focus Area 1 could also be implemented to exhibit the utility of land use planning for biodiversity conservation and adaptation to climate change; this would address direct threats as well as the root cause. In addition, as the Climate Change Vulnerability Assessment (CCVA) for Barbados recommends, the United States National Oceanic and Atmospheric Administration has technical expertise in planning and zoning marine areas. In combination with land use planning, USAID could also finance an activity with the Barbados Coastal Zone Management Unit that would *provide technical assistance in marine zone planning and zoning*.

(2) Strengthen the environmental NGO sector, in particular focus on NGOs that involve youth and advocacy. This would not only address root causes (lack of government will to protect the environment and lack of financial support from the government for biodiversity conservation), but it would also be linked to Focus Areas 2 and 3 by training youth to enter the job market and participate in the economy; youth would be involved, through environmental NGOs, in awareness raising of environmental impacts and the importance of biodiversity conservation.

(3) A principal finding is that Barbados lacks a comprehensive, coordinated system for generating, analyzing, sharing, and using reliable data about its terrestrial and marine biodiversity and forests. Consequently, its conservation institutions do not always effectively use data to make decisions or share data with each other. Given the strength of United States government institutions in data generation, analysis, management, and use, this report recommends that USAID assist Barbados to strengthen its capability for obtaining, analyzing, sharing, and using data for making decisions that will affect its biodiversity and tropical forests. This permanent, reliable system to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery) is especially critical for reef and forest conservation. Support for this system would include a component for strengthening systems for inter-agency sharing of data, as well as making data available to the public.

(4) Support robust studies of the socioeconomic value of reefs to tourism, real estate, and fisheries and establish user-fee systems for biodiversity resource users. As part of this recommendation, USAID should incorporate the communication of results of socioeconomic studies to different segments of the Barbados

citizenry. This should also involve public awareness, education programs, and behavior change communication related to the impact of land-based activities (e.g., coastal development, sewage, agriculture, deforestation) on marine biodiversity.

Based on the Assessment Team's research, interviews, and analyses, the following is a priority action for support:

(1) A key constraint for biodiversity conservation is that significant environmental legislation in Barbados is currently languishing in Parliament. According to stakeholders, there are two reasons for this: a lack of political will and lack of qualified and trained professionals with the capacity to write regulations and policy. As such, a potential area of USAID support could be to increase capacity of public policy professionals to develop policy and regulations.

The Barbados CCVA recommends the following, which would also contribute to biodiversity and forest conservation:

(1) The Integrated Gully Ecosystem Management Plan (IGEMP), already prepared for the north central part of Barbados, provides a basis to balance the need to protect biodiversity and the gullies' primary function of drainage with the development required for ecotourism and agricultural uses in this part of the country. The plan is not currently being implemented due to inadequate and irregular financing. USAID should consider providing assistance to design and finance an activity to assist the National Water Authority to establish a fee-based mechanism to finance watershed management programs to be implemented by the MED.

(2) USAID should consider supporting the design and implementation of an education program to increase public support for the measures required to conserve reefs, seagrass beds, and beaches.

(3) USAID should consider financing an activity with the Barbados Coastal Zone Management Unit (CZMU) that would provide technical assistance in marine zone planning, and implementation of the plan.

(4) Reliable data on the rate of sea level rise on the coasts of Barbados are a key information gap, and are critical for establishing reasonable regulations regarding setbacks, as well as for management of coastal and marine resources. USAID should consider financing technical assistance and training in techniques to measure changes in sea level.

## REFERENCES

- Austin, M. 2005. Methodological Study to Assess Vegetation Cover Changes in Barbados. University of the West Indies.
- Barbados National Union of Fisherfolk. 2013. Barbados National Union of Fisherfolk. Available on the Internet at: <http://www.barnufo.org>.
- Barbados Sea Turtle Project. 2010. Our Vision and Mission. Available on the Internet at: <http://www.barbadosseaturtles.org/>.
- Barbados Today. 2013. CZMU may offer gully hikes. Barbados Today. June 6.
- Bouchon, C. 2008. Status of coral reefs of the Lesser Antilles after the 2005 coral bleaching event. In C. a. Wilkinson, Status of Caribbean coral reefs after bleaching and hurricanes in 2005 (pp. 85-103). Townsville: Global Coral Reef Monitoring Network.
- Brewster, L. 2001. Integrating Management of Watersheds and Coastal Areas in Small Island Developing States of the Caribbean: The Barbados National Report. UNDP.
- Broome, R., Sabir, K., and Carrington, S. 2007. Plants of the Eastern Caribbean. Available on the Internet at: <http://ecflora.cavehill.uwi.edu/index.html>.
- Burke, L. 2004. Reefs and Risk in the Caribbean. Washington DC: The World Resources Institute.
- Burke, W. and Wege, D. 2009. Hunters in Barbados Help to Create the Country's First Shorebird Refuge. In WHSRN News, November 30. Available on the Internet at: <http://www.whsrn.org/news/article/hunters-barbados-help-create-country-s-first-shorebird-refuge>.
- Caribbean Natural Resources Institute (CANARI). 2008. Climate Change and Biodiversity in the Caribbean (CCBIC). Available on the Internet at: <http://www.canari.org/macarthurclimatechange.html>.
- Caribbean360. 2012. Invasive lionfish now a cause for concern in Barbados. December 4. Available on the Internet at: [http://www.caribbean360.com/index.php/news/barbados\\_news/640874.html#ixzz2dlHdDsST](http://www.caribbean360.com/index.php/news/barbados_news/640874.html#ixzz2dlHdDsST)
- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org.lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- Coastal Zone Management Unit (CZMU). 2013. CZMU. Available on the Internet at: <http://www.coastal.gov.bb/>.
- De Grave, S., Mantellato, F. and Klotz, W. 2013. *Atya brachyrhinus*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. Available on the Internet at: [www.iucnredlist.org](http://www.iucnredlist.org).

Environmental Protection Department. 2013. Environmental Protection Department. Government of Barbados. Available on the Internet at: <http://www.epd.gov.bb/>.

Food and Agriculture Organization of the United Nations (FAO). 2005. Fishery Country Profile: Barbados.

FAO. 2010. Global Forest Resources Assessment 2010 Country Report: Barbados. Rome: FAO.

FAO. 2013. Fisheries and Aquaculture Department. Available on the Internet at: <http://www.fao.org/fishery/en>.

Government of Barbados. 1998. Marine Pollution Control. 1 L.R.O. 1998. Chapter 392A. Available on the Internet at: <http://faolex.fao.org/docs/pdf/bar18055.pdf>.

Government of Barbados. 2003. Physical Development Plan (Amended 2003). Government of Barbados.

Helmer, E. H. 2008. Land Cover and Forest Formation Distributions for St. Kitts, Nevis, St. Eustatius, Grenada and Barbados from Decision Tree Classification of Cloud-Cleared Satellite Imagery. Caribbean Journal of Science , 175-198.

Hoetjes, P. 2002. Status of coral reefs in the Eastern Caribbean: The OECS, Trinidad and Tobago, Barbados, The Netherlands Antilles and the French Caribbean. Status of Coral Reefs of the World , 327.

Maynard, T. 2003. Country Experience in Land Issues: Barbados. Land Tenure Center for USAID. BASIS IQC LAG-I-00-98-0026-0. Available on the Internet at: [http://pdf.usaid.gov/pdf\\_docs/PNADC135.pdf](http://pdf.usaid.gov/pdf_docs/PNADC135.pdf).

McGill University. 2013. Bellairs Research Institute. Available on the Internet at: <http://www.mcgill.ca/bellairs/>.

Ministry of Agriculture. 2012a. Ministry of Agriculture. Available on the Internet at: <http://www.agriculture.gov.bb/agri/>.

Ministry of Agriculture. 2012b. About Plant Protection. Available on the Internet at: [http://www.agriculture.gov.bb/agri/index.php?option=com\\_content&view=article&id=209&Itemid=88](http://www.agriculture.gov.bb/agri/index.php?option=com_content&view=article&id=209&Itemid=88).

Ministry of Environment and Drainage. 2011. Barbados' Fourth National Report to the Convention on Biological Diversity (CBD). Bridgetown, Barbados: Natural Heritage Department, Ministry of Environment and Drainage.

Ministry of Physical Development and Environment. 2002. A National Biodiversity Strategy & Action Plan for Barbados. Ministry of Physical Development and Environment.

Oxenford, H. R. 2008. Large scale coral mortality in Barbados: a delayed response to the 2005 bleach episode. Ft. Lauderdale: International Coral Reefs Symposium.

PR Newswire. 2013. Last remaining mangrove wetland in Barbados disappearing due to unchecked pollution and government inaction. Available on the Internet at:

<http://www.prnewswire.com/news-releases/last-remaining-mangrove-wetland-in-barbados-disappearing-due-to-unchecked-pollution-and-government-inaction-93020534.html>.

REEF. 2012. Lionfish Research Program. Retrieved June 2013, from [www.reef.org](http://www.reef.org):

<http://www.reef.org/lionfish>.

Tomascik, T., & Sander, F. 1987. Effects of eutropication on reef-building corals. *Marine Biology*, 77-94.

Town & Country Development Planning Office. 2013. Town & Country Development Planning Office. Available at the Internet at: <http://www.townplanning.gov.bb/>.

Trading Economics. 2013. Agricultural land (% of land area) in Barbados. Available on the Internet at: <http://www.tradingeconomics.com/barbados/agricultural-land-percent-of-land-area-wb-data.html>.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Barbados.



## ANNEX A: LIST OF CONTACTS

### TABLE A1. CONTACTS

NAME	ORGANIZATION AND TITLE	EMAIL	PHONE
FOCUS GROUP DISCUSSION			
Shontelle Stoute	Caribbean Institute for Meteorology and Hydrology (CIMH), Technical Officer	<a href="mailto:ssoute@cimh.edu.bb">sstoute@cimh.edu.bb</a>	425-1362
Katherine Blackman	CERMES, Research Assistant	<a href="mailto:katherine.blackman@cavehill.uwi.edu">katherine.blackman@cavehill.uwi.edu</a>	417-4512
Kim Downes Agard	Ministry of Environment and Drainage, Environmental Officer, Biodiversity	<a href="mailto:kim.downesagard@barbados.gov.bb">kim.downesagard@barbados.gov.bb</a>	407-5700
Eleanor Jordan	Ministry of Tourism, Tourism Development Officer	<a href="mailto:jordane@tourism.gov.bb">jordane@tourism.gov.bb</a>	430-7500
Charles Yearwood	Ministry of Environment and Drainage, Senior Technical Officer	<a href="mailto:charles.yearwood@barbados.gov.bb">charles.yearwood@barbados.gov.bb</a>	426-9695
Reginald Burke	Barbados Association of Non-Governmental Organizations - CYEN	<a href="mailto:riburke@gmail.com">riburke@gmail.com</a>	231-7263
Allison Reeves	Environmental Protection Department	<a href="mailto:enveng@carbisure.com">enveng@carbisure.com</a>	310-3600
Keith Barrow	Drainage Division, Director	<a href="mailto:keith.barrow@">keith.barrow@</a>	426-9695 271-5374
Leona Deane	Sanitation Service Authority	<a href="mailto:leona.deane@ssa.gov.bb">leona.deane@ssa.gov.bb</a>	430-5055 266-4196
Fay Best	Barbados Agricultural Development and Marketing Corporation, Chief Executive Officer	<a href="mailto:fay.best@badmc.org">fay.best@badmc.org</a>	428-0250
Stevenson Skeete	Ministry of Agriculture, Senior Agronomist	<a href="mailto:skeetese@hotmail.com">skeetese@hotmail.com</a>	434-5097
Lorna Inniss	Coastal Zone Management, Director	<a href="mailto:director@coastal.gov.bb">director@coastal.gov.bb</a>	228-5950 228-5955
Michelle Howard	Soil Conservation Unit	<a href="mailto:michellegy22@gmail.com">michellegy22@gmail.com</a>	422-9910
James Paul	Barbados Agricultural Society, Chief Executive Officer	<a href="mailto:heshimu@caribsurf.com">heshimu@caribsurf.com</a>	436-6683
Dawne Gollard	Barbados Red Cross	–	230-1356

NAME	ORGANIZATION AND TITLE	EMAIL	PHONE
KEY CONTACTS			
Antonio Rowe	Coastal Zone Management Unit, Deputy Director	<a href="mailto:arowe@coastal.gov.bb">arowe@coastal.gov.bb</a>	228-5950
Derrick Oderson	Independent Consultant, Chair of the UNFCCC Joint Implementation Supervisory Committee for Barbados	<a href="mailto:doderson@bcc.bb.edu">doderson@bcc.bb.edu</a>	426-2858
John Mwanza	The Barbados Water Authority, Acting General Manager	<a href="mailto:john.mwanza@bwa.bb">john.mwanza@bwa.bb</a>	424-1650
Geeta Chatrani	Yellow Bird Hotel, Owner	<a href="mailto:yellowbird@caribsurf.com">yellowbird@caribsurf.com</a>	418-8444
Leonard Nurse	The University of West Indies, Center for Resource Management and Environmental Studies, Senior Lecturer, Climate Change	<a href="mailto:leonard.nurse@cavehill.uwi.edu">leonard.nurse@cavehill.uwi.edu</a>	417-4344
Adrian Cashman	The University of West Indies, Center for Resource Management and Environmental Studies, Senior Lecturer, Water Resources Management	<a href="mailto:adrian.cashman@cavehill.uwi.edu">adrian.cashman@cavehill.uwi.edu</a>	417-4316
John Nicholls	National Conservation Committee, Folkestone Marine Park Manager	<a href="mailto:contact@nccbarbados.gov.bb">contact@nccbarbados.gov.bb</a>	425-1200/2
Ryan Als	National Conservation Committee, Technical Officer	<a href="mailto:contact@nccbarbados.gov.bb">contact@nccbarbados.gov.bb</a>	425-1200/2
Rickardo Ward	Ministry of Environment and Drainage, National Coordinator for Climate Change	<a href="mailto:Rickardo.Ward@barbados.gov.bb">Rickardo.Ward@barbados.gov.bb</a>	467-5700
Susan Springer	Barbados Hotel and Tourism Association, Director	<a href="mailto:sues@bhta.org">sues@bhta.org</a>	426-5041
Judy Clarke	Caribsave, Regional Coordinator	<a href="mailto:judi.clarke@caribsave.org">judi.clarke@caribsave.org</a>	426-2042
Owen Day	Caribsave, Chief Technical Officer, Head of Biodiversity and Fish Fund Director	<a href="mailto:owen.day@caribsave.org">owen.day@caribsave.org</a>	426-2042
Newton Eristhee	Eatern Caribbean Coordinator (C-FISH)	<a href="mailto:newton.eristhee@caribsave.org">newton.eristhee@caribsave.org</a>	426-2042
Natalie Hutchinson	Senior Program Officer	<a href="mailto:natalie.hutchinson@caribsave.org">natalie.hutchinson@caribsave.org</a>	426-2042
Mark Cummins	The Office of Town and Country Development Planning, Chief Town Planner	<a href="mailto:mark.cummins@townplanning.gov.bb">mark.cummins@townplanning.gov.bb</a>	467-3070
George Browne	The Office of Town and Country Development Planning	<a href="mailto:george.brown@townplanning.gov.bb">george.brown@townplanning.gov.bb</a>	467-3070
Clifton Ford	The Office of Town and Country Development Planning	<a href="mailto:clifton.ford@townplanning.gov.bb">clifton.ford@townplanning.gov.bb</a>	467-3070

# ANNEX B: MAPS

## FIGURE B1. BARBADOS SYSTEM OF PARKS AND OPEN SPACE (2003)

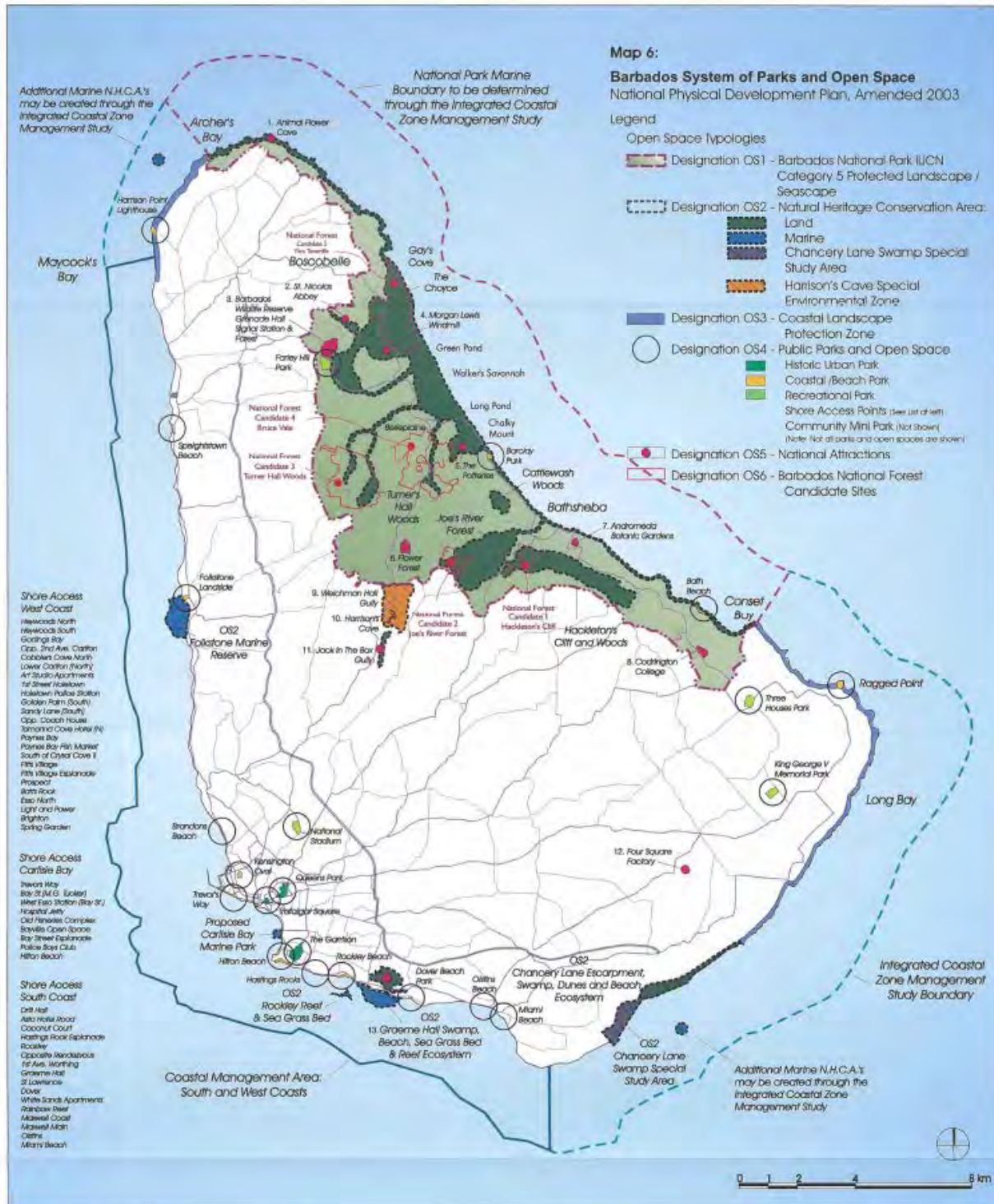




FIGURE B2. BARBADOS LAND COVER AND FOREST FORMATIONS CIRCA 2001

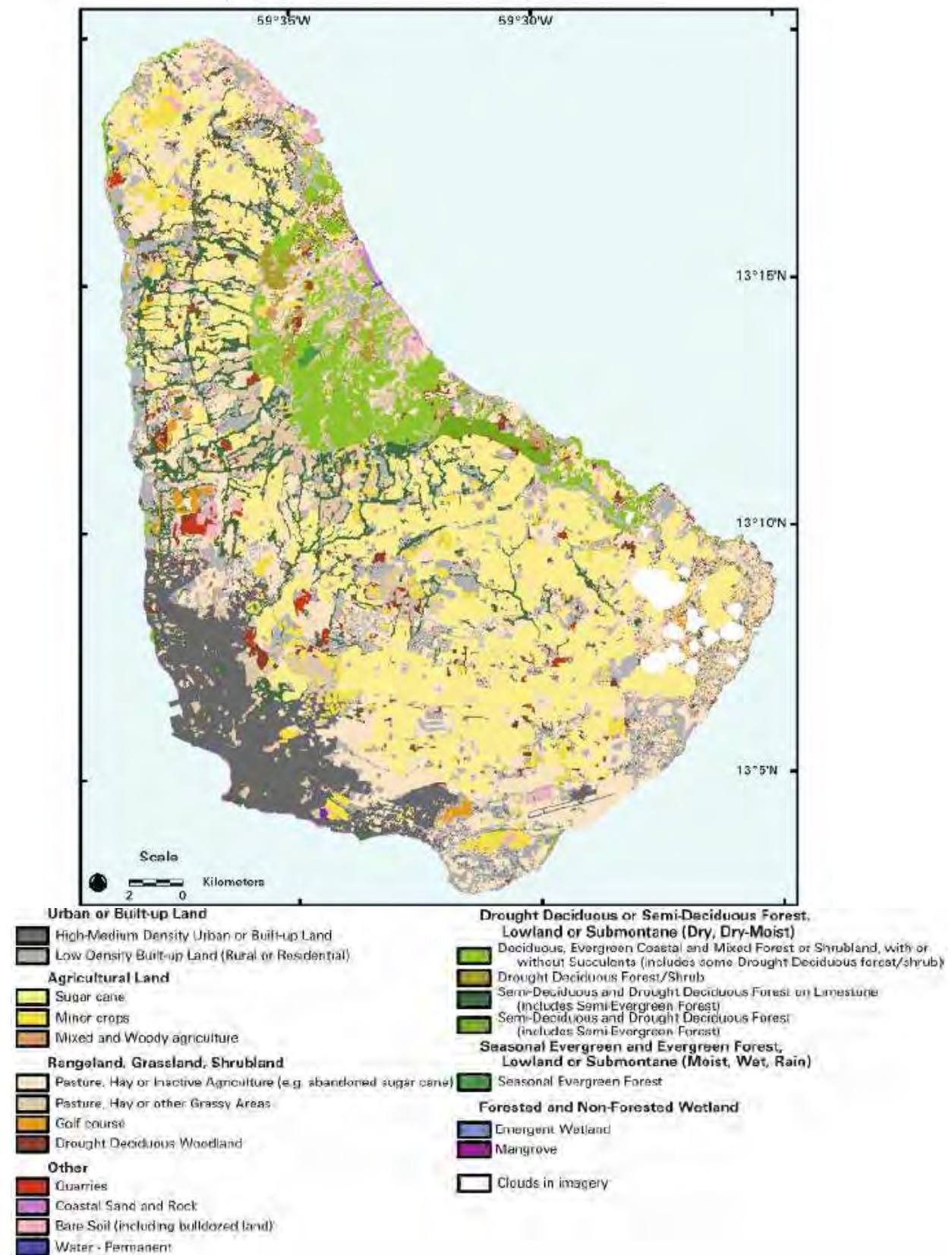


FIGURE B3. CORAL REEFS SURROUNDING BARBADOS



Source: CZMU, 2013.

## ANNEX C: THREATENED SPECIES OF BARBADOS

### TABLE C1. IUCN RED LIST FOR BARBADOS

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS	YEAR ASSESSED
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008
Animalia	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008
Animalia	<i>Atya brachrhinus</i>		CR	2013
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011
Animalia	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR	2008
Animalia	<i>Hyporthodus nigritus</i>	Black Grouper, Black Jewfish, Warsaw Grouper	CR	2006
Animalia	<i>Numenius borealis</i>	Eskimo Curlew	CR	2012
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003
Animalia	<i>Liophis perfuscus</i>	Barbados Racer	EN	1996
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008
Animalia	<i>Montastraea faveolata</i>		EN	2008
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011
Animalia	<i>Agaricia iamarcki</i>	Lamarck's Sheet Coral	VU	2008
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006
Animalia	<i>Carcharodon carcharias</i>	Great White Shark	VU	2009
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008
Animalia	<i>Dendroica cerulea</i>	Cerulean Warbler	VU	2012
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008
Animalia	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS	YEAR ASSESSED
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012
Animalia	<i>Montastraea franksi</i>		VU	2008
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008
Animalia	<i>Myotis martiniquensis</i>	Schwartz's Myotis	VU	2008
Animalia	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008
Plantae	<i>Guaiaacum officinale</i>	Commoner Lignum Vitae, Guaiac Tree	EN	1998
Plantae	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998
Plantae	<i>Juniperus barbadensis</i>	West Indies Juniper	VU	2013



TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

DOMINICA

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	3
LEGISLATION .....	3
GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS .....	3
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS .....	6
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	7
PROTECTED AREAS.....	7
THREATENED AND ENDANGERED SPECIES.....	10
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	12
TYPES OF FOREST .....	12
MANAGEMENT STRUCTURE .....	12
ECONOMIC IMPORTANCE.....	12
CONSERVATION OUTSIDE OF PROTECTED AREAS .....	13
MANAGED NATURAL ECOSYSTEMS .....	13
EX-SITU CONSERVATION .....	13
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	14
DIRECT THREATS .....	14
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	16
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS .....	17
FOCUS AREA 1.....	17
FOCUS AREA 2.....	17
FOCUS AREA 3.....	17
FOCUS AREA 4.....	17
CONCLUSIONS AND RECOMMENDATIONS .....	19
REFERENCES.....	21
ANNEX A: MAPS.....	22
FIGURE A1: LAND DESIGNATIONS .....	22
FIGURE A2: PARKS.....	23
ANNEX B: THREATENED SPECIES OF DOMINICA.....	24
TABLE B1: IUCN RED LIST FOR DOMINICA.....	24
TABLE B2: STATUS OF CRITICAL COASTAL MARINE RESOURCES IN DOMINICA .....	27
ANNEX C: LIST OF CONTACTS .....	28
TABLE C1. CONTACTS.....	28

## REPORT FINDINGS

Dominica is the most northerly and largest of the sub-regional Windward Islands. It is one of the most forested islands in the region with a distinctive mountainous topography. The vegetation in Dominica's forests comprise over 1,000 species of flowering plants with about sixty woody plant and tree species per hectare. Seven vegetation communities are found in Dominica: coastal swamp, littoral woodland, dry scrub woodland, deciduous/semi-evergreen forest (including grassland and savanna sub-types), rainforest, montane rainforest, and elfin woodland. Approximately 65 percent of the island is covered by natural vegetation, while 61 percent of Dominica is forested. Almost 20 percent of the landmass (approximately 150 km<sup>2</sup>) is under some form of protection as National Parks or Forest Reserves. The International Union for Conservation of Nature lists 42 animal and 10 plant species that are threatened in Dominica.

The forests of Dominica support a diverse population of avifauna; Dominica may have the most diverse bird population among the Eastern Caribbean countries. It is home to four endemic, endangered parrots and numerous other endemic animals and plants. Dominica has more than 175 species of birds, most of which are migratory, but 60 of which breed in Dominica, including the endemic parrot species, *Amazona imperialis* and *Amazona arausiaca*, that are considered endangered and threatened, respectively. They are listed as specially protected birds under Dominican law.

Coral reef resources in the near-shore area around Dominica are limited due to the narrow continental shelf; however existing reefs support a diverse assemblage of species. Compared to other Caribbean states, the extent of reefs off the coast of Dominica is more limited. The waters of Dominica are important habitat for pelagic fish and marine mammals. Marine mammals commonly sighted in Dominican waters include six species of whales, four dolphin species, and whale sharks. In addition, seagrass beds are important as nursery grounds and forage areas for many marine organisms.

Dominica's topography creates unique challenges for management of coastal resources as the steep terrain and narrow coastal shelf place benthic habitats in close proximity to the island's coastal settlements. Coral reefs are severely threatened by coastal development, runoff, and sedimentation, while marine turtle habitat is also threatened.

The Assessment Team noted the following direct threats to biodiversity and forests: quarrying for stones, sand, pumice, and other construction material; invasive species; loss of traditional/indigenous varieties of crops; climate change; over-exploitation of wildlife; pollution; indiscriminate and/or illegal cutting of timber; indiscriminate sapping and poor practices in sapping gommier trees; and unregulated development.

The following are the root causes of the threats:

- Poverty and dependence on natural resources for subsistence
- Land tenure issues: two-thirds of forest is privately owned
- Political will to conserve biodiversity is lacking
- Development is unplanned and haphazard
- Lack of knowledge about and pride in local varieties of crops, especially those on the verge of disappearing
- Limited enforcement capacity. Forestry and Wildlife Department has no jurisdiction in Carib forest and there are no Carib foresters (GEF has trained four Carib men to serve as para-foresters)
- Data is deficient, which affects, among other things, control of invasive species and capacity to manage impacts from climate change

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

ADS	Automated Directives System
CARDI	Caribbean Agricultural Research & Development Institute
CBD	Convention on Biological Diversity
CCVA	Climate Change Vulnerability Assessment
CEHI	Caribbean Environmental Health Institute
CEPF	Critical Ecosystem Partnership Fund
CFR	Central Forest Reserve
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COMPACT	Community Management of Protected Areas for Conservation
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
DWA	Dominica Water-Sports Association
EIA	Environmental impact assessment
EN	Endangered, as designated by the IUCN Red List of Threatened Species
FAA	Foreign Assistance Act
FRA	Forest Resource Assessment
GDP	Gross domestic product
GEF SGP	Global Environment Facility Small Grants Programme
GIZ	German International Cooperation
IICA	Inter- American Institute for Cooperation in Agriculture
IUCN	International Union for Conservation of Nature
LAMA	Local Area Management Authority
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental organization
NTFPs	Non-timber forest products
NWCEPT	North East Wildlife Conservation Environment Protection and Tours
OECS-ESDU	Organization of Eastern Caribbean States Environment and Sustainable Development Unit
OPAAL	OECS Protected Areas and Associated Livelihoods Project
PA	Protected area
PEPFAR	President's Emergency Plan for AIDS Relief
PPCR	Pilot Program for Climate Resilience
RDCS	Regional Development Cooperation Strategy
RoSTI	Rosalie Sea Turtle Initiative
SPAW	Specially Protected Areas and Wildlife
SSMR	Soufriere Scottshead Marine Reserve
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species
ZSL	Zoological Society of London

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Dominica component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* For this Dominica Foreign Assistance Act (FAA) 118/119 Assessment, the Assessment Team held in-country stakeholder consultations from May 29 to June 1, 2013 (Annex C: List of Contacts). The Assessment Team convened a focus group in Dominica on May 31 (Annex C shows focus group participants) to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. This FAA 118/119 Assessment also involved an extensive review of documents and Websites (see References). The Assessment Team visited Global Environment Facility (GEF) projects in Dominica, as follows:

(1) *Reducing poverty and improving food security and nutrition among Dominica's rural population through sustainable agriculture:* This project, implemented by the Dominica Academy of Arts and Sciences in Portsmouth, raises tilapia, sells fry to fish farmers, trains farmers in aquaculture, and also sells tilapia directly to buyers. One aim is to reduce pressure on wild caught fish.

(2) *Conserving biodiversity and enabling climate change resilience in the coastal village of Calibishie:* Implemented by the Calibishie Golden Age Group, this project uses traditional practices, such as native species hedge plantings, for fencing. It also builds and manages trash receptacles.

(3) *Community-based Sea Turtle Conservation, Management, and Eco-Tourism Project* is constructing an interpretive center that will have an exhibit about turtle conservation and an office and accommodation for volunteers and other visitors. It is implemented by the North East Wildlife Conservation Environment Protection and Tours, Londonderry (NWCEPT), and is located on a beach used by leatherback, hawksbill, and green turtles.

The Assessment Team also visited a Carib Village Interpretive Center.

*Information Used and Gaps:* Dominica submitted their National Biodiversity Strategy and Action Plan (NBSAP) for 2001 to 2005 in 2000, and it is currently being revised. Dominica submitted its Fourth National Report to the Convention on Biological Diversity (CBD) in 2009. The 2009 Fourth National Report was not available at the time the last FAA 118/119 Assessment was completed. These two documents, the 2000 NBSAP and 2009 Fourth National Report, form the base of the information used in this Assessment.

A critical gap, brought up by several stakeholders, is that the forest inventory is outdated (forest inventory data are especially needed for Pilot Program for Climate Resilience (PPCR) and carbon credits). Additionally, very little is known about Dominica's agro-biodiversity; no inventory exists of the wild species of crops that are present on the island or that have been extirpated. Specific data on climate change impacts on the

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the FAA of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

terrestrial, marine, and coastal environment are unable, and are a key information gap. Other specific information gaps are noted throughout this Assessment.

*General Country Description and Description of Ecosystem and Species Diversity:* With a total land area of 750.6 km<sup>2</sup> (290 mi<sup>2</sup>), Dominica is the most northerly and largest of the sub-regional Windward Islands. The country's total population recorded in 2001 was 71,727 (Commonwealth of Dominica, 2009). The largest community is Roseau with a population of 14,847, which represents almost 21 percent of the total population. Most of the population centers are along the coast.

Dominica has 153 kilometers (95 miles) of coastline, which joins a 715 km<sup>2</sup> coastal shelf. The country is very mountainous and measures 47 kilometers long and 22 kilometers wide at its widest point. The topography of the island is dominated by a central line of volcanic peaks that rise to 1,220 meters and from which radiate numerous ridges that extend to the coastline, where they sometimes end abruptly as steep sea cliffs. Of an estimated total landmass of 197,500 ha, 94,800 ha are classified as unutilized, and 17,800 ha are classified as suitable for agriculture.

The 2008 FAA 118/119 Assessment describes Dominica's species, ecosystem, and genetic diversity primarily using information from the 2000 NBSAP. That information is still valid. Therefore, to minimize duplication, the below description of Dominica's biodiversity avoids repetition from the 2008 Assessment unless important for a full understanding of the island's biodiversity.

Seven vegetation communities are found in Dominica: coastal swamp, littoral woodland, dry scrub woodland, deciduous/semi-evergreen forest (including grassland and savanna sub-types), rainforest, montane rainforest, and elfin woodland. The Fourth National Report states that 65 percent of the island is covered by natural vegetation. Approximately 61 percent of Dominica is forested. The total change in forest cover from 1990 to 2005 was -4000 ha; and from 2000 to 2005, the total change in forest cover was negative 8 percent (Durand and Baptiste, 2009). A number of plant species are endemic to the island including *Sabinea carinalis* (Bwa Kwaib), the national flower of Dominica.

The Fourth National Report also states that the avifauna of Dominica is very diverse and may be the most diverse among the Eastern Caribbean countries. Dominica has more than 175 species of birds, most of which are migratory, but 60 of which breed in Dominica, including the endemic parrot species, *Amazona imperialis* and *Amazona arausiaca* that are considered endangered and threatened, respectively. They are listed as specially protected birds under Dominican law.

Marine resources in the near-shore area around Dominica are limited due to the narrow continental shelf. The reef resources off the coast of Dominica are less extensive compared to other Caribbean states. Seagrass beds and coral reefs are most commonly found on the north and west coasts of Dominica, while rocky reefs and sandy bottoms dominate the eastern and southern coasts.

According to the 2000 NBSAP, the coastal waters of Dominica are a haven for many marine mammals. In studies conducted by the Fisheries Department in collaboration with Woods Hole Oceanographic Institute (Massachusetts, USA), several species of whales and dolphins were observed in the coastal waters of Dominica, including:

- Sperm whale (*Physeter catodon*)
- Bryde's whale (*Balaenoptera edeni*)
- Short-finned pilot whale (*Globicephala macrorhynchus*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Pygmy sperm whale (*Kogia breviceps*)
- Humpback whale (*Megaptera novaenglia*)
- Whale shark (*Rhincodon typus*)
- Spinner dolphin (*Stenella clymene*)
- Spotted dolphin (*Stenella sp*)
- Frasers dolphin (*Lagenodelphis hosei*)
- Bottlenose dolphin (*Tursiops truncatus*)

According to the Fourth National Report, the coral reefs around the island, which are located at depths between 10m and 60m, support a great diversity of fish species. However, no list of species has ever been compiled for Dominica. Some of the most common species identified in the fish landings of Dominica are lobster, many species of groupers and snappers, squirrel fish, black bar soldier fish, shrimp, goatfish, grunts, many species of wrasse, parrotfish, and file fish.

Dominica’s fisheries are artisanal consisting of around 1,500 people, the majority of whom are part-time fishers (CEHI/GIZ, 2013). There are approximately 440 small boats in the industry. The fishing fleet includes traditional canoes made of gommier (*Dacryodes excelsa*). The industry is focused on migratory pelagic species, but there is some fishing of demersal species on the west coast. The main migratory pelagics fished are yellowfin tuna and dolphin fish (Project Global, 2006 in CEHI/GIZ, 2013). Fishing contributes 3.26 percent to Dominica’s gross domestic product (GDP).

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

The main challenge in the legislative framework for the protection and management of biological resources is the lack of a national land use policy and national development plan. In late 2012, the Government of Dominica received funding from the Caribbean Development Bank to develop an “explicit policy and physical development framework conducive to long-term socio-economic management of Dominica’s environment and natural resources.” In addition, lack of a comprehensive database, including geospatial data, inhibits management of natural resources.

The NBSAP has several objectives including an inventory of biological resources, expanded measures for conservation and protection of threatened species, public awareness and education campaign on biodiversity conservation, development of comprehensive legislation and institutions for environmental management, and integration of impacts of climate change on biodiversity, among others.

The legislative and policy framework for biodiversity conservation and sustainable forest management is contained in numerous legislative acts, which are largely unchanged since 2008 (USAID, 2008). Key pieces of legislation governing forests, water, and national parks are outdated. The Forest Act became law in 1958, the National Parks and Protected Areas Act in 1975, and the Forestry and Wildlife Act in 1976. The Forest Management Plan, developed in 1975, was never formally adopted while the management plan for Morne Trois Pitons National Park has yet to be implemented. No national water policy and no national land use policy or plan exist. A water policy has been drafted. The Physical Planning Act, which has broad-based authority for managing land development, has not been implemented. Sustainable development is at the core of both the Growth and Social Protection Strategy and the Tourism 2010 Policy.

### GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

A number of government and non-governmental organizations (NGOs) are involved in biological and forest resource management (See Table 1).

Table 1. Institutions Involved in the Management and Conservation of Biological Resources

INSTITUTION	KEY ROLES	ENABLING LEGISLATION
Min. of Environment, Natural Resources, Physical Planning & Fisheries	<ul style="list-style-type: none"> <li>• Land use planning</li> <li>• Fisheries</li> <li>• Environment</li> <li>• International agreements</li> </ul>	<ul style="list-style-type: none"> <li>• Montreal Protocol Act, 1996</li> <li>• Fisheries Act</li> </ul>



INSTITUTION	KEY ROLES	ENABLING LEGISLATION
Min. of Agriculture and Forestry	<ul style="list-style-type: none"> <li>• Prevention and recovery from pests of economic importance (giant African snail, red palm mite, citrus greening, citrus tristeza, bay leaf rust, dasheen complex disease)</li> <li>• Promotion of organic agriculture for entire island</li> </ul>	<ul style="list-style-type: none"> <li>• Forests and Wildlife Act</li> <li>• Forests Act</li> <li>• Botanical Gardens Act</li> <li>• Bush Fires Act</li> <li>• National Parks and Protected Areas Act</li> <li>• Plant Protection Act</li> </ul>
Forestry, Wildlife and National Parks Department	<ul style="list-style-type: none"> <li>• Oversight of parks and protected areas</li> <li>• Issuing of access permits</li> <li>• Monitoring of key endemic species (parrots)</li> </ul>	<ul style="list-style-type: none"> <li>• Forests and Wildlife Act</li> <li>• Forests Act</li> <li>• Botanical Gardens Act</li> <li>• Bush Fires Act</li> <li>• National Parks and Protected Areas Act</li> </ul>
Fisheries Division	<ul style="list-style-type: none"> <li>• Management of Marine Reserves</li> <li>• Monitoring of invasive species (lionfish, Halophila stipulacea)</li> <li>• Enforcement of closed seasons (turtles)</li> <li>• Monitoring of fisheries activities (fishing practices, fish landings)</li> <li>• Introduction of “species friendly” devices such as fish pots with biodegradable panels</li> </ul>	Fisheries Act
Environmental Coordinating Unit	<ul style="list-style-type: none"> <li>• Lead agency for Multi-lateral Environment Agreements (MEAs) relating to climate change, biodiversity, land degradation, and biosafety</li> <li>• Prepare, implement, monitor, and report on projects</li> </ul>	
Carib Council	<ul style="list-style-type: none"> <li>• Manage natural resources of Kalinago area (Carib Territory)</li> <li>• Member of GEF Small Grants Programme (SGP) committee</li> </ul>	
Clemson University	<ul style="list-style-type: none"> <li>• Ongoing multi-year research on biodiversity and ecosystems</li> <li>• Located at Springfield field station</li> <li>• Share findings with government agencies</li> </ul>	

INSTITUTION	KEY ROLES	ENABLING LEGISLATION
Texas A&M University	<ul style="list-style-type: none"> <li>• Ongoing multi-year research on biodiversity and ecosystems</li> <li>• Located at Springfield field station</li> <li>• Share findings with government agencies</li> <li>• Maintain website of research program</li> </ul>	
NGOs <ul style="list-style-type: none"> <li>• North East Wildlife Conservation, Environment Protection and Tours</li> <li>• Portsmouth Community Watch Association</li> <li>• Ecobalance</li> <li>• Giraudel Flower Growers Group</li> <li>• National Association of Youth in Agriculture (NAYA)</li> </ul>	<ul style="list-style-type: none"> <li>• Implement community level projects for species conservation, environment, eco or nature tourism, income generation</li> </ul>	No funding information available
Dominica Organic Agriculture Movement	<ul style="list-style-type: none"> <li>• Promotion of organic agriculture</li> </ul>	No funding information available
Donors <ul style="list-style-type: none"> <li>• GEF SGP</li> <li>• United Nations Environment Programme (UNEP)</li> </ul>	<ul style="list-style-type: none"> <li>• Financing or co-financing of projects</li> <li>• Provision of grants</li> </ul>	No funding information available

Table 2 lists key MEAs and Dominica's signatory status.

Table 2. Biodiversity-related MEAs

MEA	STATUS
Convention on Biological Diversity (CBD)	Accession as of 1994
The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)	Not a Party
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES Convention)	Party Entry into force 1995
Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean (SPAW Protocol)	Not a party
Convention on Migratory Species (CMS)	Not a party

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

International donors and agencies have played an important role in many of the environmental initiatives in Dominica. In particular, the World Bank has been a major funder of several projects under the Climate Resilience Low Carbon Strategy.

The following is a list of current and recent biodiversity-related projects undertaken by NGOs or financed by donors, including USAID. Where information was available, the funding amount is provided.

Table 3. Key Donor and NGO-implemented Biodiversity Conservation Projects

ORGANIZATION	ACTIVITY	VALUE
Inter-American Institute for Cooperation in Agriculture (IICA) and Caribbean Agricultural Research & Development Institute (CARDI)	Inventory of local plant resources	Not available
GEF SGP	Funding of projects under thematic areas: <ul style="list-style-type: none"> <li>• Biodiversity conservation</li> <li>• Climate Change</li> <li>• International Waters</li> <li>• Land Degradation</li> <li>• Sustainable Forest Management*</li> </ul>	US\$748,642 total value of current grants
World Bank	Climate Resilience Low Carbon Strategy - Several projects under the strategy	US\$60 million approved in March 2013
European Union	Country Strategy and National Indicative Programme 2008 to 2013	EU€5.7 million (Envelope A) EU€1.8 million (Envelope B)
CEHI/GIZ	Marine biodiversity support component of the Land and Coastal Resources Management Programme (2013 to 2017) will support Scott's Head – Soufriere Marine Management Area	Not available

ORGANIZATION	ACTIVITY	VALUE
USAID	The USAID climate change program assists the six Organization of Eastern Caribbean States (OECS) countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and resilience, and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.	Not available

\* Source: GEF SGP, 2012a.

Currently, there is limited donor funding for biodiversity conservation in Dominica. GEF SGP is the most visible donor with a wide range of projects related to climate change adaptation measures in coastal zones. The GEF projects support the efforts of Dominica to implement specific, integrated pilot adaptation measures that focus on biodiversity and land degradation along coastal and near-coastal areas. Projects are geographically distributed throughout Dominica, but concentrated on the western side of the country.

According to stakeholders, donors are required to comply with Dominica’s Environmental Impact Assessment (EIA) requirements. Projects involving infrastructure construction and rehabilitation, energy development, including hydro-electric power, sewage, waste, and waste water disposal, resort development, among other types, require EIAs. However, stakeholders noted that due to political expediency, EIAs are considered more procedural than a means to identify and mitigate environmental impacts. Of note is the resort construction at Soufriere, which impacts globally important shorebird habitat, yet has been approved and is moving forward.

## STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

### PROTECTED AREAS

Dominica’s Protected Area (PA) history goes back many decades. In the 1950s the first Forest Ordinance was enacted, which authorized the establishment of Forest Reserves on Crown Lands and protected forest on private land for purposes of soil and water conservation (O. Grell; NCSA Report 2005 in Commonwealth of Dominica, 2009.) Now, almost 20 percent of Dominica’s land mass of 750 km<sup>2</sup> is under some form of protection as National Parks or Forest Reserves. According to stakeholders interviewed for this report, PA coverage is adequate, and includes the important biodiversity of the island. Dominca’s PAs are described in Table 4.

Table 4. Protected Areas

PROTECTED AREA (PA)	AREA/YEAR ESTABLISHED	DESCRIPTION OF PROTECTED RESOURCES	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
Morne Diablotin National Park (includes a Marine PA component)	3,335 ha, established January 2000	Home to the island's highest mountain, Morne Diablotin, whose summit is 4,747 feet above sea level, and to the Syndicate Trail, which has some of the most diverse birdlife in Dominica.	A Management Plan has been developed for terrestrial and marine components.
Northern Forest Reserve	5,476.9 ha, established 1977	The largest refuge for the island's two indigenous species of parrot, the sisserou and the jacquot.	
Cabrits National Park (includes a Marine PA component)	5,388 ha, established 1986	Established to protect the island's largest tracts of dry coastal forests, and preserve its largest wetlands (marsh, freshwater swamp and mangroves), and coral reefs. Forest products from Cabrits National Park are used in the production of some of the island's handicrafts, medicines, spices, and food.	<ul style="list-style-type: none"> <li>• The Protected Areas and Associated Livelihoods (OPAAL) Project supported the establishment of a strong community-based component in which a group of stakeholders help to manage PA operations.</li> <li>• A Management Plan has been developed for terrestrial component.</li> <li>• The marine component of the Cabrits National Park, though designated since the establishment of the Park, has not been fully operational. Funding was secured from OPAAL (as part of the OECS Environmental and Sustainable Development Unit (OECS-ESDU)) for the development of the marine section of the management plan for Cabrits National Park (Commonwealth of Dominica, 2009).</li> </ul>
Morne Trois Pitons National Park	6,872 ha, established 1975	Dominica's first national park. When it was opened, its primary function was to protect samples of the island's flora and fauna. It was officially declared a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site in 1998. According to Durand and Baptiste (2009), the Morne Trois Pitons National Park is considered a "Wholly Irreplaceable	A Management Plan has been developed.

PROTECTED AREA (PA)	AREA/YEAR ESTABLISHED	DESCRIPTION OF PROTECTED RESOURCES	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
		Site in the Caribbean Islands Hotspot.”	
Central Forest Reserve (CFR)	410 ha, established 1952	CFR contains an abundance of gommier, which grows to heights of almost 120 feet. The Caribs use the wood from these trees to produce canoes and crafts.	
Soufriere Scottshead Marine Reserve (SSMR)	Established 1998	Located off the southern coast of the island, SSMR was established to avoid conflicts between traditional users (fishermen) and new entrants in the water-sports sector of the tourism industry. The SSMR protects a unique marine ecosystem and the adjacent fringing coastline. It contains some of the healthiest coral reef systems, warm underwater sulfur vents, and abrupt underwater drop-offs, making it an ideal location for schooling, migrating, coastal pelagic fish and cetacean species. Protection status confers protection to the biodiversity and allows for the establishment of zones designated for sustainable marine activities, thereby reducing user conflict issues.	A community-based approach to management of the SSMR is in place. Local businesses together with the Dominica Water-Sports Association (DWA) teamed up with the Fisheries Division and the Local Area Management Authority (LAMA) of the SSMR to host schools (35 to 50) from across the island each year to observe SSMR Day. This event allows schools to interact with different features of the reserve.
Syndicate Parrot Preserve	81 ha		

A combination of economic and social pressures and limited management capacity threaten Dominica’s PAs, however, there is general agreement that this ambitious PA system should be maintained.<sup>2</sup>

Stakeholders mentioned the following threats to Dominica’s PAs (discussed further in the Threats section):

- 1) Use of chemicals (agro-chemicals). No buffer zones have been established for PAs to buffer agricultural pollution.
- 2) Due to a high rate of poverty, dependency on forest resources for subsistence
- 3) Encroachment into forests especially for tourism
- 4) Indiscriminate, illegal cutting of lumber for furniture

<sup>2</sup> GEF SGP, 2012b.

- 5) Indiscriminate and bad practices in sapping gommier trees
- 6) Climate change-induced intensity of rains resulting in landslides and destruction of vegetation
- 7) Invasive species, including lionfish and seagrass (*Halophila stipulacea*); seagrass coverage has increased from 5 percent to 90 percent in 2 to 3 years

Root causes of the threats include outdated legislation, especially regulations that cover wildlife conservation; limited capacity to manage the PA system; and limited resources, including supplies, equipment, and financial resources.

### *Initiatives in Support of Dominica's PA System*

As part of the NBSAP, the Government of Dominica is interested in establishing biosphere reserves in Dominica in tandem with the UNESCO Man and the Biosphere Programme. Under this initiative, Biosphere Reserves would be set aside for certain species, ecosystems, habitats, and genetic pools for present and future generations.

Community Management of Protected Areas for Conservation (COMPACT, funded by the GEF Small Grants Programme (SGP)) was launched in 2001 with an initial focus on the communities surrounding Morne Trois Piton National Park. In 2005 it extended its target area to include the landscape and communities around the Morne Diablotin National Park, the Central and Northern Forest Reserves, and the Carib Territory. A relatively small population lives in these rural areas near the PAs. In expanding its geographic focus, COMPACT's aim was to create a cluster that would eventually extend World Heritage status to these locations.

With assistance from the GEF SGP, a study was undertaken in the SSMR to determine the feasibility of establishing coral reefs to address increasing demands on the resource. Based on this study, a Biorock reef development project may be funded.

A completed GEF project assisted in developing the management framework, establishing community management, and developed capacities at Morne Trois Pitons National Park.

## THREATENED AND ENDANGERED SPECIES

According to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, species listed as critically endangered (CR), endangered (EN), and vulnerable (VU) are considered threatened. In Dominica, 42 animal and 10 plant species meet these criteria, as shown in Annex B. Table 5 provides a breakdown of numbers of plants and animals in each category. Most species on the list have declining populations with the exception of three corals and one frog (*Eleutherodactylus amplinympha*) described as stable. For 12 species (three animals and nine plants), no population status was given and for eight species (seven animals and one plant) status is described as unknown.

Table 5. Summary of Threatened Animals and Plants based on IUCN Red List

RED LIST STATUS	ANIMALS	PLANTS
CR	6	1
EN	12	4
VU	24	5

Dominica uses the IUCN Red List as its reference for threatened species. Some of its species at risk are well known and population and distribution are regularly recorded (i.e., Dominica's two endemic parrot species, the endangered imperial Amazon (*Amazona imperialis*) and the vulnerable red-necked Amazon (*Amazona*



*arausiaca*). However, in general, data on threatened species are deficient, including information on numbers, habitats, and other characteristics.

Jurisdiction over management of threatened and endangered species is spread across a few government agencies. The Forestry Division works on the protection of avian species and implements the laws that prohibit the capture of birds. The Fisheries Division oversees regulations that govern taking of fish during certain seasons, and collaborates with other sectors to control activities that impact on the marine biota. It partners with the Division of Tourism to regulate activities involving coral resources, specifically prohibiting the extraction of coral from the sea.

According to the Critical Ecosystem Partnership Fund (CEPF) (Durand and Baptiste, 2009), species with existing small distributions are at high risk. The CEPF cites Dominica's endemic parrots, whose numbers have decreased from clearing forest for agriculture and timber extraction. Hurricanes that destroy forest cover have further impacted the parrots to the point that they were on the edge of extinction (see information below about recovery efforts).

Some threatened and endemic animals are shot or collected for medicinal use. The clouded boa or "tetechiens" (*Boa onstrictor nebulosus*) is collected by locals who believe the fat under the skin, used to make "snake oil," helps cure joint problems and backache.

Limited data constrain management of endangered species. According to the NBSAP, four species of turtle are found in Dominican waters. The hawksbill (*Eretmochelys imbricata*) is the most common nesting turtle; the leatherback turtle (*Dermochelys coriacea*) is the next most commonly observed turtle nesting on Dominica; and the green turtle (*Chelonia mydas mydas*) and the loggerhead turtle (*Caretta caretta*) are also found in the waters around Dominica. There are reports of the loggerhead turtle being caught in Dominican waters but no evidence of nesting. Little is known of the distribution of this species.

A few initiatives are being implemented to protect threatened species. The GEF is a partner on a project to support shorebirds at the southern tip of the country, where there are important wetlands. This project, located in Soufriere, receives a significant amount of co-financing from overseas. At Cabrits, a resort is being developed, which will affect habitat of migratory birds; they will need to have another resting spot—Soufriere.

Some tourism companies and operators in Dominica contribute to biodiversity conservation, in particular protection of threatened species. Rosalie Bay Resort is a major private sector contributor to sea turtle conservation. The Rosalie Sea Turtle Initiative (RoSTI) engages locals and guests in helping the recovery of sea turtles on the island and throughout the Caribbean. The program includes night patrol during nesting season, clean up on nesting beaches, education programs, and data collection. In 2003, there were just seven leatherback nests; by 2010, there were 69 nests of three sea turtle species – leatherback, hawksbill, and green – and a 100 percent survival with all nesting species protected. The initiative has now expanded throughout Dominica. In 2012, *Travel + Leisure* recognized Rosalie Bay Resort's efforts with a Global Vision Award for Conservation.

A breeding program has been in place for several years for the sisserou (imperial parrot, the national bird) and the jaco (red-necked parrot). Both parrot species live mainly in the northern part of the island and are protected, which has helped the population recover, and they are now spreading farther south. The Parrot Research Centre, located in the Botanical Gardens in Roseau, strives to preserve these birds and to educate people about them.

## STATUS AND MANAGEMENT OF FOREST RESOURCES

Dominica is the most forested island in the Lesser Antilles. According to the Fourth National Report, 25 percent of Dominica's forest lands are legally protected either as Forest Reserves or National Parks (See Annex A, Figure A1 for land designations). Dominica has two declared Government Forest Reserves, the Central Forest Reserve (410 ha) established in 1951 and the Northern Forest Reserve (5,475 ha) established in 1977. These two Forest Reserves in the north-central part of the island cover over 11 percent of Dominica's land area.

### TYPES OF FOREST

The forest types present in Dominica are coastal swamp, littoral woodland, dry scrub woodland, deciduous/semi-evergreen forest (including grassland and savanna sub-types), rainforest, montane rainforest, and elfin woodland. Details of the composition, features, and species diversity of these forest types are found in the NBSAP and in Dominica, Nature Island of the Caribbean: A Guide to Geology, Climate and Habitats (Evans and James, 1997). According to Dominica's Director of Forestry, approximately 66 percent of Dominica's land area is under forest cover. However, the forest cover has decreased at a rate of 250 ha (~0.5 percent) per year over the 20 years from 1990 to 2010 resulting in a total loss of forest of 10 percent or 5,000 ha in that time.

Table 6 shows the breakdown of forest into primary, secondary, and plantation forest.

Table 6. Forest Characteristics

FOREST TYPE	1000 HA	PERCENT OF FOREST AREA
Primary forest	27	60
Other naturally regenerated forest	18	40
Planted forest	Ns	Ns

### MANAGEMENT STRUCTURE

Two-thirds of the forest in Dominica is privately owned. Except for forests in the Carib Territory, Government manages forests on public land in Dominica. The Department of Forestry, Wildlife and National Parks manages publicly owned forests, while the Carib Council manages indigenous land, including forests.

### ECONOMIC IMPORTANCE

The Food and Agriculture Organization's (FAO) 2010 Forest Resource Assessment (FRA) indicates that no economic data were available for wood and non-timber forest products (NTFPs). Timber harvest activity in Dominica is minimal, however a small timber industry was active in the past. Public lands are allocated for commercial forestry, and timber harvesting could occur in the future. Although data related to NTFPs are scarce, the Carib produce handicrafts, such as baskets, from wood products. The forests are important for tourism, and trekking to forested areas near the Freshwater Lake and in national parks, such as Morne Trois Piton, for bird watching and other eco-tourism activities are popular with international tourists. The forests of Dominica are important for the ecosystem services they provide, including potable water, habitat, and carbon sequestration. Currently, Dominica has no certified forests.

# CONSERVATION OUTSIDE OF PROTECTED AREAS

## MANAGED NATURAL ECOSYSTEMS

Conservation outside PAs is primarily undertaken by the private sector and funded through private fundraising or with grant support (see above, the RoSTI). The activities are varied and may represent local concerns, or may be purely conservation-based, such as coastal erosion control and biodiversity conservation. One activity managed by NEWCEPT has a livelihood and income generating component which aims to ensure its sustainability.

The Carib reservation is communally owned land comprising 3,782.03 acres. Approximately 3,500 people live on the Carib reservation, which consists of eight hamlets. The Ministry of Carib Affairs is part of the Government of Dominica; the Government of Dominica channels funds to the Carib Council, which is considered an NGO. The council includes six Councilors and one Chief of Council. The GEF has provided funding for biodiversity conservation projects on the Carib reservation; these have involved capacity strengthening of para-foresters and other capacity strengthening interventions.

### Beaches

The beaches of Dominica are predominantly dark in color due to their volcanic origin. However, the beaches on the east and northeastern coast are lighter indicating their coral limestone origin. The beaches along the west coast of Dominica undergo dramatic changes at various times of the year, changing from sandy to stony surface. Some east coast beaches are made of large boulders while at other beaches on the east coast, cliff faces drop sharply into the sea. According to the Fourth National Report, these variations of topography, accessibility, wave action, and human activity have a profound effect on marine and coastal biodiversity.

The beaches on the east coast of the island are important for leatherback turtle nesting. However, these beaches are threatened due to illegal sand mining.

## EX-SITU CONSERVATION

The crapaud, a frog, also called the mountain chicken, is the national dish of Dominica and a national symbol represented on the coat of arms. Yet, the crapaud almost became extinct in the wild due to a disease caused by chytridiomycosis, a fungal skin condition from the chytrid fungus. Zoological Society of London (ZSL) conservationists removed seven frogs from their native habitat and brought them to the London Zoo before they succumbed to the disease. Another collection of 12 frogs is held by a private collector in the United States. Locally within Dominica, the Botanical Gardens has a captive breeding program to rear and release juveniles treated for the disease; so far this initiative has been successful. The crapaud is important to global biodiversity with populations found on only two islands.

Table 7 lists some initiatives that focus on biodiversity conservation outside PAs and *ex-situ* conservation activities.

Table 7. Conservation Outside of Protected Areas & *Ex-Situ* Conservation

LOCATION	ORGANIZATION(S)	ACTIVITY
MANAGED NATURAL ECOSYSTEMS		
Calabishie		Planting of sea grapes along coast to reduce coastal erosion
Grande Riviere, Pointe des Fous	Dominicans in the diaspora	Large number of birds

LOCATION	ORGANIZATION(S)	ACTIVITY
Duboc		Conservation of swamp important for waterfowl and other birdlife
Londonderry	North East Wildlife Conservation Environment Protection and Tours (NEWCEPT)	Management of beach for turtle nesting and protection of hatchlings
<b>EX-SITU CONSERVATION</b>		
London Dominica USA	<ul style="list-style-type: none"> <li>• ZSL</li> <li>• Botanical Gardens</li> <li>• Private Collector</li> </ul>	<i>Leptodactylus fallax</i> (crapaud or mountain chicken). The crapaud is now described as critically endangered on the IUCN Red List.
Botanical Gardens in Roseau		
Tissue Culture Lab	Dept. of Agriculture	Plant genetic resources conserved and replicated
Springfield	<ul style="list-style-type: none"> <li>• Botanical and Zoological Collections compiled by Clemson and Texas A&amp;M</li> <li>• Digital field guides for select taxa (e.g., shrimp)</li> </ul>	<ul style="list-style-type: none"> <li>• Approximately 70 percent of the plants of Dominica authoritatively identified</li> <li>• Collection shared with government departments, though quality of collections have declined due to improper storage</li> </ul>

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

### DIRECT THREATS

The Assessment Team identified the following key direct threats to biodiversity and forests from stakeholder consultations and review of literature, in particular the Fourth National Report to the CBD.

(1) **Quarrying for stones, sand, pumice, and other construction material** is a growing enterprise in Dominica; much of the material is for export. The Fourth National Report states, “Many coastal ridges and mountains along with portions of Dominica’s largest river (Layou River) are major mining centres.” Export markets, according to the Fourth National Report, are the French West Indies, the United States, and other OECS destinations. Runoff from mining facilities affects coastal and marine ecosystems and destroys coral reefs. The Fourth National Report states that Government ceased granting new licenses for mining operations on the west coast, where 18 fishing communities were directly affected by quarrying. The Fisheries Division has a Quarry Monitoring Program to assess impacts on the west coast. However, mining is still allowed on other parts of the island.

(2) **Invasive Species:** Stakeholders considered the most problematic invasive species to be: (i) lemongrass, which is a problem on the west coast from Canefield to Portsmouth. Annual bush fires spread lemongrass; once openings are created by fire, lemongrass colonizes. Lemongrass is oily and fuels the spread of fire. (ii) lionfish, which displace native fish; and (iii) seagrass (*Halophila stipulacea*), which has spread from 5 percent to 90 percent coverage in only 2 to 3 years. The fish populations typically found off the coast of Dominica are not found in seagrass beds (see [www.itme.com](http://www.itme.com)). In the focus group meeting, participants agreed that invasive species seem to be increasing with climate change, but no data are available to confirm this.

(3) **Loss of traditional/indigenous varieties of crops:** According to a stakeholder, “Since there is more reliance on processed foods, people are not taking the time to care for traditional crops. Some hot peppers have been totally lost. Wild bananas and avocados are still found, but disappearing. There is no inventory. People only know from word of mouth what has been lost.”

(4) **Climate change:** Climate change and increased climate variability are mainly seen in more frequent and more intense rains and bush fires. These effects of climate change result in land degradation from increased gullying and landslides. Although no cause-effect data are available, the effects of more intense rains and fires can be seen around the island; soil is washed to the sea and vegetation and habitat are destroyed. The Dominica Rapid Climate Change Vulnerability Assessment (CCVA) (a report produced simultaneous with this FAA 118/119 Assessment and by a sub-team of the Assessment Team; USAID, 2013) cites coastal erosion as a major impact of climate change in Dominica. According to the 2004 World Resources Institute report, *Reefs at Risk in the Caribbean*, climate change is affecting reefs and coastal ecosystems. In the past, hurricanes (Hurricane David in 1979 was the last hurricane that directly struck Dominica) and storm surges damaged reefs, but reefs were able to recover. Now, with increased development and the significant impacts from land-based activities that affect the marine environment, coupled with climate change, the pressure on marine and coastal ecosystems may be too great for recovery. Specific data on climate change impacts on the terrestrial, marine, and coastal environment are unavailable, and are a key information gap (as noted above).

(5) **Over-exploitation of wildlife:** The Fourth National Report notes that this threat is decreasing because of an increase in public awareness, the more direct involvement of communities in natural resource management, and because of strengthened enforcement of relevant laws. However, stakeholders noted that the pet trade is still an issue (parrots, reptiles) and that illegal hunting still takes place.

(6) **Pollution:** Use of agro-chemicals is polluting catchments, protected areas, and fish. As mentioned above, PAs have no buffer zones, so agro-chemical pollution from adjacent agricultural fields contaminates PA land and waters.

(7) **Indiscriminate, illegal cutting of timber:** Trees are mainly cut to make furniture for the local market. In Carib Territory, trees are cut for house construction, firewood, and boat construction. The resulting deforestation on hillsides results in landslides, which affect coastal and marine resources. In Carib Territory, a school, church, and other buildings were re-located because of landslide threat, and now cemeteries are threatened.

(9) **Indiscriminate sapping and poor practices in sapping gommier trees.** A stakeholder told the Assessment Team that a recent government estimate found that 3,000 trees had died from poor sapping practices, but actually, an inventory of gommier trees found many more had died. The gum from gommier trees is exported to France and ex-French colonies. A GEF project is addressing this threat.

(10) **Unregulated development:** This is a broad category of threats that includes farming on slopes; building without Planning Department permission and planning approval driven by political motives; building at high elevations (on slopes) for the cooler weather; seawall construction that fails to consider ecological conditions such as crab and turtle migration; and encroachment into forests especially for tourism development.

# IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats, stakeholder consultations, and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 8. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Poverty: Dependent on natural resources for subsistence	<ul style="list-style-type: none"> <li>• Support alternatives to hunting wildlife</li> <li>• Support alternative income generation activities (i.e., alternatives to poor sapping practices; furniture making using improved practices and alternative materials).</li> <li>• Support aquaculture/fish farms</li> </ul>
Land tenure: two-thirds of forest is privately owned.	<ul style="list-style-type: none"> <li>• Require environmental review and mitigation for projects in certain areas and of certain types (for example, currently no EIA is needed for small-scale projects, yet small-scale projects can have large-scale environmental impacts.)</li> </ul>
Political will to conserve biodiversity is lacking.	<ul style="list-style-type: none"> <li>• Support development and implementation of a Land Use Plan so that rather than being guided by political expediency, decisions are based on the plan and are transparent</li> <li>• Educate planning commission board to strengthen their understanding of the importance of biodiversity conservation and climate change effects</li> <li>• Strengthen the environmental NGO sector</li> </ul>
Development is unplanned and haphazard.	<ul style="list-style-type: none"> <li>• Develop a Land Use Plan that designates buffer zones/development areas around PAs; that designates areas for quarrying; and areas vulnerable to effects of climate change (a hazard assessment is being done, this should inform a land use plan)</li> </ul>
Lack of knowledge about and pride in local varieties of crops, especially those on the verge of disappearing	<ul style="list-style-type: none"> <li>• Catalog pepper, mango, pineapple, and other varieties that are found on Dominica and that can be used as food</li> </ul>
Limited capacity: Forestry and Wildlife has no jurisdiction in Carib forest and there are no Carib foresters (GEF has trained four Carib men to serve as para-foresters.)	<ul style="list-style-type: none"> <li>• Employ government foresters as Carib forest officers as a stop-gap measure</li> <li>• Train Carib forest officers to manage and patrol Carib territory forest</li> <li>• Declare part of the Carib forest as a PA (according to a stakeholder, this is expected to be an outcome of a GEF grant); and develop bylaws for the PA and construct PA infrastructure</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Data is deficient: this affects, among other things, control of invasive species and capacity to manage impacts from climate change.	<ul style="list-style-type: none"> <li>• Conduct a forest inventory-for PPCR and for carbon credits</li> <li>• Research natural control measures for insect pests</li> <li>• Research effects of climate change on biodiversity</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 9 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

Economic Growth: Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID Mission to Barbados and the Eastern Caribbean (USAID/BEC) region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector’s active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

### FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID’s HIV/AIDS program will continue to be funded through the President’s Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework



objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 9: Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Support alternatives to hunting wildlife</li> <li>• Support alternative income generation activities (i.e., alternatives to poor sapping practices; furniture making using improved practices and alternative materials)</li> <li>• Support development of aquaculture/fish farms</li> </ul>	<ul style="list-style-type: none"> <li>• Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</li> <li>• Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.</li> </ul>
<p>Require environmental review and mitigation for projects in certain areas and of certain types (for example, currently no EIA is needed for small-scale projects.)</p>	<p>Focus Area 1: Global Climate Change will assist with adaptation measures to mitigate the effects of climate change.</p>
<ul style="list-style-type: none"> <li>• Develop and implement a Land Use Plan so that rather than being guided by political expediency, decisions are based on the plan and are transparent.</li> <li>• Educate planning commission board to strengthen their understanding of the importance of biodiversity conservation and climate change effects</li> <li>• Strengthen the environmental NGO sector</li> </ul>	<p>Focus Area 1: Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</p>
<p>Develop a Land Use Plan that designates buffer zones/development areas around PAs; that designates areas for quarrying; and areas vulnerable to effects of climate change (a hazard assessment is being done, this should inform an LUP).</p>	<p>Focus Area 1: Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</p>
<p>Catalog pepper, mango, pineapple, and other varieties that are found on Dominica and that can be used as food.</p>	<p>Focus Area 1: Global Climate Change will assist with adaptation measures to mitigate the effects of climate change.</p>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• a) Employ government foresters as Carib forest officers as a stop-gap measure</li> <li>• b) Train Carib forest officers to manage and patrol Carib territory forest</li> <li>• c) Declare part of the Carib forest as a PA (according to a stakeholder, this is expected to be an outcome of a GEF grant)</li> <li>• d) Develop bylaws for the PA and construct PA infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>• a &amp; b) Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</li> <li>• a &amp; b) Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.</li> <li>• c &amp; d) No proposed USAID actions meet these needs</li> </ul>
<ul style="list-style-type: none"> <li>• Conduct a forest inventory-for PPCR and for carbon credits</li> <li>• Research natural control measures for insect pests</li> <li>• Research effects of climate change on biodiversity</li> </ul>	<p>Focus Area 1: Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.</p>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Dominica’s conservation of biodiversity and tropical forests.

- (1) Under Focus Areas 2 and 3, USAID should consider supporting alternative livelihood activities, in particular for youth, which steer them away from poor practices and unsustainable use of natural resources (hunting, sapping, fishing, wood harvesting).
- (2) Under Focus Area 1, Climate Change, USAID should consider strengthening the environmental NGO sector, in particular with a focus on NGOs that involve youth in environmental projects and advocacy.
- (3) Under Focus Area 1, Climate Change, USAID should consider supporting the development of a Land Use Plan to guide development decisions; providing capacity building to the planning commission board so they understand the repercussions of their decisions; and a transparent process for making decisions on development projects.
- (4) Under Focus Area 1, Climate Change, USAID should consider supporting capacity strengthening in EIA, including assistance in preparing and vetting EIAs that illustrate good practices in climate change adaptation.

(5) As part of climate change adaptation/demonstration projects, USAID should consider supporting a herbarium/arboretum in which local/traditional varieties of crops are conserved. This will contribute to climate change adaptation by conserving crop varieties that may be more resilient to climate change.

(6) Under the Climate Change Focus Area, USAID should consider supporting research on climate change impacts on biodiversity. This will contribute to climate change adaptation by providing data to inform development planning in Dominica.

(7) Under Focus Areas 2 and 3, USAID should consider training youth as foresters and other natural resources officers; and should train Carib forest officers to manage Carib Territory forests. This should also include providing internships and assistance with job placement. This will support Focus Areas 2 and 3 by enhancing technical training and ability of youth to participate in emerging market employment opportunities.

The Dominica CCVA recommends the following that would also contribute to biodiversity and forest conservation:

(1) Building of NGO and Government Department capacity in support of designing and carrying out climate change vulnerability reduction activities. The focus should be on broadening the number of capable actors and reinforcing existing groups.

(2) The promotion and implementation of an island-wide land use planning model that is accompanied by practical application of sound planning concepts in relation to climate change.

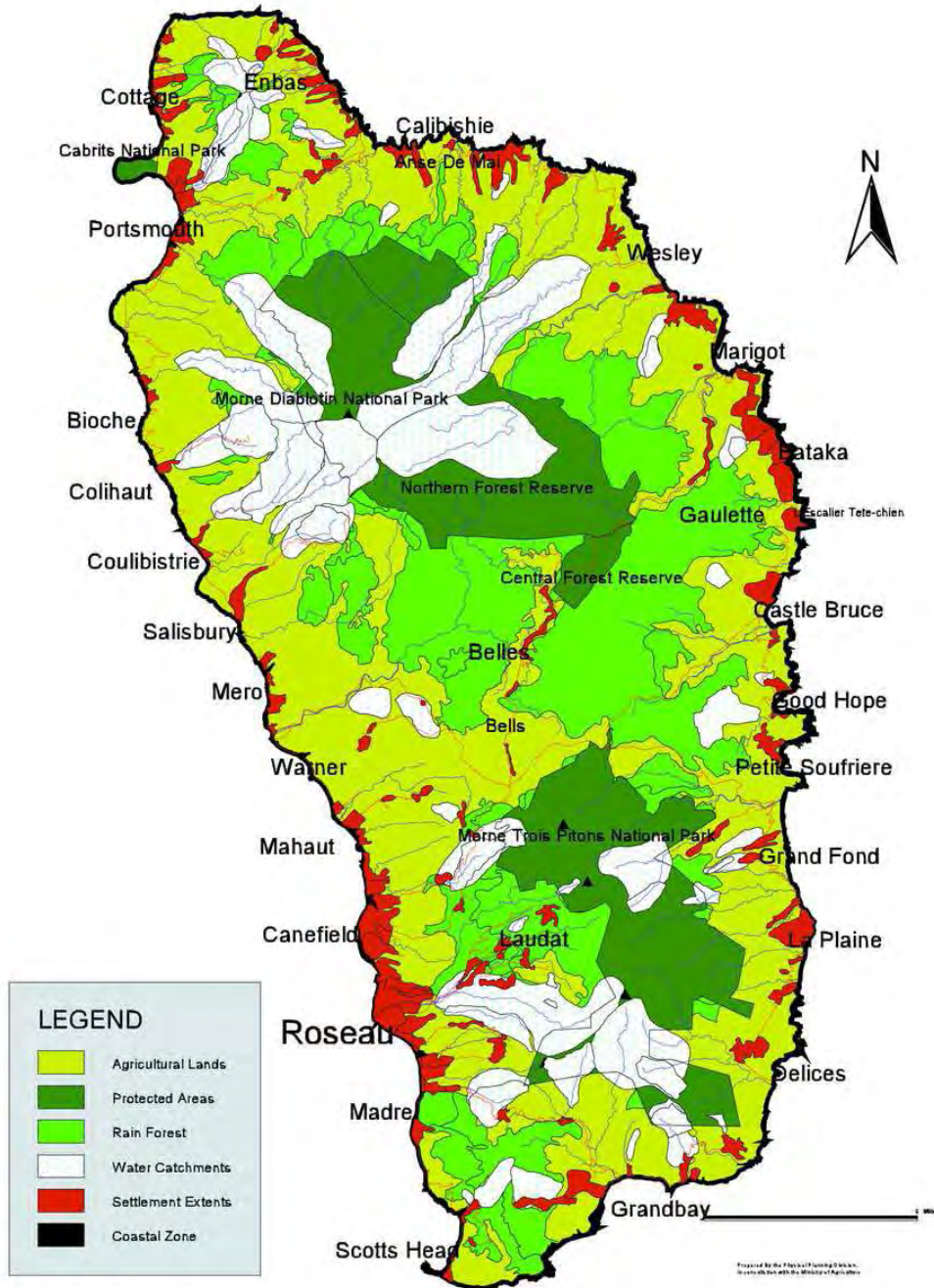
(3) Support targeted research that relies both on scientific rigour and local knowledge that is focussed on very specific issues such as the impact of invasive species.

## REFERENCES

- Burke, L. and J. Maidens. 2004. *Dominica, in Reefs at Risk in the Caribbean*. World Resources Institute. Available on the Internet at: <http://www.wri.org/publication/content/7884>.
- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. *Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary*. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- Commonwealth of Dominica. 2000. *National Biodiversity Strategy and Action Plan*. Available on the Internet at: <http://www.cbd.int/doc/world/dm/dm-nbsap-01-en.pdf>.
- Commonwealth of Dominica. 2009. *Dominica's Fourth National Report to the Convention of Biological Diversity*. Available on the Internet at: <http://www.cbd.int/doc/world/dm/dm-nr-04-en.pdf>.
- Durand, S. and Baptiste, B, Jno. 2009. *Dominica, in Important Bird Areas Americas - Priority sites for biodiversity conservation*. C. Devenish, D. F. Díaz Fernández, R. P. Clay, I. Davidson & I. Yépez Zabala Eds. Quito, Ecuador: BirdLife International. Available on the Internet at: <http://www.birdlife.org/datazone/userfiles/file/IBAs/AmCntryPDFs/Dominica.pdf>.
- Evans, P. G. H., & James, A. 1997. *Dominica, Nature Island of the Caribbean: A Guide to Geology, Climate and Habitats*. Roseau, Dominica: Ministry of Tourism, Commonwealth of Dominica.
- Global Environment Facility (GEF). 2012. *Dominica and the GEF*. Available on the Internet at: [http://www.thegef.org/gef/country\\_fact\\_sheet/dominica-and-gef](http://www.thegef.org/gef/country_fact_sheet/dominica-and-gef).
- Global Environment Facility (GEF) Small Grants Programme (SGP). 2012a. *Our Grantees*. Available on the Internet at: <http://www.gefsgpdominica.com/grantees-profile.html>
- GEF SGP. 2012b. *Community Management of Protected Areas for Conservation (COMPACT): Engaging local communities in stewardship of globally significant protected areas*. Available on the Internet at: [http://www.gefsgpdominica.com/uploads/1/0/5/8/10586363/compact\\_engaging\\_local\\_communities\\_in\\_s\\_tewardship\\_of\\_globally\\_significant\\_protected\\_areas.pdf](http://www.gefsgpdominica.com/uploads/1/0/5/8/10586363/compact_engaging_local_communities_in_s_tewardship_of_globally_significant_protected_areas.pdf).
- USAID. 2008. *FAA 118/119 Tropical Forests and Biodiversity Assessment, Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines*. Available on the Internet at: <http://www.usaid.gov/documents/1862/faa-118119-tropical-forest-biodiversity-assessment>.
- USAID. 2013. *Rapid Climate Change Vulnerability Assessment: Dominica*.

# ANNEX A: MAPS

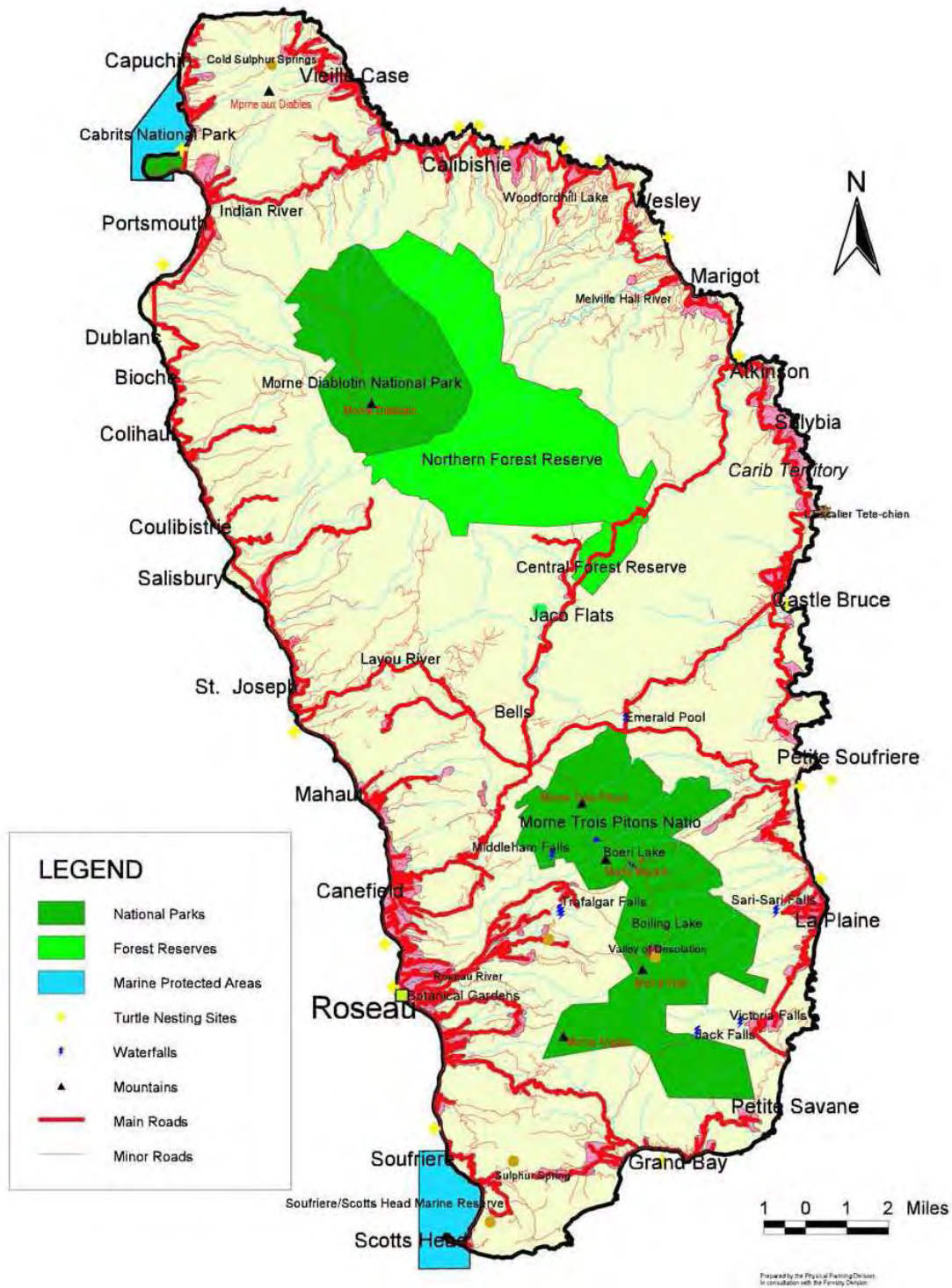
## FIGURE A1: LAND DESIGNATIONS



Source: The Fourth National Report to the CBD



FIGURE A2: PARKS



Source: The Fourth National Report to the CBD

## ANNEX B: THREATENED SPECIES OF DOMINICA

### TABLE B1: IUCN RED LIST FOR DOMINICA

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008	stable
Animalia	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008	stable
Animalia	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008	decreasing
Animalia	<i>Amazona arausiaca</i>	Jacquot, Red-necked Amazon, Red-necked Parrot	VU	2012	increasing
Animalia	<i>Amazona imperialis</i>	Imperial Amazon, Imperial Parrot	EN	2012	increasing
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996	
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006	decreasing
Animalia	<i>Centrophorus granulosus</i>	Gulper Shark	VU	2006	decreasing
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008	stable
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000	decreasing
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008	decreasing
Animalia	<i>Eleutherodactylus amplinympha</i>	Rainfrog	EN	2010	stable
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011	unknown
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
Animalia	<i>Gymnophthalmus pleii</i>	Rough-scaled Worm Lizard	EN	2010	unknown
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008	decreasing
Animalia	<i>Iguana delicatissima</i>	Lesser Antillean Green Iguana, West Indian Iguana	EN	2010	decreasing
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011	decreasing



KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
Animalia	<i>Leptodactylus fallax</i>	Giant Ditch Frog, Mountain Chicken	CR	2010	decreasing
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996	
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011	decreasing
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
Animalia	<i>Millepora striata</i>	Fire Coral	EN	2008	decreasing
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008	decreasing
Animalia	<i>Montastraea faveolata</i>	Mountainous Star Coral	EN	2008	decreasing
Animalia	<i>Montastraea franksi</i>	Boulder Star Coral	VU	2008	decreasing
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008	unknown
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008	decreasing
Animalia	<i>Myotis dominicensis</i>	Dominican Myotis	VU	2008	unknown
Animalia	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008	unknown
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Sperm Whale, Sperm Whale	VU	2008	unknown
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013	decreasing
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007	decreasing
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008	decreasing
Animalia	<i>Turdus lherminieri</i>	Forest Thrush	VU	2012	decreasing
Plantae	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998	
Plantae	<i>Freziera cordata</i>		1998		
Plantae	<i>Guaiacum officinale</i>	Commoner Lignum Vitae,	EN	1998	

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
		Guaiac Tree			
Plantae	<i>Inga dominicensis</i>		VU	1998	
Plantae	<i>Nectandra krugii</i>		EN	1998	
Plantae	<i>Phycolepidozia exigua</i>		CR	2000	unknown
Plantae	<i>Pouteria pallida</i>		EN	1998	
Plantae	<i>Pouteria semecarpifolia</i>		VU	1998	
Plantae	<i>Swietenia macrophylla</i>	Big-leaf Mahogany, Bigleaf Mahogany, Big Leaf Mahogany, Brazilian Mahogany, Honduras Mahogany, Large-leaved Mahogany	VU	1998	
Plantae	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998	

CR - Critically endangered, as designated by the IUCN Red List of Threatened Species

EN - Endangered, as designated by the IUCN Red List of Threatened Species

VU - Vulnerable, as designated by the IUCN Red List of Threatened Species

**TABLE B2: STATUS OF CRITICAL COASTAL MARINE RESOURCES IN DOMINICA**

SPECIES	PREVIOUS STATUS	CURRENT STATUS	CAUSE
White Sea Urchin	Endangered	Threatened	Exact cause is not known. There is no fishery for this resource - some environmental factors such as poor water quality are suspected <i>Population on the rise where habitat conditions improve – less polluted runoffs reduced sedimentation, etc.</i>
Marine Turtles	Threatened	Lessened Threat	Illegal harvesting, loss of habitat and nesting grounds <i>Above still present but at reduced level. Community conservation initiatives having positive impact</i>
Corals	Severely Threatened	Severely Threatened	Siltation due to erosion from poor land management practices, anchor damage, scuba diving, collection of coral for export, poor fishing practices, and natural disasters.
Seagrass	Threatened	Lessened Threat	Siltation is the main cause of death of this species. <i>Population has proliferated where siltation has been absent but concerns remain.</i>
Reef Fish	Threatened	Threatened	Habitat destruction, poor water quality, and poor fishing practices along west coast of Dominica.
Coastal Pelagic Resources	Threatened	Lessened Threat	<i>Resource rebounded. Lately harvest levels of coastal pelagics are on the rise.</i>

## ANNEX C: LIST OF CONTACTS

### TABLE C1. CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Derry Hubert Lewis (Silk)	Treasurer	Dominica Organic Agriculture Movement			FG
Sarah Elwin	Certified Hernalist & Certified Organic Farmer	Mother Nature Organics	<a href="mailto:Adial@gmail.com">Adial@gmail.com</a>	1(767) 615-1482	FG
Iyva Gage	Fisheries Officer	Fisheries Division	iddgage@gmail.com	1(767) 616-3062	FG
Bradley Guye	Environmental Officer	Environmental Coordinating Unit	brad.g908@hotmail.com	1(767) 448-4577	FG
Don Corriette	National Disaster Coordinator	Office of Disaster Management	odm@dominica.gov.jm OR corriette@dominica.gov.dm	1(767) 448-7777	FG
Adisa Trotter	Agricultural Officer (Acting)	Agriculture Division	trottera@dominica.gov.dm	1(767) 266-3804	FG
Eisenhower Douglas	Permanent Secretary	Min. of Environment, Natural Resources, Physical Planning & Fisheries and Min. of Agriculture and Forestry			FG
Sylvanie Burton	Development Officer	Min. of Carib Affairs	caribaffairs@dominica.gov.dm	1(767) 449-8132	IM
Agnes Esprit	National Coordinator	GEF SGP	gefsgocompact@cwdom.dm OR agnese@unops.org	1(767) 440-4345	IM
Ricky Brumant	Director of Agriculture	Agriculture Division	brumantr@dominica.gov.dm	1(767) 266-3810/3812	IM
Minchinton Burton	Director of Forestry, Wildlife & National Parks	Ministry of Agriculture & Forestry	burtonm@dominica.gov.dm		IM
Jim Woolley	Entomologist	Texas A&M University	jimwooley@tamu.edu		IM

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Johnson Boston	Manager	Dominica Academy of Arts and Sciences		1(767) 276-0367	FT
Virginia Peters	Member	Calibishie Golden Age Group		1(767) 265-4937	FT
Charles Watty	Member	North East Wildlife Conservation, Environment Protection and Tours		1(767) 225-6258	FT

FG-Focus group

FT-Field trip

IM-Individual meeting

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

GRENADA

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
LEGISLATION .....	2
GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS .....	3
BILATERAL, OTHER DONORS AND INTERNATIONAL ORGANIZATIONS .....	5
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	8
PROTECTED AREAS.....	8
THREATENED AND ENDANGERED SPECIES.....	9
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	9
TYPES OF FOREST .....	9
MANAGEMENT STRUCTURE .....	10
ECONOMIC IMPORTANCE.....	10
CONSERVATION OUTSIDE OF PROTECTED AREAS .....	11
MANAGED NATURAL ECOSYSTEMS .....	11
EX-SITU CONSERVATION .....	13
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	14
DIRECT THREATS .....	14
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	15
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS .....	16
FOCUS AREA 1.....	16
FOCUS AREA 2.....	16
FOCUS AREA 3.....	16
FOCUS AREA 4.....	17
CONCLUSIONS AND RECOMMENDATIONS .....	18
REFERENCES.....	20
ANNEX A: LIST OF CONTACTS.....	22
TABLE A1: CONTACTS.....	22
ANNEX B: MAPS .....	23
FIGURE B1. BIO-GEOGRAPHIC REGIONS, PROTECTED AREAS, AND CORAL REEFS OF GRENADA .....	23
FIGURE B2. PROTECTED AREAS AND PROPOSED PROTECTED AREAS AS OF 2009.....	24
ANNEX C: THREATENED SPECIES OF GRENADA.....	25
TABLE C1. IUCN RED LIST FOR GRENADA .....	25



## REPORT FINDINGS

Grenada has 2,000 species of plants and 450 species of flowering plants. Of these, 15 species are endemic to the Lesser Antilles while three are endemic to Grenada. It is home to 233 marine species, 69 marine/brackish water species, and 17 species of freshwater fish. As of 1995, 20.8 percent of Grenada was forested.

Grenada has eight designated terrestrial protected areas (PAs), four pending terrestrial PAs, and three marine PAs. The PA system currently comprises 8 percent of terrestrial, 3 percent of marine, and 6 percent of freshwater habitats. There are approximately 50 proposed PAs, however little information is available on the size and status of these areas.

According to the International Union for the Conservation of Nature, there are 46 threatened species in Grenada. Within the marine environment there are 37 threatened animal species, including six critically endangered, 10 endangered, and 21 vulnerable. There are no threatened marine plant species. Within the terrestrial and freshwater environments, there are six threatened animal species, including one critically endangered, two endangered and three vulnerable. There are three threatened plant species, including two endangered and one vulnerable.

There are about 3.4 km<sup>2</sup> of mangroves in Grenada. Mangroves are declining significantly in the country because of physical and economic pressures. Principal physical threats include exploitation for material (e.g., charcoal production), tourism development and jetties, pollution by solid waste dumping, releases of oil and sewage, paint debris from yachts at marinas, root cutting for oyster catching, sand mining, and inland sources such as pesticide runoff and sedimentation. Loss of mangroves impacts adjacent seagrass beds and coral reefs as sedimentation and coastal runoff increases with loss of coastal mangroves. An estimated 12.5 km<sup>2</sup> surrounding Grenada is occupied by coral reefs. Most of the reefs around Grenada, especially along the east and southeast coast are in varying stages of degradation and/or recuperation.

There are approximately 44 ha of emergent wetland in Grenada. The Nature Conservancy's Protected Area Gap Analysis states that 16 percent were protected as of 2006 and that only 2 percent were planned to be included in PAs at that time.

A key deficiency in the legislative framework for the protection and management of biological resources, specifically, the legislation to implement the signed and ratified multilateral environmental agreements, remains a central issue, as identified in the 2008 Foreign Assistance Act (FAA) 118/119 Assessment. The National Biodiversity Strategy and Action Plan has only been partially implemented since its publication in 2000.

Since the 2008 FAA 118/119 Assessment, very few changes to the institutional framework for biodiversity conservation have been made. Aspects of biodiversity management fall under the jurisdiction of at least 20 government agencies, thus clarifying areas of overlapping and/or unclear jurisdiction remains an important issue.

The international and national conservation non-governmental organizations working in Grenada include RARE, People in Action, WIDECAST, the Agency for Rural Transformation, Friends of the Earth, GRENCODA, St. Andrew's Development Organization, and St. Patrick's Development Organization.

Direct threats to biodiversity and forests include inappropriate development practices, increasing urbanization, and increasing rate of resource exploitation. Indirect threats to Grenada's biodiversity and tropical forests are:

- Lack of a land use framework and a land use policy
- Insufficient enforcement of legislation
- Economic development incentives work against biodiversity conservation
- Climate change impacts on marine and terrestrial ecosystems
- Ecological goods and services provided by critical ecosystems are not typically considered in national accounting and decision making
- Culturally linked practices that negatively impact biodiversity are exacerbated by modernization of technologies, industries, and an increased availability of consumer products
- Systematic data collection is lacking across all sectors relating to biodiversity protection
- Institutional, technical, and financial capacity is lacking for the support of biodiversity protection and management

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

ART	Agency for Rural Transformation
CBD	Convention on Biological Diversity
CBO	Community-based organization
CCVA	Climate Change Vulnerability Assessment
CEHI	Caribbean Environmental Health Institute
CIA	United States Central Intelligence Agency
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
CREP	Caribbean Environmental Regional Program
CRFM	Caribbean Regional Fisheries Mechanism
DIFD	Department for International Development (UK)
EC	European Commission
EIA	Environmental impact assessment
EN	Endangered, as designated by the IUCN Red List of Threatened Species
ENCAPD	Environmental Capacity Development Project
FAA	Foreign Assistance Act
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross domestic product
GEF	Global Environment Facility
GFC	Grenada Fund for Conservation
GIS	Geographic information system
GoG	Government of Grenada
GRENCODA	Grenada Community Development Agency
ICNT	Informal Composite Negotiation Text
IUCN	International Union for the Conservation of Nature
IWCAM	Integrating Watershed and Coastal Areas Management
JICA	Japan International Cooperation Agency
MEA	Multilateral environmental agreement
MHEEA	Ministry of Health, Environment, and Ecclesiastic Affairs
MOA	Ministry of Agriculture
MOU	Memorandum of understanding
MPA	Marine protected area
NBSAP	National Biodiversity Strategy and Action Plan
NCSA	National Capacity Self-Assessment
NGO	Non-government organization
NISP	National Implementation Support Partnership
NTFP	Non-timber forest product
OAS	Organization of American States
OECS/ESDU	Organization of Eastern Caribbean States/Environmental and Sustainable Development Unit
OPAAL	OECS Protected Areas and Associated Sustainable Livelihoods Project

PA	Protected area
PEPFAR	President's Emergency Plan for AIDS Relief
RDCS	Regional Development Cooperation Strategy
SADO	St. Andrew's Development Organization
SLM	Sustainable Land Management Project
STABEX	Systeme de Stabilisation des Recettes d'Exportation
TNC	The Nature Conservancy
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Grenada component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

During the period from 2014 to 2018 the USAID Regional Program will have four components. Climate Change will finance demonstrations of adaptation to climate change. Economic Growth will increase youth capabilities for gaining employment and avoiding criminal activities. Citizen Security will provide education and training for youth and will improve legal systems for juvenile justice. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* The Assessment Team primarily used the following reports to prepare this Foreign Assistance Act (FAA) 118/119 Assessment: the 2010 Fourth National Report of Grenada to the Convention on Biodiversity (Ministry of Finance (MoF), 2010), the National Biodiversity Strategy and Action Plan (NBSAP) for Grenada (MoF, 2000), the Country Report to the Food and Agriculture Organization of the United Nations (FAO) International Conference on Plant Genetic Resources (Leipzig, 1996), and the Global Forest Resource Assessment 2010 Country Report Grenada (FAO, 2010). Additional information used in this report is in the References section.

The Assessment Team convened a focus group with 12 participants. The Assessment Team also interviewed eight individual stakeholders. Stakeholders consulted for this FAA 118/119 Assessment are included in Annex A, List of Contacts. The Assessment Team also undertook site visits to:

- Grand Etang National Forest
- Worburn and Calivigny mangrove restoration projects
- Sandy Island/Oyster Bed marine protected area (MPA)
- Molinere/Beausejour MPA
- Belmont Estate/Grenada Chocolate Cooperative
- Various coastal sites on the west and north sides of the island

*Information Gaps:* Significant information gaps exist, specifically an inventory of the status of Grenada's marine biodiversity, including the current condition of its coral reefs, seagrass beds, and mangroves. Very little data are available in the national reports on the status and condition of wetlands. Data are lacking on the effectiveness of international donor funded programs and the status of implementation of pertinent international agreements and conventions.

*General Description of the Country and Ecosystem and Species Diversity:* The state of Grenada, the most southerly of the Windward Islands, is comprised of three main islands: Grenada, Carriacou, and Petit Martinique. The total area of the state is approximately 344 km<sup>2</sup> with the largest island, Grenada, accounting for 312 km<sup>2</sup> and a coastline of approximately 121 km. Carriacou, the second largest island, is located 24 km to the northeast of Grenada and has an approximate area of 34 km<sup>2</sup>. Petit Martinique is a 2 km<sup>2</sup> island off of the northeast of Carriacou. Unless otherwise stated, Grenada refers to Grenada, Carriacou, and Petit Martinique.

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the FAA of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

Grenada has a rugged interior surrounded by low rolling terrain down to the coast. The highest point is Mount St. Catherine at 840 meters above sea level. Seventy-five percent of the land area is below 305 meters. Extensive coral reefs ring the island and comprise an area of about 12.5 km<sup>2</sup>.

The U.S. Central Intelligence Agency (CIA) World Fact Book's July 2013 population estimate is 109,590 inhabitants, of which 40,000 reside in the most populous city of St. Georges on the southeastern shore of Grenada. In 2010, the urban population of Grenada was 39 percent of the total population with an estimated annual rate of urbanization of 1.6 percent.

Much of Grenada's biodiversity is found in its forests. The most recent agricultural census (1995) stated that 20.8 percent of the land was forested. Total forest cover has stayed roughly constant, despite major damage from Hurricanes Ivan and Emily. Grenada has 2,000 species of plants, 450 species of flowering plants, 15 plant species endemic to the Lesser Antilles and three that are endemic to Grenada, the Grand Etang fern (*Danaea* sp.), the cabbage palm (*Ocxeodoxa oleracea*), and the tree species (*Maythenus grenadensis*) (Ministry of Health, Environment, and Ecclesiastic Affairs (MHEEA), 2008; MoF, 2010). There are four amphibian species, 13 species of reptiles including one endemic species, 150 species of birds, four native species of terrestrial mammals, and 11 native bat species.

According to the International Center for Living Aquatic Resource Management, 233 marine species, 69 marine/brackish water species, and 17 species of freshwater fish are found in Grenada. The fish stock composition includes pelagic finfish, demersal finfish, crustaceans, shellfish and unclassified fish species. In addition to the prevalent green, leatherback, loggerhead, and hawksbill turtles, the Kemps ridley and olive ridley turtle species are found in Grenada's waters (MoF, 2010).

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

The key gap in the legislative framework for the protection and management of biological resources identified in the 2008 FAA 118/119 Assessment, specifically that enabling legislation to implement the signed and ratified multilateral environmental agreements (MEAs) is lacking, remains a central issue. Despite references that are consistent with the objectives of the Convention on Biological Diversity (CBD), in the 70 plus pieces of legislation that govern the protection and management of the forests, soil, water, wildlife conservation, planning, development and use of lands (CARIBSAVE, 2012) and regulate pesticides, pollution and waste management (MoF, 2000), there is no direct reference to the CBD goals among draft or pending legislation (MoF, 2010). A draft Environmental Bill seeks to address critical legislative gaps. According to the Fourth Communication to the CBD and key contacts in the government and environmental non-governmental organizations (NGOs), an integrated national land use policy and enabling legislation are gaps that remain glaring issues for effective management of natural resources and sustainable development.

The NBSAP has only been partially implemented since its publication in 2000. Stated obstacles to the implementation of the plan include the devastating ecologic and economic effects of hurricanes, the lack of political will and adequate funding, the prioritization of socioeconomic considerations and lack of appropriate focus on the environment, the lack of clarity on the roles of the different stakeholders, and the lack of baseline information for informed decision-making. Nonetheless a combination of national and global targets of the NBSAP has been adopted and assessments of NBSAP defined indicators carried out. Generally, adherence to the strategy has been positive as it has facilitated the flow of financial resources for conservation activities.

## GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

There have been very few changes to the institutional framework for biodiversity protection since the 2008 FAA 118/119 Assessment. As aspects of the management of biodiversity fall under the jurisdiction of at least 20 government agencies, areas of overlapping and/or unclear jurisdiction remain. Despite multiple efforts to establish a coordinating mechanism, no operational central authority on the environment has yet been created. Key contacts and national reports alike state that enforcement of environmental regulations suffers from inadequate legislation, lack of clear legislation defining jurisdictions, and poor inter-agency collaboration.

The Ministry of Agriculture, Lands, Forestry, Fisheries, and Environment is the lead government agency charged with the protection of Grenada's biodiversity and tropical forest resources. In the Ministry, the Divisions of Forestry Management and the Division of Fisheries are particularly important for managing and conserving habitat, wildlife, and marine stocks.

Created by the Forest, Soil and Water Conservation Act of 1949, the Forestry Division's main responsibility is to implement the National Forestry Policy which includes the mandate "to protect such areas as may be required for the provision of a natural and undisturbed habitat for indigenous flora and fauna" (MLA, 2013). The Fisheries Division is charged with implementing the Fisheries Management and Development Plan as outlined by the Fisheries Act (Act No. 15 of 1986), which provides for the creation of MPAs, among other marine biodiversity protection measures (MLA, 2013).

In addition to the Forestry and Fisheries Divisions, the Land use, Pest Management, Agricultural Extension, Agronomy, and Veterinary Divisions of the Ministry of Agriculture, Lands, Forestry, Fisheries and Environment also have important roles in the protection of biodiversity.

Grenada is signatory to the principal international conventions related to the conservation of biodiversity and tropical forests:

- Convention on Biological Diversity (CBD)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat
- Convention Concerning the Protection of the World Cultural and Natural Heritage
- International Convention to Combat Desertification in those Countries Experiencing Serious Drought and or Desertification
- United Nations (UN) Convention on the Law of the Sea
- International Plant Protection Convention
- Protocol concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region
- Protocol to Amend the International Convention on Civil Liability for Oil Pollution Damage Convention for the Protection and the Development of the Marine Environment of the Wider Caribbean Region
- Protocol to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
- UN Framework Convention on Climate Change



Grenada participates in various regional and sub-regional environmental programs, namely:

- Caribbean Environment Programme
- Programme of Action for the Sustainable Development of Small Island Developing States
- Caribbean Regional Fisheries Mechanism
- Caribbean Regional Environmental Programme
- St. George's Declaration of Principles for Environmental Sustainability in the Organization of Eastern Caribbean States (OECS)

Most of the global and regional agreements and conventions have not been translated into local acts or regulations and the institutional arrangements have not all been developed. Exceptions are the Grenada Marine Boundaries Act (1978) and the Grenada Territorial Waters Act (1978), both inspired by the United Nations Convention on the Law of the Sea (UNCLOS) process (Informal Composite Negotiation Text (ICNT). As a result of the 1982 UNCLOS III, these acts were later consolidated into the Grenada Territorial Seas and Marine Boundaries Act (1989) and the Grenada Fisheries Act (1986). Currently, it is unclear how the signed or ratified conventions and international agreements will make an impact on the local conservation of terrestrial and marine resources (MoF , 2010).

The Nature Conservancy (TNC) has been assisting biodiversity management planning through a number of projects in Grenada. In the sectors of Woburn and Calivigny in the southwest of Grenada, TNC has been helping community-based organizations (CBOs) and local NGOs such as the Grenada Fund for Conservation (GFC) restore hurricane damaged and polluted mangroves. TNC has helped in capacity and technical support in various projects including national protected area planning through Grenada's Protected Areas Systems Planning Ecological Gap Assessment (which came out of the National Implementation Support Partnership (NISP) memorandum of understanding (MOU) that TNC signed with Grenada after the COP7 summit of the CBD in 2004). According to key contacts they have been one of, if not the best resource for education material, community capacity building and increasing community's access to scientific information on the islands. Key contacts noted that TNC brought a specialist in mangrove planting to educate the community on mangrove restoration and management; TNC was also responsible for publicizing studies on climate change adaptability that could not be obtained from local government entities. The financial commitment of TNC on the island is not clear due to the number of projects in which they are involved.

The GFC's mission is to "inspire and contribute to the conservation of Grenada's natural resources while enabling local communities to benefit from conservation initiatives through education, advocacy and the creation of jobs" (Caribbean Birding Trail, undated). Since its inception in 2007, GFC has partnered with community-based, local, regional and international organizations to conduct such projects as mangrove conservation, restoration and outreach campaigns, monitoring sea turtle nesting beaches, summer programs for young people interested in environmental conservation themes, and development and production of multimedia outreach materials that have been widely broadcast and distributed. In the last 2 years GFC has been organizing and engaging community groups around the Woburn Bay MPA to increase community engagement and stewardship in mangrove conservation.

GFC and several other international and national non-profit NGOs, and CBOs work directly with communities to build appreciation for biodiversity and management of community resources, such as RARE, People in Action, WIDECAST, the Agency for Rural Transformation (ART), Friends of the Earth, Grenada Community Development Agency (GRENCODA), St. Andrew's Development Organization (SADO), and St. Patrick's Development Organization. They have been successful in some cases and learned hard lessons in others on the task of building public sensitization and buy-in for biodiversity conservation. Interviewees agreed that the government is not doing this or supporting the groups doing it, sufficiently. The financial

capacity of these organizations was broadly described as highly limited and often their most reliable source of funds is through partnerships with international donor or multilateral organizations.

## BILATERAL, OTHER DONORS AND INTERNATIONAL ORGANIZATIONS

International donors and agencies have played a vital role and have largely been driving financially, many of the environmental initiatives in Grenada especially in terms of advancing the nation’s national environmental policy framework. The Government of Grenada's (GoG’s) sustainable finance plan for environmental management identified large gaps in the financing of environmental initiatives let alone biodiversity conservation. It determined the bulk of resources is sourced from contributions from the international community, in particular the Global Environment Facility (GEF).

The Physical Planning and Development Control Act of 2002 established environmental review and permitting requirements including environmental impact assessments (EIAs), the enforcement of development control, and the protection of the natural ecosystems. The Act details issues related to EIAs, the liability and redress regime, and mechanisms for the protection of the natural submarine and subterranean areas and their flora and fauna. It also established procedures for public participation in the process and for public scrutiny of any report. The legislation also provided a schedule of matters for which an EIA is required. These include any coastal development, and development in wetlands, marine parks, national parks, conservation areas, environmental protection areas, or other sensitive environmental areas.

Many issues typically addressed in an EIA do not have corresponding or clear state regulations. Thus, in the best case, issues relating to biodiversity conservation are dealt with on an ad hoc, inconsistent basis in EIAs. The national policy on environmental reviews and permitting presented in the Physical Planning and Development Control Act also applies to international donors.

Table 1. Key Donors, NGOs, and Biodiversity Conservation Projects

INTERNATIONAL INSTITUTION	PRIMARY PARTNERS	PROGRAMS	FUNDING INFORMATION
United Nations Development Programme (UNDP)	GEF, GoG	Provided funding for national assessments that are the baseline requirements for implementation of MEAs relating to biodiversity and tropical forest protection. These assessments include the NBSAP, the Country Report to the CBD, and the National Capacity Self-Assessment (NCSA) for the Global Environmental Report	NBSAP and country report to CBD: US\$100,000  NCSA: US\$300,000
United Nations Environmental Programme (UNEP)	GEF, GoG, and Caribbean Environmental Health Institute (CEHI)	Funded the project, Integrating Watershed and Coastal Areas Management (IWCAM), to implement an integrated approach to management of watersheds and coastal areas	Total: US\$112.3 million Funds to Grenada: unknown
	GEF and GoG	Supported the development of the Environmental Management and Sustainable Development Bill with the future program of developing a regulatory framework for sustainable land management	
	Various	Provided funding through the Sustainable Land	

INTERNATIONAL INSTITUTION	PRIMARY PARTNERS	PROGRAMS	FUNDING INFORMATION
	agencies of the GoG	Management (SLM) Project to develop a "Best Use and Practice Manual for Sustainable Land Management"	
World Bank	GEF, OECS/ Environmental and Sustainable Development Unit (ESDU), Organization of American States (OAS), and GoG	Funded the OECS Protected Areas and Associated Sustainable Livelihoods Project (OPAAL) to improve management of PAs and increase the involvement of civil society	Grenada eligible for US\$800,000
	TNC, OECS, and GoG	Supported the Sustainable Funding for Protected Areas Project through the Caribbean Biodiversity Trust Fund	US\$8.75 million (across eastern Caribbean)
	OECS and GoG	Solid Waste Management Program	
	GEF and GoG	Dry Forest Biodiversity Conservation aimed at protecting the endangered Grenada dove and its habitat	US\$750,000
TNC	St. George's University and the GoG	Key financial supporter of the NISP initiative to meet Grenada's commitment under CBD for biodiversity protection	
	GoG	The Caribbean Challenge Initiative works with 10 countries in the region to address the growing threats to the sea and its resources via establishment of new MPAs and creation of National Conservation Trust Funds.	
European Commission (EC)	GoG, FAO	Provided funding for projects on reforming the agriculture sector in Grenada through Systeme de Stabilisation des Recettes d'Exportation (STABEX) funding. They also have funded freshwater resource infrastructure, energy production management, plant protection and management, and promotion of organic agriculture.	More than EU€41 million between 1993 and 1999 (Grenada's largest international assistance donor)
		Supported the Caribbean Regional Environment Program (CREP) and the Grenada Amenity Area Project, which was designed to build capacity to manage and use the resources of the Carriacou Sandy Island/ Oyster Bed MPA in a sustainable manner. Funds development of resource management plans and builds partnerships between government, civil society, and the private	EU€100,000

INTERNATIONAL INSTITUTION	PRIMARY PARTNERS	PROGRAMS	FUNDING INFORMATION
		sector for the sustainable use and development of the PA.	
Canadian International Development Agency (CIDA)	OECS/ESDU	Environmental capacity development project (ENCAPD) supports coastal and environmental management	
Department for International Development (DIFD)	GoG	Funding for development of the forestry policy and supplemental forestry related training in 2000	
Japan International Cooperation Agency (JICA)	Caribbean Regional Fisheries Mechanism (CRFM) and Ministry of Agriculture (MoA) Fisheries Division	Development of a master plan for sustainable fishery resource use and management targeting local artisanal fishers and their communities in the Caribbean region in partnership with the CRFM (2009)	
German International Cooperation (GIZ)	CEHI	Land and Coastal Resources Management Programme (2013 to 2017) will support Molinière/ Beauséjour Marine Protected Area (MBMPA) as part of the marine biodiversity support component	
USAID		The USAID climate change program assists the six OECS countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and resilience, and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.	

# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

Terrestrial PAs and National Parks are co-managed by the Forestry Division of the Ministry of Agriculture and the National Parks Department of the Ministry of Tourism. The MPAs are managed exclusively by the Fisheries Division of the Ministry of Agriculture. Additional protection classifications include Natural Landmarks, Protected Seascapes, Cultural Landmarks, Multiple Use Management Areas, and Forest Reserves (MHEEA, 2008).

Grenada has eight designated and four pending terrestrial PAs. The PA system currently comprises 8 percent of all terrestrial, 3 percent of marine, and 6 percent of freshwater habitats. Including areas that are soon to be designated and that have been proposed, this percentage would increase to 11 percent, 12 percent, and 7 percent respectively (MHEEA, 2008; Byrne, 2006). No assessments of the PA system have been undertaken to determine whether the integrity of landscape features or ecosystems have been maintained. Additionally, there are approximately 50 proposed PAs. Limited data is available on the size and status of the proposed PAs.

Grand Etang (3800 acres) was designated for forest protection in 1906 and as a wildlife sanctuary in 1928. Annandale (600 acres) was designated in 2001 and is a significant catchment of potable water for St. Georges. Mt St. Catherine (2300 acres) is a proposed national park that contains northern Grenada's least disturbed ecosystem and is a major freshwater source for towns in the north. Mt. Hartman Forest Reserve (200 acres) and Perseverance Sanctuary (300 acres) are two smaller areas which protect the national bird, the Grenada dove. Mt Moritz, Morne Gazo, Richmond Hill, Levera, Lagoon, and Camerhogne Park are much smaller parks ranging from 60 to 3 acres. In addition, High North National Park, located at the northern tip of Carriacou, is a forest reserve that protects some of the most outstanding terrestrial ecosystems in Grenada (See Figures B1 and B2 in Annex B.)

There are three designated MPAs, including Molinere/Beausejour MPA, Woburn/Clark's Court Bay MPA, and Sandy Island/Oyster Bed MPA in Carriacou and four pending or proposed MPAs. Northern (Levera and archipelago) is one of the largest mangrove swamps in Grenada, and is highly productive and the northernmost habitat for scarlet ibis. Grande Anse MPA contains the most economically important coastal zone in Grenada. Sister Rock MPA is the most heavily used dive site in Carriacou and is a seabird nesting site. Petit Dominique and Fota Rock MPA contain diverse and healthy reef systems (Gardner, 2006; MHEEA, 2008; Byrne, 2006). According to the German International Cooperation (GIZ) Caribbean Environmental Health Institute (CEHI) report, the Molinere/Beausejour MPA is impacted by sewage outfall. It also reports capacity building for staff and community stakeholders is needed as well as equipment to effectively monitor MPAs; in that regard, the government has requested support to hire a biologist to manage the Molinere/Beausejour MPA and for acquisition of equipment. Furthermore, public awareness and alternative livelihood programs are important to discourage illegal fishing in the MPA.

There are a number of initiatives dealing with PAs at various stages of design and implementation, including major international projects, such as the OECS Protected Areas and Associated Sustainable Livelihoods Project (OPAAL). Support from regional and global initiatives form the backbone of PA management where otherwise, low level of management, lack of management planning, and informal stakeholder participation arrangements would be the norm.

As part of TNC's Caribbean Challenge Initiative, a program to protect marine and coastal ecosystems in the Caribbean, Grenada has committed to:

- Expand the MPA system to include at least 20 percent of its nearshore area by 2020
- Develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for the national PA system
- Develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and overuse

## THREATENED AND ENDANGERED SPECIES

The International Union for Conservation of Nature (IUCN) Red List refers to species as 'threatened' if they fall within one of three Red List Categories: vulnerable, endangered, or critically endangered. These Red List Categories indicate increasing degrees of threat of extinction of a species. According to the IUCN Red List (see Annex C), there are 46 threatened species in Grenada. Within the marine environment there are 37 threatened animal species, including six critically endangered, 10 endangered, and 21 vulnerable. There are no threatened marine plant species. Within the terrestrial and freshwater environments, there are six threatened animal species, including one critically endangered, two endangered, and three vulnerable. Three plant species are threatened, two are endangered and one is listed as vulnerable.

Measures to safeguard threatened nesting sea turtles in Grenada include protection of healthy seagrass communities and nesting beaches while prohibiting egg hunting via the inclusion of nesting areas in MPA policies and management. TNC's National Protected Areas Gap Analysis in 2006 revealed that 5 percent of leatherback and 4 percent of hawksbill nesting sites were protected; while future conservation planning would protect an additional 19 percent and 22 percent, respectively.

The dry, coastal scrub-woodland of the southwestern parts of the county are important remnant habitats for the critically endangered Grenada dove and other species endemic to Grenada and/or the Lesser Antilles; these areas include the Mt Hartman estate in the southwest and the Perseverance and adjacent Woodford estates in the west. The habitat of Grenada's national bird is extremely limited and fragmented due to hurricanes, fire, land clearance for agricultural production, housing, infrastructure and commercial development, predation by invasive species, and pest infestation (MoF, 2010). Conservation and protection for this species includes legal protection from hunting and egg-collecting, environmental education in schools and ecotourism, and featuring them on stamps. The 2008 revised conservation and recovery plan recommended specific mitigation actions in response to threats in each of the habitat patches around the country. These have been included in the development and management plans of proposed hotel and resort construction projects.

## STATUS AND MANAGEMENT OF FOREST RESOURCES

### TYPES OF FOREST

Table 2 shows the area and type of forest present in Grenada. From 1990 to 2010 the forest cover in Grenada has stayed roughly constant at around 20 percent of total land area. Despite substantial damage to forests caused by Hurricanes Ivan (2004) and Emily (2005), land use patterns and forest cover did not change dramatically as a result of these disruptions (FAO, 2010).

Table 2. Forest Characteristics

FOREST CLASS NAME	2010 AREA (ha)
Cloud forest (elfin forest)	198.00
Cloud forest transitional (montane forest)	663.48
Evergreen and seasonal forest (Rainforest)	6,366.51
Mixed woody agriculture	9,002.06
Dry deciduous forest	4,315.95
Drought deciduous forest	54.00
Semi-deciduous forest	7,189.65
Mangrove	178.65
<b>Total Grenada</b>	<b>35,469.99</b>

Source: (FAO, 2010)

Figure B1 in Annex B depicts forest cover in Grenada.

Elevation, rainfall and floristic communities are the defining characteristics of these forest types. As a general rule the higher elevation forests receive greater annual rainfall than lower elevation forests. Conservation efforts have emphasized the importance of the high elevation forests for the capture of freshwater and the retention of soil. Thus, the cloud and montane forests, although covering relatively little area and found mostly in the highly inaccessible areas of Mt. St. Catherine and the Grand Etang Forest Reserve, were both found to have about one-third of their total areas protected as of 2006. TNC also found in its Protected Area Gap Analysis that plans for future protection of these forest types would protect around 90 percent of their total area (Byrne, 2006).

Other types of forest and vegetation are less widespread and under threat. Littoral woodlands exist along the coast in small stretches throughout the country. Only a small tract remains of the original expanse in the northeast of Grenada (MoF, 2010). Drought deciduous forests and cactus scrub are found in the south and north of mainland Grenada and on Carriacou and Petit Martinique and are mostly degraded or have been eliminated (Leipzig, 1996). Mangrove woodlands mostly occur along the eastern and southeastern coastline of Grenada and on the north and south coasts of Carriacou mainly in small patches (Leipzig, 1996). Only 5 percent of this woodland type had been protected as of 2006 whereas a total of 21 percent is included in future protection planning (Byrne, 2006).

## MANAGEMENT STRUCTURE

The state owns about 69 percent of the land classified as forests and woodlands, which is managed by the Forestry Division and National Parks Department (Leipzig, 1996). Currently 8 to 11 percent of terrestrial habitats are contained in PAs. The additional forested land is privately owned.

## ECONOMIC IMPORTANCE

Timber production in Grenada is being phased-out. Local forests currently provide a very small proportion of Grenada's timber needs. Timber production is limited by a number of factors including poor wood stock due to serious damage caused by hurricanes, pest infestation, past logging activities, and inaccessibility of mountainous areas. A greater emphasis on the multiple use benefits of conservation and recreation is replacing timber extraction.



Non-timber forest products (NTFPs) have increased in importance since the reduction of timber extraction. The main NTFPs are bamboo, screw pine, poles, fruits, charcoal, medical plants, crayfish, and wildlife. For example, screw pine and bamboo are raw materials for the production of spice baskets and other handicrafts for sale to tourists. Commercialization of NTFPs without adequate baseline data to assess the impact on biodiversity is a major concern (MoF, 2010).

Forest resources in Grenada are noted for their important public environmental functions. Forests provide and protect water supplies and provide recreational resources; they control, soil erosion and enhance soil productivity. Many rural groups who engage in hunting, sawmilling, handicraft making, animal grazing, and tourism activities depend on the forest for their livelihoods.

The main threats to forests in Grenada are climate change, natural disasters, pest infestation, deforestation, and inadequate enforcement of legislation protecting forest resources. These are discussed further in the section below on threats. There are currently no forest certification programs in Grenada.

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

Figure B1 in Annex B shows land uses/biogeographic regions in Grenada.

#### *Agricultural systems*

Grenada has a diversified agriculture sector with numerous perennial and annual crops grown. Cocoa, nutmeg/mace, bananas, and other fresh fruits are the chief export crops. Since Hurricanes Ivan and Emily the agriculture sector has slowly been increasing its contribution to gross domestic product (GDP) and national export earnings. Prior to Ivan and Emily, the contribution to GDP was 8.65 percent in 2003. In 2008 it was 6.25 percent and in 2009 it was 6.62 percent. The 10.17 percent growth in the agriculture sector in 2009 is equivalent to a positive change of US\$8.47 million in value (Thomas K. M., 2011).

In Grenada's agricultural systems, intercropping of perennial and annual crops is a common practice, which is greatly preferable to cultivation in monoculture of annual crops. It helps maintain biodiversity, watershed functions (infiltration, partial soil protection), provides habitat for birds, pollinators, soil organisms, builds soil organic matter, and sequesters atmospheric carbon (MoF, 2010).

Conversely, conversion of land use for agriculture negatively affects biodiversity by reducing wildlife habitat. It also expedites soil erosion and siltation of rivers and coral reefs. The increasing use of pesticides and insecticides and accompanying pollution, the introduction of invasive alien species, pest infestation, and poor farming practices (burning and clearing of steep slopes) also impact biodiversity (MoF, 2010). Currently only 1 percent of agricultural land is considered protected, but land under cultivation has stayed relatively constant for the last several decades at about 75 percent of total land area. Around 67 percent is cultivated in "permanent" or perennial agricultural systems.

Agriculture is mostly practiced in plots of 5 acres or less, this is a result of conversion to mass private ownership after independence in 1974 and subsequent continuous subdivision of family properties. Tracking land ownership and regulating private property development are difficult because families often do not document subdivision of their property (MoF, 2010).

## Wetlands

Grenada has approximately 44 ha of emergent wetlands. TNC's Protected Area Gap Analysis states that 16 percent are protected as of 2006 and that only 2 percent had been planned to be included in PAs at that time. Most emergent wetlands in Grenada exist in or around the volcanic calderas scattered around the islands, including the recently (2012) designated Ramsar wetland in the Levera National Park.

Wetlands occurring near coastal areas, especially those in the most populated southwestern part of the country are at particular risk for conversion for development or agriculture and at increased risk of pollution from proximity to human settlement. One specific case of wetland loss as a result of conversion and pollution has been documented in St. Georges Parish. Rural to urban migration for economic opportunity led to unauthorized settlements and poorly serviced accommodations in or directly around a wetland ecosystem (MoF, 2000).

## Mangroves

Grenada has about 3.4 km<sup>2</sup> of mangroves. The common varieties of mangrove are red mangrove, black mangrove, white mangrove, and buttonwood. Healthy stands of mangroves are located at Levera Pond, St. Patrick, Harvey Vale, Carriacou or the Conference/Pearls area, and the bays between St. David and Prickly Bay on the south coast of the island (MoF, 2000).

Mangroves are declining significantly around the country due to a number of threats. Principal physical threats include exploitation for material (e.g., charcoal production), tourism development and jetties, pollution from solid waste dumping, oil and sewage, paints on yachts at marinas, root cutting for oyster catching, sand mining, and inland sources such as pesticide runoff and sedimentation. Root causes of the threats are a lack of baseline data to monitor and manage mangroves, and lack of public awareness of the ecological services provided by mangroves (MoF, 2010).

## Seagrass

Seagrass beds are ecologically important transitions between mangrove communities and reef systems and fishing grounds. Marine turtles, specifically the Atlantic green turtle, depend on healthy seagrass communities as a source of food. Seagrass communities can be found in the Telescope area and within the barrier type reef extending from Grenville Bay to Prickly Bay in the south, at Carriacou in the L'Esterre Bay and Manchineel Bay, and within the reef at North Bay, Isle de Rhonde (MoF, 2000). The main threats to seagrass ecosystems include pollution, nutrient loading from land-based sources, and physical damage.

## Coral reefs

Coral reefs occupy approximately 12.5 km<sup>2</sup> around Grenada. The reefs mainly consist of elkhorn coral (*A. palmata*), boulder coral (*Monstastrea spp.*), finger coral (*Porites porites*), mustard coral (*Porites asteroides*), and brain coral (*Colpophyllia spp.*, *Diploria spp.*). Significant quantities and diverse species of marine algae are also present. Coral reefs are important nursery grounds, habitat, and shelter for some resident and transient species as well as substrate for algae and other organisms. In addition to providing economically important fish habitat, reefs moderate storm impacts, maintain biodiversity, play an important role in the nutrient cycle, and are an attraction for recreation and tourism.

Fishing makes up 2 percent of GDP, 13.3 percent of national export earnings, and 45 percent of agricultural sector exports (Thomas K. M., 2011). Small-scale and subsistence fishing operations account for a significant segment of Grenada's fisheries. Commercial operations target tuna; yellow fin tuna is the most economically important fishery. It is the largest commercial catch in national landings and earns a high price internationally. The composition of the national fisheries is tuna (24 percent), big eye scad (12 percent), flying fish (6

percent), sailfish (6 percent), and dolphin fish (5 percent). There is also a significant harvest of crustaceans and other shellfish.

Most of the reefs around Grenada, especially along the east and southeast coast, are in varying stages of degradation. The main threats to coral reefs include diseases, destructive fishing methods, sedimentation and pollution, bleaching, rise in sea temperature, loss of algal grazers (leading to algal blooms), coastal development, physical damage, and coral harvesting.

## *Beaches*

Grenada's beaches protect the coastal area from wave action and provide habitat and nesting sites for marine species, such as sea turtles and shorebirds. Sand mining harms crustacean species that inhabit the beaches, disrupting the food chain.

## *Freshwater*

There are 17 freshwater species on the Grenada mainland. The most important species are yoca, titiree, crevalle jack, mullet, crayfish, zandmey, river coco, tilapia, guppy, and sword tail. Grenada has a great diversity of benthic macro-invertebrates, such as snails and insects. Freshwater fishing is mainly for subsistence and recreation; no commercial exploitation of freshwater fish species currently occurs. No data have been collected on the abundance or rate of removal via fishing of aquatic freshwater species.

The main threats to the freshwater ecosystem are improper domestic solid waste and liquid disposal, over-exploitation of species, unsustainable agricultural practices, including the use of pesticides, saline intrusion, deforestation, and introduction of alien invasive species.

## **EX-SITU CONSERVATION**

Progress towards completion of Goal 3 of the CBD, "promote the conservation of genetic diversity" was listed as, "Efforts to establish germplasm bank ongoing" in the 2010 Fourth National Report (MoF, 2010). There are no long-term seed storage programs or national gene banks. When national collections of seeds occur, it is practiced for the current year's production program of that crop species. A lack of proper seed storage facilities has limited the practice of national seed collection. Grenada does however have a Botanic Garden which preserves several species of trees. An arboretum in Grenada contains minor spices (Leipzig, 1996).

Some land races and traditional varieties of plants, especially fruit and tree crops, such as stinking toe damsel, mammee apple, sapote, and mangoes are in decline. Many are still being conserved on farms and estates throughout the islands (Leipzig, 1996). The existing small private ecotourism and agricultural production-oriented botanical gardens preserve and propagate diverse strains of economically important plants. According to a contact, the former zoo shut down due to lack of interest, maintenance, and funding.

# MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

## DIRECT THREATS

Focus group participants and other key contacts described a variety of threats to the conservation and improved management of biodiversity. This section describes the threats that were most frequently cited by stakeholders and that are described in the NBSAP and/or the 2010 Fourth National Report.

(1) **Inappropriate development practices** such as improper management of land on steep slopes, and land in or adjacent to wetlands, mangroves, seagrass beds, and coral reefs can put these ecosystems at risk. Land-based sources pose the greatest threat to these ecosystems through pollution, nutrient loading, and sedimentation. Additionally, corporate purchase of coastal lands has often led to conversion of natural landscapes into tourism or housing development. The coastal zones are at particular risk from over-development without infrastructure for wastewater and storm water management. The absence of environmental audits to guide decision-making in planning routes for infrastructural development is also a noted problem.

(2) **Increasing urbanization, as a result of migration from rural to urban areas spurred by economic opportunity,** has increased the demand for housing and utilities. This has been accommodated through the drainage of wetlands and conversion of land for housing and commercial development. There is little incorporation of natural areas into such development. Rivers, gullies, wetlands, and the sea are often the repository for solid waste and sewage disposal.

(3) **Rate of resource exploitation** has increased with increased population, consumerism, and introduction of technology. Common examples are sand mining and unmanaged exploitation of wild game species and the fishery. Extensive localized beach sand mining which leads to coastal erosion has been well publicized and documented at Pearls and Telescope beaches. Continued growth in the construction industry will impose further pressures on these coastal areas unless alternatives are made available. Overuse of natural resources, including popular coastal resources for recreational purposes, are threats that have already contributed to the widespread degradation of coral reefs and threaten additional sites with the expansion of recreational offerings.

(4) **Climate Change**, according to the Climate Change Vulnerability Assessment (CCVA) for Grenada (a USAID-commissioned report prepared simultaneous to this FAA 118/119 Assessment), is predicted to increase Grenada's mean annual atmospheric temperature, sea surface temperature, and intensity of tropical storms and to either decrease or increase its monthly precipitation. The CCVA states that such changes in Grenada's climate could affect its rate of economic growth. An increase in average annual temperature could, for example, raise operational costs of tourist operations; an increase in sea surface temperature associated with climate change would negatively impact coral reefs, a major tourist attraction in Grenada. Decreases in precipitation might reduce the quantity and reliability of fresh water. Increases in precipitation, by contrast, might augment soil erosion and thereby cause more sedimentation to Grenada's coral reefs and seagrass beds. If that were to reduce these ecosystems' vigor, they would become more susceptible to invasive species, rises in sea level, increases in concentrations of CO<sub>2</sub> in sea water and higher temperature of sea water. Climate change may induce changes in species composition of Grenada's forests and have water quality and watershed impacts.

# IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats. “Actions necessary” are derived from stakeholder consultations and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 3. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
(1) Lack of a land use framework and a land use policy	<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect biodiversity and important ecosystems</li> <li>• Strengthen local and regional collaboration to develop land use guidance</li> </ul>
(2) Insufficient enforcement of legislation	<ul style="list-style-type: none"> <li>• Improve coordination, including clarification of jurisdiction among key governmental agencies</li> <li>• Provide funding, training, and capacity-building for employees of government agencies charged with environmental management and protection</li> </ul>
(3) Economic development incentives	<ul style="list-style-type: none"> <li>• Establish a user-fee system (i.e., access fees) for biodiversity resource users and a system for compensation for damage to fragile or endangered habitats</li> <li>• Evaluate use of subsidies for land development and agro-chemical usage</li> </ul>
(4) Ecological goods and services	<ul style="list-style-type: none"> <li>• Perform robust studies of the socioeconomic value and ecological goods/services of natural resources (reefs, etc.) to tourism, real estate, and fisheries</li> <li>• Communicate results of socioeconomic and scientific studies to different segments of the Grenadine citizenry</li> <li>• Conduct public outreach campaigns: awareness of direct and indirect benefits of ecological services; impact of land-based activities on the marine environment</li> </ul>
(5) Culturally linked practices	<ul style="list-style-type: none"> <li>• Implement a behavior change communication and public outreach program to change attitudes and behaviors regarding impacts of waste discharge, fishing practices, and other poor natural resources management practices</li> <li>• Support agricultural extension services for soil conservation, safe pesticide application, and crop management</li> </ul>
(6) Systematic data collection	<ul style="list-style-type: none"> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., Geographic Information Systems (GIS) and satellite imagery), especially for reefs and forests</li> <li>• Strengthen systems for inter-agency sharing of data</li> <li>• Perform an impact assessment on biodiversity and NTFPs</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
(7) Institutional technical and financial capacity	<ul style="list-style-type: none"> <li>• Perform robust studies of the socioeconomic value of reefs to tourism, real estate, and fisheries in Grenada</li> <li>• Provide more funding, personnel, monitoring, training, and enforcement for biodiversity-related agencies</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 4 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

**Global Climate Change:** The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

**Citizen Security:** The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

**Economic Growth:** Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID Mission to Barbados and the Eastern Caribbean (USAID/BEC) region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

## FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID’s HIV/AIDS program will continue to be funded through the President’s Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the USAID/BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 4. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED USAID ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect biodiversity and important ecosystems</li> <li>• Strengthen local and regional collaboration and participation to develop land use guidance</li> </ul>	Focus Area 1 will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.
<ul style="list-style-type: none"> <li>• Improve coordination, including clarification of jurisdiction among key governmental agencies</li> <li>• Provide funding, training, and capacity building for employees of governmental agencies charged with environmental management and protection</li> </ul>	Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.
<ul style="list-style-type: none"> <li>• Establish a user-fee system (i.e., access fees) for biodiversity resource users and a system for compensation for damage to fragile or endangered habitats</li> <li>• Evaluate use of subsidies for land development and agro-chemical usage</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.
<ul style="list-style-type: none"> <li>• Perform robust studies of the socioeconomic value and ecological goods/services of natural resources (reefs, etc.) to tourism, real estate, and fisheries</li> <li>• Communicate results of socioeconomic and scientific studies to different segments of the Grenadine citizenry</li> <li>• Conduct public outreach campaigns and behavior change communication: awareness of direct and indirect benefits of ecological services; impact of land-based activities (i.e., runoff, sedimentation) on marine environment</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.
<ul style="list-style-type: none"> <li>• Support agricultural extension services for soil conservation, safe pesticide application, and crop management</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.



ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED USAID ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for reefs and forests</li> <li>• Strengthen systems for inter-agency sharing of data</li> <li>• Perform an impact assessment on biodiversity and NTFPs</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>
<ul style="list-style-type: none"> <li>• Perform robust studies of the socioeconomic value of reefs to tourism, real estate, and fisheries in Grenada</li> <li>• Provide more funding, personnel, monitoring, training, and enforcement for biodiversity-related agencies</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p> <p>Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</p>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Grenada’s conservation of biodiversity and tropical forests.

Under Focus Area 1, Global Climate Change, the following are priority actions. USAID should consider integrating the following into their strategic approach:

- (1) Development of a land use plan to control coastal development and protect biodiversity and important ecosystems and strengthening collaboration on land use guidance could be part of climate change demonstration projects. This would contribute to climate change adaptation by ensuring that Grenada’s development is climate-wise.
- (2) Support development of a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for reefs and forests, including training for long-term use as well as dissemination and sharing of data. The database would help guide climate-wise development, would help evaluate climate-related impacts, and could serve as an early warning for impacts to biodiversity.
- (3) Support robust studies of the socioeconomic value and ecological goods and services of natural resources (reefs, mangroves, etc.) to tourism, real estate, and fisheries. This would contribute to conservation of these resources, which are important for mitigating the effects of climate change.
- (4) As part of climate change demonstration projects, support agricultural extension services for soil conservation, safe pesticide application, and crop management to help mitigate effects of climate change.

Under Focus Area 2, Citizen Security, USAID should consider integrating the following into their strategic approach:

(1) Support for an internship program for at-risk youth to supplement staff at government agencies charged with environmental management and protection. Interns could help government personnel at biodiversity-related agencies perform monitoring and enforcement.

In addition, the following CCVA recommendations would contribute to biodiversity conservation and are compatible with Focus Area 1 Global Climate Change:

(1) USAID should consider financing an activity that would assist Grenada to formulate policies that reconcile growth in tourism with conservation of terrestrial and marine ecosystems.

(2) USAID should consider establishing a replicable model for strengthening institutional capacity for conserving a marine area. A good model would be the Sandy Island/Oyster Bed MPA in Carriacou.

## REFERENCES

Byrne, J. 2006. Grenada National Protected Area System Gap Assessment. Christiansted: The Nature Conservancy.

Caribbean Birding Trail. Undated. Partners. Retrieved June 22, 2013, from Grenada Fund for Conservation: [http://www.caribbeanbirdingtrail.org/?page\\_id=1476](http://www.caribbeanbirdingtrail.org/?page_id=1476).

Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.

CARIBSAVE. 2012. The Caribsava Climate Change Atlas; Climate Change Risk Profile for Barbados. Christ Church, Barbados.

Food and Agriculture Organization of the United Nations (FAO). 2010. Global Forest Resource Assessment 2010 Country Report Grenada. Forestry Department Food and Agriculture Organization of the United Nations.

Finlay, J. 2010. National Assessment Report Grenada: small island developing states, Mauritius Strategy of Implementation . Westerhall.

Gardner, L. 2006. Review of the Policy, Legal, and Institutional Frameworks for Protected Areas Management in Grenada. Environment and Sustainable Development Unit, Organisation of Eastern Caribbean States.

Helmer, e. a. 2008. Land Cover and Forest Formation Distributions for St. Kitts, Nevis, St. Eustatius, Grenada and Barbados from Decision Tree Classification of Cloud-Cleared Satellite Imagery. Caribbean Journal of Science , 44 (2), 175-198.

Leipzig. 1996. Grenada: Country Report to the FAO International Conference on Plant Genetic Resources. St. Georges: Ministry of Agriculture, Forestry and Fisheries.

Ministry of Health, Environment, and Ecclesiastic Affairs (MHEEA). 2008. Supporting Country Action on the CBD Programme of Work on Protected Areas: Application for Funding. St. Georges: Ministry of Health, Environment and Ecclesiastic Affairs.

Ministry of Legal Affairs (MLA). 2013. Laws of Grenada. (M. o. Affairs, Producer) Retrieved June 22, 2013, from <http://laws.gov.gd/>.

Ministry of Finance (MoF) . 2010. Fourth National Report of Grenada to the CBD. Carenage: Ministry of Finance.

MoF. 2000. Grenada National Biological Diversity Strategy and Action Plan. Ministry of Finance.

Thomas, A. 2000. National Report on the Implementation of the United Nations Convention to Combat Desertification and/or Drought. Queen's Park: Ministry of Agriculture, Lands, Forestry, and Fisheries.

Thomas, K. M. 2011. Annual Agriculture Review Grenada W.I. St. Georges: Ministry of Agriculture.

Turner, M. 2009. Grenada Protected Area System Plan Part 2. North Vancouver: OECS/ESDU.

United Nations Environmental Programme - Regional Office for Latin America and the Caribbean (UNEP-ROLAC). 2010. National Environmental Summary Grenada 2010. United Nations Environmental Programme - Regional Office for Latin America and the Caribbean.

USAID. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment, Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines. Available on the Internet at: <http://www.usaid.gov/documents/1862/faa-118119-tropical-forest-biodiversity-assessment>.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Grenada.

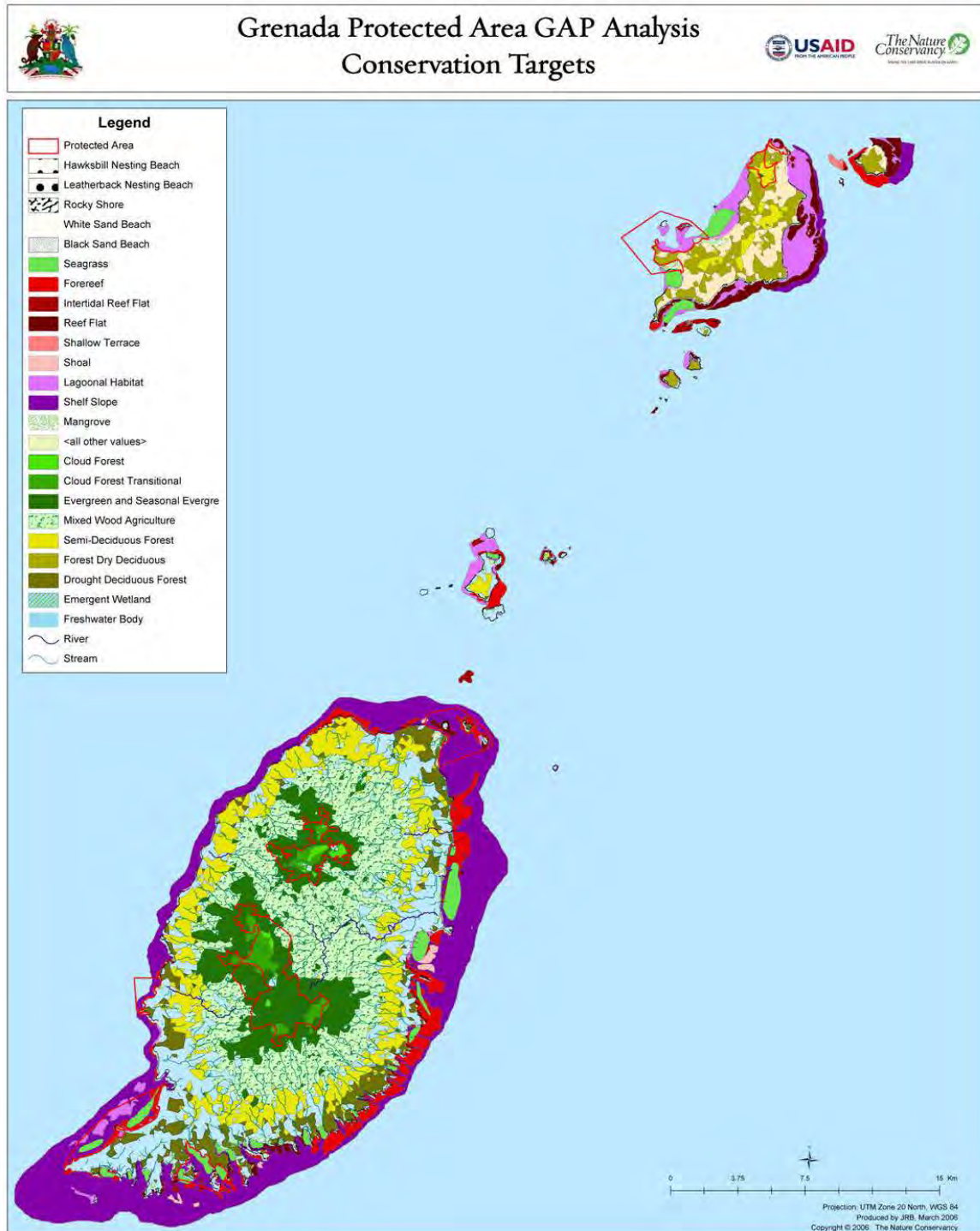
## ANNEX A: LIST OF CONTACTS

### TABLE A1: CONTACTS

NAME	ORGANIZATION AND TITLE	EMAIL ADDRESS	PHONE NUMBER
FOCUS GROUP DISCUSSION			
Rosalie Lagrenade	OAS, Administrative Technician	<a href="mailto:rlagrenade@oas.org">rlagrenade@oas.org</a>	473-440-2439
Gordon Paterson (also interviewed)	Forestry/Parks Dep't, Head of watershed management	<a href="mailto:Massaiman2004@yahoo.com">Massaiman2004@yahoo.com</a>	
George Grant	Grant Communications, PR consultant	<a href="mailto:grantcom@spiceisle.com">grantcom@spiceisle.com</a>	
Kirl Grant-Hoschtialek	Grenada Board of Tourism, Senior Product Development Officer	<a href="mailto:Khoschtialek@grenadagrenadines.com">Khoschtialek@grenadagrenadines.com</a>	473-440-2279
Ashley Calliste	Land-Use Division MoA	<a href="mailto:Ashleycalliste1979@gmail.com">Ashleycalliste1979@gmail.com</a>	473-440-3078
Deon David	NADMA	<a href="mailto:deondavid@hotmail.com">deondavid@hotmail.com</a>	473-440-0838
Augustine Pasco	Ministry of Tourism	<a href="mailto:Pasco007@hotmail.com">Pasco007@hotmail.com</a>	473-440-0366
Alan Joseph	Consultant (TNC)	<a href="mailto:Agjoseph16@yahoo.com">Agjoseph16@yahoo.com</a>	
Francis Balwant	Ministry of Health	<a href="mailto:francisbalwant@hotmail.com">francisbalwant@hotmail.com</a>	473-407-4179
Tyrone Buckmire (also interviewed)	Grenada Fund for Conservation, Executive Director	<a href="mailto:Gfcinc1@gmail.com">Gfcinc1@gmail.com</a>	473-404-5814
Denyse Ogilwe (also interviewed)	People in Action, Executive Director	<a href="mailto:Denyse.ogilwe@gmail.com">Denyse.ogilwe@gmail.com</a>	
Dane Baldeau	SPECTO	<a href="mailto:Yacubu13@yahoo.com">Yacubu13@yahoo.com</a>	
KEY CONTACT INTERVIEWS			
Fabian Purcell	Physical Planning Dept., Chief of Physical Planning Dept.	<a href="mailto:fabpurcell@gmail.com">fabpurcell@gmail.com</a>	473-417-9478
Aden Forteau	Forestry Division, MoA, Chief forestry officer	<a href="mailto:Adenforteau@yahoo.com">Adenforteau@yahoo.com</a>	473-440-2934
Luther Rennie	Carriacou Environmental Committee (CEC), Board member of Sandy Island/Oyster Bed MPA	<a href="mailto:lutherrennie@gmail.com">lutherrennie@gmail.com</a>	473-457-3517
Orlando Harvey	CEC, Manager of Sandy Island/Oyster Bed MPA		
Pancy Cross	Hotel and Tourism Association, Executive Director	<a href="mailto:pancy@ghta.org">pancy@ghta.org</a>	473-444-1353
Paul Philip	Coastal Resources Management Unit, MoE, Senior Environmental Officer	<a href="mailto:Paul.phillipA@gmail.com">Paul.phillipA@gmail.com</a>	473-440-2101

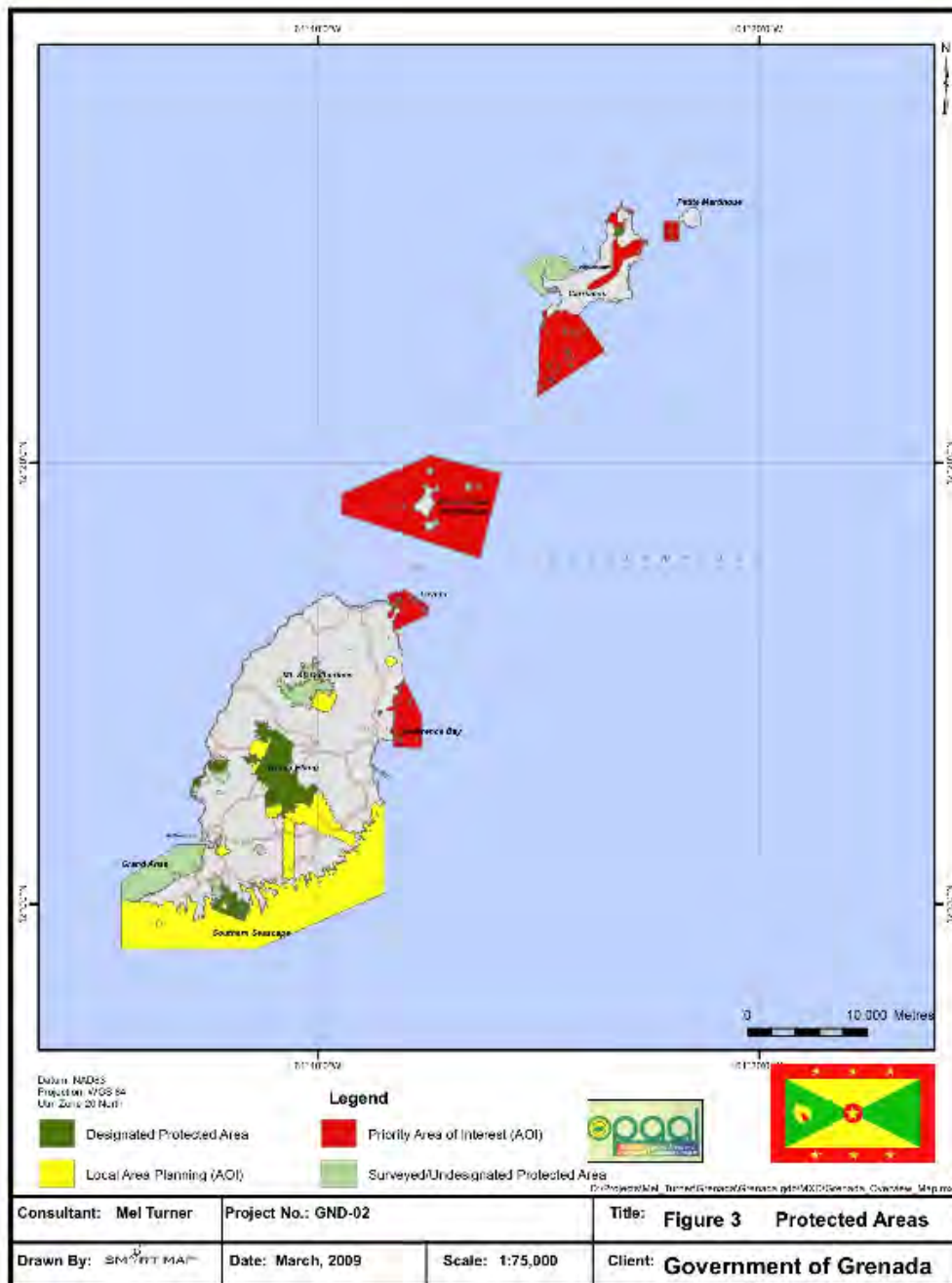
# ANNEX B: MAPS

## FIGURE B1. BIO-GEOGRAPHIC REGIONS, PROTECTED AREAS, AND CORAL REEFS OF GRENADA



Source: (Byrne, 2006)

FIGURE B2. PROTECTED AREAS AND PROPOSED PROTECTED AREAS AS OF 2009<sup>2</sup>



Source: (Turner, 2009)

<sup>2</sup> Several of the undesignated and priority areas of interest have since been designated protected areas.



## ANNEX C: THREATENED SPECIES OF GRENADA

### TABLE C1. IUCN RED LIST FOR GRENADA

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS*	YEAR ASSESSED
ANIMALIA	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008
ANIMALIA	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008
ANIMALIA	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000
ANIMALIA	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011
ANIMALIA	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR	2008
ANIMALIA	<i>Leptotila wellsi</i>	Grenada Dove	CR	2012
ANIMALIA	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013
ANIMALIA	<i>Balaenoptera musculus</i>	Blue Whale, Pygmy Blue Whale, Sibbald's Rorqual, Sulphur-bottom Whale	EN	2008
ANIMALIA	<i>Caretta caretta</i>	Loggerhead	EN	1996
ANIMALIA	<i>Chelonia mydas</i>	Green Turtle	EN	2004
ANIMALIA	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003
ANIMALIA	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008
ANIMALIA	<i>Montastraea faveolata</i>		EN	2008
ANIMALIA	<i>Pristimantis euphronides</i>		EN	2010
ANIMALIA	<i>Pterodroma hasitata</i>	Black-capped Petrel	EN	2012
ANIMALIA	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007
ANIMALIA	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007
ANIMALIA	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011
ANIMALIA	<i>Typhlops tasymicris</i>	Grenada Bank Blindsnake	EN	2011
ANIMALIA	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008
ANIMALIA	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996
ANIMALIA	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006
ANIMALIA	<i>Dendrocygna arborea</i>	Black-billed Wood-duck, Cuban Tree-duck, West Indian Tree-duck, West Indian Whistling-duck, West Indian Whistling Duck, West Indian Whistling-Duck	VU	2012
ANIMALIA	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS*	YEAR ASSESSED
ANIMALIA	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008
ANIMALIA	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008
ANIMALIA	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008
ANIMALIA	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009
ANIMALIA	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011
ANIMALIA	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010
ANIMALIA	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996
ANIMALIA	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996
ANIMALIA	<i>Makaira nigricans</i>	Blue Marlin	VU	2011
ANIMALIA	<i>Megalops atlanticus</i>	Tarpon	VU	2012
ANIMALIA	<i>Montastraea franksi</i>		VU	2008
ANIMALIA	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008
ANIMALIA	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008
ANIMALIA	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008
ANIMALIA	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008
ANIMALIA	<i>Sphaerodactylus kirbyi</i>	Bequia Dwarf Gecko, Bequia Sphaero, Grenadines Sphaero	VU	2011
ANIMALIA	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011
ANIMALIA	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008
PLANTAE	<i>Guaiacum officinale</i>	Commoner Lignum Vitae, Guaiac Tree	EN	1998
PLANTAE	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998
PLANTAE	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998

CR - Critically endangered, as designated by the IUCN Red List of Threatened Species

EN - Endangered, as designated by the IUCN Red List of Threatened Species

VU - Vulnerable, as designated by the IUCN Red List of Threatened Species

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

GUYANA

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
GOVERNMENT AND LEGISLATION.....	2
NON-GOVERNMENTAL ORGANIZATIONS.....	4
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	4
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	5
PROTECTED AREAS.....	5
THREATENED AND ENDANGERED SPECIES.....	6
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	7
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	9
MANAGED NATURAL ECOSYSTEMS.....	9
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	10
DIRECT THREATS.....	10
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	11
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	12
FOCUS AREA 1.....	12
FOCUS AREA 2.....	13
FOCUS AREA 3.....	13
FOCUS AREA 4.....	13
CONCLUSIONS AND RECOMMENDATIONS.....	14
REFERENCES.....	16
ANNEX A: LIST OF CONTACTS.....	18
TABLE A1. CONTACTS.....	18
ANNEX B: THREATENED SPECIES OF GUYANA.....	20
TABLE B1. IUCN RED LIST FOR GUYANA.....	20
ANNEX C: MAPS.....	24
FIGURE C1. VEGETATION MAP OF GUYANA.....	24
FIGURE C2. FOREST RESOURCES ALLOCATION MAP 2013.....	25
FIGURE C3. PROTECTED AREAS OF GUYANA.....	26
FIGURE C4. AVAILABLE LANDS IN GUYANA.....	26
ANNEX D: INTERNATIONAL CONVENTIONS AND IMPLEMENTATION PROGRESS.....	28
TABLE D1. RATIFIED/SIGNED INTERNATIONAL CONVENTIONS RELATED TO BIODIVERSITY CONSERVATION AND IMPLEMENTATION PROGRESS.....	28
ANNEX E: PHOTOS.....	30

## REPORT FINDINGS

Guyana has one of the highest levels of biodiversity in the world. Guyana has more than 1,000 terrestrial vertebrates and 1,815 known species of fishes, amphibians, birds, reptiles, and mammals. Guyana is home to one of the richest mammalian fauna assemblages of any comparably sized area in the world. Approximately 8,000 species of plants are found in Guyana, half of which are endemic. Guyana's climate and soils support tropical forests, ranging from dry evergreen and seasonal forests to montane and lowland evergreen rain forest to mangroves and savannas. The Guiana Shield region is little known, but extremely rich biologically. Unlike other areas in South America, over 70 percent of the natural habitat in Guyana has not been affected by development.

While Guyana has a high level of biodiversity, the International Union for the Conservation of Nature recognizes 85 threatened species in Guyana. In the terrestrial environment there are 25 threatened animal species, including two endangered and two critically endangered. Twenty-three terrestrial plants are endangered, of which 19 are vulnerable, three are endangered, and one is critically endangered. In the marine environment there are 33 threatened animal species, of which 23 are vulnerable, five are endangered, and five are critically endangered. There are no threatened marine plant species. In the freshwater environment there are four threatened species, of which three are vulnerable and one is endangered.

Guyana's protected areas legislation covers:

- Kaieteur National Park (63,000 ha)
- Iwokrama Forest Reserve (371,000 ha)
- Kanuku Mountain and Shell Beach Protected Areas (1 million ha)
- Community-owned conservation areas: the Upper Essequibo Conservation Area and the Konashen COCA (626,000 ha)
- Kanuku Mountains and Shell Beach

Conservation International, World Wildlife Fund, and other non-governmental organizations (NGOs) work in partnership with the Government of Guyana on biodiversity conservation and forest management issues. Other more regionally focused NGOs include Guyana Marine Turtle Conservation Society and Kanuku Mountains Community Representative Group.

Despite progress in land use and natural resources management, Guyana faces a number of challenges related to biodiversity, climate change, and natural resources. Direct threats to biodiversity and forests include inappropriate development practices; capture and/or collection of animals, plants, and other biological resources for international trade; land use change (e.g., savanna to rice cultivation, mangrove destruction); increasing rate of resource exploitation, especially gold mining, timber harvesting, and fishing; and climate change impacts to forests and biodiversity.

Indirect threats to Guyana's biodiversity and tropical forests include the following:

- Lack of a legally-enforceable land use framework and a land use policy
- Insufficient institutional, technical, and financial capacity for enforcement of biodiversity-focused legislation
- Lack of systematic data collection across all sectors relating to biodiversity protection
- Economic development incentives that work against biodiversity conservation
- Ecological goods and services provided by critical ecosystems are not typically considered in national accounting and decision-making

The Conclusions and Recommendations section includes recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

ADS	Automated Directives System
CBD	United Nations Convention on Biological Diversity
CCVA	Climate Change Vulnerability Assessment
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
EN	Endangered, as designated by the IUCN Red List of Threatened Species
EPA	Environmental Protection Agency
EU FLEGT	European Union Forest Law Enforcement Governance and Trade
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FORESEEN	Forest and Remote Sensing Exchange Network
FSC	Forestry Stewardship Council
GDP	Gross domestic product
GFC	Guyana Forestry Commission
GGB	Guyana Gold Board
GGMC	Guyana Geology and Mines Commission
GIS	Geographic information systems
GLSC	Guyana Lands and Surveys Commission
GMTCS	Guyana Marine Turtle Conservation Society
GNIFC	Guyana National Initiative for Forest Conservation
GPAS	Guyana's National Protected Areas System
GSF	Guiana Shield Facility
HFLD	High forest cover, low deforestation
IUCN	International Union for Conservation of Nature
KfW	German Development Bank
KMPA	Kanuku Mountains Protected Area
KNP	Kaieteur National Park
KMCRG	Kanuku Mountains Community Representative Group
COCA	Konashen Community Owned Conservation Area
LCDS	Low Carbon Development Strategy
MOU	Memorandum of Understanding
MNRE	Ministry of Natural Resources and the Environment
NAREI	National Agricultural Research and Extension Institute
NBAP	Guyana's National Biodiversity Action Plan
NGO	Non-governmental organization
NPC	National Parks Commission
NTFP	Non-timber forest product
NTWG	National Technical Working Group
PAC	Protected Areas Commission



PEPFAR	President's Emergency Plan for AIDS Relief
RDCS	Regional Development Cooperation Strategy
REDD+	Reduced Emissions from Deforestation and Degradation
SBPA	Shell Beach Protected Area
SCPDA	South Central People's Development Association
SUA	Sustainable Utilization Area
TEDs	Turtle exclusion devices
UNDP	United Nations Development Programme
UECC	Upper Esequibo Conservation Concession
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
VPA	Voluntary partnership agreement
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species
WMA	Wildlife Management Authority
WP	Wilderness Preserve
WWF	World Wildlife Fund

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Guyana component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID/Eastern and Southern Caribbean Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. The HIV/AIDS Focus Area will support programs to reduce HIV infections and strengthen health facilities.

*Methodology:* To prepare this Foreign Assistance Act (FAA) 118/119, the Assessment Team primarily used the following sources of data: Guyana's Fourth National Report to the Convention on Biological Diversity (Environmental Protection Agency (EPA), 2010) the Code of Practice for Timber Harvesting (Guyana Forestry Commission (GFC), 2002) and other forestry papers (unpublished), wetlands assessments (World Wildlife Fund (WWF) Guianas, 2012a) (Watkins & Oxford, 2010), land use information (Guyana Lands and Surveys Commission (GLSC), 2012), indigenous lands maps (South Central People's Development Association (SCPDA), 2012), wildlife inventories (WWF, 2009), government policy (Office of the President, 2013), extractive industries information (Conservation International, WWF, 2013), and the Forest Assessment of Guyana (Food and Agriculture Organization of the United Nations (FAO), 2010). The Assessment Team obtained supplementary information on the policy, legal, and institutional frameworks for the management of forests, protected areas (PAs), and biodiversity from websites and from the legal instruments that govern the Ministry of Natural Resources and the Environment (MNRE) and its agencies.

The Assessment Team consulted over 60 knowledgeable people in 14 meetings including four focus groups (see Annex A). They took field trips to Demerara on the east coast to see mangrove restoration projects, to a forest concession, and to a gold mining area in the Mabura Hill, Upper Demerara region.

Although still not comprehensive, quantitative data about Guyana's biodiversity and forests are much more available than 5 years ago, the result of research for Reduced Emissions from Deforestation and Degradation (REDD+) and the preparation of a low-carbon economy strategy.

*Information Gaps:* Gaps are related to the threats to biodiversity and forests. For example, there are no quantitative data on invasive species or on pollution (including agro-chemical) threats to biodiversity and water resources. In addition, a significant amount of Guyana's biodiversity remains unknown.

*General Country Description and Description of Ecosystem and Species Diversity:* Guyana is on the northeastern coast of South America and covers a surface area of 215,000 km<sup>2</sup>. Venezuela is to the west, Suriname to its east, and Brazil to its south. The Atlantic Ocean is to the north. Over 90 percent of the country's population of about 800,000 lives on the narrow coastal plain, which is 2 meters below sea level.

Guyana's climate and soils support tropical forest except in some areas of the southwest where there is extensive natural savanna. The main forest types are seasonal, montane, swamp, marsh, dry evergreen, and

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

mangrove. There are 7,000 to 10,000 vascular plant species (Ek, 1997), more than 1,000 terrestrial vertebrates (GFC, 2007), and 1,815 known species of fishes, amphibians, birds, reptiles, and mammals, some of them endemic to the Guiana Shield although not to Guyana (EPA, 2010).

Cultivation of rice and sugar, mostly on the coast, dominates the economy. Gold, diamond, and bauxite mining and logging are also important. There is little manufacturing (Watkins & Oxford, 2010). Forest production contributes 4 to 5 percent of gross domestic product (GDP) and provides over 20,000 jobs. Artisanal and small-scale mining have been increasing their contribution to the GDP (Conservation International, WWF, 2013).

## POLICY AND INSTITUTIONAL FRAMEWORKS

Since the last USAID Tropical Forests and Biodiversity Assessment was prepared in 2008, the most important legislative and institutional change affecting conservation of tropical forests and biodiversity in Guyana has been the promulgation of its Low Carbon Development Strategy (LCDS) in 2009. The LCDS intends to use Guyana's natural resources to leverage funds. A contact said, "LCDS has created an understanding that data collection should serve decision making. The REDD+ Roadmap features development of support tools for better monitoring and verification." According to this stakeholder, REDD+ includes plans for a Centre of Excellence for Biodiversity Research (and Low Carbon Development) at University of Guyana, which is expected to be an international hub for biodiversity research in the country.

## GOVERNMENT AND LEGISLATION

In 2011, the MNRE was established to oversee the management of forestry, mining, environmental management, wildlife, PAs, land use planning and coordination, and climate change, thus bringing the overall responsibility of natural resources management under one government ministry and minister. The following entities are now under the purview of the MNRE:

- Guyana Forestry Commission (GFC)
- Guyana Geology and Mines Commission (GGMC)
- Guyana Gold Board (GGB)
- Guyana Lands and Surveys Commission (GLSC)
- Wildlife Management Authority (WMA)
- United States Environmental Protection Agency (EPA)
- National Parks Commission (NPC)
- Protected Areas Commission (PAC)

Under the provisions of the 2009 Forest Act, the National Forest Policy and National Forest Plan of 2010, the GFC administers sustainable forest management of the 16 million ha of public forest. The goal of the National Forest Policy is to conserve, protect, manage, and utilize Guyana's forest resources, while ensuring their permanent capacity to produce goods and services. The National Forest Plan provides the framework within which programs and activities are accomplished, enabling effective implementation of the policy and fulfillment of the provisions of the Forest Act (GFC, 2008).

The GFC is implementing a monitoring, reporting and verification system, based on data from remote images and permanent plots, to assess deforestation and forest degradation. Guyana's LCDS in 2009 (Office of the President, 2013), as well as the Norway-Guyana Agreement and the REDD+ Strategy through the Forest Carbon Facility Partnership required the GFC to expand its responsibilities to include the REDD+

Secretariat, which has responsibility for implementing the technical aspects of REDD+ agreements and programs.

The GGMC functions under the Guyana Mining Concession Act of 1979. It promotes mineral development, markets mineral resources, explores for minerals, enforces the terms of mining licenses and permits and collects rentals, fees, charges, and levies payable under the Mining Act (GGMC, 2011).

Guyana Gold Board Act of 1981 established the GGB. The mandate of the GGB is to plan the role of gold production in Guyana's economic development. It aims to modernize gold processing, improve accountability of small-scale mining, enhance gold mining sustainability, and improve market operations of gold trading (MNRE, 2013).

The GLSC, under the provisions of the Guyana Lands and Surveys Act No. 15 of 1999, is mandated to administer land, maintain a land register and cadastral records, optimize land use, maintain a land information system, and provide surveying and geographic information system (GIS) services to the public (GLSC, 2013).

The 2008 FAA 118/119 Assessment identified the lack of a national land use plan as a constraint for the conservation of Guyana's biodiversity and tropical forests. Since then the GLSC has drafted the National Land Use Plan that will shortly be sent to Parliament for approval. The plan is intended to enable careful and strategic land use management and to avoid conflict over land use between competing interests. The most common conflict between land uses is between mining and logging operations, of which over 65 percent overlap (GLSC, 2012). Contacts in the MNRE indicated that coordination between these two interest groups is increasing.

The WMA was established under the Wildlife Act of 1919. New regulations for the import and export of wildlife have been prepared in draft and will soon be considered by Parliament. If approved and implemented effectively, they would enable Guyana to fulfill its obligations under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Guyana's Environmental Protection Act of 1996 established the EPA to manage, conserve, protect, and improve the environment, prevent and control pollution, assess the environmental impact of economic development, and promote sustainable use of natural resources (EP Act. Number 11, 1996). It operates under the provisions of the Environmental Protection Regulations (2000) (EPA, 2012). Key contacts said that the EPA needed to be restructured and strengthened to better fulfill its mandate. Greater emphasis and support needs to be placed on monitoring, compliance, and enforcement. Technical support (technology transfer and training) is needed for improving operations in the extractive industry such as developing mercury-free gold processing methods and for solid waste management.

The National Parks Commission Act established the NPC with responsibility for the maintenance of public parks. The NPC manages the Botanic Gardens, Zoological Park, and the Kaieteur National Park. The Protected Areas Act (2011) provides for the establishment of a PAC, the creation of a national PAs system and the establishment of a PAs trust fund. The PAC will facilitate the management, maintenance, promotion, and expansion of Guyana's National Protected Areas System (GPAS). Stakeholders noted the PAC has specific technical needs in areas of monitoring and evaluation, development of management and strategic plans for PAs, tourism development, and wildlife management.

Estimates indicate the GPAS included 1 percent of the territory of Guyana, or approximately 2,525 km<sup>2</sup>, comprised of Kaieteur National Park, Iwokrama Forest Reserve, 17 forest reserves, and the Mabura Hill Forest Reserve (ter Steege, 2000). Key contacts estimate that the addition to the GPAS of Kanuku Mountain and Shell Beach PAs has increased GPAS's coverage to 8 percent of Guyana. However, the target of 17 percent of the national area by 2020 in PAs established by the Convention on Biological Diversity (CBD) has not yet been met.

The Ministry of Agriculture administers government programs in agriculture, livestock, hydrometeorology, and freshwater and marine fish. Guyana's fishing is mostly artisanal on the continental shelf and in fresh water. Shrimp are the main catch farther from shore (Project Global, undated).

## NON-GOVERNMENTAL ORGANIZATIONS

The Guyana Marine Turtle Conservation Society (GMTCS) monitors areas along Shell Beach in the northwest, and implements projects to involve communities in the protection of marine turtles and their nests and improvement of fishing practices. Contacts stated GMTCS has been successful in significantly reducing incidents of poaching and in maintaining an active monitoring program. Due to limited funds, however, it is unable to conduct all the research and public awareness programs required to protect marine turtles. Contacts noted that while turtle exclusion devices (TEDs) were mandatory for trawlers, artisanal fishermen are not required to have these devices and are considered to pose the greatest threat to sea turtle populations.

The Kanuku Mountains Community Representative Group (KMCRG) is a not-for-profit group of 11 Amerindian (Wapichan and Macushi) villages located adjacent to the Kanuku Mountains Protected Area (KMPA). KMCRG aims, via partnerships with government, non-governmental organizations (NGOs), and funding agencies, to represent its members on all issues relating to the protection and enhancement of natural resources, traditional values, and livelihoods to maximize the benefits to them of nearby development projects, including the KMPA. One achievement of the KMCRG (in collaboration with community leaders and institutions) was the development and promulgation of a community-based plan for Amerindian lands in southern Guyana. The plan (SCPDA, 2012) contains over 40 agreements made by the communities based on collective principles and actions, and promotes sustainable land use and community development.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

The Guiana Shield Facility (GSF), administered by the United Nations Development Programme (UNDP), provides long-term financing of national and regional activities to conserve ecosystems, protect biodiversity, and sustain human livelihoods within the Guiana Shield eco-region. It manages funds provided by the European Union and Dutch Government, among others, and in 2015 will establish a UNDP Trust Fund. Brazil, Columbia, Guyana, French Guiana, and Suriname participate in the GSF. The GSF has established the Forest and Remote Sensing Exchange Network (FORESEEN), an interdisciplinary database for the Guiana Shield countries (GSF, 2013).

The World Wildlife Fund (WWF) Guyana office works to conserve the distinct natural communities and ecological phenomena, and "to maintain viable populations of species of the Guianas in order to sustain important ecological processes and services that maintain biodiversity, while supporting the region's socio-economic development" (WWF Guianas, 2012a). For instance, the Living Guianas Report 2012 (WWF Guianas, 2012b) notes the severe pressures on biodiversity resulting from gold mining: deforestation has increased two-fold in 8 years due to mining and mercury used in small-scale gold mining negatively impacts aquatic and human health. WWF programs address these issues. WWF Guyana has supported the production of Guyana's National Biodiversity Action Plan (NBAP) and GPAS, and supported wildlife management and improved gold mining practices.

Conservation International Guyana (CI-Guyana) works in partnership with Guyana stakeholders to develop sustainable economies through the adoption of long-term sustainable development models. CI-Guyana collaborates with the Government of Guyana in the development of land management models for PAs, indigenous and community-owned lands, and conservation concessions, and supports capacity building, and strengthening of environmental policy and planning. Its conservation actions focus on the Upper Esequibo

Conservation Concession (UECC), KMPA, and the Konashen Community Owned Conservation Area (COCA). It has also supported environmental awareness programs and the development of institutional and human capacity for the implementation of Guyana's LCDS and REDD+ initiatives. In 2012, CI-Guyana worked with the Government of Guyana, the Global Conservation Fund, and the German Development Bank (KfW) to establish a Conservation Trust Fund, which will provide long-term financing for the management of the country's PA system (CI-Guyana, 2012).

The Government of Norway signed an agreement to support LCDS in Guyana with a financial commitment of US\$250 million.

USAID has collaborated with the Government of Guyana on a long-term basis; USAID's programs focus on health, economic growth, and democracy and governance. In particular, USAID's economic growth activities are related to management of natural resources as USAID's programs support increased investments in non-traditional exports within four sectors: wood products, aquaculture, agribusiness, and ecotourism. In addition, USAID has supported improvements in rule of law, good governance, civil society, and political competition and consensus building. These activities may indirectly contribute to biodiversity and forest conservation.

## STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

### PROTECTED AREAS

The areas included in the PAs legislation are Kaieteur National Park (63,000 ha), Iwokrama Forest Reserve (371,000 ha), and the Kanuku Mountain and Shell Beach Protected Areas (1 million ha). Two community-owned conservation areas, the Upper Essequibo Conservation Area and the Konashen COCA (626,000 ha), are managed and permitted under the Amerindian Act (2006). The Kanuku Mountains and Shell Beach, a nesting area for four endangered marine turtles, were declared PAs under the Protected Areas Act in October 2011 (Annex C, Figure C3).

The Kaieteur National Park (KNP) (62,100 ha) was established in 1929 and is now in the Protected Areas Act (2011). Its level of endemism is one of the highest in South America; approximately 35 percent of the plant species (~7,000 species) are endemic (EPA, 2010). Several threatened and endangered species, including the cock-of-the-rock (*Rupicola rupicola*), inhabit the area. The forests of the KNP protect important watersheds of the upper Potaro and Kuribong Rivers, whose waters are used by indigenous communities.

The Iwokrama<sup>2</sup> Forest Reserve (371,000 ha) is part of the Iwokrama International Centre for Rain Forest Conservation and Development Project and was declared a PA enshrined by the Iwokrama Act (1996). It represents 1.6 percent of Guyana's landmass and 2 percent of its forested area. The area includes intact tropical rainforest and the Iwokrama mountain range. Iwokrama's mission is "to promote conservation and the sustainable and equitable use of tropical rainforests in a manner that will lead to lasting ecological, economic, and social benefits to the people of Guyana and to the world." This mission is implemented via research, training, and the development and dissemination of technologies. The reserve has two areas of approximately equal size – the Wilderness Preserve (WP) and the Sustainable Utilization Area (SUA) – selected for conservation and sustainable use (respectively) demonstrating non-commercial and commercial activities for national development and global value.

---

<sup>2</sup> *Iwokrama* translates from the indigenous Makushi language to mean 'place of refuge'.

One titled Amerindian community (Fair View, 22,000 ha) exists within the Iwokrama Forest and 15 other communities are contiguous to it. The Iwokrama Act (1996) guarantees and protects the rights of indigenous peoples and enables access to the Iwokrama Forest to these communities with customary forest rights. These are enshrined in a Memorandum of Understanding (MOU) and a Collaborative Management Agreement signed between the Iwokrama International Centre and the North Rupununi District Development Board in 2003 and 2008, respectively.

The Shell Beach Protected Area is a 145 km stretch of beach on Guyana's northwest coast, between the Pomeroon River mouth and the Waini River. It is a nesting site for four species of endangered marine turtles, the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), and olive ridley (*Lepidochelys olivacea*). The beaches are subject to a complex 35-year cycle of erosion and deposition, which can drastically shift the mud flats near the shore. Key contacts suggest this cycle may be shortening due to the effects of climate change.

The Shell Beach wetland area supports high concentrations of birds, mammals, reptiles, amphibians, fish, and invertebrate species. The near-shore waters have high biological productivity and highly productive fisheries, due to nutrients from the Essequibo estuary to the southeast, the Orinoco estuary to the northwest, and the mangrove forests.

The GMTCS was established officially in April 2000 and was identified as the lead agency for the management of the Shell Beach Protected Area (SBPA). Key contacts noted that poaching of turtle nests and adults has been curbed and support is available for beach conservation, however, support for data collection is needed.

The Kanuku Mountains Protected Area (5,000 km<sup>2</sup>) is centrally located in the Rupununi Savannahs, in southwestern Guyana. The Rupununi River divides the mountains into western and eastern ranges. Considered one of the most ecologically diverse areas in Guyana, the KMPA is estimated to have 155 species of mammals, about 70 percent of those known to exist in Guyana, and 1,577 species of plants, about 26.3 percent of those known to exist in Guyana (EPA, 2010).

## THREATENED AND ENDANGERED SPECIES

The International Union for Conservation of Nature (IUCN) Red List refers to species as “threatened” if they fall within one of three “Red List Categories”: vulnerable (VU), endangered (EN), or critically endangered (CR). According to the IUCN Red List, there are 85 threatened species in Guyana. In the terrestrial environment, there are 25 threatened animal species, including two endangered and two critically endangered. Twenty-three terrestrial plants are endangered, of which 19 are vulnerable, three are endangered, and one is critically endangered. In the marine environment there are 33 threatened animal species, of which 23 are vulnerable, five are endangered, and five are critically endangered. There are no threatened marine plant species. In the freshwater environment there are four threatened species, of which three are vulnerable and one is endangered. See Annex B for a complete list of the threatened species in Guyana.

Among Guyana's vulnerable plant species, many are endemic including *Mollia glabrescens*, *Eschweilera fanshawei*, *Manilkara pubicarpa*, *Navia sandwithii*, and *Pouteria penicillata*. Guyana is also home to several regional endemic vulnerable plant species such *Bonnetia rubicunda*, *Dulacia crassa*, *Lecythis brancoensis*, and *Lecythis schomburgkii*. The Kaieteur Plateau is home to a newly described species, represented by a single population: the vulnerable *Pouteria kaieteurensis*. A threatened amphibian is also endemic to the country: *Anomaloglossus beebei*, a frog that is only found on the Kaieteur Plateau and is listed as vulnerable. The critically endangered Rio Branco antbird (*Cercomacra carbonaria*) is regionally endemic; its distribution is limited to the middle sections of the Rio Blanco and some of its tributaries in Roraima.



## STATUS AND MANAGEMENT OF FOREST RESOURCES

Guyana is located on the northeastern coast of South America’s precambrian shield, the Guiana Shield, forming an integral part of the Amazon Region. The country has tropical rainforests and savannas, and extensive networks of waterways that support rich and diverse species of flora and fauna.

With over 85 percent forest cover, an estimated 5 gigatons of carbon dioxide in aboveground biomass, and with a deforestation rate of less than 0.1 percent annually, Guyana is considered a leader as a high forest cover, low deforestation (HFLD) country. The application of the LCDS nationally as the mechanism through which the low-carbon economy will be developed has attracted international support in the form of a US\$250 million agreement signed between the Kingdom of Norway and the Government of Guyana in October 2009 (Office of the President, 2013).

Commercial forest activities are monitored and guided according to a Code of Practice for Timber Harvesting (GFC, 2002). A log-tracking system, implemented countrywide and supported through training provided by the GFC and the Forestry Training Centre, is used to monitor the movement of logs from the forest to sawmill. A network of permanent and mobile forest stations along the main transportation arteries of Guyana monitors logging operations. Logs can be traced back to the stump in the field, which boosts the GFC’s ability to track and/or deter any illegal activity. The GFC monitors harvesting practices through regular field visits and inspections.

The forest is classified into six types (Table 1, and depicted in Annex C, Figure C2).

Table 1. Forest Characteristics

FOREST TYPE	PERCENT COVERAGE
Mixed Forests	36%
Montane Forests	35%
Swamp and Marsh Forests	15%
Dry Evergreen Forests	7%
Seasonal Forests	6%
Mangrove Forests	1%

Source: (GFC, 2007)

The GFC administers Guyana’s state forests. The state forest is zoned for production, conversion, and protection, and categorized into seven forest classes (Table 2).

Table 2. Forest Classes

FOREST CLASS	DESCRIPTION/PURPOSE
Permanent Production Forests	Exclusively allocated for sustainable commercial timber utilization
Permanent Protection Forests and Biodiversity Reserves	Solely for protection of natural and cultural heritage
Reserve Forests	Exempt from commercial production of forest produce
Extractive Forests	Sustainable commercial use of non-timber forest products (NTFPs)
Multiple-use Forests	Allocated for concurrent sustainable use of timber and NTFPs
Permanent Research	Scientific research

FOREST CLASS	DESCRIPTION/PURPOSE
Conversion Forests	Allocated for uses exclusive of forestry practices

Source: (GFC, 2007)

Commercial logging activities are conducted on the principle of selective logging as described in the GFC's Code of Practice for Timber Harvesting, which stipulates proximity limits, diameter size classes, cutting cycles, and quotas. The Code sets minimum operational standards to promote and ensure reduced impact logging practices are implemented through management planning. Annual Operational Plans and five-year Forest Management Plans must be submitted to the GFC for approval. In addition, the GFC stipulates that every forest concession must set aside at least 4.5 percent of the total forest area in representative Biodiversity Reserves; this is included in each concession agreement between the GFC and each medium or large-scale concession holder.

Local and foreign companies conduct timber harvesting and are allocated concessions for commercial use of forest products. The Forest Products Marketing and Development Council, which is associated with the GFC, is attempting to make more tree species marketable and encourage processing of wood into products of higher value than simply sawn wood.

Forest concessions are classified according to the size of the area and duration of the award. Timber Sales Agreements are granted for a period up to 25 years for an area exceeding 24,000 ha; Wood-Cutting Leases are granted for a period up to 10 years for an area of 8,000 to 24,000 ha; and State Forest Permissions are granted for a period up to 2 years for an area of less than 8,000 ha.

The distribution of forest allocations within the country along with the location of PAs and forest reserves are summarized in Table 3 and depicted on the 2013 Forest Resources Allocation Map (Annex C, Figure C2).

Table 3. Allocations of State Forest Concessions

CONCESSION TYPE	DIVISIONS				
	BERBICE	DEMERARA	ESSEQUIBO	NORTH WEST DISTRICT	TOTAL
Timber Sales Agreement	5	2	17	3	<b>27</b>
Wood Cutting Lease	1	0	0	0	<b>1</b>
State Forest Exploratory Permits	4	0	4	0	<b>8</b>
State Forest Permission	160	184	194	22	<b>560</b>
Vacant State Forest Exploratory Permits	0	0	0	0	<b>0</b>
Proposed Conversion Areas	0	0	0	0	<b>0</b>
<b>Total</b>	<b>170</b>	<b>186</b>	<b>215</b>	<b>25</b>	<b>596</b>

Source: Forest Resources & Information Unit, GFC June 2013

Guyana is currently pursuing the European Union Forest Law Enforcement Governance and Trade (EU FLEGT) process to arrive at a voluntary partnership agreement (VPA) with the EU by September 2015. To this end, with support from the Government of Norway, Guyana is strengthening its standards for trade in forest products. The Guyana EU FLEGT VPA process is on-going and includes active participation of stakeholders in workshops, group discussions, and meetings through a multi-stakeholder steering group, the National Technical Working Group (NTWG).

In 2003, the Guyana National Initiative produced the third draft of the National Standard for Forest Conservation (GNIFC) with support from the GFC, WWF, and USAID. The standard was developed based on the principles and criteria of the Forest Stewardship Council (FSC). The next step in the process is to attain FSC endorsement of the standard, but this has not been pursued.

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

#### *Mangroves*

Nearly all of Guyana's population (>90 percent) lives on the Coastal Plain, which is below sea level and flood-prone. The coast is protected by 370 km of sea defenses, 80 km of which are manmade, while the remainder is naturally occurring, including mangroves. Thus, mangroves are critical in providing additional coastal protection (Annex C, Figure C2).

Contacts from the Guyana Mangrove Restoration Project note that given the importance of mangroves for Guyana, ensuring their protection and conservation is a priority. Guyana's Sea and River Defense Policy calls for alternative solutions for coastal protection, such as reforestation of mangroves, to the traditional "hard structures." Using an alternative solution such as restoration of mangroves provides effective flood defense and protects environmental resources. Guyana Mangrove Restoration Project activities are aimed at promoting sustainable management of mangrove forests; developing effective protection of mangrove ecosystems and rehabilitation (replanting); increasing public awareness and education of the benefits of mangrove forests; establishing and completing a legal framework for mangrove ecosystem management; encouraging community-based mangrove management; and establishing the administrative capacity for the management of mangroves in Guyana.

#### *Fisheries*

Guyana's marine fisheries sector is important economically; fisheries exports in 2004 were valued at US\$54.2 million (FAO, 2005). The sector employs approximately 12,000 people in direct fishing activities and support activities (e.g., fish processing). Targeted species include four species of shrimp and ground fish, and fishing gear ranges from shrimp trawlers to wooden vessels. Shrimp trawlers inevitably produce bycatch, including the seabob (a smaller shrimp), lobsters, squid, crab, shark, catfish, and snappers. Fishing methods range from artisanal to trawling, and mesh size is generally not regulated, while use of TEDS is mandatory by law (As mentioned above, artisanal fishers are excluded from this requirement.) The nearshore fishery is overexploited, specifically shrimp resources and sharks. Deep slope species and pelagic species are not considered overexploited.

Principal challenges in fisheries management include over-fishing of the industrial fishery, lack of professional capacity to manage stock, lack of enforcement on fisheries gear, and lack of agreement on many management issues.

Freshwater fishing occurs for subsistence purposes in Guyana's rivers, lakes, swamps, and flooded plains, while aquaculture development is limited.

## Beaches

Shell Beach, located in northwestern Guyana, is an important nesting ground for four of the world's seven endangered marine turtles: the leatherback, the green turtle, the hawksbill turtle, and the olive ridley turtle. Their annual nesting season runs from March to August and a sea turtle monitoring program was established in 1988.

Several villages located on beaches along the southeast Atlantic coast are popular for recreation and fishing. Coastal development impacts the beaches in the southeastern region.

## EX-SITU CONSERVATION

The GFC maintains several sites for *ex-situ* conservation and research. These include the Mabura Hill Forest Reserve, Pibiri Site, Moraballi Forest Reserve, and the Yarrowkabra Forest Reserve along with other locations at Chikabaru, Long Creek, and Mabaruma, North West District.

Floral collections maintained at the Promenade and Botanical Gardens by the National Parks Commission have been in a state of neglect in recent years. The Guyana Zoological Park was opened in 1952 and houses animal species mostly found in Guyana's interior regions including harpy eagles and manatees. The zoo attracts visitors to see many species of mammals (such as jaguars, pumas, tapirs, giant otters, monkeys, and sloths); birds (such as raptors, parrots, macaws, toucans, and owls); and reptiles (such as rattlesnakes, spectacled caiman, anacondas, boa constrictors, and turtles, and freshwater fish). The Zoological Park has received increasing numbers of complaints from the public about the inadequate size of the holding areas and the poor state of the facility.

The National Agricultural Research and Extension Institute (NAREI) maintains germplasm collections of agricultural crops and other plants of importance at Kairuni, Timerhi, Mon Repos, and at other locations across the country. Key contacts indicated to the FAA 118/119 Assessment Team that collections suffer from limited resources and lack of regular maintenance.

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

### DIRECT THREATS

From documents, meetings, and field visits, the Assessment Team identified five main direct threats to Guyana's biodiversity and tropical forests.

(1) **The capture of wild animals for sale to international markets** may be affecting the populations or genetic diversity of some species of commercially traded species. If captured species play a role in the regeneration of other species of plants or provide food for other animals, then their over-exploitation could be affecting a wider range of Guyana's biodiversity than only the commercially traded species themselves. No data were available, however, to enable a valid assessment of this threat.

(2) **Prospecting and mining for gold** is destroying forests and impacting water quality and aquatic ecosystems within forest concessions. One contact said that about 9,000 ha of forest have been affected so far, however, the Assessment Team was unable to confirm this. Guyana's policies, laws, and regulations give priority to gold mining over forest management. Thus, a gold mining company can claim any part of Guyana's public forests, which are the majority of forests. Ultimately, the goals of sustainable forest

management plans and enforcement of their provisions can be negated by the declaration of exploration or exploitation of gold within a forest management unit.

(3) **Climate change impacts to forests and biodiversity.** The Rapid Climate Change Vulnerability Assessment (CCVA) for Guyana (a USAID-commissioned report prepared simultaneous to this FAA 118/119 Assessment) notes that climate change is predicted to increase Guyana’s mean annual atmospheric temperature and intensity of tropical storms and to either decrease or increase its monthly precipitation. A sea level rises of 1 meter will affect 50 percent of Guyana’s sea turtle nests. A combination of a 1-meter rise in sea level with a 1-in-100-year storm surge would likely devastate them. The CCVA notes that a 1 meter rise in sea level could cause damages of US\$205 million and a 2 meter sea level rise could cause damages of US\$1.2 billion. Rises in sea level would cause flooding, salt water intrusion into ground water, damage to sea walls, and erosion of the sea coast. Erosion of the coast would affect coastal and marine biodiversity, including fish nurseries, adult fish populations, and amphibian, bird, and reptile habitat. Wetlands would also be affected by a mid-level rise (1 meter) in sea level. In addition, climate change is a threat to the country’s forests and biodiversity, including the extensive mangroves along Guyana’s coast, as well as marine ecosystems.

(4) **The destruction of mangrove forests** along Guyana’s coast for fuel, construction, and by goats constitutes a threat to its coastal and marine biodiversity. Mangroves are important habitat for many marine species at various stages in their life cycles; their destruction reduces available habitat, thereby affecting Guyana’s marine biodiversity. No data were available, however, to quantitatively assess the scale of mangrove destruction and its impact on biodiversity.

(5) Guyana’s **commercial fish species may be over-exploited**, however, the Assessment Team was unable to find quantitative data on this threat.

(6) **Some areas of Guyana’s savanna are being converted to large-scale rice production.** No data were available, however, to make a quantitative assessment of the scale of this threat to Guyana’s biodiversity.

No data were available that indicated that direct threats to biodiversity and tropical forests that commonly occur in many other countries – pollution and invasive species – are currently threatening Guyana’s biodiversity and tropical forests.

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats. “Actions necessary” are derived from stakeholder consultations and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 4. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of a legally-enforceable land use framework and a land use policy	<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control development, protect biodiversity, especially forests and wildlife.</li> <li>• Strengthen local and regional collaboration and participation to develop land use guidance.</li> <li>• Designate some areas for the exploration and exploitation of</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
	<p>gold and others for permanent forest management; revise policies that give preference to gold mining over forest conservation.</p> <ul style="list-style-type: none"> <li>Promulgate and enforce regulations that prohibit destruction of mangroves and support mangrove restoration.</li> </ul>
Insufficient institutional, technical, and financial capacity for enforcement of biodiversity-focused legislation	Provide funding, training, and capacity-building for employees of governmental agencies charged with environmental management and protection.
Lack of systematic data collection	<ul style="list-style-type: none"> <li>Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for forests, mangroves, and wildlife trade.</li> <li>Strengthen systems for inter-agency sharing of data.</li> </ul>
Incentives favor economic development over conservation	<ul style="list-style-type: none"> <li>Establish user-fee and development fee systems (i.e., access fees) for biodiversity resource users and system for compensation for injury to fragile or endangered habitats.</li> <li>Assess rate of savanna conversion to rice cultivation and possible incentives for savanna conservation.</li> </ul>
Ecological goods and services are not highly valued or well understood.	<ul style="list-style-type: none"> <li>Perform studies of the socioeconomic value and ecological goods/services of natural resources (e.g., forests and mangroves and their value for fisheries, storm/flood protection, and tourism).</li> <li>Support public outreach campaigns: awareness of direct and indirect benefits of ecological services; impact of land-based activities on biodiversity, both terrestrial and marine; impact of wildlife trade.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s 2014 to 2018 program is briefly described. Table 5 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCCS.

## FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeated offense among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

## FOCUS AREA 3

Economic Growth: Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market, thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

## FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR) and, as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 5. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control development and protect biodiversity, especially forests and wildlife.</li> <li>• Strengthen local and regional collaboration and participation to develop land use guidance.</li> <li>• Designate some areas for the exploration and exploitation of gold and others for permanent forest management; revise policies that give preference to gold mining over forest conservation.</li> <li>• Promulgate and enforce regulations that prohibit destruction of mangroves and support mangrove restoration.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change by integrating the private sector, NGOs, and local communities.</p>



ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
Provide funding, training and capacity-building for employees of governmental agencies charged with environmental management and protection.	Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.
<ul style="list-style-type: none"> <li>• Develop a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for forests, mangroves, and wildlife trade.</li> <li>• Strengthen systems for inter-agency sharing of data.</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change by integrating the private sector, NGOs, and local communities.
<ul style="list-style-type: none"> <li>• Establish user-fee and development fee systems (i.e., access fees) for biodiversity resource users and system for compensation for injury to fragile or endangered habitats.</li> <li>• Assess rate of savanna conversion to rice cultivation and possible incentives for savanna conservation.</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change by integrating the private sector, NGOs, and local communities.
<ul style="list-style-type: none"> <li>• Perform studies of the socioeconomic value and ecological goods/services of natural resources (e.g., forests and mangroves and their value for fisheries, storm/flood protection, and tourism).</li> <li>• Support public outreach campaigns: awareness of direct and indirect benefits of ecological services; impact of land-based activities on biodiversity, both terrestrial and marine; and impact of wildlife trade.</li> </ul>	Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change by integrating the private sector, NGOs, and local communities.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Guyana’s conservation of biodiversity and tropical forests.

Under Focus Area 1, Global Climate Change, the following are priority actions. USAID should consider the following actions in their strategic approach:

(1) Support the development of a Land Use Plan to guide development decisions. As part of this support, USAID should provide capacity strengthening to the planning entities, and support a transparent process for decision-making in development projects. In particular, the land use planning exercise should establish clearly

designated areas for gold mining, ensuring that these sites will not affect key areas for forest conservation. This effort would also contribute to climate change resilience in Guyana and is compatible with REDD+ and low-carbon development strategies. The land use planning exercise should also establish areas for protection and rehabilitation of mangroves.

(2) Support demonstration projects for mangrove restoration. Mangroves are an important natural buffer against tropical storms and sea-level rise, and provide shoreline protection, and therefore play an important role in climate change resiliency.

(3) Support funding, training, and capacity-building for employees of governmental agencies charged with environmental management and protection. This activity would contribute to climate change adaptation by enhancing the technical capacity of Guyana's government agencies to anticipate and plan for climate change impacts.

(4) Support development of a permanent, reliable system and database to obtain, process, and analyze data, including spatial data (i.e., GIS and satellite imagery), especially for forests, mangroves and the wildlife trade. The database would integrate climate change impacts into development plans and could serve as an early warning for impacts to biodiversity. This is in line with the CCVA recommendation: The collection of climate change data should be intensified to enhance planning, preparedness, and response to extreme weather events. GIS is now being used to gather a range of data related to climate and land use, but a more centralized management of these data would be useful.

(5) Develop public outreach campaigns to increase awareness of direct and indirect benefits of ecological services; and impacts of land-based activities on biodiversity, both terrestrial and marine. This would contribute to climate change adaptation by increasing awareness about human impact on ecosystems and unsustainable uses of natural resources.

Under Focus Area 3, Economic Growth, USAID should consider the following action:

(1) Support internships for youth to work in governmental agencies charged with environmental management and protection.

The CCVA recommends the following that would also contribute to biodiversity and forest conservation:

(1) A cost-benefit analysis of the use of mangroves to protect Guyana's coastlands and a needs assessment to identify the key areas for mangrove restoration. This CCVA recommendation could be implemented in conjunction with recommendations (1) and (2) under Focus Area 1.

(2) The University of Guyana could play a beneficial role in educating professionals in mangrove restoration and conservation and in assessing the main threats to mangroves, such as insect and fungal infestations. To allow the University to take up this role, it would be necessary to strengthen the Center of Excellence on Biodiversity; to support the newly created master's program in environmental management; to create PhD programs in climate change, mangrove forestry, poverty reduction and engineering; to retool laboratories; and to establish a GIS laboratory.

## REFERENCES

Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at:

<http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.

CI-Guyana. 2012. Supporting a Healthy Sustainable Economy. Strategy 2012 - 2015. Conservation International Guyana.

Conservation International, WWF. 2013. Guyana's Extractive Industry Sector: A synopsis of issues and recommendations for the mining sector as a sustainable element of Guyana's Low Carbon Development Strategy (LCDS). Georgetown, Guyana.

Ek, R. C. 1997. Botanical Diversity in the Tropical Rain Forest of Guyana. Georgetown, Guyana: Tropenbos-Guyana Programme.

Environmental Protection Agency (EPA). 2010. Guyana: Fourth National Report to the Convention on Biological Diversity. Guyana Environmental Protection Agency.

EPA. 2012. About Us. Available on the Internet at: <http://www.epaguyana.org/index.php/aboutus>.

Food and Agriculture Organization of the United Nations (FAO). 2005. General Economic Data. Available on the Internet at: <http://www.fao.org/ft/oldsite/FCP/en/GUY/profile.htm>.

FAO. 2010. Global Forest Resources Assessment 2010 Country Report: Guyana. Rome: FAO.

Guiana Shield Facility (GSF). 2013. Guiana Shield Facility. Available on the Internet at: <http://www.guianashield.org/>.

Guyana Forestry Commission (GFC). 2002. Code of Practice for Timber Harvesting. Available on the Internet at: <http://www.forestry.gov.gy/publications.html>.

GFC. 2007. Forestry in Guyana 2007.

GFC. 2008. Guyana Forestry Commission. Available on the Internet at: <http://www.forestry.gov.gy/>.

Guyana Geology and Mines Commission (GGMC). 2011. GGMC Mining Supplement 2011. Georgetown, Guyana: Guyana Geology and Mines Commission.

Guyana Lands and Surveys Commission (GLSC). 2012. Guyana National Land Use Plan Summary. Georgetown, Guyana: Guyana Lands and Surveys Commission.

GLSC. 2013. Guyana Lands and Surveys Commission. Available on the Internet at: <http://www.lands.gov.gy/>.

International Union for Conservation of Nature (IUCN). 2012. IUCN Red List of Threatened Species. Version 2012.2. Retrieved May 20, 2013, from IUCN Red List.

Ministry of Natural Resources and the Environment (MNRE). 2013. Available on the Internet at: <http://www.nre.gov.gy/GGMC%20Supplement%20March%202001%202012.pdf>.

Office of the President. 2013. Transforming Guyana's Economy while Combating Climate Change: Low Carbon Development Strategy Update. Georgetown, Guyana: Office of the President, Republic of Guyana.

Projet Global. Undated. Global bycatch of long-lived species. Country profile - Guyana.

South Central People's Development Association (SCPDA). 2012. Thinking together for those coming behind us: an outline plan for the care of Wapichan territory in Guyana. South Rupununi, Region 9, Guyana: South Central and South Rupununi Districts Toshaos Councils.

ter Steege, H. 2000. Plant Diversity in Guyana: With recommendations or a national protected areas strategy. Tropenbos Series Netherlands.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Guyana.

Watkins, G., & Oxford, P. 2010. Rupununi: Rediscovering a lost world. Arlington, Virginia, USA: Earth in Focus Editions.

World Wildlife Fund (WWF). 2009. Wildlife of the Guianas: An identification pocketbook for wildlife trade monitoring and enforcement officers. Washington D.C.: World Wildlife Fund Inc.

WWF Guianas. 2012a. Wetlands of Guyana. An insight into the ecology of selected wetlands with recommendations from WWF Guianas.

WWF Guianas. 2012b. Living Guianas Report. Paramaribo, Suriname: WWF Guianas.

## ANNEX A: LIST OF CONTACTS

### TABLE A1. CONTACTS

NAME	POSITION	ORGANIZATION
FOCUS GROUP 1 – MINISTRY OF NATURAL RESOURCES AND THE ENVIRONMENT		
Robert Persaud	Minister	Ministry of Natural Resources and the Environment
Damian Fernandes	Commissioner	Protected Areas Commission
Denise Fraser	Deputy Commissioner	Protected Areas Commission
Dr. Indarjit Ramdass	Executive Director	Environmental Protection Agency
Gavin Agard	Technical Advisor	Ministry of Natural Resources and the Environment
Donald Singh	Land Administrative Officer	Guyana Geology and Mines Commission
Ryan Smith	Environmental Officer	Guyana Geology and Mines Commission
Avril Dickson	Administrator	Guyana Wildlife Management Authority
FOCUS GROUP 2 – MINISTRY OF PUBLIC WORKS AND HYDRAULICS		
Robeson Benn	Minister	Ministry of Public Works and Hydraulics
Geoffrey Vaughn	Head, Work Services Group; Sea and River Defence Board	Ministry of Public Works and Hydraulics
12 other technical staff	Various departments	Ministry of Public Works and Hydraulics
FOCUS GROUP 3 – GUYANA FORESTRY COMMISSION		
Edward Goberdhan	Head, Finance Department	Guyana Forestry Commission
Jagdesb Singh	Deputy Commissioner of Forests, Forest Resources Management Division	Guyana Forestry Commission
Nasheta Dewnauth	Project Coordinator, REDD+ Secretariat	Guyana Forestry Commission
Sumedha Mahadeo	Botanist	Guyana Forestry Commission
FOCUS GROUP 4 – MINISTRY OF AMERINDIAN AFFAIRS, AMERINDIAN ADVOCACY GROUPS & FORESTRY TRAINING CENTRE		
Yvonne Pearson		Ministry of Amerindian Affairs
June DaSilva		Ministry of Amerindian Affairs
Rommel Simon	Member	National Amerindian Development Foundation (NADF)
Colin Klautky	Committee Member	Guyanese Organization of Indigenous Peoples (GOIP)
Peter Persaud	President	The Amerindian Action Movement of

NAME	POSITION	ORGANIZATION
		Guyana (TAAMOG)
Laura George		Amerindian Peoples Association (APA)
Dwane Griffith	Technical Officer	Forestry Training Centre Incorporated (FTCI)
Neville Calistro	Founding Member	Amerindian Association of Guyana
2 affiliate members		NADF and TAAMOG
KEY CONTACTS		
Dr. Patrick Williams	Country Manager	World Wildlife Fund - Guyana
Charles Hutchinson	Protected Areas REDD+ Lead Officer	World Wildlife Fund - Guyana
Dr. Patrick Chesney	Chief Technical Advisor	Guiana Shield Facility, UNDP
Rickford Vieira	Commissioner (acting)	Guyana Geology and Mines Commission
Dr. David Singh	Executive Director	Conservation International- Guyana
Dr. Raquel Thomas-Caesar	Director, Resource Management and Training	Iwokrama International Centre
Michelle Kalamadeen	Researcher/Coordinator	Guyana Marine Turtle Conservation Society
Kelllawan	President	Forest Products Association of Guyana
Deonarine Ramsaroop	Junior Vice President	Forest Products Association of Guyana
Dhanpaul Dhanraj	Chief Executive Officer	Guyana Office for Investment
Dr. Isabella Bovolo	Consultant Hydrologist	World Bank – Guyana Office
Philip DaSilva	Deputy Vice Chancellor	University of Guyana
Dr. Oudho Homenauth	Chief Executive Officer	National Agricultural Research and Extension Institute
Godfrey Marshall	Director	Forestry Training Centre
Shyam Nokta	Head	Office of Climate Change, Office of the President
Preeya Rampersaud	Project Manager	Office of Climate Change, Office of the President
3	Field Officers	Guyana Geology and Mines Commission
3	Field Officers	Guyana Forestry Commission
	Operations Manager, Mabura	Demerara Timbers Limited

## ANNEX B: THREATENED SPECIES OF GUYANA

### TABLE B1. IUCN RED LIST FOR GUYANA

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED
ANIMALIA	<i>Cercomacra carbonaria</i>	Rio Branco Antbird	CR	2012
ANIMALIA	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000
ANIMALIA	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011
ANIMALIA	<i>Isogomphodon oxyrinchus</i>	Daggernose Shark	CR	2006
ANIMALIA	<i>Narcine bancroftii</i>	Caribbean Electric Ray	CR	2007
ANIMALIA	<i>Pristis perotteti</i>	Large-tooth Sawfish	CR	2007
ANIMALIA	<i>Pristis pristis</i>	Large-tooth Sawfish	CR	2013
ANIMALIA	<i>Synallaxis kollari</i>	Hoary-throated Spinetail	CR	2012
ANIMALIA	<i>Aratinga solstitialis</i>	Sun Parakeet	EN	2012
ANIMALIA	<i>Carduelis cucullata</i>	Red Siskin	EN	2012
ANIMALIA	<i>Chelonia mydas</i>	Green Turtle	EN	2004
ANIMALIA	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003
ANIMALIA	<i>Pagrus pagrus</i>	Common Seabream, Common Sea Bream, Couch's Sea-bream, Couch's Sea Bream, Porgy, Red Porgy	EN	1996
ANIMALIA	<i>Pteronura brasiliensis</i>	Giant Brazilian Otter, Giant Otter	EN	2008
ANIMALIA	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007
ANIMALIA	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007
ANIMALIA	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011
ANIMALIA	<i>Agamia agami</i>	Agami Heron	VU	2012
ANIMALIA	<i>Alopias vulpinus</i>	Common Thresher Shark	VU	2009
ANIMALIA	<i>Amazona festiva</i>	Festive Amazon, Festive Parrot	VU	2012
ANIMALIA	<i>Anomaloglossus beebei</i>		VU	2008
ANIMALIA	<i>Ateles paniscus</i>	Black Spider Monkey, Guiana Spider Monkey, Red-faced Black Spider Monkey	VU	2008
ANIMALIA	<i>Atelopus spumarius</i>	Pebas stubfoot toad	VU	2010



KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED
ANIMALIA	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996
ANIMALIA	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006
ANIMALIA	<i>Carcharhinus obscurus</i>	Dusky Shark	VU	2009
ANIMALIA	<i>Carcharhinus signatus</i>	Night Shark	VU	2006
ANIMALIA	<i>Chelonoidis denticulata</i>	Brazilian Giant Tortoise, Forest Tortoise, South American Tortoise, South American Yellow-footed Tortoise, Yellow-footed Tortoise	VU	1996
ANIMALIA	<i>Crax alector</i>	Black Curassow	VU	2012
ANIMALIA	<i>Diplobatis pictus</i>	Variiegated Electric Ray	VU	2006
ANIMALIA	<i>Gymnura altavela</i>		VU	2007
ANIMALIA	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008
ANIMALIA	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008
ANIMALIA	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009
ANIMALIA	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011
ANIMALIA	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010
ANIMALIA	<i>Leopardus tigrinus</i>	Little Spotted Cat, Little Tiger Cat, Oncilla, Tiger Cat	VU	2008
ANIMALIA	<i>Lepidochelys olivacea</i>	Olive Ridley, Pacific Ridley	VU	2008
ANIMALIA	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996
ANIMALIA	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996
ANIMALIA	<i>Manta birostris</i>	Chevron Manta Ray, Giant Manta Ray, Oceanic Manta Ray, Pacific Manta Ray, Pelagic Manta Ray	VU	2011
ANIMALIA	<i>Megalops atlanticus</i>	Tarpon	VU	2012
ANIMALIA	<i>Monodelphis reigi</i>	Reig's Opossum	VU	2011
ANIMALIA	<i>Myrmecophaga tridactyla</i>	Giant Anteater	VU	2010
ANIMALIA	<i>Myrmotherula surinamensis</i>	Guianan Streaked Antwren, Guianan Streaked-Antwren	VU	2012
ANIMALIA	<i>Neusticomys venezuelae</i>	Venezuelan Fish-eating Rat	VU	2008

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED
ANIMALIA	<i>Oreophrynella macconnelli</i>		VU	2004
ANIMALIA	<i>Oreophrynella quelchii</i>		VU	2004
ANIMALIA	<i>Patagioenas subvinacea</i>	Ruddy Pigeon	VU	2012
ANIMALIA	<i>Pheidole microgyna</i>		VU	1996
ANIMALIA	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008
ANIMALIA	<i>Picumnus spilogaster</i>	White-bellied Piculet	VU	2012
ANIMALIA	<i>Pipile cumanensis</i>	Blue-throated Piping-guan, Blue-throated Piping-Guan	VU	2012
ANIMALIA	<i>Podocnemis unifilis</i>	Yellow-headed Sideneck, Yellow-spotted River Turtle, Yellow-spotted Sideneck Turtle	VU	1996
ANIMALIA	<i>Priodontes maximus</i>	Giant Armadillo	VU	2010
ANIMALIA	<i>Sphyrna tudes</i>	Curry Shark, Golden Hammerhead, Smalleye Hammerhead Shark	VU	2006
ANIMALIA	<i>Tapirus terrestris</i>	Brazilian Tapir, Lowland Tapir, South American Tapir	VU	2008
ANIMALIA	<i>Tayassu pecari</i>	White-lipped Peccary	VU	2013
ANIMALIA	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011
ANIMALIA	<i>Tinamus tao</i>	Gray Tinamou, Grey Tinamou	VU	2012
ANIMALIA	<i>Touit huetii</i>	Scarlet-shouldered Parrotlet	VU	2012
ANIMALIA	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008
PLANTAE	<i>Vouacapoua americana</i>		CR	1998
PLANTAE	<i>Aniba rosaeodora</i>		EN	1998
PLANTAE	<i>Trichilia surumuensis</i>		EN	1998
PLANTAE	<i>Virola surinamensis</i>	Baboonwood	EN	1998
PLANTAE	<i>Bertholletia excelsa</i>	Brazil-nut Tree, Para Nut	VU	1998
PLANTAE	<i>Bonnetia rubicunda</i>		VU	1998
PLANTAE	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998
PLANTAE	<i>Couratari calycina</i>		VU	1998
PLANTAE	<i>Couratari guianensis</i>	Fine-leaf Wadara	VU	1998
PLANTAE	<i>Dulacia crassa</i>		VU	1998
PLANTAE	<i>Eschweilera fanshawei</i>		VU	1998
PLANTAE	<i>Ficus pakkensis</i>		VU	1998

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED
PLANTAE	<i>Graffenrieda caudata</i>		VU	1998
PLANTAE	<i>Haesselia roraimensis</i>		VU	2000
PLANTAE	<i>Lecythis brancoensis</i>		VU	1998
PLANTAE	<i>Lecythis schomburgkii</i>		VU	1998
PLANTAE	<i>Manilkara pubicarpa</i>		VU	1998
PLANTAE	<i>Mollia glabrescens</i>		VU	1998
PLANTAE	<i>Navia sandwithii</i>		VU	2013
PLANTAE	<i>Pouteria kaieteurensis</i>		VU	1998
PLANTAE	<i>Pouteria penicillata</i>		VU	1998
PLANTAE	<i>Swietenia macrophylla</i>	Big-leaf Mahogany, Bigleaf Mahogany, Big Leaf Mahogany, Brazilian Mahogany, Honduras Mahogany, Large-leaved Mahogany	VU	1998
PLANTAE	<i>Syagrus stratincola</i>		VU	1998

# ANNEX C: MAPS

## FIGURE C1. VEGETATION MAP OF GUYANA

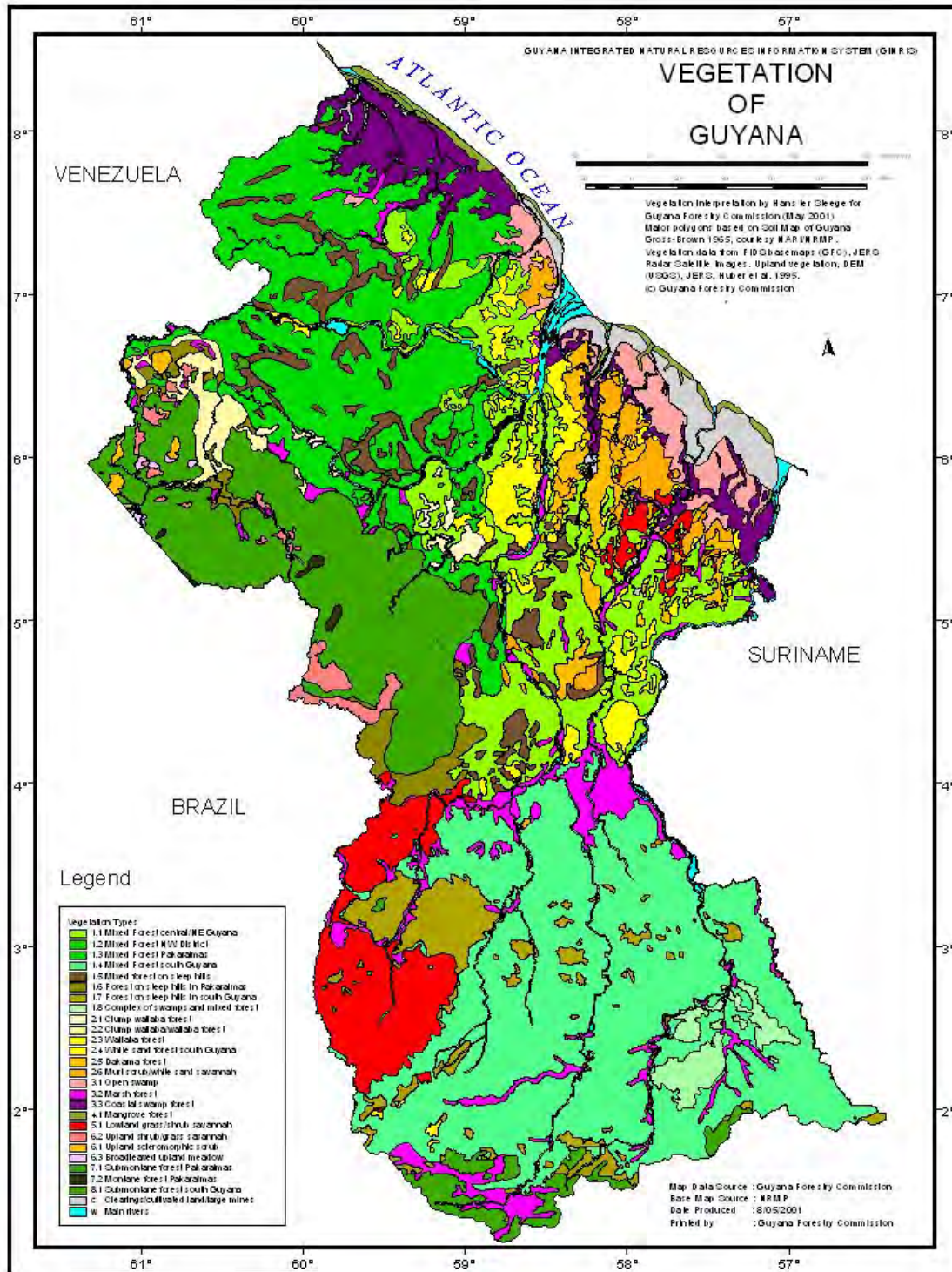




FIGURE C2. FOREST RESOURCES ALLOCATION MAP 2013

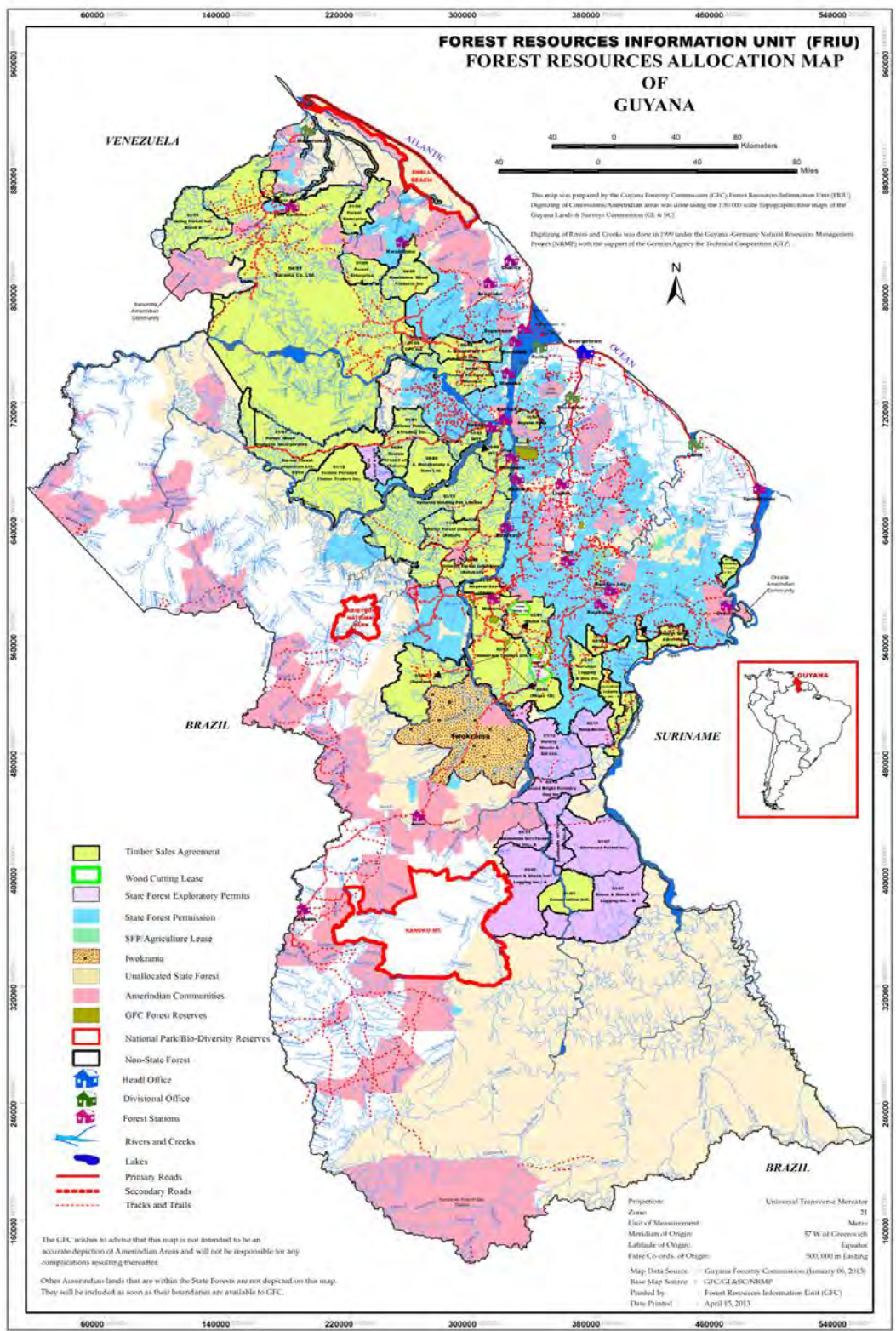
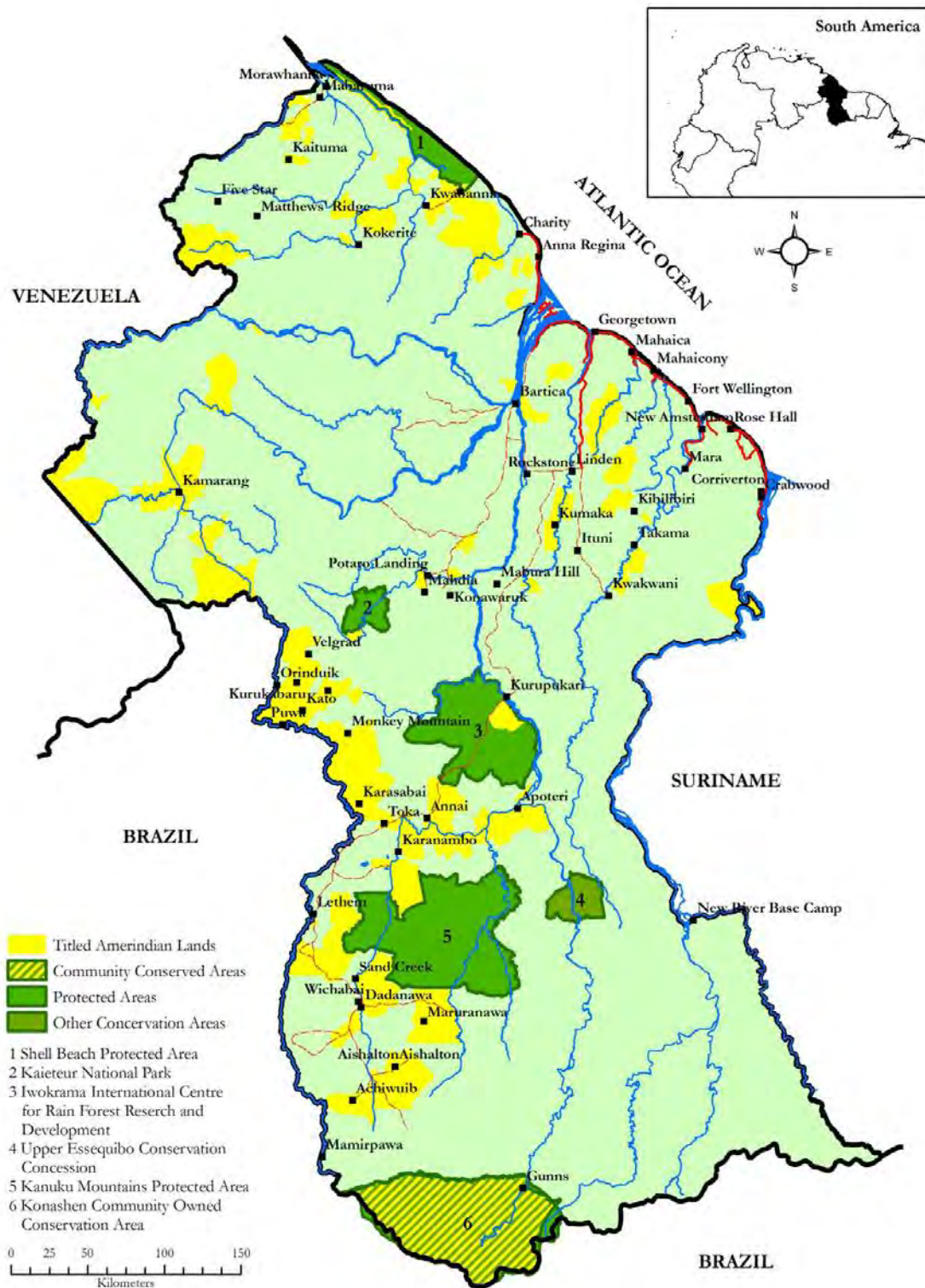


FIGURE C3. PROTECTED AREAS OF GUYANA









## ANNEX D: INTERNATIONAL CONVENTIONS AND IMPLEMENTATION PROGRESS

**TABLE D1. RATIFIED/SIGNED INTERNATIONAL CONVENTIONS RELATED TO BIODIVERSITY CONSERVATION AND IMPLEMENTATION PROGRESS**

CONVENTION	IMPLEMENTATION PROGRESS
United Nations Convention on Biological Diversity	<ul style="list-style-type: none"> <li>• Guyana ratified the Convention on Biological Diversity in 1994.</li> <li>• In 1999 the National Biodiversity Action Plan (NBAP) was developed with a framework for wildlife management, bio-prospecting, research, and <i>ex-situ</i> and <i>in-situ</i> conservation.</li> <li>• Guyana currently has approximately 8 percent of its ecologically representative terrestrial and inland freshwater ecosystems conserved in well-connected and effective PAs. These areas are the Kaieteur National Park, Iwokrama Forest Reserve, Kanuku Mountains and the Shell Beach PAs. The commitment of attaining at least 17 percent under the Convention on Biological Diversity (CBD) to create a national system of PAs needs to be met by 2020.</li> </ul>
The Cartagena Convention and the Protocol Concerning Land Based Sources of Marine Pollution	<ul style="list-style-type: none"> <li>• Guyana is party to the Cartagena Convention in March of 1983 and the Land Base Sources of Pollution Protocol under the Cartagena Convention in 2008. The Environmental Protection Agency is responsible for its implementation in country.</li> <li>• Under the provisions of the EP Act 1996, the EPA has established regulations for Hazardous Wastes; Water Quality; Air Pollution; and Noise Management. Guidelines are also in place for Storage, Transportation and Occupational Handling of Chemicals/Industrial Hazardous Waste; Storage, Transportation and Occupational Handling of Biomedical Waste; Removal, Treatment and Disposal of Oily Sludge and Environmental Guidelines for Spray Painting Operations.</li> <li>• Guidelines for Industrial effluent discharge into the environment are being drafted through a Technical Committee (Environment) of the Guyana National Bureau of Standards.</li> <li>• The Pesticide and Toxic Chemicals Act, Chapter 68:09 of the Laws of Guyana was enacted in 2002.</li> </ul>
CITES	<ul style="list-style-type: none"> <li>• The main legislation concerning CITES is the International Trade in Wild Fauna and Flora CITES Act No. 15 of 2007 which provides for the monitoring and regulation over international trade and movement of wild plants and animals.</li> <li>• Guyana became signatory to CITES in 1977. The WMA is the legal representative of CITES in country.</li> <li>• The legislation currently used by the WMA is the Wildlife Act of 1919. However, new regulations under the Environmental Protection Act 1996 are in draft for Wildlife Import and Export and Wildlife Management and Conservation will be tabled shortly in Parliament for enactment.</li> </ul>

CONVENTION	IMPLEMENTATION PROGRESS
The Protocol (to the 1983 Cartagena Convention) Concerning Specially Protected Areas and Wildlife in the Wider Caribbean (SPA-W)	<ul style="list-style-type: none"> <li>• Guyana approved accession to the Cartagena Convention and all of its three Protocols on June 17th, 2010. The accession becomes official when the Government submits its instruments of accession for official recording by the Depository for the Convention located in Cartagena, Columbia.</li> <li>• The EPA provided the Specially Protected Areas and Wildlife (SPA-W) Secretariat with nominations for the Working Group on Exemptions in 2011. Guyana has proposed for the inclusion of the Pantera onca, Jaguar in the revision of the SPA-W Annexes.</li> </ul>
Ramsar Convention	<ul style="list-style-type: none"> <li>• Guyana is a non-contracting party to the Ramsar Convention on Wetlands, however, the Ramsar Secretariat visited Guyana in May 2013 to address issues in order to enable Guyana's full participation in the Convention Agreement.</li> <li>• A Wetlands strategic planning workshop was held October 18, 2002 through the collaboration of the EPA and Iwokrama and the implications of Ramsar Membership were discussed including: <ul style="list-style-type: none"> <li>• Designating at least one Guyanese site for the Ramsar list of Wetlands of International Importance;</li> <li>• Promoting 'wise use' policies and practices;</li> <li>• Establishing nature reserves in wetlands and training programmes in the fields of wetland research, management and wardening; and</li> <li>• Cooperating with other Contracting Parties for 'transboundary sites'.</li> </ul> </li> <li>• The following sites were identified as focus areas for wetland conservation and included: <ul style="list-style-type: none"> <li>• <u>Shell Beach</u> – the focus area of the Guyana Marine Turtle Conservation Society (GMTCS), including coastal and inland wetland habitats in the north west of Guyana.</li> <li>• <u>Rupununi-Iwokrama</u> – involving Iwokrama, the NRDDB, the Karanambu Trust and regions of the Kanukus. This site includes both the 3,600 km<sup>2</sup> of the Iwokrama forest and waterways and the upstream savanna wetlands of the North Rupununi.</li> <li>• <u>Conservancies</u> – Human made wetlands areas created along the coast of Guyana as water sources for irrigation of rice and sugar cane fields and domestic use.</li> <li>• <u>Essequibo lakes</u> – St. Denys, Tapakuma, Mainstay, and Ituribisi Lakes. Major watershed for rice irrigation and important for local tourism.</li> <li>• <u>Pomeroon River mouth</u> – Mangroves and coastal feeding area for migratory shore birds including Scarlet Ibis.</li> <li>• <u>Corentyne coast</u> – mangrove and coastal areas.</li> </ul> </li> <li>• Further, an inland fisheries policy and strategic plan was drafted in national consultations in 2012 organized by the Ministry of Agriculture and FAO.</li> </ul>

## ANNEX E: PHOTOS



Removing laterite in Siparuni. Photo: Benn 2013



Yellow-headed Parrots (*Amazona ochrocephala*) destined for Wildlife Trade. Photo: Benn 2013



Water fowl in the Kurupukari Rapids near the Iwokrama Forest Reserve. Photo: Benn 2013.



GFC Officers explain Log Tracking System to Assessment Team Leader Bruce Kernan. Photo: Benn 2013



Mangrove rehabilitation seen along the East Coast Demerara. Photo: Benn 2013

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSES

ST. KITTS AND NEVIS

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	3
LEGISLATION .....	3
GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS .....	3
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS .....	5
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	3
PROTECTED AREAS.....	3
THREATENED AND ENDANGERED SPECIES.....	6
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	6
TYPES OF FOREST .....	7
MANAGEMENT STRUCTURE .....	7
ECONOMIC IMPORTANCE.....	7
CONSERVATION OUTSIDE OF PROTECTED AREAS .....	7
MANAGED NATURAL ECOSYSTEMS .....	7
EX-SITU CONSERVATION .....	9
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	10
DIRECT THREATS .....	10
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	11
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS .....	12
FOCUS AREA 1.....	12
FOCUS AREA 2.....	12
FOCUS AREA 3.....	13
FOCUS AREA 4.....	13
CONCLUSIONS AND RECOMMENDATIONS .....	14
REFERENCES.....	16
ANNEX A: THREATENED SPECIES OF ST. KITTS AND NEVIS.....	18
TABLE A1. IUCN RED LIST FOR ST. KITTS AND NEVIS .....	18
TABLE A2. ST. KITTS AND NEVIS BIRD SPECIES OF SPECIAL CONSERVATION CONCERN.....	21
ANNEX B: MAPS .....	22
FIGURE B1. ST. KITTS AND NEVIS.....	22
FIGURE B2. LANDING SITES: LOCATION OF FISH LANDING SITES IN ST. KITTS AND NEVIS.....	23
FIGURE B3. ST. KITTS BEACH EROSION HAZARD.....	24
FIGURE B4. ST. KITTS NATURE RESERVES AND PARKS .....	25
FIGURE B5. ST. KITTS VEGETATION.....	26
ANNEX C: LIST OF CONTACTS .....	27
TABLE C1. ST. KITTS CONTACTS .....	27
TABLE C2. NEVIS CONTACTS .....	27

## REPORT FINDINGS

St. Kitts and Nevis (SKN) is located in the northern part of the Leeward Islands in the eastern Caribbean (See Annex B, Figure B1). Approximately 42 percent of the terrestrial area of the islands is covered by forest and another 8 percent is described as woodlands. The forests on SKN are particularly important, as they are part of the Leeward Islands moist forests ecoregion. The small size of the islands has a disproportionate amount of endemic species. Additionally, the forested cores and their peripheral edges provide the downslope communities with a wide variety of useful goods and services such as a reliable source of domestic water, building materials, fuelwood, natural medicines, wild fruits, and a habitat for game species and other wildlife.

Despite a narrow marine shelf, SKN has a representative cross-section of Caribbean marine life, including endangered corals, marine mammals, and fish species. Over 130 species of birds inclusive of migrants are found in SKN, as described in the 2004 National Biodiversity Strategy and Action Plan. Forests, ponds, and coastal areas are priority habitats for SKN avifauna. Six species of bats are the only native terrestrial mammals found in SKN.

SKN has approximately 20 terrestrial and marine protected areas (MPAs). St. Kitts has seven protected areas (PAs) and three marine reserves, while Nevis has five terrestrial and wetland PAs and two MPAs. Terrestrial PAs cover 5.1 percent of total surface area while MPAs cover just 0.5 percent of the total marine area. SKN's PA system comprises forests, wetlands, marine habitats, bird habitat, natural monuments, and other areas. The total area of nationally recognized PAs is 26 km<sup>2</sup>.

According to the International Union for Conservation of Nature Red List of Threatened Species, 38 animal and two plant species in SKN are threatened, including bats, coral, plants, and birds. Ten, possibly 11, terrestrial reptile species or sub-species have been recorded, two of which are extinct. Three species of sea turtle, all internationally classified as endangered, are known to nest in SKN. These include the hawksbill (*Eretmochelys imbricata*), the green (*Chelonia mydas*), and the leatherback turtle (*Dermochelys coriacea*).

The Ministry of Sustainable Development is the lead government agency responsible for protecting SKN's natural environment, however specific responsibilities for environmental management and sustainable development are spread throughout several departments. While SKN has developed policies to manage its natural resources, it lacks financial resources to implement many of the policies.

Five years ago, the U.S. Government, through the Organization of American States, provided funds for a Nevis Land Use Plan (LUP). The LUP has never been legalized; it is still awaiting approval and now needs to be updated. The LUP identifies wetlands that should be protected as PAs; and it designates areas for no construction (above the 1,000 foot contour—this would protect slopes and Nevis Peak, which is supposed to become the first PA on the island).

The Assessment Team noted the following principal direct threats to biodiversity and forests in SKN: unsustainable harvesting of marine resources; inappropriate coastal development and development on hillsides; invasive species and feral animals; destruction of wetlands and mangroves; and climate change.

The following are the root causes of the threats:

- Lack of awareness of the importance of wetlands and mangroves, and the role played in attenuating flooding, mitigating coastal damage, and in biodiversity conservation
- Lack of on-island climate change expertise
- Human resources are limited
- Important biodiversity-related legislation has yet to be approved

- Lack of enforcement of existing regulations
- No land use planning: development is ad hoc, and environmental considerations do not carry the same weight as economic ones

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.



## LIST OF ACRONYMS

ADS	Automated Directives System
CARDI	Caribbean Agricultural Research & Development Institute
CBD	United Nations Convention on Biological Diversity
CCVA	Climate Change Vulnerability Assessment
CEHI	Caribbean Environmental Health Institute
CFR	Central Forest Reserve
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
DPPE	Department of Physical Planning and Environment
EIA	Environmental impact assessment
EN	Endangered, as designated by the IUCN Red List of Threatened Species
FAA	Foreign Assistance Act
FAD	Fish aggregation device
FGDC	U.S. Federal Geographic Data Committee
GEF	Global Environment Facility
GIZ	German International Cooperation
IRF	Island Resources Foundation
IUCN	International Union for Conservation of Nature
JICA	Japanese International Cooperation Agency
LUP	Land use plan
MAMRC	Ministry of Agriculture, Marine Resources and Co-operatives
MMA	Marine Management Area
MPA	Marine Protected Area
MSD	Ministry of Sustainable Development
NBSAP	National Biodiversity Strategy and Action Plan
NCEPA	National Conservation & Environmental. Protection Act
NGO	Non-governmental organization
NHCS	Nevis Historical and Conservation Society
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OPAAL	OECS Protected Areas and Associated Livelihoods Project
PA	Protected area
PEPFAR	President's Emergency Plan for AIDS Relief
RDCS	Regional Development Cooperation Strategy
SCNT	Saint Christopher National Trust
SKN	St. Kitts and Nevis
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the St. Kitts and Nevis (SKN) component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* The Assessment Team held in-country stakeholder consultations from May 27 to 29, 2013 (Annex C contains the List of Contacts). The Assessment Team convened focus groups on May 27, 2013 in Nevis and on May 28, 2013 in St. Kitts (participants are listed in Annex C) to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. This FAA 118/119 also involved an extensive review of documents and websites. The Assessment Team visited sites within the Central Forest Reserve (CFR) including the 1,000 foot contour, the CFR interpretive center, and the site of the zip line tour; they saw *Eugenia* saplings harvested for fish pots; viewed Brimstone Hill Fortress (World Heritage Site); and went to a fishery complex built with Japanese International Cooperation Agency (JICA) funds.

*Information Used and Gaps:* A Biodiversity Profile of St. Kitts and Nevis (Horwith and Lindsay, 1999) contains the most complete overview, and some of the most up-to-date information on SKN's biodiversity. The 2008 Foreign Assistance Act (FAA) 118/119 Assessment used information from the 1999 Biodiversity Profile. The 2004 National Biodiversity Strategy and Action Plan (2004 NBSAP) uses much of the same information found in the 1999 Biodiversity Profile, and little additional information on biodiversity resources has become available since then.

Gaps exist for all biodiversity resources. In particular though, the 2004 NBSAP states that data on invertebrates are lacking. The 2004 NBSAP cites other information gaps; since production of the 2004 NBSAP these gaps have yet to be filled:

- Forest resource consumption
- Botanical data, especially on endemic species
- Ecotourism impact on forest resources
- Medicinal plants and plants suitable for horticulture
- Information system to assess and monitor biodiversity status
- Inventories of marine species and ecosystems
- Fisheries stock data (According to the 2004 NBSAP, the Department of Fisheries compiles fish stock data mainly based on landings by fishermen (See Annex B, Figure B2, fish landing sites in SKN). Little or no biological data are collected. Biological data on fish stocks are needed for effective management of fisheries.)
- No ongoing monitoring of impacts to marine ecosystems

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

*General Country Description and Description of Ecosystem and Species Diversity:* Officially named the Federation of St. Kitts and Nevis, this island nation (2005 estimated population of 39,000) consists of the islands of Saint Christopher, known as St. Kitts for short, (68 mi<sup>2</sup>/176 km<sup>2</sup>), Nevis (36 mi<sup>2</sup>/93 km<sup>2</sup>), and the uninhabited Booby Island (2 mi<sup>2</sup>/5.2 km<sup>2</sup>). The capital is Basseterre on St. Kitts. The chief settlement on Nevis is Charlestown. The highest point on St. Kitts is Mount Liamuiga (3,792 ft/1,156 m). The highest point on Nevis, Nevis Peak, reaches 3,232 ft/985 m. A volcanic mountain chain dominates the center of both islands. The Narrows, a two-mile wide channel, separates St. Kitts from Nevis (See Annex B, Figure B1). The circularly shaped Nevis is surrounded by coral reefs and the island is almost entirely a single mountain.

The 2008 FAA 118/119 Assessment describes the vegetation formations in SKN from Beard (1949). Briefly, they are in St. Kitts: rainforest, dry evergreen forest, palm brake, elfin woodland, and dry scrub woodland; and in Nevis: rainforest, dry evergreen forest, montane thicket, palm brake, elfin woodland, and dry scrub woodland. The 1999 Biodiversity Profile states that Island Resources Foundation (IRF) described 36 vegetation types in *A Vegetation Classification of St. Kitts and Nevis: Implications for Conservation* (Horwith and Lindsay, 1999), following the U.S. National Vegetation Classification System developed by the U.S. Federal Geographic Data Committee (FGDC, 1997). The 1999 classification builds on, but differs from, the previous efforts of Rodrigues (1990), Beard (1949), and Britton (1901, published in Burdon, K. 1920). Whereas the prior studies emphasized vegetation categories that were believed to have existed before Europeans disrupted the landscape, IRF documents existing vegetation communities. A vegetation map of St. Kitts is in Annex B (Figure B5).

On SKN, 926 plant species (151 families and subfamilies) have been recorded. Included in the 926 species are several species introduced for horticultural, fruit crop, and agricultural purposes some of which have escaped cultivation and become naturalized. SKN has 45 plant species known to be endemic to the country or the Lesser Antilles. The 1999 Biodiversity Profile states that additional plant species would be expected to be found in the country, but few botanists have researched the islands within the last 20 to 30 years.

According to the 1999 Biodiversity Profile, the freshwater fish of SKN (as is true in the rest of the Lesser Antilles) are not well studied. There are local reports of nine species within St. Kitts, and about five species within Nevis.

A 2010 report by The Nature Conservancy (TNC) with funding from USAID, *Marine Zoning in St. Kitts and Nevis: A Path Towards Sustainable Management of Marine Resources* (Agostini et al, 2010), states that the small shelf area hosts a representative cross-section of marine biological diversity. The minimal areas of upwelling restrict nutrient supply and, subsequently, the offshore fisheries. Despite this, the reefs of SKN include endangered corals, marine mammals, fish species, and sea turtles. The diversity of corals ranges from species categorized as critically endangered by the International Union for Conservation of Nature (IUCN), such as staghorn (*Acropora cervicornis*) and elkhorn (*Acropora palmata*), to the more common finger coral (*Porites divaricata*). Complementing the hard coral varieties are an array of sponges and soft corals. Additionally, several large seagrass beds are present, most notably in the area between the two islands, The Narrows. These seagrass communities are typically co-dominated by turtle grass (*Thalassia testudinum*) and manatee grass (*Syringodium filiforme*) and serve as vital breeding grounds for fish and conch, including queen conch (*Strombus gigas*), whose trade is regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The 1999 Biodiversity Profile stated that a comprehensive list of the marine fish occurring in the waters of SKN did not exist at that time. Data on the status of any marine fish species occurring in national waters are sparse (Beaulieu et al., 1990) and lack a baseline to suggest trends. However, additional studies have been undertaken since that time and the 2010 TNC report states that there are approximately 460 species of marine fish, including 126 species that are threatened or endangered (The TNC report provides no reference for these numbers). A 2013 report prepared by the Caribbean Environmental Health Institute (CEHI) with

funding from the German International Cooperation (GIZ) agency found that the fishing industry is artisanal, and comprised of around 350 people in St. Kitts and 300 in Nevis. In St. Kitts less than 20 percent of these are full time. Coastal pelagics account for over 40 percent of the landings, but there is also significant demersal and reef fishery effort; conch also makes up a significant portion of the fishery. As stated above, no biological data are collected on SKN’s fishery.

Migrant mammals, including humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter macrocephalus*), common bottlenose dolphin (*Tursiops truncatus*), rough-toothed dolphin (*Steno bredanensis*), and spinner dolphin (*Stenella longirostris*) are consistently present on an annual basis.

The 2008 FAA 118/119 Assessment contains information on amphibians, reptiles, birds, and mammals found in SKN. While targeted studies have been undertaken, including the Marine Zoning in St. Kitts and Nevis report (with USAID funding) and work in conjunction with Global Environment Facility (GEF), no island-wide baseline inventories have been completed since the previous FAA 118/119 Assessment. That document provides the most up-to-date information on amphibian, reptile, bird, and mammal diversity.

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

The United Nations Environment Programme’s (UNEP) National Environmental Summary Federation of St. Kitts & Nevis (2010) identified several critical gaps in supporting environmental priorities. Essentially, SKN is policy-rich, but lacks the financial resources to implement many of its policies. The current framework requires strengthening in several ways, including additional personnel, increased technical capacity, improved data collection and monitoring, use of information in decision-making, and creation of new incentives for sustainable use of natural capital. In addition, legislation to endow specific agencies with power to manage natural resource use is absent; further, there is often no regulatory structure to implement legislation. Finally, the backlog of draft legislation related to environmental issues and sustainable development inhibits protection and management of natural resources.

### GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

The Ministry of Sustainable Development (MSD) is the lead government agency with responsibility to protect SKN’s natural environment, however several departments have specific responsibilities for environmental management and sustainable development. The agencies and/or departments with specific responsibilities for environmental management and sustainable development include departments responsible for agriculture, fisheries, lands and housing, health, public works, utilities, transport, tourism, education, legal affairs, solid waste management, the National Emergency Management Agency, and the Nevis Island Administration (Table 1).

Table 1. Institutions Involved in the Management and Conservation of Biological Resources

INSTITUTION	KEY ROLE(S)	ENABLING LEGISLATION
Min. of Agriculture – St. Kitts	<ul style="list-style-type: none"> <li>• Agricultural research especially heat/drought tolerant crops</li> <li>• Characterization of key crops such as sweet potato (work done with Caribbean Agricultural Research &amp; Development Institute (CARDI))</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural Development Act 1973</li> <li>• Forestry Act (Cap 92)</li> <li>• Plant Protection Act</li> </ul>

INSTITUTION	KEY ROLE(S)	ENABLING LEGISLATION
Dept. of Physical Planning and Environment – St. Kitts	<ul style="list-style-type: none"> <li>• National Physical Plan</li> <li>• Thematic GIS Atlas with links to other government agencies</li> </ul>	
Min. of Sustainable Development – St. Kitts	<ul style="list-style-type: none"> <li>• Development control</li> <li>• Physical planning</li> </ul>	<ul style="list-style-type: none"> <li>• National Conservation &amp; Environmental Protection Act (NCEPA) 1987</li> <li>• National Conservation &amp; Environmental Protection (Amendment) Act 1996</li> </ul>
Dept. of Marine Resources – St. Kitts	<ul style="list-style-type: none"> <li>• Introduction of new fishing strategies – fish aggregation devices (FADs), aquaculture</li> <li>• Closed season to protect select species such as lobster</li> </ul>	<ul style="list-style-type: none"> <li>• Fisheries Act 1984, updated 2002</li> <li>• Fisheries Regulations 1995, updated 2002</li> </ul>
Dept. of Physical Planning – Nevis	<ul style="list-style-type: none"> <li>• Land use planning</li> <li>• Recommendations for setbacks</li> <li>• Request and review environmental impact assessments (EIAs)</li> </ul>	Town and Country Planning Act
Ministry of Agriculture – Nevis	<ul style="list-style-type: none"> <li>• Development of agriculture sector</li> <li>• Surveillance and action against pests and diseases (fire ants, lethal yellowing) that affect plants especially those of economic importance</li> <li>• Protection of forests</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural Development Act 1973</li> <li>• Forestry Act</li> </ul>
Dept. of Fisheries – Nevis	<ul style="list-style-type: none"> <li>• Monitoring of fishing activity</li> <li>• Collection of catch statistics</li> <li>• Promotion of new fishing strategies and MPAs and Marine Management Areas (MMAs)</li> </ul>	Fisheries Act 1984
Nevis Historical and Conservation Society (NHCS)	<ul style="list-style-type: none"> <li>• Public education</li> <li>• Small environmental activities especially in coastal zone</li> </ul>	<ul style="list-style-type: none"> <li>• Nevis Companies Act of 1999</li> <li>• Non-Government Organization Act of 2008</li> <li>• Proposed changes in legislation to make society into a trust</li> </ul>
Nevis Island Administration	<ul style="list-style-type: none"> <li>• Ratification of laws, plans, and policies applicable to Nevis</li> <li>• Identification of issues specific to Nevis that need government input</li> </ul>	Constitution of St. Kitts and Nevis

SKN is signatory to the principal international conventions related to the conservation of biodiversity and tropical forests, including the following:

- Convention on Biological Diversity (CBD)
- CITES
- UN Framework Convention on Climate Change
- UN Convention to Combat Desertification
- Cartagena Protocol on Biosafety
- International Convention for the Regulation of Whaling
- International Convention on Civil Liability for Oil Pollution Damage
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
- Kyoto Protocol
- Montreal Protocol
- Vienna Convention for the Protection of the Ozone Layer
- United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage
- Stockholm Convention on Persistent Organic Pollutants

The Nevis Historical and Conservation Society (NHCS) was established in 1980 to conserve the natural, cultural, and historic resources of the island and adjacent marine areas. It is a non-profit managed by an executive board. NHCS has developed and implemented projects to preserve Nevis' history and environment while making it accessible to locals and visitors. The Saint Christopher National Trust (SCNT) is a non-governmental organization (NGO) founded in 2009 with the goal to preserve the national heritage of St. Kitts.

TNC, in partnership with USAID, assisted SKN in a marine spatial planning project, which recommended an approach for marine zoning and sustainable management of marine resources in SKN. Ross University conducts research on the control of feral animals in SKN, among other projects.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

International donors and agencies, including USAID, have played a vital role and have provided significant financial support to many of the environmental initiatives in SKN (Table 2). A United Nations Development Programme (UNDP) report identified lack of financial resources to support environmental initiatives as one of the barriers for environmental management and sustainable development in SKN.

One of the most successful biodiversity conservation projects in SKN is the Organization of Eastern Caribbean States (OECS) Protected Areas and Associated Livelihoods Project (OPAAL). The objective of the project is to contribute to the conservation of biodiversity of global importance in the participating countries of the OECS by removing barriers to the effective management of protected areas (PAs) and increasing the involvement of civil society and the private sector in the planning, management, and sustainable use of these areas. According to an April 2012 GEF publication, some of the expected outputs of the project include reviews of national PA frameworks; drafts of models of PA-relevant legislation, policies, and institutional arrangements; national actions leading to new or modifications of existing institutional frameworks; establishment of at least six PAs in the OECS region; training of local personnel to increase administrative efficiency in national institutions responsible for biodiversity conservation and PA management; and the empowerment of local communities to increase effectiveness in local management decision-making (GEF, 2012).



SKN is also participating in the regional project, Sustainable Financing and Management of Eastern Caribbean Marine Ecosystems, whose objective is to enhance the long-term sustainability of PA networks in the OECS region. Among other activities, this project aims to strengthen MPAs and deploy a regional monitoring and information system for PA networks. The expected outcomes of this project include the development of a region-wide, open access, web-based monitoring system for effective PA management for participating countries and the establishment of a Caribbean Biodiversity Fund, which will have an endowment of at least US\$15 million for participation of OECS countries to generate income for PA management. The project preparation grant completion date is June 15, 2014; followed by preparation of the full project proposal.

SKN is part of TNC's Caribbean Challenge Initiative, which is an effort to protect marine and coastal ecosystems in the Caribbean. As part of the initiative, SKN has committed to:

- Expand the MPA system to include at least 20 percent of its nearshore area by 2020
- Develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for the national PA system
- Develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and overuse

Five years ago, the U.S. Government through the Organization of American States (OAS), provided funds for a Nevis Land Use Plan (LUP). The LUP has never been legalized; it is still awaiting approval and now needs to be updated. The LUP identifies wetlands that should be protected as PAs and areas for no construction (above the 1,000 ft. contour—this would protect slopes and Nevis Peak, which is supposed to become the first PA on the island).

USAID, through the OECS, funded a master drainage plan for Nevis. Implementation of the plan would address many of the impacts of construction on slopes and at high elevations.

Table 2. Key Donors, NGOs, and Biodiversity Conservation Projects

ORGANIZATION	ACTIVITY	VALUE (if available)
Organization of American States (OAS) – USAID	Land Use Plan for Nevis	Project was funded for Antigua and Barbuda and SKN for US\$1.5 million
Global Environment Fund	GEF-5	US\$4,480,000 available.
USAID	Master Drainage Plan for Nevis	Not available (n/a)
Ross University	Control of feral donkeys	n/a
Caribbean Development Bank	Physical infrastructure for water supply	n/a
Nevis Historical and Conservation Society (NHCS)	<ul style="list-style-type: none"> <li>• Reforestation of the Coastline Project, which undertakes small-scale re-vegetation of eroding beaches</li> <li>• Publishes a newsletter, "Econews"</li> </ul>	n/a
HOPE (Helping our People Excel) Inc. Nevis	Builds community resilience to drought, flooding, and other natural hazards in one community in each of Nevis's five parishes by implementing sustainable preventative practices to safeguard communities from hazards and equip the local population with	US\$50,000 from OAS



ORGANIZATION	ACTIVITY	VALUE (if available)
	the knowledge and technical skills to prepare, respond to, and minimize the fallouts from natural and human-induced hazards.	
TNC (USAID funded)	Establishment of MPAs and MMA: TNC initiated a marine spatial planning process that resulted in the development of island-wide marine zoning. The primary objective of this project was to lay the groundwork to support future implementation of a marine zoning plan in SKN and to assist in the development of a marine zoning design.	n/a
Caribbean Challenge Initiative (TNC)	The Caribbean Challenge Initiative works with 10 countries in the region to address the growing threats to the sea and its resources via establishment of new MPAs and creation of National Conservation Trust Funds.	US\$43 million
GIZ with the CEHI	The marine biodiversity support component of the Land and Coastal Resources Management Programme (2013 to 2017) will support the South East Peninsula Marine Management Area.	n/a
USAID	The USAID climate change program assists the six OECS countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and resilience, and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.	

Environmental impact assessments (EIAs) are required for certain types of construction; infrastructure rehabilitation; sewage, water, and wastewater systems; and other types of projects, as listed in Schedule 4 of SKN's EIA legislation. The Department of Physical Planning in the MSD is responsible for review of EIAs and for issuing permits for development. Although EIAs are prepared, reviewed, and approved for development projects, the National Physical Development Plan, currently in draft (since 2006), which mandates EIA, has not yet been approved. According to stakeholders interviewed, donors are required to comply with the Physical Planning Department's EIA legislation.

# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

Table 3 shows the declared and proposed PAs in SKN (also see Annex B, Figure B4). The MSD's Department of Physical Planning and Environment (DPPE) has the primary responsibility for the management of all PAs; the Environment Unit is responsible for coastal management; and the Ministry of Agriculture, Marine Resources and Co-operatives' (MAMRC) Department of Marine Resources is responsible for coral reef monitoring and conservation. The declared/proposed status has changed little from 2008, when 13 PAs were proposed and one was declared (Southeast Peninsula National Park), and the others were proposed or recommended.

Table 3. Protected Areas

PROTECTED AREA (PA)	DESCRIPTION OF PA	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
<b>ST. KITTS</b>			
St. Kitts Central Forest Reserve (CFR) declared under OPAAL as Central Forest PA	Above the 1,000 foot contour; last remaining intact tropical forest, The FR is important because it provides water for the communities around it, has medicinal, beverage, and ornamental plants and saplings used for fish pot straps.	Declared	OECS project, PAs & Associated Livelihoods (2005). Each country developed demonstration sites with livelihoods applications. St. Kitts focused on the CFR. It has a management plan (MP), but the MP is not yet being implemented. An interpretive center was renovated, but has no staff (plans are to put one staff person there), and it is not yet open.
Mt. Liamuiga Central Range National Park & Royal Basseterre Valley National Park, re-named St. Kitts National Capitol Park in 2011	<ul style="list-style-type: none"> <li>• Forest and habitat protection; soil, water, and species conservation; recreation; aquifer protection (Basseterre)</li> <li>• Critically important for watershed protection and water provision</li> </ul>	Declared: Mt Liamuiga was declared under OPAAL; Mt. Liamuiga and Basseterre: in July 2011 officially re-named it St. Kitts National Capitol Park	DPPE Management Plan developed under the GEF project (Rehabilitation and Management of the Basseterre Valley as a Protection Measure for the Underlying Aquifer, a \$530,000 project), the Basseterre Valley Liamuiga National Park Management Plan
Nagshead Wildlife Reserve	Species protection (magnificent frigate bird, brown pelican)	Proposed (2004 NBSAP)	DPPE
Black Rocks Natural Monument	Unique lava phenomenon, public education	Proposed (2004 NBSAP)	DPPE

PROTECTED AREA (PA)	DESCRIPTION OF PA	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
Greatheeds Pond	Primary freshwater pond in St. Kitts; extensively used by migratory waterfowl and shorebirds	Proposed (2004 NBSAP)	
Southeast Peninsula Salt Ponds (Avian Sanctuary)	Species protection, ecotourism	Proposed (2004 NBSAP)	DPPE
Brimstone Hill Fortress National Park	Brimstone Hill Fortress National Park is a UNESCO World Heritage Site of historical, cultural, and architectural significance. It is one of the best-preserved historical fortifications in the Americas.	Declared	Brimstone Hill and its Fortress is a National Park that is managed on behalf of the Government and people of SKN by the Brimstone Hill Fortress National Park Society.
<b>Marine Reserves</b>			
Guana Island Marine Reserve	Habitat protection	MPA (in process, not yet declared)-runs from Nevis to Frigate Bay, SK. Environment Unit is responsible for coastal management.	
Southeast Peninsula Marine Park	Reef protection, recreation	Proposed (2004 NBSAP)	
Sandypoint Reef Marine Reserve	Reef protection, recreation		
<b>NEVIS</b>			
Nevis Peak National Park	Forest and habitat protection; soil, water, and species conservation; and recreation	Proposed	The Nevis LUP designates areas for no construction above the 1,000 ft. contour—this would protect Nevis Peak, which is supposed to become the first NP on the island.
Gallows Bay Bog	Wetland habitat, species protection	Proposed (2004 NBSAP)	
Saddle Hill	Historic and scenic value	Proposed (2004 NBSAP)	
Round	Bird habitat	Proposed (2004	

PROTECTED AREA (PA)	DESCRIPTION OF PA	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
Hill/Hurricane Hill		NBSAP)	
Marine Reserves			
Cades Bay Marine Park	Reef habitat, Amerindian site, recreation		
New Castle Marine Park	Reef protection, recreation		

SKN has 5 percent of its total terrestrial territory and 0.5 percent of its marine territory under protection status; this is below the CBD goal of 17 percent of area in protected status (Trading Economics, 2013).

According to CEHI/GIZ (2013), officially there are no MPAs in St. Kitts but there are proposed sites (see below). While not officially listed, the Southeast Peninsula area is currently being managed as an MPA (EcoEngineering Caribbean Ltd. 2010 in CEHI/GIZ, 2013; Fisheries pers. comm. in CEHI/GIZ, 2013). The CEHI/GIZ report also mentions an additional PA (not included in the table above), the St. Mary’s Biosphere Reserve, which was designated by UNESCO as a Biosphere Reserve. The Reserve has both marine and terrestrial components ranging from coral reefs to elfin woodland.

Constraints to effective management of the PA system are lack of adequate management plans and staff to implement management; limited capacity in PA management; lack of supplies and equipment needed to implement management; and lack of inventories of biodiversity resources.

The 1999 Biodiversity Profile states that, “protecting representatives of each of the vegetation communities identified for SKN would be the most efficient and effective approach to conserving the country’s biodiversity. Unless such measures are taken, much of the flora (and fauna) is at risk based on existing trends” (Horwith and Lindsay, 1999). The 1999 Biodiversity Profile identifies representative ecosystems for protection:

- The central mountain range of St. Kitts, especially the dwarf montane area surrounding Dos D'ane Pond at the top of Verchild's mountain
- The Southeast Peninsula of St. Kitts
- Nevis Peak
- The small patches of dry forests in the southeast and southwest of Nevis
- Ghauts on both islands that may serve as important habitat links for species that would otherwise be isolated by agricultural cultivation and human habitations

According to the 2004 NBSAP, the northwest coast is the most valuable coastal corridor on the island of Nevis, in terms of its environmental significance as well as property value. Yet this area is not under PA status. The area contains most of the wetlands and beaches in Nevis.

In 2010, with USAID support, TNC implemented a project on marine zoning. The project is scheduled for completion at the end of 2013. The outcome is intended to be the designation of an MMA, which would extend 2 miles out to sea around St. Kitts, Nevis, and Booby islands. It includes an MPA, where some species can be taken; and complete protection of the Narrows, which is a nursery area for lobster and conch, and will be designated a no-take zone. The MPA will include Narrows, Sandy Point, and Dieppe Bay.

## THREATENED AND ENDANGERED SPECIES

According to the IUCN Red List of Threatened Species, species listed as critically endangered (CR), endangered (EN), and vulnerable (VU) are considered threatened. Thirty eight animal and two plant species meet these criteria as shown in Annex A. Table 4 summarizes of the numbers of plants and animals in each category. Most species on the list have declining populations with the exception of three corals described as stable. For six species (four animals and two plants), no population status was given.

Table 4. Summary of Threatened Animals and Plants Based on the IUCN Red List

RED LIST STATUS	ANIMALS	PLANTS
CR	7	-
EN	9	1
VU	22	1

SKN uses the IUCN list as their national list; there is no country-specific list of threatened species. The IUCN list is referred to for preparation and review of EIAs, and it provides the framework for CITES implementation. Additional information on SKN's threatened species is in Annex A.

Critical habitats include wetlands; salt ponds; forest; mangrove; beaches; coastal and marine ecosystems, including coral reefs (See Section E for more information on these ecosystems.) However, according to the 2004 NBSAP, no coral reef monitoring is done for SKN's reefs, and, as a result, no scientific data are available to support decision making and conservation efforts. Other important habitats for threatened species are white mangrove (*Languncularia racemosa*) stands, which surround fresh or brackish water lagoons on the western and northern coasts of Nevis. White mangroves are also found at Pinneys Estate, New Castle Bay and at the mouth of Bath Stream. These are not listed as PAs.

The Department of Marine Resources staff in Nevis conducts most of the turtle monitoring for the country. The St. Kitts and Nevis Turtle Monitoring Network advises and provides data to the Department of Marine Resources.

## STATUS AND MANAGEMENT OF FOREST RESOURCES

According to the 2004 NBSAP, the National Conservation and Environmental Protection Act (1987) provides for the Minister of Environment, in consultation with the Conservation Commission, to establish forest reserves. To date, however, no forest reserves have been established. The 2004 NBSAP states that the absence of clearly defined forest reserves has resulted in the illicit felling of timber and unlawful grazing of livestock, which have resulted in serious degradation of the forest. Additionally, very little information is known about the extent and species composition, the standing volume, and increment of the forest resources of the islands.

Fragments of virgin forest remain; however, most of the islands' land area has been modified due to centuries of sugarcane cultivation. The CFR in St. Kitts consists of the last remaining tropical forest on the island. Because it is above the 1,000 foot contour, protection status is conferred—no construction is allowed above 1,000 feet. However, it has not officially been listed as a PA. The CFR is comprised of three volcanic hills. It provides critical ecosystem services including water for the communities around it; medicinal and ornamental plants; saplings used for fish pot straps; and plants that are used to make beverages.

## TYPES OF FOREST

Five types of forest are found on St. Kitts: rainforest, dry evergreen forest, palm brake, elfin woodland, and dry scrub woodland. The 2008 FAA 118/119 describes each type. Nevis, though a smaller island with its highest point (Nevis Peak) lower than Mt. Liamuaga, has six forest types: rainforest and humid forest, elfin woodland, montane thicket, palm brake, dry scrub woodland, and dry evergreen forest (refer to the 2008 report for a complete description). Beard's classification system was revised by Potter, which resulted in 36 forest types (a comparison of the two systems was presented in Appendix 7 of the 2008 FAA 118/119). Table 1 below presents the extent of forest cover (FAO, 2010). Forest covers 42 percent of the land area of SKN and an additional 8 percent is characterized as other wooded land. Since 1990, the annual rate of forest cover change has been almost zero; it is not clear if this trend is due to increased forest protection or lack of data.

## MANAGEMENT STRUCTURE

Management of forest resources in SKN falls under the jurisdiction of the Department of Agriculture and the DPPE for both St. Kitts and Nevis, though NGOs such as the NHCS and the St. Kitts Heritage Society also manage forest resources.

## ECONOMIC IMPORTANCE

Currently, there is no commercial forestry activity in SKN, however forests are used for subsistence, including use of saplings to make fish pots and fence posts. In addition, forests support tourism (hiking trails through the island's PAs), provide potable water, and prevent erosion and sedimentation in adjacent fresh and marine waters. Currently, there are no forest certification programs in SKN.

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

#### *Agricultural systems*

Up until 2005, SKN was a major sugar exporter and the majority of SKN's agricultural sector was focused on the cultivation of sugarcane. However, the government-run sugar company ceased sugar exports as the sugar export industry became less profitable. Since then, the agricultural sector has been in transition and the main challenge has been increasing non-sugar agricultural production in a competitive and sustainable manner. SKN is focused on scaling up current production for the domestic market, developing selected products for the export market, using sugarcane for energy production (co-generation of electricity and ethanol) and livestock feed, and converting sugarcane fields to fields suitable for non-sugar crop production.

#### *Mangroves and wetlands*

Fifteen mangrove sites have been identified in SKN, eight in St. Kitts and seven in Nevis. Friar's Bay Pond and Greatheeds Pond contain the highest number of distinct mangrove species in one location, while the majority of the sites are characterized by only a few mangrove species. The most common species are *Avicennia germinans*, *Laguncularia racemosa*, *Rhizophora mangle*, and *Avicennia schaueriana*. White mangrove stands (*L. racemosa*) are typically found around fresh or brackish water lagoons. In Nevis, the most common species of mangrove are *L. racemosa* and *Conocarpus erectus*. Mangroves are threatened by coastal development for tourist facilities and land use disputes, and major losses in the past were due to the creation of salt production ponds.

No recent information is available on the wetlands of SKN, however several areas of mangroves are recognized as important wetland areas. Greatheeds Pond, located on the east coast of St. Kitts, is a small saline lagoon surrounded by mangrove swamps behind a sea beach. Sugarcane fields and secondary vegetation surround the lagoon; it is an important breeding area for birds and invertebrates as well as an important feeding ground for migratory shorebirds. The southern border of the pond abuts the island's main garbage dump, which likely impacts the pond's ecology. Half Moon Pond, also on the east coast of St. Kitts, is a permanent saline lagoon, 17 ha in size and up to 50 cm deep. The mangrove swamps are located behind a beach and the main threats to this pond include shrimp farming, pollution from domestic waste, and fertilizers.

Muddy Pond, located on the east coast of St. Kitts, is a small saline lagoon with some brackish marshes approximately 30 ha in size. It is public land and an important feeding area for migratory shorebirds. Great Salt Pond and four nearby ponds (c. 275 ha) located on the southeast peninsula of St. Kitts are important feeding grounds for shorebirds and habitat for brine shrimp. The beaches adjacent to the ponds are important nesting areas for sea turtles. The ponds have muddy shorelines and small patches of mangroves, specifically at Friar's Bay Pond, Little Salt Pond, and on the northeast shore of Great Salt Pond. A 1989 survey counted 2,300 birds and 25 species, and recommended that the pond system of St. Kitts should be recognized as having international significance.

The 1999 Biodiversity Profile also states that winter residents (birds arriving in July/August, but remaining until April/May before leaving for breeding grounds farther north) use a slightly different set of ponds than those of the fall migration. Half Moon Pond has the highest wintering shorebird diversity and abundance of all the ponds, with Friars Bay Pond, the eastern shore of Great Salt Pond, and Mosquito Pond also supporting large numbers of wintering shorebirds. Yet wetlands and salt pond systems are not protected in SKN.

## Seagrass

There are several large seagrass beds in SKN, most notably in The Narrows. The seagrass beds are typically dominated by both turtle grass (*Thalassia testudinum*) and manatee grass (*Syringodium filiforme*). Dense seagrass beds cover 3,098 ha while sparse seagrass beds comprise about 370 ha of SKN benthic habitat shallower than 30 ft. Seagrass communities are vital breeding grounds for fishes and conch, including the queen conch (*Strombus gigas*), which is regulated by CITES.

## Coral reefs

Coral reefs occupy 1,578 ha in water shallower than 30 ft in SKN, while remnants of elkhorn coral cover 574 ha in the waters around SKN. SKN is characterized by a narrow continental shelf that surrounds both islands. On the western side of St. Kitts, the ocean shelf drops off precipitously after reaching 30 m, and carbonate sand covers much of the shelf, while coral structures cover a limited part of the areas. Thus, a narrow shelf and stable water temperatures physically limit proliferation of coral. Despite these limiting factors, SKN has a representative cross-section of marine life, including endangered corals, marine mammals, fish species, and sea turtles. It has viable stands of the IUCN-listed staghorn and elkhorn corals (*Acropora cervicornis* and *A. palmata*, respectively), and also more common corals.

The main threats to corals reefs include improper anchoring, storms, unsustainable fishing practices, land-based sources of pollution, rising ocean temperatures, and increasing intensity of storm events. Fishing is mainly artisanal and all fisheries are marine-based. The annual value of fisheries export is US\$160,000 and employs approximately 600 people. Most catch is exported or sold locally to restaurants and hotels. The four major fisheries are demersal, coastal pelagic, ocean pelagic, and conch. The demersal (reef/bank) fishery is the largest in terms of vessels, persons, and gear used and comprises over 80 percent of the registered fishing vessels. The coastal pelagic fishery employs just over 10 percent of registered fishermen, but accounts for



over 40 percent of total landings annually. Targeted species include gars, bolleyhoo, jacks, and small tunas. The ocean pelagic fishery operates up to 35 nautical miles from shore and is highly seasonal. Targeted species included dolphin fish, tuna, and mackerel. The conch fishery uses small vessels (16-20 ft) and is fished by free divers in shallow areas and using SCUBA in deep areas (>60ft).

## Beaches

Beaches are located on the southeast peninsula of St. Kitts, and include Turtle Beach, Sand Bank Bay, and Friar’s Bay South. At the northern end of the island, there are numerous gray volcanic sand beaches. Several beaches are found on Nevis, including Pinney’s Beach, Oualie Beach, Cades Bay Beach, and Lover’s Beach. They protect the coast area from wave action and provide habitat and nesting sites for marine species such as sea turtles and shorebirds. Coastal development and increasing human presence are threats to beach habitat.

Beaches, coastal, and marine areas are critical for endangered turtles, among other species. According to the 2004 NBSAP, nesting turtles in SKN are green turtles (*Chelonia mydas*), leatherbacks (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*), all of which are listed by CITES as either endangered or threatened. Although regulations are in place to protect sea turtles in SKN, there have been no studies of the turtle populations, no evaluation of their status, and no focused work on their conservation (NBSAP, 2004). A moratorium has been in place on the harvesting of marine turtles from the waters around SKN. However, fishermen and some members of the public would like to see this overturned. Turtle consumption still occurs, but according to one stakeholder interviewed for this assessment, consumption is expected to decrease since mainly people over 50 eat turtles, and the younger generation does not.

## Freshwater

There are no freshwater fisheries in SKN. The main threats to the freshwater ecosystem include unsustainable forest use, lack of watershed planning, improper waste disposal, unsustainable agricultural practices, deforestation, and introductions of invasive species.

The Watercourses and Waterworks Act (Cap 185) provides for declaration of specific areas as watersheds, and regulates activities in these areas (grazing, construction, and cultivation). The National Conservation and Environmental Protection Act (1987) provides for conservation of water and watersheds. Table 5 below shows key conservation activities outside of PAs in SKN.

## EX-SITU CONSERVATION

The Botanical Gardens of Nevis (Table 5) cover five acres with trees, shrubs, orchids, bromeliads, and vines. The national flower (*Delonix regia*) is grown in its gardens. The botanical garden is managed by a private enterprise and is being restored. Additionally, the NHCS has undertaken a project to re-introduce mangroves on the islands and develop a public education program on the importance of mangroves. Seedlings are procured from Antigua.

Table 5. Conservation Outside of Protected Areas & *Ex-Situ* Conservation

LOCATION	ORGANIZATION	ACTIVITY/IMPORTANCE
MANAGED NATURAL ECOSYSTEMS		
1,000 ft contour and above. Nevis Peak	Dept. of Physical Planning	<ul style="list-style-type: none"> <li>To be declared a PA</li> <li>Even without declaration the area is protected from development. Nevis is basically conical and forested slopes are important for watershed functions.</li> </ul>
Coastal zone of Nevis	<ul style="list-style-type: none"> <li>Nevis Historical and</li> </ul>	<ul style="list-style-type: none"> <li>Public education on importance of</li> </ul>

LOCATION	ORGANIZATION	ACTIVITY/IMPORTANCE
	Cultural Society (NHCS) <ul style="list-style-type: none"> <li>Department of Physical Planning</li> </ul>	mangroves <ul style="list-style-type: none"> <li>Setback to protect coasts</li> </ul>
1,000 ft contour and above – St. Kitts (Olivees Mountain, Mount Liamuiga and the Verchilds Mountain)	Govt of St. Kitts and Nevis	Lands designated as the St. Kitts CFR Reserve now declared a national park
Watershed area	<ul style="list-style-type: none"> <li>Water Boards of St. Kitts and Nevis</li> <li>Ministry of Health and Environment</li> </ul>	<ul style="list-style-type: none"> <li>Declaration of such areas to protect water supply</li> <li>9.0 km<sup>2</sup> area. Nature trail construction and awareness activities</li> </ul>
Wingfield Watershed Project, Old Road		
<b>EX-SITU CONSERVATION</b>		
Mangroves in Nevis	NHCS	Reintroduction of mangroves using seedlings from Antigua
Botanical Gardens of Nevis	Douglas Enterprises	<ul style="list-style-type: none"> <li>Five acres with trees, shrubs, orchids, bromeliads and vines</li> <li>The national flower, <i>Delonix regia</i>, is grown in the gardens.</li> </ul>

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

### DIRECT THREATS

The Assessment Team identified the following key threats to biodiversity and forests from stakeholder consultations and review of literature, in particular the 2004 NBSAP (2004, submitted in 2008) and the TNC marine zoning report (Agostini et al., 2010).

(1) **Unsustainable harvesting of marine resources:** According to the 2004 NBSAP, unsustainable fishing practices in the waters of SKN and the neighboring islands have led to severely depleted marine fish stocks. At Cow Rocks, juvenile conchs are being severely overharvested. Jones Bay, a nursery for lobsters, fish, and conch, and an ecological study area, is under threat from harvesting of juveniles (also from habitat disruption by yacht anchoring and construction of jetties). Lobsters are being imported into Nevis, usually from Anguilla, to meet the in-country demand. According to a stakeholder interviewed for this assessment, conch used to be found at 20 to 40 foot depth and now they are typically found at 100 to 130 feet using SCUBA gear (conch is CITES-listed). At Cow Rocks, juvenile conch and spawning sites for lobster will be protected under the MMA, and this is expected to help lobster recovery and avoid a CITES listing, but for conch, more effective measures beyond a closed season or minimum size are needed.

(2) **Inappropriate coastal development and development on hillsides:** Sand mining is a threat to the coast on both islands. Sand is taken from beaches and the sea floor, and exported. Poorly located and operated quarries result in run-off, carrying sediment from quarries to the coast, damaging and killing reefs, and affecting entire marine ecosystems (See Annex B, Figure B3, Beach Erosion in St. Kitts). With no mitigation measures required, and no enforcement or oversight of quarry operations, haphazard development of quarries has occurred. Erosion is a major problem in the coastal zone of Nevis, especially in Pinney's. According to the 2004 NBSAP, the northwest coast is the most valuable coastal corridor on Nevis, in terms

of its environmental significance as well as property value, however, the area is also the most susceptible to coastal erosion from storm surges and hurricanes and the erosion rate is conservatively estimated at 2.4 meters per year.

(3) **Invasive species and feral animals:** Stakeholders mentioned several invasive species that threaten SKN’s biodiversity resources. The African green monkey (or vervet monkey, *Cercopithecus aethiops*) was introduced from West Africa approximately 300 years ago as a pet; it escaped and is now found on SKN. It affects the agriculture sector, home gardens and potentially biodiversity as they chase birds from trees. The Cuban tree frog is a threat to local toads and eats bird eggs. Pink mealybugs destroy hibiscus plants. Lionfish are affecting marine biodiversity and their population is growing, as they produce 15,000 eggs/month and mature in one year, faster than it can be offset by their predators (grouper and sharks). Nevis had a competition in which 190 lionfish were caught; as one stakeholder noted, “this is a drop in the bucket!” Feral donkeys overgraze, resulting in erosion and sedimentation along the coast. Lethal yellowing (coconut trees) is present at Pinney’s Beach and is spreading around the island.

(4) **Destruction of wetlands and mangroves:** These are threatened directly by human activities and by climate change. Mangroves are cut for firewood and fencing, while wetlands are filled for construction projects. Given their critical role in sustaining key biodiversity resources, degradation and destruction of these habitats are significant concerns for conservation.

(5) **Climate change:** Climate change impacts include sea level rise, coastal erosion, and terrestrial erosion. Sedimentation of the nearshore has destroyed coral reefs and coastal areas are being lost. The St. Kitts and Nevis Climate Change Vulnerability Assessment (CCVA), a report prepared simultaneous to this FAA 118/119 Assessment, states that the potential effects of the predicted changes in SKN’s climate would be likely to decrease the international competitiveness of its tourism industry by raising its costs and reducing its attractiveness in comparison with alternative international tourist destinations. Based on this assessment, climate change would not only directly affect biodiversity conservation, but would also have an indirect effect since international tourism is a main incentive for conserving SKN’s biodiversity.

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119 d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats. “Actions necessary” are derived from stakeholder consultations and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following needs are the ones deemed critical to address the root causes and to conserve biodiversity and forests (Table 6).

Table 6. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of awareness of the importance of wetlands and mangroves, and the role they play in mitigating flooding and coastal damage, and in biodiversity conservation	<ul style="list-style-type: none"> <li>• Implement a public awareness campaign about wetlands and mangroves, and their roles in mitigating climate change impacts and biodiversity conservation.</li> <li>• Strengthen the environmental NGO sector so they can advocate and undertake projects for conservation of wetlands, mangroves, and other important ecosystems.</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of on-island climate change expertise	Strengthen capacity of natural resources staff and politicians on climate change-related topics, especially climate-wise development.
Human resources are limited; each natural resources staff person “wears six or seven hats.”	Hire additional staff.
Important biodiversity-related legislation has yet to be approved; and lack of enforcement of existing regulations. Stakeholders noted that construction setbacks, especially along the coast, are often not complied with. The required setback is 120 feet from the permanent vegetation line. Stakeholders noted that drawings (for infrastructure development) are approved for construction without Physical Planning and Environment clearance so development is occurring in areas where it shouldn’t (e.g., where potable water is inadequate such as on hillsides or on the coast)	<ul style="list-style-type: none"> <li>• Educate the public and developers about the setback requirement and importance of the setback.</li> <li>• Improve enforcement (Several stakeholders noted that because these are small islands, everyone knows each other, everyone is related, they don’t want to hurt the economic situation of their friends and family).</li> <li>• Approve the National Physical Development Plan, currently in draft (since 2006), which mandates EIA.</li> </ul>
No land use planning; development is ad hoc, and environmental considerations do not carry the same weight as economic ones.	<ul style="list-style-type: none"> <li>• Update and approve the LUP/Physical Plan for Nevis.</li> <li>• Implement activities from the Master Drainage Plan.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119 d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 7 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders

with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

**Economic Growth:** Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID Mission to Barbados and the Eastern Caribbean (USAID/BEC) region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

### FOCUS AREA 4

**HIV/AIDS:** Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR) and, as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 7. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Implement a public awareness campaign about wetlands and mangroves, and their roles in mitigating climate change impacts and biodiversity conservation.</li> <li>• Strengthen the environmental NGO sector so they can advocate and undertake projects for conservation of wetlands, mangroves, and other important ecosystems.</li> </ul>	<p>The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.</p>
<p>Strengthen capacity of natural resources staff and politicians on climate change-related topics, especially climate-wise development.</p>	<p>The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.</p>
<p>Hire additional staff.</p>	<p>No proposed USAID actions meet this need.</p>
<ul style="list-style-type: none"> <li>• Educate the public and developers about the setback requirement and importance of the setback.</li> <li>• Improve enforcement.</li> <li>• Approve the National Physical Development Plan, currently in draft (since 2006), which mandates EIA.</li> </ul>	<p>The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures; and will assist the 10 countries with adaptation measures to mitigate the effects of climate change.</p>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Update and approve the LUP/Physical Plan for Nevis.</li> <li>• Implement activities from the Master Drainage Plan.</li> </ul>	<p>The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures; and will assist the 10 countries with adaptation measures to mitigate the effects of climate change.</p>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing SKN’s conservation of biodiversity and tropical forests.

Under Focus Area 1, Global Climate Change, the following are priority actions. USAID should consider the following actions in their strategic approach:

- (1) Update and implement activities from the Physical Plan/Master Drainage Plan for St. Kitts and Nevis as a means of supporting climate change adaptation measures. This should also include a public awareness campaign about wetlands, mangroves, and their roles in mitigating climate change impacts and in biodiversity conservation.
- (2) Support capacity-building for natural resources staff and raise awareness among politicians on climate change-related topics, especially climate-wise development. This could be incorporated into the above recommendation, or may be stand-alone.
- (3) Strengthen the environmental NGO sector so they can advocate and undertake projects for conservation of wetlands, mangroves, and other important ecosystems.

In addition to the above recommendations that address the root causes, the Assessment Team recommends the following to build on USAID’s substantial investment in marine ecosystem conservation in SKN. These recommendations address the root cause of limited capacity, and also address direct threats to marine biodiversity:

- (4) Support co-management arrangements. The TNC-implemented, USAID-funded project on marine zoning aims to designate a Marine Management Area (MMA), which would extend 2 miles out to sea around St. Kitts, Nevis, and Booby islands (project completion date is end of 2013). However, as the Assessment Team found, and as the TNC report states, the capacity of the country’s marine management agencies is limited and needs to be addressed for effective management of the MMA. The TNC report states that co-management arrangements are one possible mechanism to help supplement this capacity. In addition, several of those interviewed for this FAA 118/119 Assessment suggested co-management arrangements as a means to improved PA management. However, depending on the timing of a USAID intervention, preliminary steps to co-management may be needed, and should be considered for USAID support. The CEHI/GIZ (2013) baseline study, Section 2.6.8, provides a range of possible preliminary steps for support. Given USAID’s expertise and long history supporting co-management of PAs, the Assessment Team recommends that USAID support the establishment of a management protocol, including a management plan, for the MMA.

(5) Fill gaps in marine biodiversity knowledge and fund data collection on the use and characteristics of offshore habitats and current health of the marine ecosystem (e.g., coral reefs and fish populations). This data should be added to the information base already developed by the TNC project. The TNC report also states that predictions of future conditions in the marine ecosystem of SKN and the implications for resource management within the context of climate change should also be prioritized. The Assessment Team concurs with this recommendation, noting that it addresses climate change adaptation as well as biodiversity conservation, and is in line with USAID's Climate Change Focus Area.

The Assessment Team notes the significant impacts of inappropriate sand mining on biodiversity, and the request of Nevis stakeholders noted in the CEHI/GIZ report to minimize threats to the coastal environment. Therefore, the Assessment Team recommends that USAID consider the following recommendations in line with Focus Area 1:

- (1) Support the drafting of appropriate sand mining legislation and develop appropriate management plans for quarry sites.
- (2) Support the development of a Coastal Zone Plan for Nevis in a participatory and transparent manner.

The St. Kitts and Nevis CCVA recommends the following that would also contribute to biodiversity and forest conservation:

- (1) To strengthen the climate change adaptive capacity of SKN, an integrated institutional framework for managing their vulnerable terrestrial and marine ecosystems is needed. One approach to balancing social and economic demands on the coast with the protection of coastal ecosystems is by managing vulnerable areas using an integrated coastal zone management approach. Though the Physical Planning Departments and Environment Units in SKN identified a need for integrated coastal zone management, no current program or project is assisting with the development of such an initiative. USAID should consider financing the development of a program to strengthen institutional capacity within the framework of a federal coastal zone management unit for SKN.
- (2) Increase public support for biodiversity conservation. Given the fundamental importance of stakeholder "buy-in" at all levels to the effective implementation and maintenance of conservation initiatives for natural ecosystems, a priority action is to design and implement a public information and education strategy. USAID should consider financing the design and implementation of a public education and awareness program to support on-going ecosystem conservation and climate change management initiatives.



## REFERENCES

- Agostini, V. N., S. W. Margles, S. R. Schill, J. E. Knowles, and R. J. Blyther. 2010. *Marine Zoning in Saint Kitts and Nevis: A Path Towards Sustainable Management of Marine Resources*. The Nature Conservancy. Available on the Internet at: [http://www.marineplanning.org/Case\\_Studies/StKitts\\_Report.html](http://www.marineplanning.org/Case_Studies/StKitts_Report.html).
- Beard, J. S. 1949. *The natural vegetation of the Windward & Leeward Islands*. Oxford: Clarendon Press.
- Beaulieu, J, R Young, C Esser, D Rodrigues, R De Athe and B Scully. 1990. *Survey of the Marine Life, Coral Communities and Coastal Features of Nevis*. Unpublished, in files of the NHCS.
- Burdon, K. 1920. *A Handbook of St. Kitts-Nevis*. The West India Committee. London.
- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org.lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- Food and Agriculture Organization of the United Nations (FAO). (2010). *Global forest resources assessment 2010: Main report*. Rome: Food and Agriculture Organization of the United Nations. Available on the Internet at: <http://www.fao.org/docrep/013/i1757e/i1757e.pdf>.
- Global Environment Facility (GEF). 2012. St. Kitts and Nevis and the GEF. Available on the Internet at: [http://www.thegef.org/gef/country\\_fact\\_sheet/st-kitts-and-nevis-and-gef](http://www.thegef.org/gef/country_fact_sheet/st-kitts-and-nevis-and-gef).
- Government of St. Kitts and Nevis. 2008. *National Biodiversity Strategy and Action Plan for St. Kitts and Nevis: To the Convention on Biodiversity*.
- Horwith, B. and Lindsay, K. 1999. A Biodiversity profile of St. Kitts and Nevis. Prepared for the Nevis Historical and Conservation Society and The St. Christopher Heritage Society with funding from the UNDP/GEF Small Grants Programme. Available on the Internet at: <http://www.bio-diversity-nevis.org/Documents/Biodiversity%20Profile%20of%20SKN.pdf>.
- Lindsay, K and B Horwith. 1999. A Vegetation Classification of St. Kitts and Nevis: Implications for Conservation. Island Resources Foundation. Eastern Caribbean Biodiversity Programme. Antigua.
- Rodrigues, D. 1990. The Vegetation Zones of Nevis, West Indies. Vanier College, Canada.
- Trading Economics. 2013. Bird Species; Threatened in St. Kitts and Nevis. Available on the Internet at: <http://www.tradingeconomics.com/st-kitts-and-nevis/bird-species-threatened-wb-data.html>.
- United Nations Development Programme (UNDP). 2013. Request for Quotations RFQ130621: Protected Areas, Ecosystems and Biodiversity Expert. Available on the Internet at: [http://procurement-notices.undp.org/view\\_notice.cfm?notice\\_id=11514](http://procurement-notices.undp.org/view_notice.cfm?notice_id=11514).
- United Nations Environment Programme (UNEP). 2010. National Environmental Summary Federation of St. Kitts & Nevis. Available on the Internet at: [http://www.unep.org/drc/Portals/118/Documents/NESs/ROLAC/St%20Kitts%20Nevis\\_NES\\_2010\\_SIDS.pdf](http://www.unep.org/drc/Portals/118/Documents/NESs/ROLAC/St%20Kitts%20Nevis_NES_2010_SIDS.pdf).

USAID. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment, Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines. Available on the Internet at: <http://www.usaid.gov/documents/1862/faa-118119-tropical-forest-biodiversity-assessment>.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: St Kitts and Nevis.

U.S. Federal Geographic Data Committee (FGDC). 1997. National Vegetation Classification Standard. June. FGDC-STD-005. Available on the Internet at: <http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation>.

## ANNEX A: THREATENED SPECIES OF ST. KITTS AND NEVIS

### TABLE A1. IUCN RED LIST FOR ST. KITTS AND NEVIS

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008	stable
Animalia	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008	stable
Animalia	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008	decreasing
Animalia	<i>Alsophis rufiventris</i>	Orange-bellied Racer, Red-bellied Racer, Saba Racer	EN	1996	
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996	
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006	decreasing
Plantae	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998	
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
Animalia	<i>Dendrocygna arborea</i>	Black-billed Wood-duck, Cuban Tree-duck, West Indian Tree-duck, West Indian Whistling-duck, West Indian Whistling Duck, West Indian Whistling-Duck	VU	2012	increasing
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008	stable
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000	decreasing
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008	decreasing
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011	unknown
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
Animalia	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR	2008	decreasing
Animalia	<i>Hippocampus erectus</i>	Lined Seahorse, Northern Seahorse	VU	2003	decreasing
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008	decreasing
Animalia	<i>Iguana delicatissima</i>	Lesser Antillean Green Iguana, West Indian Iguana	EN	2010	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011	decreasing
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
Animalia	<i>Leptodactylus fallax</i>	Giant Ditch Frog, Mountain Chicken	CR	2010	decreasing
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996	
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011	decreasing
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008	decreasing
Animalia	<i>Montastraea faveolata</i>		EN	2008	decreasing
Animalia	<i>Montastraea franksi</i>		VU	2008	decreasing
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008	unknown
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008	decreasing
Animalia	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008	unknown
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008	unknown
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013	decreasing
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007	decreasing
Plantae	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998	
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008	decreasing

**TABLE A2. ST. KITTS AND NEVIS BIRD SPECIES OF SPECIAL CONSERVATION CONCERN**

Brown Pelican ( <i>Pelecanus occidentalis</i> )	Lesser Antillean endemic
Magnificent Frigatebird ( <i>Fregata magnificens</i> )	† Ruddy Quail-Dove ( <i>Geotrygon montana</i> )
† West Indian Whistling Duck ( <i>Dendrocygna arborea</i> )	† Burrowing Owl Fossil record only
West Indian endemic; Rare, Endangered in	† Barn Owl Anecdotal evidence only
† White-cheeked Pintail ( <i>Anas bahamensis</i> )	Mangrove cuckoo ( <i>Coccyzus minor</i> )
Ruddy Duck ( <i>Oxyura jamaicensis</i> )	Purple-throated Carib ( <i>Eulampis jugularis</i> )
Osprey ( <i>Pandion haliaetus</i> )	Green-throated Carib ( <i>Sericotes holosericeus</i> )
† Broad-winged Hawk ( <i>Buteo platypterus insulicola</i> )	Antillean Crested Hummingbird ( <i>Orthorhynchus cristatus</i> )
Peregrine Falcon ( <i>Falco peregrinus</i> )	endemic
Clapper Rail ( <i>Rallus longirostris</i> )	Caribbean Elaenia ( <i>Elaenia martinica rissii</i> )
Laughing Gull ( <i>Larus artricilla</i> )	Lesser Antillean Flycatcher ( <i>Myiarchus oberi</i> )
Roseate Tern ( <i>Sterna dougallii</i> )	Caribbean Martin ( <i>Progne dominicensis</i> )
Least Tern ( <i>Sterna antillarum</i> )	Scaly-breasted Thrasher ( <i>Margarops fuscus</i> )
Bridled Tern ( <i>Sterna anaethetus</i> )	Brown Trembler ( <i>Cinlocerthia ruficauda</i> )
Sooty Tern ( <i>Sterna fuscata</i> )	Yellow Warbler ( <i>Dendroica petechial bartholemica</i> )
Brown Noddy ( <i>Anous stolidus</i> )	† Antillean (Blue-headed)
Red-necked pigeon ( <i>Columba squamosa</i> )	Euphonia ( <i>Euphonia musica</i> )
White-crowned pigeon ( <i>Columba leucocephala</i> )	St.Kitts Bullfinch ( <i>Loxigilla portoricensis grandis</i> )
Zenaida Dove ( <i>Zenaida aurita</i> )	Lesser Antillean Bullfinch ( <i>Loxigilla noctis</i> )
Bridled Quail-Dove ( <i>Geotrygon mystacea</i> )	† Ruddy Quail-Dove ( <i>Geotrygon montana</i> )
† Ruddy Quail-Dove ( <i>Geotrygon montana</i> )	
Zenaida Dove ( <i>Zenaida aurita</i> )	

Rare; Vulnerable or Endangered; and /or Endemic

† = species suspected to exist in the country, but not documented

Source: UNDP, 2013.

# ANNEX B: MAPS

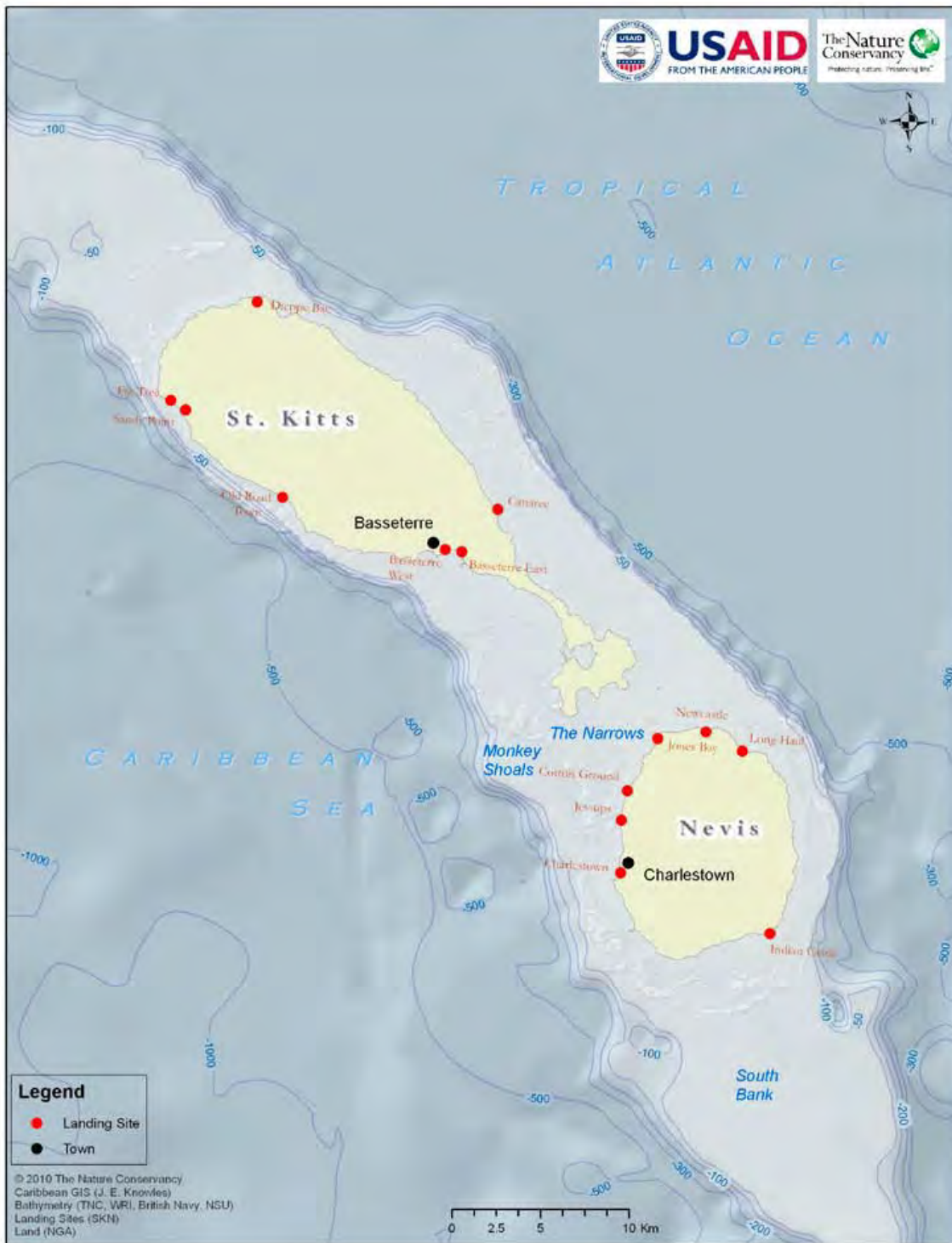
## FIGURE B1. ST. KITTS AND NEVIS



Source: NBSAP - Government of St. Kitts and Nevis, 2008



FIGURE B2. LANDING SITES: LOCATION OF FISH LANDING SITES IN ST. KITTS AND NEVIS



Source: Agostini et al, 2010

FIGURE B3. ST. KITTS BEACH EROSION HAZARD

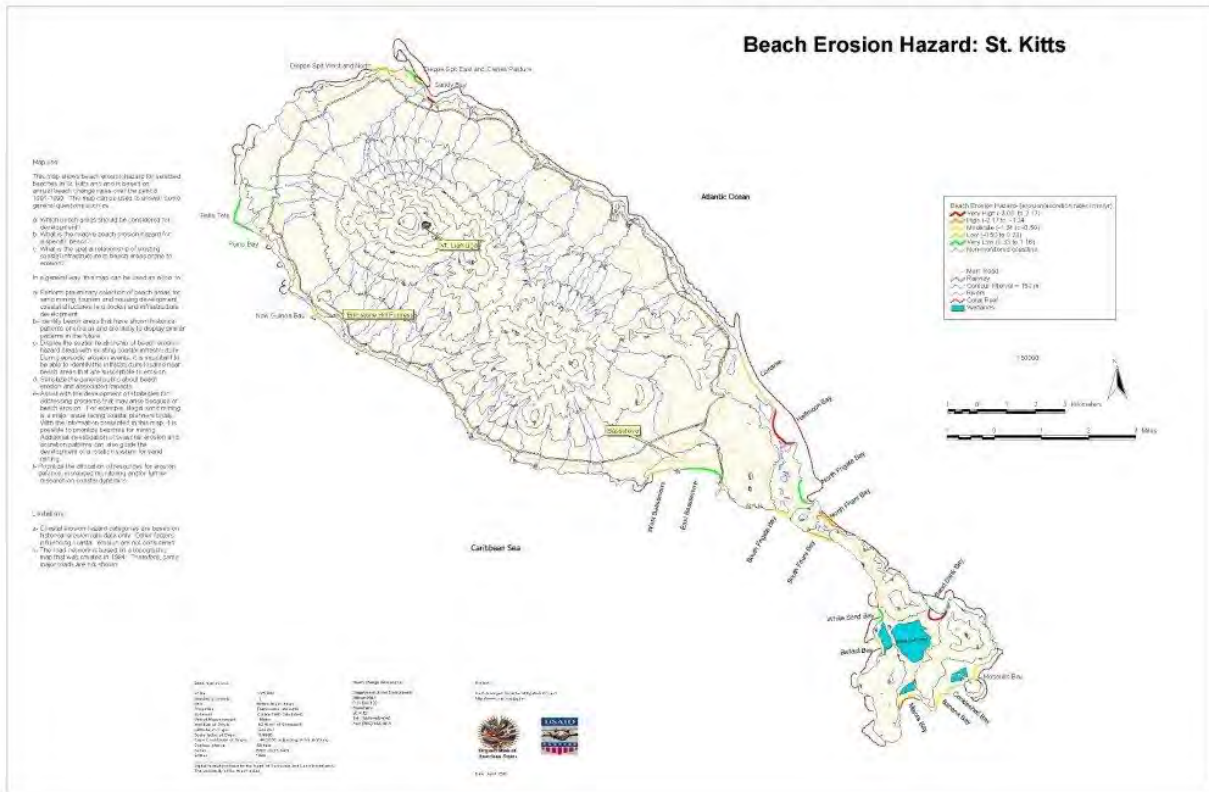


FIGURE B4. ST. KITTS NATURE RESERVES AND PARKS

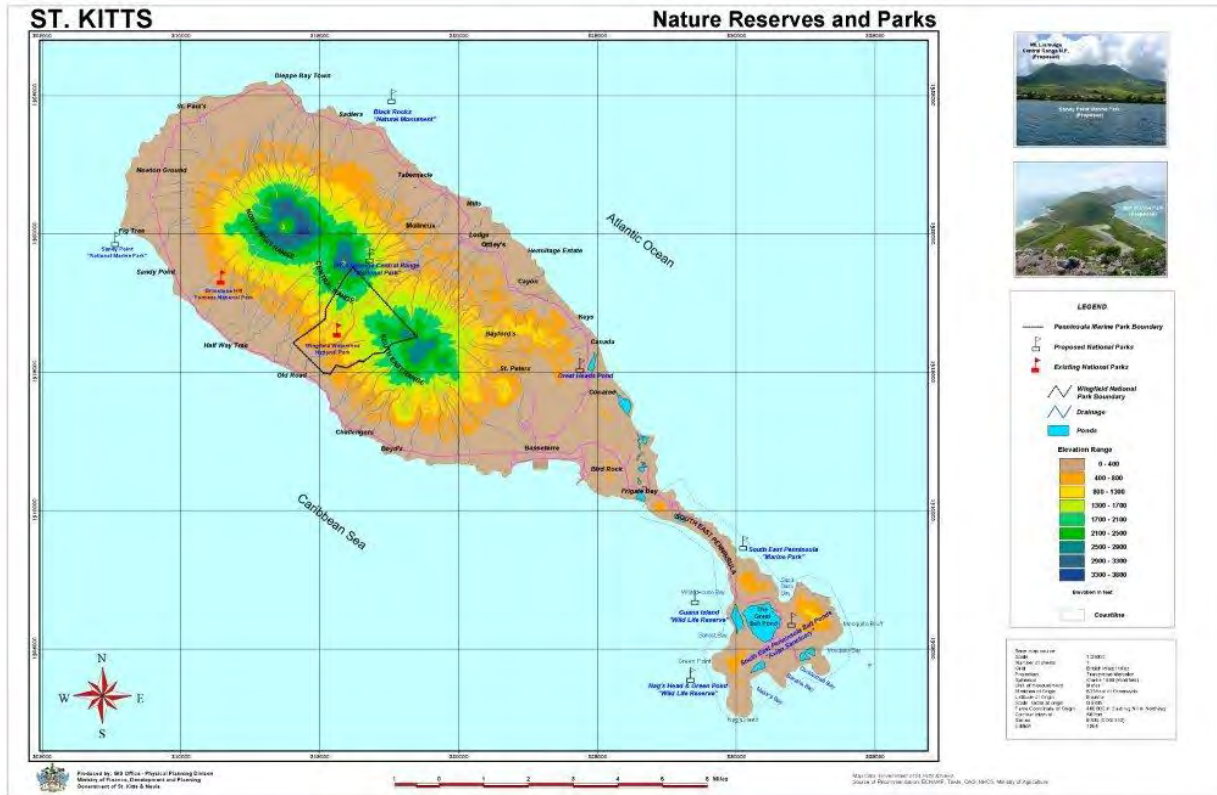
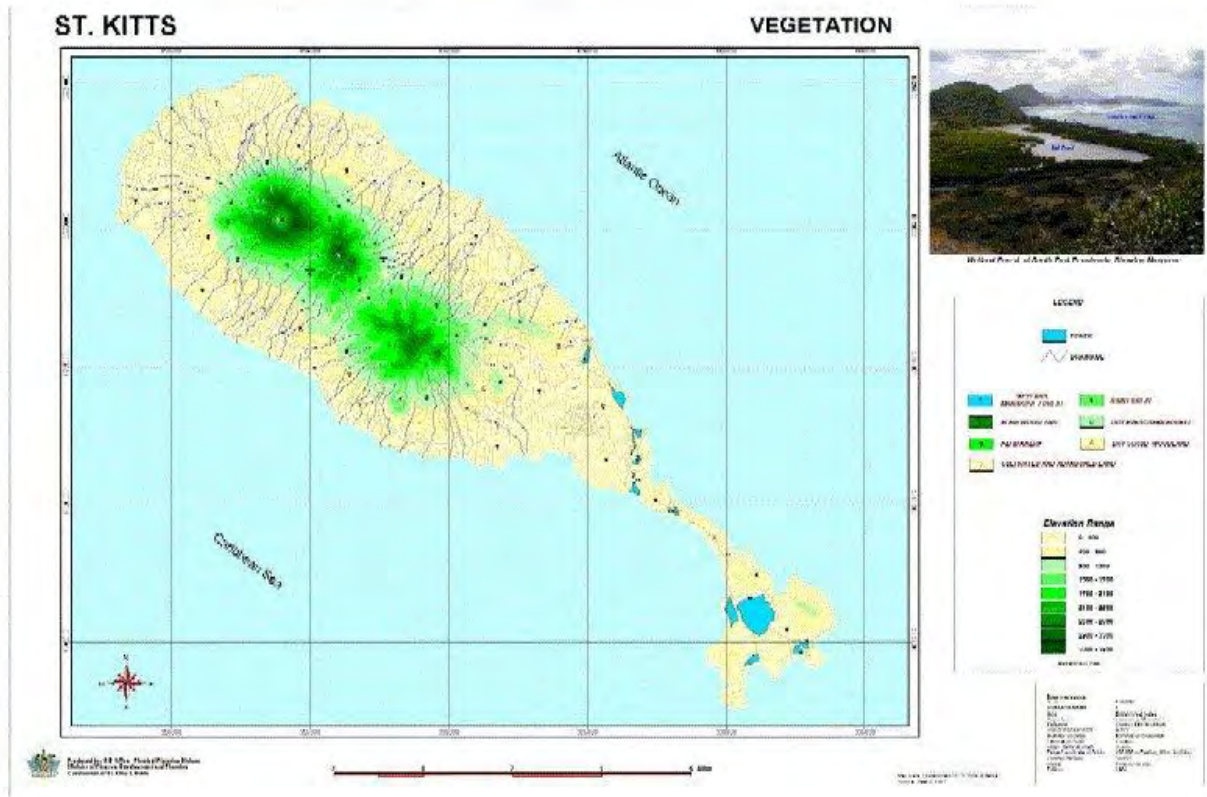


FIGURE B5. ST. KITTS VEGETATION



## ANNEX C: LIST OF CONTACTS

### TABLE C1. ST. KITTS CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Paul Benjamin	Agronomist	Min. of Agriculture	<a href="mailto:mpaanben@hotmail.com">mpaanben@hotmail.com</a>	(869) 465-3544	FG
Ian Chapman	Agricultural Officer	Dept. of Agriculture	<a href="mailto:ian.chapman@digicel.blackberry.com">ian.chapman@digicel.blackberry.com</a>	(869)465-2335	FG
Vesta Southwell	Public Relations Officer	NEMA	<a href="mailto:nemaskb@thecable.net">nemaskb@thecable.net</a>	(869) 466-5100	FG
Jermaine Lake	Env. Health Officer	Env. Health Dept.	<a href="mailto:lake.jermaine@yaoo.com">lake.jermaine@yaoo.com</a>	(869) 661-5797	FG
Livingston Pemberton	Engineer	PWD	<a href="mailto:livpembo@hotmail.com">livpembo@hotmail.com</a>	(869) 467-1122	FG
Dwight Francis	Director of Land & Surveys	Land and Survey	<a href="mailto:geoinformatics@gmail.com">geoinformatics@gmail.com</a>	(869) 467-1506	FG
Andy Blanchette	Conservation Officer	DPPE	<a href="mailto:ajblanchette@live.com">ajblanchette@live.com</a>	(869) 467-1055	FG
Elmo Stevens	Lab. Tech	Water Services Dept	<a href="mailto:shaki287@hotmail.com">shaki287@hotmail.com</a>	(869) 466-3070	FG
Teslyn Morris	Economist	Min. of Sustainable Development	<a href="mailto:teslyns@gmail.com">teslyns@gmail.com</a>	(869) 467-1249	FG
June Hughes	Senior Env. Officer	DPPE	<a href="mailto:ccodoe@sisterisles.kn">ccodoe@sisterisles.kn</a>	(869) 465-2277	FG
A. Jay Farier	Physical Planning Officer	DPPE	<a href="mailto:phyplskb@sisterisles.kn">phyplskb@sisterisles.kn</a>	(869) 465-2277	FG
Marc Williams	Director	Dept. of Marine Resources	<a href="mailto:dmrskn@gmail.com">dmrskn@gmail.com</a>	(869) 465-8045	IM
Randel Thompson	Fisheries Officer	Dept. of Marine Resources	<a href="mailto:randel.thompson24@gmail.com">randel.thompson24@gmail.com</a>	(869) 760-6058	IM

FG – Focus group

IM – Individual meeting

### TABLE C2. NEVIS CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Carl Williams	Assistant Secretary	Ministry of Tourism	<a href="mailto:carl.williams@niagov.com">carl.williams@niagov.com</a>	(869) 662-1552	FG-1
Ernie Stapleton	Permanent Secretary	Ministry of Communication and Works	<a href="mailto:ernies570@gmail.com">ernies570@gmail.com</a>	(869) 762-6739	FG-1



NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Vera Herbert	Secretary	National Disaster Management Office	<a href="mailto:odpnevis@yahoo.com">odpnevis@yahoo.com</a>	(869) 469-1423	FG-1
Charles Parris	Lab Technician	Nevis Water Department	<a href="mailto:parris-charles@hotmail.com">parris-charles@hotmail.com</a>	(869) 765-2482	FG-1
Gail Lawrence	Project Officer	Dept. of Statistics and Economic Planning	<a href="mailto:gail.lawrence@niagov.com">gail.lawrence@niagov.com</a>	(869) 469-2251 extn 2168	FG-1
Anglea Delpeche	Director	Dept. of Physical Planning	<a href="mailto:nevplan@yahoo.com">nevplan@yahoo.com</a>	(869) 469-5521 extn 2134	FG-1
Amelda Maynard-Sak	Planning and Development Manager	Nevlec	<a href="mailto:adak@nevlec.com">adak@nevlec.com</a>	(869) 469-7243/5 or 763-8382	FG-1
Dennis Browne	Project Supervisor	Nevis Housing and Land Development Corp.	<a href="mailto:rudybrowne200@hotmail.com">rudybrowne200@hotmail.com</a>	(869) 665-7117	FG-1
Evelyn Henville	Executive Director	Nevis Historical and Conservation Society (NHCS)	<a href="mailto:evelyn53@aol.com">evelyn53@aol.com</a>	(869) 661-3070	FG-1
Lindsey Archibald	Forestry Officer	Ministry of Agriculture	<a href="mailto:lindseyjohnny@hotmail.com">lindseyjohnny@hotmail.com</a>	(869) 664-2042	FG-2
Clive Wilkinson	Fisheries Asst.	Dept of Fisheries	<a href="mailto:cliwilks@hotmail.com">cliwilks@hotmail.com</a>	(869) 764-9999	FG-2
Keithley Amory	Director	Dept of Agriculture	<a href="mailto:doanevis@hotmail.com">doanevis@hotmail.com</a>	(869) 469-5521 extn 2087	FG-2
Eric Evelyn	Acting PS	Ministry of Agriculture	<a href="mailto:eric_evelyn@hotmail.com">eric_evelyn@hotmail.com</a>	(869) 663-8941	FG-2

FG-1 – Focus group 1

FG-2 – Focus group 2

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

ST. LUCIA

(FAA 118/119)



# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
LEGISLATION AND INSTITUTIONS.....	2
NON-GOVERNMENTAL ORGANIZATIONS.....	3
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	4
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	5
PROTECTED AREAS.....	5
THREATENED AND ENDANGERED SPECIES.....	6
STATUS AND MANAGEMENT OF FORESTS RESOURCES.....	7
TYPES OF FOREST.....	7
ECONOMIC IMPORTANCE.....	7
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	8
MANAGED NATURAL ECOSYSTEMS.....	8
EX-SITU CONSERVATION.....	9
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	9
DIRECT THREATS.....	9
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	11
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	13
FOCUS AREA 1.....	13
FOCUS AREA 2.....	13
FOCUS AREA 3.....	13
FOCUS AREA 4.....	13
CONCLUSIONS AND RECOMMENDATIONS.....	15
REFERENCES.....	17
ANNEX A: MAPS.....	19
FIGURE A1. FOREST RESERVES OF ST. LUCIA.....	19
FIGURE A2. TYPES AND LOCATIONS OF ST. LUCIA'S LAND USES AND VEGETATION.....	20
FIGURE A3. LOCATION OF REEFS IN ST. LUCIA.....	21
FIGURE A4. CRITICAL AREAS OF BIODIVERSITY INSIDE AND OUTSIDE OF EXISTING PROTECTED AREAS.....	22
FIGURE A5. PRIORITY BIODIVERSITY AREAS.....	23
ANNEX B: LIST OF CONTACTS.....	24
TABLE B1. CONTACTS.....	24
ANNEX C: THREATENED SPECIES OF ST. LUCIA.....	26
TABLE C1. IUCN RED LIST FOR ST. LUCIA.....	26

## REPORT FINDINGS

St. Lucia has 47,000 ha of forest and 10 forest types. Its forested area has remained about the same over the last decade. There are 1,432 species of flowering plants and ferns, 17 species of native reptiles, 10 species of native mammals, two native species of amphibians, 216 birds, and more than 1,400 species of beetles. Fifty-three species are threatened (37 marine, 24 terrestrial). Nine plants, six birds, seven reptiles, one amphibian, one mammal, and more than 200 beetles are endemic. There are 250 reef fish species and 50 coral species. Three threatened sea turtles nest on St. Lucia beaches.

Available documentation does not describe clearly the number, location, and categories of St. Lucia's protected areas (PA) and estimates of their number range from 51 to 80. Forest reserves cover 9,951 ha, about 15 percent of St. Lucia's geographic area. In addition to their importance for production of forest products, forested areas protect the watersheds that supply St. Lucia's drinking water. In 1986, St. Lucia declared 24 marine reserves, but no map is available of their location and they receive almost no funding.

The lead public agency for the conservation of biodiversity and tropical forests is the Ministry of Sustainable Development Energy, Science and Technology. The St. Lucia National Trust and the Soufriere Marine Management Association are the principal private/public conservation institutions involved in biodiversity conservation. There are no completely private conservation institutions.

International organizations that have worked or are working in St. Lucia are Durrell Wildlife Conservation Trust, Fauna and Flora International, The Nature Conservancy, and the World Resources Institute. St. Lucia is party to all the main international environmental and conservation agreements. The principal current conservation projects in St. Lucia are the National Bio-Safety Implementation Project and the Second National Biodiversity Strategy and Action Plan Islands without Aliens Project.

The primary direct threats to St. Lucia's biodiversity and tropical forests are coastal development, inadequate management of marine PAs, inadequate disposal of solid and liquid waste, the effects of climate change, and aggressive invasive species.

The principal indirect threats to St. Lucia's biodiversity and tropical forests are a lack of:

- Land use planning
- Political will to improve the policy framework for biodiversity conservation
- Adequate implementation of environmental impact assessments
- Sufficient reliable, up-to-date data
- Institutional capacity
- Representation of threatened biodiversity in PAs

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation

## LIST OF ACRONYMS

ADS	Automated Directives System
BMZ	Federal Republic of Germany/Ministry of Economic Development and Cooperation
CBD	Convention on Biological Diversity
CCVA	Climate change vulnerability assessment
CEHI	Caribbean Environmental Health Institute
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CMMA	Canaries/Anse la Raye Marine Management Area
CZMU	Coastal Zone Management Unit
DCA	Development Control Authority
EIA	Environmental Impact Assessment
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FFI	Fauna and Flora International
IUCN	International Union for the Conservation of Nature
MAFPFRD	Ministry of Agriculture, Food Production, Fisheries and Rural Development
MMA	Marine Management Area
MPA	Marine protection area
MPDHUR	Ministry of Physical Development, Housing and Urban Renewal
MSDEST	Ministry of Sustainable Development, Energy, Science and Technology
NBSAP	National Biodiversity Strategy and Action Plan
NEC	National Environmental Commission
NGO	Non-governmental organization
OECS	Organization of Eastern Caribbean States Protected area
PA	Protected Areas
PEPFAR	President's Emergency Plan for AIDS Relief
PPCR	Pilot Program for Climate Resilience
RDCS	Regional Development Cooperation Strategy
SDED	Sustainable Development and Environment Division
SFFA	Special Framework for Assistance
SLAPS	St. Lucia Animal Protection Society
SLNT	St. Lucia National Trust
SMMA	Soufriere Marine Management Association
SPAW	Protocol to the 1993 Cartagena Convention Concerning Specially Protected Areas and Wildlife in the Wider Caribbean
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
WRI	World Resources Institute

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the St Lucia component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID/Eastern and Southern Caribbean Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* The Assessment Team used the following sources for this Foreign Assistance Act (FAA) 118/119 Assessment: the Fourth National Report to the Convention on Biodiversity (MAFPFRD, 2009); reports on reptiles (Daltry, 2009a), vegetation (Graveson, 2009), and species (Morton, 2009); Forest Assessment of St Lucia (FAO, 2010) for information on St. Lucia's forests; Review of the Policy, Legal, Institutional Frameworks for Protected Areas Management in St. Lucia for St. Lucia's policy and legal framework for conservation (Gardner, 2007); the Web site of the St. Lucia Central Statistics Office for information on the economic value of St. Lucia's forests, fisheries, and agriculture (Central Statistical Office of St. Lucia, 2001); and Coastal Capital for information on the economic value of reefs in St. Lucia (Burke, 2008). The Reference section provides full details of these and other sources of information.

The Assessment Team interviewed 27 people, working in government institutions, non-profit organizations, and private sector enterprises (see Annex B, List of Contacts).

The Assessment Team undertook field trips along the west coast of St. Lucia between Castries and Soufriere, to the east of Soufriere in Fond St. Jacques, in the Central Forest Reserve and Parrot Reserve, in the Pigeon Island Historical Park, between Castries and Dennery, and on the east coast between Micoud and Vieux Fort, including the Mankote Mangrove Reserve.

*Information Gaps:* Quantitative data about St. Lucia's biodiversity and tropical forests are lacking. Available data for marine ecosystems mostly concern commercial fish species, while there are few data related to the extent and condition of the components of its marine ecosystems, such as the area and health of reefs and seagrass beds, trends in population of marine organisms, and the sources, characteristics, sites, and effects of various types of pollutants on marine biodiversity. Coastal water quality data are also limited; only one land-based pollution water quality study in the area around the capital city of Castries has been done by the Caribbean Environmental Health Institute (CEHI) in collaboration with St. Lucia government agencies in 2010 (Caribbean Environmental Health Institute, 2010). In the terrestrial ecosystems, species and forest resource surveys have been done but these studies are done on an ad-hoc basis when donor support is available. As such, there is little ongoing monitoring of the status of species and ecosystems that have been identified as critical for conservation or at risk (Department of Forestry, 2013)

## *General Country Description and Description of Ecosystems and Species Diversity*

St. Lucia is a volcanic island located in the Lesser Antillean Arc of the Caribbean Archipelago. It is the second largest island of the Lesser Antilles, with an area of 616 km<sup>2</sup>, and a population estimated at 166,838 residents.

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

Much of the island's interior is uninhabited and contains the majority of the forested areas. The major populations and centers of economic activity are concentrated along the coasts. This is largely a result of dependence on the natural resource base and biodiversity as drivers of the country's principle economic sectors of tourism and agriculture. Tourism is closely tied to the coastal beaches, reefs, and marine habitats whereas agriculture relies on exploitation of land resources and terrestrial biodiversity to maximize crop production (MAFPFRD, 2009).

The 2008 FAA 118/119 Assessment describes St. Lucia's species, ecosystems, and genetic diversity primarily using information from the National Biodiversity Strategy and Action Plan (NBSAP) submitted in 2000. Ecosystem descriptions from the 2008 assessment are still valid although a National Biodiversity Assessment completed in 2009 broadened the understanding of terrestrial species diversity on the island.

The rugged and mountainous terrain of St. Lucia provides for a variety of ecosystems and vegetation types including 10 different types of forest (lowland forest, transitional cloud forest, cloud forest, drought-deciduous forest, plantation forest, elfin forest, evergreen forest, seasonal forest, semi-deciduous forest, and mangrove forest) (FAO, 2010). Forest ecosystems are described in greater detail in Section D: Status and Management of Forest Resources, below. The Food and Agriculture Organization (FAO) of the United Nations' Forest Resource Assessment indicates that forest cover has remained constant at around 47,000 ha (FAO, 2010). St. Lucia's Fourth National Report to the Convention on Biological Diversity (CBD) states that species biodiversity is high and includes, among others, 1,288 species of flowering plants, 144 species of ferns, 17 species of native reptiles, 10 species of native mammals, two native species of amphibians, and more than 1,400 species of beetles.

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION AND INSTITUTIONS

There have been few changes in St. Lucia's policy and institutional framework since the 2008 FAA 118/119 Assessment and 2009 Fourth National Report. However, one key organizational change has occurred. The Department of Forestry, the focal point for several international conventions (CBD and the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)), was formerly seated within the Ministry of Agriculture, Food Production, Fisheries and Rural Development (MAFPFRD) but with the last change in government, the Department of Forestry was moved to the Ministry of Sustainable Development, Energy, Science and Technology (MSDEST). According to a Department of Forestry contact, this change in organization was made to re-focus the MAFPFRD's work only in sectors related to food production (Department of Forestry, 2013).

The MSDEST is one of the leading institutions for the conservation of St. Lucia's biodiversity and tropical forests more so now that it contains the Department of Forestry. The Department of Forestry implements the provisions of the Wildlife Protection Act No. 9 of 1980 and the Forest, Soil and Water Conservation Ordinance of 1946,<sup>2</sup> which authorizes the creation and management of wildlife and forest reserves. This Department provides active management of the forest reserves, which are considered some of the most well managed protected areas (PA) on the island (Haffey, 2009).

The MSDEST Water Resource Management Agency administers the National Water Authority Act<sup>3</sup> and the Water and Sewage Act of 1999 (OAS, 2005), however has yet to perform systematic data collection on status and quality of freshwater resources, which is part of its mandate (MAFPFRD, 2009). Its Coastal Zone Management Unit (CZMU) implements the Coastal Zone Management Strategy and Action Plan of 2008

---

<sup>2</sup> As amended in 1983

<sup>3</sup> As revised in 1994

(MAFPFRD, 2009), however is severely understaffed with only one current position and has very little capacity to manage coastal areas.

The MAFPFRD is the focal point for the CBD.<sup>4</sup> Within the MAFPFRD, the Fisheries Department is responsible for the protection of marine biodiversity, including marine reserves; “regulation of other marine based activities so as to mitigate negative impacts on the fishery sector and ensure the overall educational advancement of fishers;” administers the marine reserves that have been established under the Wildlife Protection Act No. 9 of 1980; and implements the Fisheries Act of 1984 and the Fisheries Regulation of 1994 (MAFPFRD, 2009). MAFPFRD’s Agriculture Department develops the “agricultural sector to ensure increased production of quality food and other commodities through environmentally sustainable management practices for the benefit of the entire population...” and supports “...the conservation of the country’s natural resource base” (MAFPFRD, 2013). It also implements the Land Conservation & Improvement Act of 1992, which established a Land Conservation Board with authority over land development and administers the Pesticides Control Act of 1975 and the Pesticides Control Regulations of 1987 (MAFPFRD, 2009).

MAFPFRD’s role in conservation of biodiversity derives from St. Lucia’s economic dependence on tourism, much of which is based on the attractions of its marine biodiversity and tropical forests, but it does not implement any conservation actions.

The Physical Planning Section of the Ministry of Physical Development, Housing and Urban Renewal (MPDHUR), operates under the provisions of the Physical Planning and Development Act of 2001. The Executive Secretary to the Development Control Authority (DCA) approves building and development plans and environmental impact assessments (EIA) and has legal authority to declare environmental protection areas in places “of natural beauty or natural interest, including submarine and subterranean areas” (Haffey, 2009).

The National Conservation Authority within the Ministry of Social Transformation manages recreational beaches. In 2008, the National Environmental Commission (NEC) was established to facilitate inter-agency collaboration and coordination. A lack of such a coordinating entity was a key institutional weakness identified in the 2008 118/119 Assessment (Edwards, 2008). However, contact reports indicate the inter-agency coordination remains a key challenge especially for joint management of mangroves and implementation of international conventions, such as CITES (Department of Forestry, 2013).

St. Lucia is signatory to the principal international conventions that concern the conservation of biodiversity and tropical forests, including the CBD, CITES, the Protocol to the 1993 Cartagena Convention Concerning Specially Protected Areas and Wildlife in the Wider Caribbean (SPAW), and the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat.

## NON-GOVERNMENTAL ORGANIZATIONS

There are few non-governmental organizations (NGOs) in St. Lucia with a permanent presence and involvement in the conservation of biodiversity. In general, the NGO and civil society sector was described by focus group participants to be weak (MSDEST, 2013). The St. Lucia National Trust (SLNT) is a private-public institution established under the National Trust Act of 1975 (St. Lucia National Trust, 2011) and manages 26 areas of cultural or ecological value. The SLNT describes itself as the only national NGO with a significant ongoing role in the conservation of biodiversity on the island and this appears to be true based on the Assessment Team’s field work and data collection. The St. Lucia Animal Protection Society organizes actions to protect sea turtle nests and eggs and promotes spaying of dogs and cats, animals which threaten

---

<sup>4</sup> MAFPFRD is the focal point for the Convention on Biodiversity only because this responsibility has not yet been transferred to MSDEST, which is a new ministry.



wildlife (SLAPS, 2013). The Soufriere Marine Management Association (SMMA), whose members include local government and private organizations, such as hotels and fishing cooperatives, manages the Soufriere and Canaries & Anse La Raye Marine Management Areas. The Soufriere Regional Development Foundation promotes the preservation of natural assets and integrated resource use planning in the Soufriere region and also collaborates with the SMMA on management of the marine reserves in this region.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

There are few international organizations and donors active in conservation of biological diversity in St. Lucia, but those present emphasize collaboration with the Government of St. Lucia. According to focus group participants, government conservation initiatives are often made possible by international donor and NGO projects and this sometimes results in government prioritizing national budgets for non-conservation activities or requiring matching funding when supporting conservation or other environmentally focused projects (MSDEST, 2013). The Assessment Team was unable to obtain information on funding levels of projects.

The Durrell Wildlife Conservation Trust is working with Fauna and Flora International (FFI) to protect the endangered whiptail lizard and the St. Lucia racer from invasive species. In 2009, The Nature Conservancy organized workshops with government and NGO stakeholders to identify geographic gaps in the protection of St. Lucia's biodiversity (World Bank, 2011). In 2008, the World Resources Institute (WRI) made an economic evaluation of St. Lucia's coral reefs and has done mapping of coral reefs (WRI, 2008).

The Nature Conservancy (TNC) is collaborating with the Government of St. Lucia to protect marine and coastal ecosystems as part of the Caribbean Challenge Initiative. The Caribbean Challenge Initiative works with 10 countries in the region to address the growing threats to the sea and its resources via establishment of new marine protected areas (MPAs) and creation of National Conservation Trust Funds.

The United Nations Environment Programme (UNEP) recently completed the Integrating Watershed and Coastal Area Management Project. Currently, it is implementing the National Bio-Safety Implementation Project and the Second NBSAP. The Critical Ecosystems Partnership Fund is implementing the Islands without Aliens Project. The Climate Investment Fund of the World Bank is financing the formulation and implementation of national policies and plans for increasing St. Lucia's resilience to climate change through its regional Pilot Program for Climate Resilience (PPCR) (Climate Investment Funds, 2013). The European Union (EU), under the Special Framework for Assistance (SFFA), now referred to as BAM, supported the National Demarcation and Bio-Physical Survey Project (SDED, 2013).

The Federal Republic of Germany/Ministry of Economic Development and Cooperation (BMZ) is funding a 4-year program (2013 to 2017) on Management of Coastal Resources and the Conservation of Marine Biodiversity in eight CARICOM countries. In St. Lucia, the marine biodiversity support component of the project will support the SMMA. The program also supports planning for the impacts of climate change.

The USAID climate change program assists the six OECS countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and resilience and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.

St. Lucia's regulations require all donor, foreign investor, and government projects to adhere to its environmental regulations and prepare EIAs when regulations require.



# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

Although St. Lucia's regulations define eight categories of PAs (Forest Reserves; Protected Forests; Environmental Protection Areas; Marine Reserves; Wildlife Reserve; Local Fisheries Management Areas; Cultural Heritage Sites; and Internationally Recognized Sites<sup>5</sup> (Gardner, 2007) available documentation does not describe clearly their number, location, and categories. Thus, the World Database of Protected Areas says there are either 51 or 80 PAs in St. Lucia (Encyclopedia of Earth, 2009). The Assessment Team could find no map of all of St. Lucia's PAs; Annex A, indicates the names, location, and size of only St. Lucia's forest reserves.

These forest reserves, which include private properties, cover 9,051 ha, the equivalent to 15 percent of the island's area, and include the lower montane, montane, cloud and elfin shrubland forest types (Graveson, 2009) and contain about 1.8 million tons of sequestered carbon (Daltry, 2009b). Because their purpose is the protection of St. Lucia's supplies of water for drinking, irrigation, and hydroelectric power, they are located mostly in the island's central mountains, where the watersheds of its principal rivers occur. The Central A and B Forest Reserves are particularly important to St. Lucia's economy and welfare, because their forests protect the watershed of the Roseau Reservoir, which supplies 89 percent of St. Lucia's drinking water (Daltry, 2009b). Reports and field observations indicate that the forest reserves are being managed and protected effectively and contacts concurred with these findings (Haffey, 2009; Department of Forestry, 2013).

In 1986, St. Lucia declared 24 marine reserves, but the Assessment Team was unable to locate a complete map of their locations. Most of them have not yet been mapped in detail or delimited physically, and they receive minimal funding from the national budget (Department of Fisheries, 2013). Figure A5, Annex A, however, indicates the location and use categories of the SMMA and the Canaries/Anse la Raye Marine Management Area (CMMA), each of which includes several of the marine reserves. According to a GIZ-CEHI report (2013), the SMMA is the most actively managed marine protection area (MPA) in the country. That the population of reef fish within the SMMA has increased since it was established, may indicate that it is being managed effectively, at least by prohibiting fishing within its boundaries (Burke, 2008), but the Assessment Team could locate no other data to evaluate its effectiveness in protecting biodiversity.

As part of TNC's Caribbean Challenge Initiative, which is an effort to protect marine and coastal ecosystems in the Caribbean, St. Lucia has committed to:

- Expand the MPA system to include at least 20 percent of its nearshore area by 2020
- Develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for the national PA system
- Develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and overuse

The Point Sable Environmental Protection Area is located along the southeast coastline and contains several PAs including the Mankote (60 ha) and Savannes Bay Mangroves (25 ha), both Ramsar sites, as well as the Pitons Management Area. The Pitons Management Area is a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, which extends from the Soufriere Bay to L' Ivrogne in the south and has 2,909 ha. It has 245 plant species, of which eight are rare tree species, and 27 bird species (five of them endemic), three indigenous rodents, one opossum, three bats, eight reptiles, and three

---

<sup>5</sup> Internationally Recognized Sites are World Heritage and Ramsar Sites

amphibians (UNESCO, 2013). The Maria Island Reserve, which lies off the southwest coast, is approximately 8 ha in size and is the only habitat of the endangered and endemic St. Lucia whiptail lizard and St. Lucia racer. The Forestry Department manages the Parrot Reserve, within the forest reserve, whose 1,320 ha are dedicated to the conservation of the St. Lucia Amazon parrot.

Annex A, Figure A5 indicates the location of the 24 additional PAs that the National Heritage Trust proposed in the 2009 draft of a Systems Plan for Management of Protected Areas. This was based on its analysis of priority areas for the conservation of biodiversity (Haffey, 2009). Since then, however, no action has been taken to declare these additional PAs.

## THREATENED AND ENDANGERED SPECIES

The International Union for Conservation of Nature (IUCN) Red List refers to species as ‘threatened’ if they fall within one of three Red List Categories: vulnerable, endangered, or critically endangered. Species that without conservation may become threatened are classified as near threatened. These Red List Categories indicate increasing degrees of threat of extinction of a species. According to the IUCN Red List, there are 53 threatened species in St. Lucia (see Annex C), of which 37 are marine and 16 are terrestrial. Of the threatened marine species, six are critically endangered, nine are endangered, and 22 are vulnerable. No marine plant species have been classified as threatened. Of the threatened terrestrial species, nine are animal species and seven are plant species. Of the threatened animal species one is critically endangered, four are endangered, and four are vulnerable. Of the threatened plant species, none are critically endangered, two are endangered, and five are vulnerable (IUCN, 2012). Annex C provides a complete listing of International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (species categorized as vulnerable, endangered, and critically endangered).

Among the 216 species of birds identified in the island, five are endemic. In addition, according to the IUCN Red List, five bird species are of special concern: the Semper’s warbler (*Leucopexa semperi*), listed as critically endangered; the St. Lucia black finch (*Melanospiza richardsoni*) and the white-breasted thrasher (*Ramphocinclus brachyurus*), categorized as endangered; and finally, the St. Lucia Amazon (*Amazona versicolor*) and the forest thrush (*Turdus lherminieri*), listed as vulnerable.

In marine ecosystems, at least 250 reef fish species and 50 coral species have been identified. Three threatened turtles are known to nest in the island: the hawksbill turtle (*Eretmochelys imbricata*) and the leatherback (*Dermochelys coriacea*), both listed as critically endangered, and the green turtle (*Chelonia mydas*), listed as endangered.

Nine plants, six birds, seven reptiles, one amphibian, one mammal, and more than 200 beetles are endemic to the country.

# STATUS AND MANAGEMENT OF FORESTS RESOURCES

## TYPES OF FOREST

Table 1 indicates the different types of forests and their areas in ha in St. Lucia as of 2010.

Table 1. Forest Characteristics

FOREST TYPE	2010 AREA (ha)
Lowland	29,759
Transitional Cloud	6,493
Cloud	1,062
Elfin	792
Seasonal	712
Evergreen	143
Plantation	1,206
Semi-deciduous	320
Drought-deciduous	6,978
Mangrove	164
<b>Total</b>	<b>47,629</b>

Source: (FAO, 2010)

St. Lucia's forest cover increased by 7,529 ha between 1971 and 2010 (FAO, 2010), mostly due to the natural re-establishment of forest on abandoned agricultural land. The 2009 National Biodiversity Report's analysis indicates that the deciduous and semi-evergreen seasonal forests support an even greater variety of indigenous species than the rainforests, including a larger number of island endemics and globally threatened species. However, the seasonal forests also contained the majority of alien invasive species and are not well protected within the existing PAs. This report estimates that forests not in the Forest Reserve system were four times more at risk from severe threats than forests inside the reserves (Daltry, 2009b; Department of Forestry, 2013). Deforestation occurs mostly in the 44 percent of St. Lucia's forest that is privately owned, mainly as a result of clearing for small-scale, shifting agriculture.

Other types of forest and vegetation are less widespread and under threat. Freshwater swamp forest, swamp redwood, and herbaceous swamps are very rare and under threat from habitat conversion for urbanization, housing, and other development. Important swamp redwood forest relics can still be found at Fond D'Or and Cul de Sac estuary (Graveson, 2009). Most of the remaining stands of swamp forests and vegetation are outside of PAs, where, according to contacts, they have not been well preserved (SDED, 2011). Fumarole vegetation, an acid tolerant vegetation class, is found only on the hillside of Mt. Souf near the Sulfur Springs (Department of Forestry, 2013).

## ECONOMIC IMPORTANCE

Charcoal is the only economic wood product being produced regularly from private forests (Daltry, 2009a). According to a contact, "Habitat restoration and rehabilitation is the primary focus of the Forestry Department and is supported by a recurring fund of US\$350,000. Previously there was a greater emphasis on silviculture and selective harvesting for wood production and sale. Now, however, most new Forestry

Department staff lack these skills; most know nothing about selecting trees to fell and other silvicultural practices” (Department of Forestry, 2013). None of St. Lucia’s forest area has been certified (SDED, 2013).

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

Annex A, Figure A2 shows three main land uses on St. Lucia. Various types of forest, indicated in several shades of green on the map, stretch in a band from the southwest to the northeast coast. Two small patches of mangrove forest on the southeast coast are indicated in blue. The largest built-up areas, shown in yellow, occur in the northeast quarter of the island, but also in the valleys that extend back from the southwest and eastern coasts and in a relatively large area on the southern end of the island. Various types of mixed farming, indicated on the map in several shades of brown, occur in the center and southeast.

#### *Agricultural Systems*

Primary cultivated crops in St Lucia are bananas, coconuts, cocoa, citrus, mangoes, and root crops, such as cassava, sweet potatoes, and yams. Approximately 12,000 ha are cultivated for these crops, however bananas are the mainstay of the sector comprising half of the cultivated area. Bananas account for 96 percent of the total agricultural exports of St. Lucia.

#### *Coral Reefs*

Annex A, Figure A3 indicates the types and locations of St. Lucia’s coral reefs, but the Assessment Team could locate no map of other marine ecosystems. Fringing reefs are found along all of St. Lucia’s coasts, however the most developed and extensive reefs are located along the island’s west coast. Narrow fringing reefs characterize the southeast coast close to shore. Coral reefs occur mainly along the southeast coast (Anse Des Sables), central west coast (off the districts of Anse La Raye, Soufriere, and Laborie), and northwest coast (Choc Bay). Reefs along the west coast are more diverse than those of the east. The northeastern reefs have been degraded by pollution from liquid waste and other runoff due to urbanization and continued poor agricultural land use in upper watersheds. The healthiest and most diverse reefs are found along the central portions of the west coast off the town of Soufriere (Scott, 1998).

#### *Marine fisheries*

A study from 2008 found the economic value of St. Lucia’s reefs for fisheries between US\$500,000 and US\$800,000, for tourism was between US\$160 and 194 million, and for shoreline protection between US\$28 million and US\$50 million (Burke, 2008). Commercially important reef fish include groupers, wrasses, snappers, grunts, squirrelfish, goatfish, boxfish, and surgeonfish. Commercially important coastal pelagic fish are jacks, ballyhoo, and sardines and commercial migratory pelagic fish are king mackerel, wahoo, dolphin fish, tunas, flying fish, billfish, and swordfish. Several shark species and 27 species of mammals, including several whale species, migrate through St. Lucia’s marine waters.

#### *Beaches*

St Lucia’s numerous beaches are located along the entire coastline, however the western beaches are typically calmer, while the eastern side beaches are subject to the influence of the Atlantic Ocean. From November to January, beaches are important sea turtle nesting grounds for loggerhead and leatherback sea turtles.

## Mangroves

Eighteen mangrove sites have been identified in St Lucia, according to the FAO (2005); five species of mangrove were identified in St Lucia, including *Rhizophora mangle*, *Laguncularia racemosa*, and *Avicennia germinans*. Twelve PAs contain mangroves and coverage of mangrove remained fairly stable (200 ha) between 1980 to 2002. More recent information is unavailable.

## Freshwater resources

There are 37 watersheds or river basins in St. Lucia. While a hydrological network was installed in the mid-1980s, available surface water estimates have not been calculated. Groundwater is scarce and generally not developed for use.

## EX-SITU CONSERVATION

The Forestry Department maintains collections of economically valuable plants, such as medicinal plants, fruit trees, flowering plants, and herbs and operates the Mini-Zoo on Union Island, which has St. Lucia whiptail lizards and Amazon parrots. The St. Lucia National Trust has a small collection of native medicinal plants. The Diamond Falls Botanical Garden on Soufriere Island has many species of native and exotic plants.

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

The Assessment Team identified the major conservation issues primarily from stakeholder meetings and confirmed them via reference to reports, particularly the NBSAP and National Reports to the CBD, as well as personal observations during field site visits.

## DIRECT THREATS

(1) **Coastal development.** A contact said, “Coastal development, especially large-scale hotels, is a huge threat to sensitive areas” on the west and east coasts and another contact noted that development is threatening the conservation of even the Piton World Heritage Site and noted “Every tourism advertisement sells the natural beauty of the island; at the same time touristic development projects and policies are causing the destruction of the island’s natural beauty on which tourism depends” (SLNT, 2013). Investment in hotels drives much of St. Lucia’s coastal development projects, so the decisions and actions of hotel businesses strongly affect coastal conservation. While some hotels, according to a contact, “understand the importance of the environment for the quality of their tourism product”, others, “...that have been around for shorter periods do not have this same level of commitment. Sandals Hotel, for instance, constructed pilings below the high-water mark in certain areas where the zoning was not clear regarding where construction was permitted” (SDED, 2013). The latest National Report to the CBD, confirms that land use conversion and resulting habitat destruction is a priority threat to biodiversity (MAFPFRD, 2009).

(2) **Inadequate management of marine protected areas** contributes to haphazard coastal development. One contact said, “There is no formal delimitation of these protected areas. They are just declared on paper and very little study and mapping of them has taken place. This is an issue as many of these areas are along the shoreline. The lack of clear lines where the marine reserve ends can create opportunity for private land owners to dispute the protection of coastal areas that they would like to develop. The law is that private land ends at the high water mark” (SDED, 2013).

(3) A specific land use issue that will affect conservation of biodiversity involves the **construction of a new road to northeast Ivanola region of St. Lucia**. Northeastern St. Lucia above the east coast city of Dennery, is currently almost inaccessible by vehicles but the new road will permit access and "...may increase the human population, increase construction, and cause changes in land use." Another contact said, "The Ivanola road project will be a true test of the Government of St. Lucia's commitment to sustainable development and ability to ensure preservation of important biodiversity areas" (SDED, 2011).

(4) **Inadequate disposal of solid and liquid waste** is an important conservation issue, mostly because of their negative effects on reefs. According to national reports to the CBD, decreases in reef cover attributed to sedimentation have occurred at alarming rates from 1995 to 2001; reefs off the central west coast around Soufriere, lost an average of 47 percent of coral reef cover in shallow waters and 48 percent in deeper waters; a trend which is continuing. This report to the CBD also indicates that near shore fisheries are threatened by sedimentation and losses in reef cover (MAFPFRD, 2009).

A CEHI land-based pollution hotspot study found that several areas of the west coast, where the most diverse and healthy reefs are found, are under high threat from land based sources of pollution and several coastal areas suffer from fecal coliform loading well above the limits for all four rivers sampled (CEHI, 2010).

(5) **Climate change**. Effects are most evident on St. Lucia's reefs. In 2005, high sea water temperatures caused large areas of reef to die. A contact said, "St Lucia used to be one of the top 10 dive destinations in the world and is now not even in the top 10, although the reefs are recovering" (SDED, 2013). Severe storms such as Hurricane Tomas, also produced noticeable damage to coral reefs, as reported by contacts (Scuba Steve's Diver Center, 2013).

(6) **Aggressive alien invasive species** are affecting St. Lucia's biodiversity. Lionfish, a voracious predator on ecologically and economically important marine species (REEF, 2012), according to one contact, were first seen in March 2012. A contact said, "We are going to have to live with the lionfish. We are not looking at complete removal because it is not possible, so our focus is on keeping the population at a manageable level by doing culling, organizing marketing events with restaurants and chefs to promote people eating this fish, training fishermen to catch and prepare these fish, and public events to raise awareness of the possible uses of the lionfish."

There are 289 non-native plant species deliberately or accidentally established. Some of the most invasive plants are common bamboo (*Bambusa vulgaris*), African tulip tree (*Spathodea campanulata*), water hyacinth (*Eichornia crassipes*), and leucaena (*Leucaena leucocephala*). Terrestrial invasive fauna, such as the mongoose, rats, feral pigs, and opossum threaten several endangered, endemic birds, reptiles, and turtles (i.e., St. Lucia iguana, St. Lucia nightjar, nesting sea turtles) (Daltry, 2009a).

A contact from the MAFPRD Research Dept. reported that the island's quarantine system implemented by the Dept. of Phytosanitary Inspection functions quite well at the two major ports of Castries and Vieux Fort. However, visiting yachtsmen access the island from many coastal harbors not well policed by inspection and quarantine services. Visiting yachtsmen are the expected source of introduction of the Asian citrus psyllid, which is an alien insect that carries a major citrus disease, 'citrus greening' (Ag. Research, MAFPRD, 2013).

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity and is based on the information and perspectives gathered from meetings with key contacts, field visits to forest and marine reserves, and literature review. For long-term, sustainable results, the root causes of the threats to biodiversity must be addressed with targeted actions necessary for conservation of tropical forests and biodiversity, these are presented in Table 2, below.

Table 2. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
<p>Lack of land use planning and of political will to improve policy framework for biodiversity conservation</p> <p>A contact noted, "The country has neither a national land use plan, development plan, building code nor zoning regulations to guide the development and build-up of land (SDED, 2013) (DCA, 2013).</p>	<ul style="list-style-type: none"> <li>• Demonstrate the economic and cultural value of biodiversity resources through willingness to pay and ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on St. Lucia's biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts).</li> <li>• Develop and/or implement a National Land Use Policy, National Development Policy, National Building Code, zoning regulations, Forest Policy (2008), Systems Plan for Protected Areas (2009), National Environmental Management Policy, Environmental Management Act, and Biodiversity Conservation and Sustainable Use Act, especially related to better management of marine resources.</li> <li>• Improve clarity of Ministry roles for implementation of CITES and specify date of commencement.</li> <li>• Increase capacity of decision-making and high impact segments of the population regarding the importance of proper planning, assessment, and land use relative to critical habitats, species, and protected areas.</li> <li>• Strengthen environment sector NGOs so they can advocate for development and implementation of an improved policy framework for biodiversity conservation.</li> </ul>
<p>Limited implementation of environmental impact assessments</p> <p>A contact said, "The EIAs are what is used to protect the flora and fauna. The EIA needs to be emphasized, the monitoring aspect of the EIA is critical, to make sure that the construction is done in accord with the EIA's provisions. Physical Planning has the mandate to do this type of monitoring however we do not have the funds to do it."</p>	<ul style="list-style-type: none"> <li>• Prosecute offenders who do not comply with land-use restrictions or with EIA requirements.</li> <li>• Train in implementation, monitoring, and enforcement of EIA.</li> </ul>



ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
<p>Lack of sufficient reliable, up-to-date data limits the ability of decision-makers and professionals to manage and protect St. Lucia's biodiversity and forests based on scientific data.</p>	<ul style="list-style-type: none"> <li>• Improve existing and establish additional data management systems for key parameters of priority species/ecosystems, such as MPAs and coral reefs, using automated and ongoing monitoring. Promote an easily accessible biodiversity information network.</li> <li>• Delineate and map all existing marine reserves and protected areas.</li> <li>• Conduct routine ecosystem health assessments (particularly for marine environment which has not had a biodiversity study in over 10 years).</li> <li>• Use recognized and standard methodology for data collection and increase capacity in monitoring and analysis.</li> </ul>
<p>Limited capacity of the institutions responsible for conservation. One aspect of institutional capacity concerns lack of sufficient numbers of personnel with adequate training. A contact said, "The available resources are stretched very thin, the same staff is doing all the education and enforcement there is a deficit of human resources." (SDED, 2013) The CZMU has only one of its authorized three staff members. Of the US\$818,834 budgeted in 2004 to 2005 only 1 percent of this funding was spent on management of protected areas. According to reports, only twelve of the total 24 reserves are under 'sub-active to active management'.</p>	<ul style="list-style-type: none"> <li>• Increase funding, personnel, monitoring, and enforcement for biodiversity-related agencies, via public-private partnerships and user-fee ecosystem service charges.</li> <li>• Invest in coastal water quality protection (improvements to the outdated sanitation plant and land use, reforestation, soil and water conservation interventions in critical areas of the upper watershed).</li> </ul>
<p>Threatened biodiversity is not sufficiently represented in St. Lucia's PA system: Little or no deciduous seasonal, semi-evergreen forests, redwood swamp, freshwater swamp forest, and herbaceous vegetation types, for example, lie within St. Lucia's PAs, although they provide habitat for several of its endemic threatened species.</p>	<ul style="list-style-type: none"> <li>• Accelerate approval and implement environmental laws and regulations that are currently not in place or are outdated, such as Systems Plan for Protected Areas.</li> <li>• Apply and ramp up best practices (i.e., SMMA) for the improved management and protection of marine resources.</li> <li>• Identify and map existing and proposed MPAs.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 3 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCCS.

### FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

Economic Growth: Under the new RDCCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID Mission to Barbados and the Eastern Caribbean (USAID/BEC) region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

### FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID’s HIV/AIDS program will continue to be funded through the President’s Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the USAID/BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 3. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Demonstrate the economic and cultural value of biodiversity resources through willingness to pay and ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on St. Lucia’s biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts).</li> <li>• Develop and/or implement a National Land Use Policy, National Development Policy, National Building Code, zoning regulations, Forest Policy (2008), Systems Plan for Protected Areas (2009), National Environmental Management Policy, Environmental Management Act, and Biodiversity Conservation and Sustainable Use Act.</li> <li>• Improve clarity of Ministry roles for implementation of CITES and specify date of commencement.</li> <li>• Increase capacity of decision-making and high impact segments of the population regarding the importance of proper planning, assessment, and land use relative to critical habitats, species, and protected areas.</li> <li>• Strengthen environment sector NGOs so they can advocate for development and implementation of an improved policy framework for biodiversity conservation.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>
<ul style="list-style-type: none"> <li>• Prosecute offenders who do not comply with land-use restrictions or comply with EIA requirements</li> <li>• Train in implementation, monitoring, and enforcement of EIA.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>
<ul style="list-style-type: none"> <li>• Improve existing and establish additional data management systems for key parameters of priority species/ecosystems using automated and ongoing monitoring. Promote an easily accessible biodiversity information network.</li> <li>• Delineate and map all existing marine reserves and protected areas.</li> <li>• Conduct routine ecosystem health assessments (particularly for marine environment which has not had a biodiversity study in over 10 years).</li> <li>• Use recognized and standard methodology for data collection and improved monitoring and analysis capacity.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>
<ul style="list-style-type: none"> <li>• Increase funding, personnel, monitoring, and enforcement for biodiversity-related agencies, via public-private partnerships and user-fee ecosystem service charges.</li> <li>• Invest in coastal water quality protection.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Accelerate approval and implementation of environmental laws and regulations that are currently not in place or are outdated.</li> <li>• Apply and ramp up best practices (i.e. SMMA) for the improved management and protection of marine resources</li> <li>• Identify and map existing and proposed MPAs.</li> </ul>	<p>Focus Area 1 will assist countries with adaptation measures to mitigate the effects of climate change integrating the private sector, NGOs, and local communities.</p>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing St. Lucia’s conservation of biodiversity and tropical forests.

Under Focus Area 1: Global Climate Change, USAID should consider supporting the following into their strategic approach:

- (1) As coastal resources are an important component of St. Lucia’s economy, management of coastal resources, including beaches, mangroves, and coral reefs, USAID should support the development of a Land Use Plan to guide development decisions and control coastal development, with an aim to protect biodiversity and plan for climate change impacts.
- (2) USAID should consider strengthening the environmental NGO sector, in particular with a focus on NGOs that involve youth in environmental projects and advocacy. The focus on advocacy NGOs will help build a community that can advocate for an improved policy framework for biodiversity conservation and can serve an oversight role as “watchdogs.” USAID should also focus on strengthening NGOs that can help implement conservation projects. This could help illustrate the importance of biodiversity conservation (economic, cultural, and biological value), while providing youth at risk with job opportunities.
- (3) Support development of a permanent, reliable system and database to obtain, process, and analyze data, including spatial and temporal data for coastal resources. Currently, no maps exist of MPAs which leads to conflicts where coastal development is allowed. According to the GIZ-CEHI report, St Lucia lacks staff capacity for day-to-day management of coastal resources. USAID should support training for long-term use as well as dissemination of data. This would help guide climate-wise development, evaluate climate-related impacts, and could serve as an early warning for impacts to biodiversity. The US Forest Service could help in the establishment of these standard methods for data collection and monitoring (Department of Forestry, 2013).
- (4) Support development of willingness to pay and ecosystem services valuation studies in marine and terrestrial environments to demonstrate value of biodiversity to the overall community. In conjunction with this, USAID should support dissemination of information on St. Lucia’s biodiversity value (i.e., intact biodiversity, WRI valuation of coastal reefs for tourism and protection of coasts) to generate stakeholder support and community involvement in coastal management.

The St. Lucia Climate Change Vulnerability Assessment (CCVA) recommends the following that would also contribute to biodiversity and forest conservation:

- (1) Support for increased public awareness and involvement regarding the value of St. Lucia's land and marine resources to better design and implement conservation and management measures.
- (2) Building of NGO and Government Department capacity in support of designing and carrying out climate change vulnerability reduction activities. The focus should be on broadening the number of capable actors and reinforcing existing groups.
- (3) The promotion and implementation of an island-wide land use planning model that is accompanied by practical application of sound planning concepts in relation to climate change. This could include be in relation for example, land use planning and building standards.
- (4) Support for targeted data collection, analysis, and distribution to establish a baseline understanding of natural resources and to inform conservation and planning efforts.

## REFERENCES

- Burke, L. 2008. Coastal Capital: Economic Valuation of Coral Reefs in Tobago and St. Lucia. WRI.
- Caribbean Environmental Health Institute. 2010. Coastal Water Quality Demonstration Project towards the minimization of land-based sources of marine pollution in St. Lucia Phase I and II. Caribbean Environmental Health Institute.
- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- Central Statistical Office of St. Lucia. 2001. Saint Lucia's Compendium of Environmental Statistics. Government Statistics Department.
- Climate Investment Funds. 2013. Strategic Program for Climate Resilience St. Lucia. Cape Town: Climate Investment Funds.
- Daltry, J. C. 2009a. Biodiversity Assessment of St. Lucia's Forests, with Management Recommendations. Helsinki, Finland: Finnish Consulting Group.
- Daltry, J.C. 2009b. The Status and Management of Saint Lucia's Forest Reptiles and Amphibians: Technical Report No. 2 to the National Forest Demarcation and Bio-Physical Resource Inventory Project. Helsinki, Finland: FCG International Ltd.
- DCA. 2013. Planning Section and Development Control Authority. June 7. (B. Kernan, Interviewer)
- Department of Fisheries. 2013. Department of Fisheries. June 4. (B. Kernan, Interviewer)
- Department of Forestry. 2013. Department of Forestry. June 5 and 7. (B. Kernan, Interviewer)
- Edwards, T. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment: Antigua & Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and The Grenadines. USAID.
- Encyclopedia of Earth. 2009. Protected Areas of St. Lucia. May 27. Retrieved June 2013, from Encyclopedia of Earth: [http://www.eoearth.org/article/Protected\\_areas\\_of\\_Saint\\_Lucia](http://www.eoearth.org/article/Protected_areas_of_Saint_Lucia)
- FAO. 2010. Global Forest Resources Assessment 2010 Country Report: St. Lucia. Rome: FAO.
- Gardner, L. 2007. Review of the Policy, Legal, Institutional Frameworks for Protected Areas Management in St. Lucia. OECS-Environment and Sustainable Development Unit.
- Graveson, R. 2009. National Forest Demarcation and Bio-Physical Resource Inventory Project: The Classification of the Vegetation of St. Lucia. Helsinki, Finland: Finnish Consultancy Group (FCG) International Ltd.
- Haffey, D. 2009. A Systems Plan for Protected Areas in Saint Lucia. OECS PAALP.

IUCN. 2012. IUCN Red List of Threatened Species. Version 2012.2. Retrieved May 20, 2013, from IUCN Red List.

MAFPFRD. 2009. St. Lucia Fourth National Report to the Convention for Biological Diversity. Government of Saint Lucia.

MAFPFRD. 2013. Department of Agriculture. Retrieved June 2013, from St. Lucia Ministry of Agriculture Food Production, Fisheries and Rural Development:  
[http://www.malff.com/index.php?option=com\\_content&view=article&id=46&Itemid=53](http://www.malff.com/index.php?option=com_content&view=article&id=46&Itemid=53)

Morton, M. N. 2009. Management of Critical Species on Saint Lucia: Species Profiles and Management Recommendations. Helsinki, Finland: FCG International Ltd.

MSDEST. 2013. Focus Group Discussion. June 3. (B. Kernan, Interviewer)

OAS. 2005. Saint Lucia: Main Water Issues. Retrieved June 2013, from Environmental Law, Policy and Economics: [http://www.oas.org/usde/environmentlaw/WaterLaw/Saint\\_Lucia.htm](http://www.oas.org/usde/environmentlaw/WaterLaw/Saint_Lucia.htm)

REEF. 2012. Lionfish Research Program. Retrieved June 2013, from REEF: <http://www.reef.org/lionfish>

Saint Lucia National Trust. 2011. Saint Lucia National Trust. Retrieved May 15, 2013, from Sites and Protected Areas: <http://slunatrust.org/sites>

Scott, S. 1998. Marine and Coastal Ecosystems. Government of St. Lucia.

Scuba Steve's Driver Center 2013. June 9. (H. Eysenbach, Interviewer)

SDED. 2011. Second National Communication on Climate Change for Saint Lucia. Ministry of Physical Development and Environment.

SDED, M. 2013. June 7. (B. Kernan, Interviewer)

SLAPS. 2013. Working for Animal Welfare. Retrieved June 2013, from St. Lucia Animal Protection Society: <http://www.stluciaanimals.org>

SLNT. 2013. Saint Lucia National Trust. June 7. (B. Kernan, Interviewer)

UNESCO. 2013. Pitons Management Area. Retrieved June 2013, from UNESCO World Heritage Centre: <http://whc.unesco.org/en/list/1161/>

USAID. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment, Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines. Available on the Internet at: <http://www.usaid.gov/documents/1862/faa-118119-tropical-forest-biodiversity-assessment>.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: St Lucia.

World Bank. 2011. Eastern Caribbean Countries to Protect 100,000 Hectares of Fragile Ecosystem. Retrieved from World Bank News: <http://www.worldbank.org>

WRI. 2008. Millennium Coral Reef Mapping Project. WRI.



# ANNEX A: MAPS

## FIGURE A1. FOREST RESERVES OF ST. LUCIA

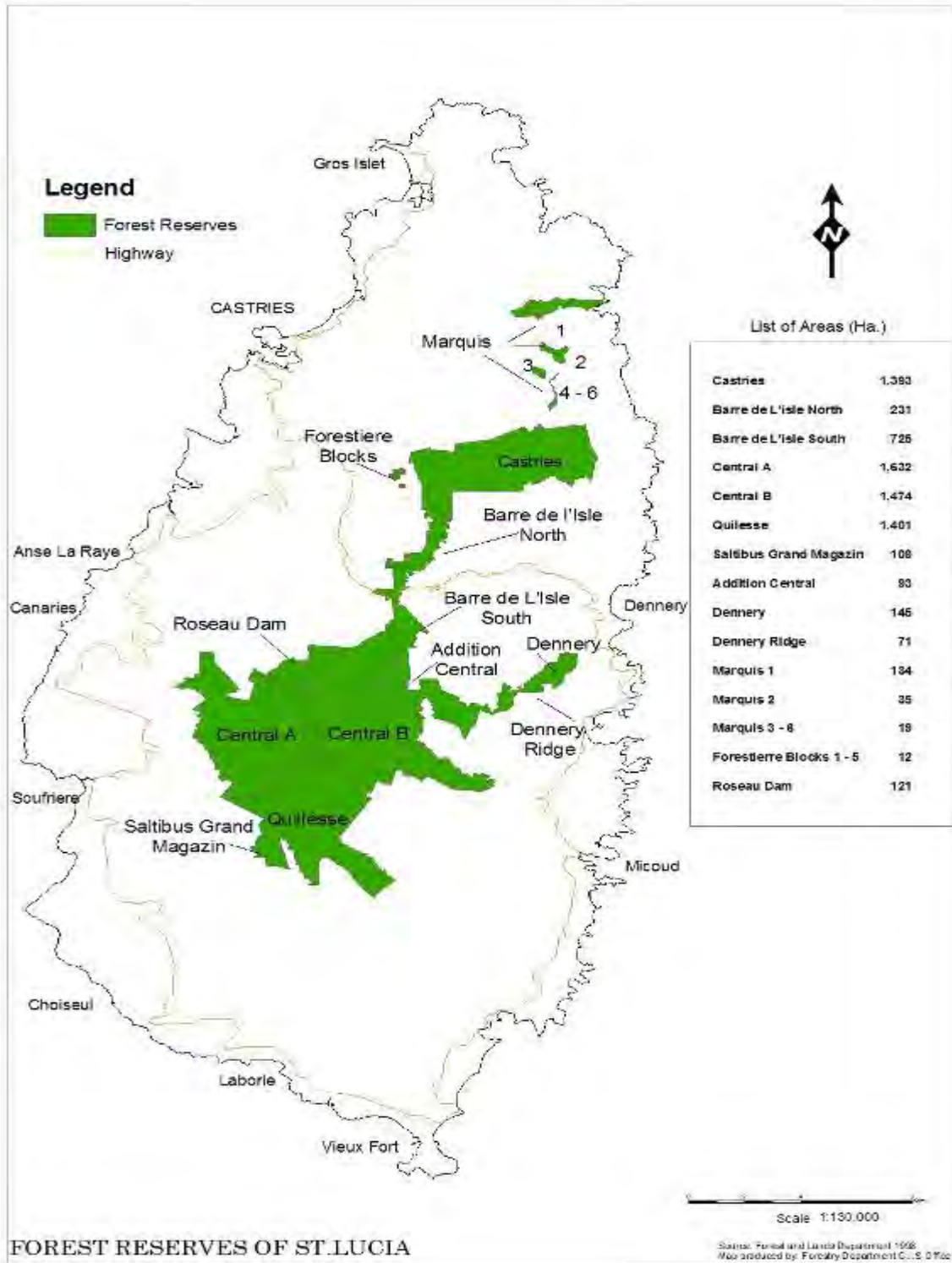


FIGURE A2. TYPES AND LOCATIONS OF ST. LUCIA'S LAND USES AND VEGETATION

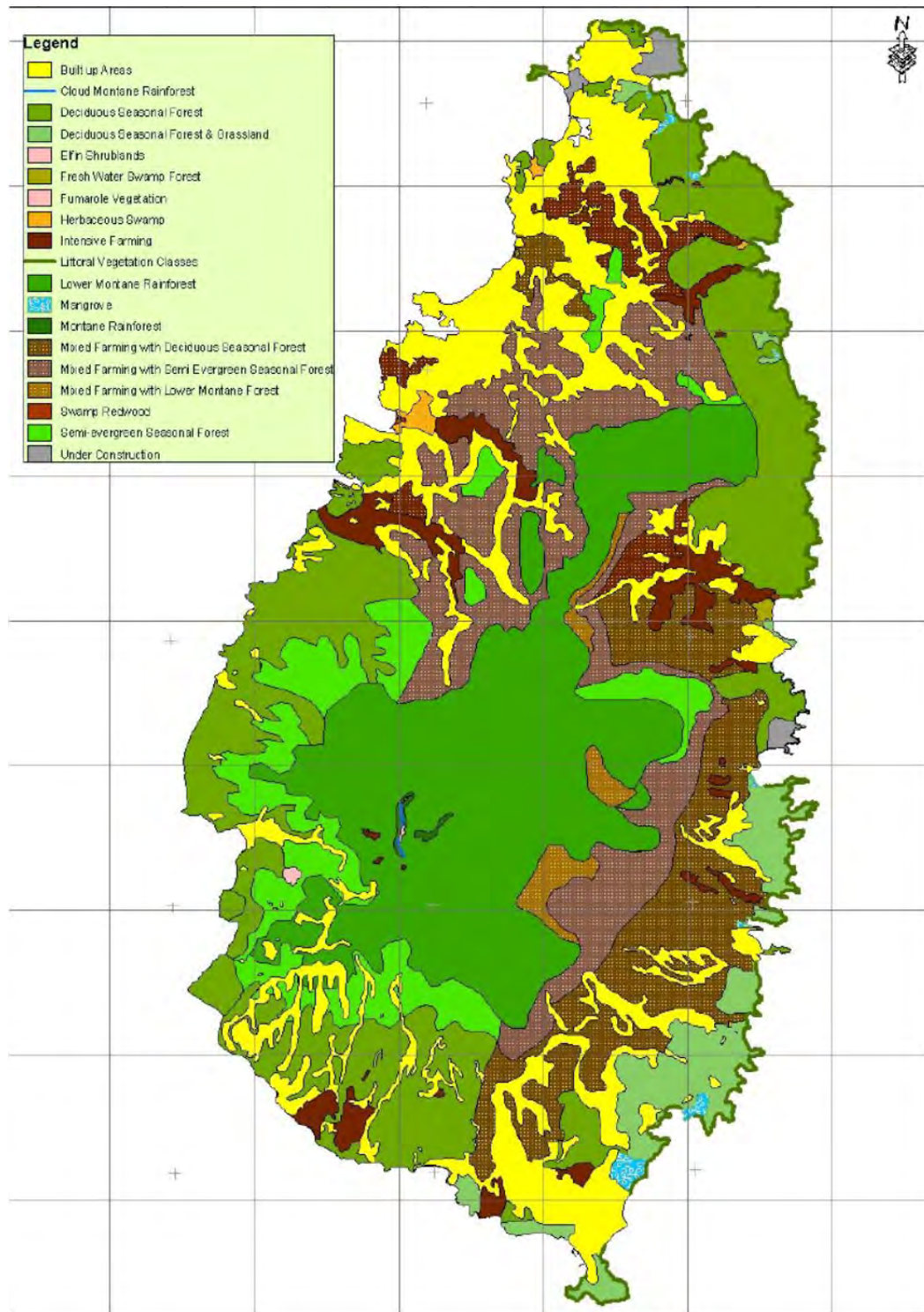
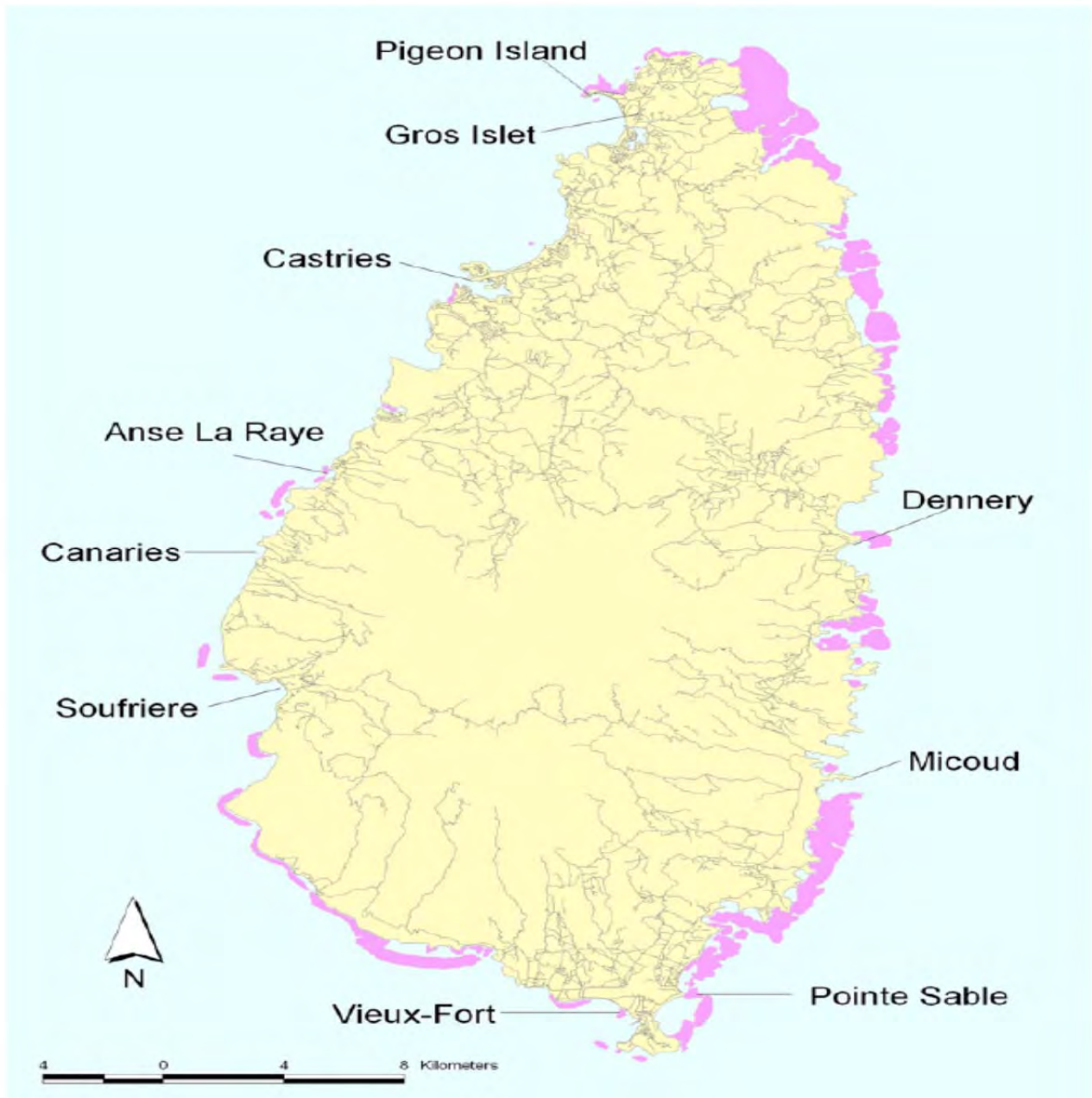


FIGURE A3. LOCATION OF REEFS IN ST. LUCIA



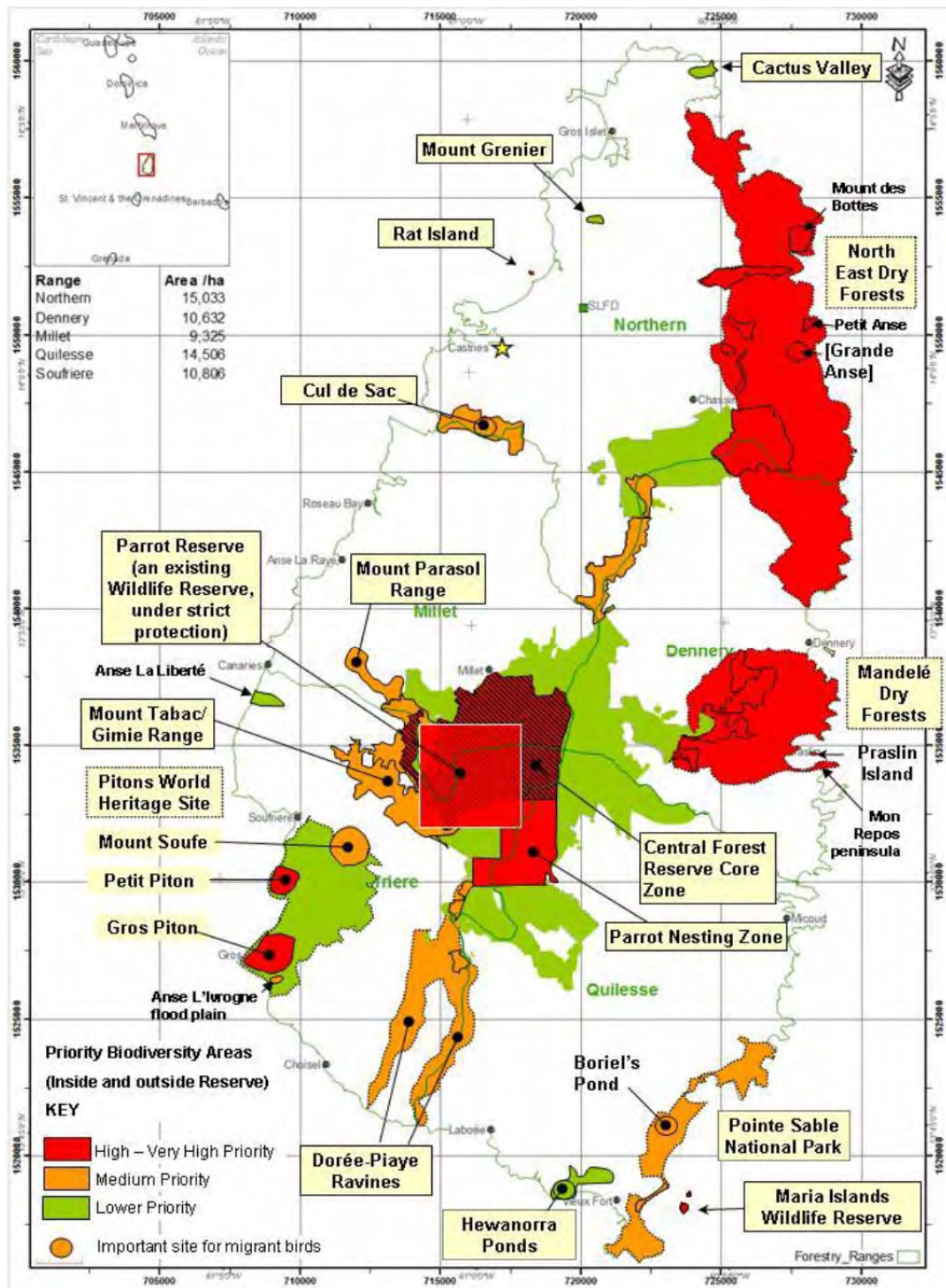
Source: (WRI, 2008)



FIGURE A4. CRITICAL AREAS OF BIODIVERSITY INSIDE AND OUTSIDE OF EXISTING PROTECTED AREAS



FIGURE A5. PRIORITY BIODIVERSITY AREAS



(Daltry, 2009b)

## ANNEX B: LIST OF CONTACTS

### TABLE B1. CONTACTS

NAME	POSITION	ORGANIZATION NAME	EMAIL	PHONE
<b>KEY CONTACTS</b>				
Adams Toussaint	Deputy Chief	Department of Forestry, Ministry of Sustainable Development, Energy, Science and Technology MSDEST	<a href="mailto:adams.toussaint@govt.lc">adams.toussaint@govt.lc</a>	468-5641
Lyndon John	CITES Point of Contact	Department of Forestry, MSDEST	<a href="mailto:Lynjohn1@yahoo.com">Lynjohn1@yahoo.com</a> <a href="mailto:lynamazon@gmail.com">lynamazon@gmail.com</a>	468-8645
Sarita Williams Peter	Head Biologist	Department of Fisheries, Ministry of Agriculture, Food Production, Fisheries and Rural Development (MAFPFRD)		468-4639
Jeanine Compton-Antoine	Manager of Local Fisheries Management Area	Soufriere Marine Management Association (SMMA)	<a href="mailto:jcompton@smma.org.lc">jcompton@smma.org.lc</a>	459 5500
Thadeus Constantine	Researcher	Department of Research, MAFPRD	<a href="mailto:tconstantin@yahoo.com">tconstantin@yahoo.com</a>	468 4132
Karen Augustin	Head Planner	Department of Planning, Ministry of Physical Development, Housing and Urban Renewal (MPDHUR)	<a href="mailto:kaugustin@gosl.gov.lc">kaugustin@gosl.gov.lc</a>	468 4436
E. Crispin d' Auvergne	Chief Officer	Sustainable Development and Environment Division (SDED), MSDEST	<a href="mailto:cdauvergne@sde.gov.lc">cdauvergne@sde.gov.lc</a>	451-8746
Bishnu Tulsi,	Director	St. Lucia National Trust	<a href="mailto:director@slunatrust.org">director@slunatrust.org</a>	452 5005
Steve Smith	Owner	Scuba Steve's Dive Center	<a href="mailto:info@scubastevesdiving.com">info@scubastevesdiving.com</a>	450 9433
<b>FOCUS GROUP PARTICIPANTS</b>				
Adams Toussaint,	Deputy Chief	Department of Forestry, Ministry of Sustainable Development, Energy, Science and Technology MSDEST	<a href="mailto:adams.toussaint@govt.lc">adams.toussaint@govt.lc</a>	468-5641
Lyndon John	CITES Point of Contact	Department of Forestry, MSDEST	<a href="mailto:Lynjohn1@yahoo.com">Lynjohn1@yahoo.com</a> <a href="mailto:lynamazon@gmail.com">lynamazon@gmail.com</a>	468-8645
Michael Bobb	Chief	Department of Forestry, MSDEST	<a href="mailto:Michaelbobb.2000@yahoo.com">Michaelbobb.2000@yahoo.com</a>	468-5637

NAME	POSITION	ORGANIZATION NAME	EMAIL	PHONE
Annita Jones	Former Biodiversity Coordinator	Ministry of Sustainable Development, Energy, Science and Technology (MSDEST)	anitavja@gmail.com	452-4332
E. Crispin d' Auvergne	Chief Officer	Sustainable Development and Environment Division (SDED), MSDEST	<a href="mailto:cdauvergne@sde.gov.lc">cdauvergne@sde.gov.lc</a>	451-8746
Dawn Pierre-Nathaniel		Sustainable Development and Environment Division (SDED), MSDEST	<a href="mailto:dpnathaniel@gmail.com">dpnathaniel@gmail.com</a>	468-5802
Valerie Leon		Ministry of Sustainable Development, Energy, Science and Technology (MSDEST)	<a href="mailto:vleon@gosl.gov.lc">vleon@gosl.gov.lc</a>	468-5851/5833
Nadia B. Joseph		SDED, MSDEST	<a href="mailto:josephnadiab@gmail.com">josephnadiab@gmail.com</a>	713-8566 287-8566
Annette Augustin		SDED, MSDEST	aaugustin.sde@gmail.com	451-8746
Emerson Vitalis		Department of Environmental Health, Ministry of Health	<a href="mailto:emersonvitalis@yahoo.com">emersonvitalis@yahoo.com</a>	468-3700/ 3704
Lavina Alexander		Coastal Zone Management Unit, MSDEST	<a href="mailto:lalexander@sde.gov.lc">lalexander@sde.gov.lc</a> <a href="mailto:lavina.alexander@gmail.com">lavina.alexander@gmail.com</a>	451-8746
Fitzgerald John		Water Resource Management Agency, MSDEST	<a href="mailto:Geraldjohn61@gmail.com">Geraldjohn61@gmail.com</a>	468 5665
Bethia Daniel		Energy, Science and Technology Section, MSDEST	<a href="mailto:bdaniel@sde.gov.lc">bdaniel@sde.gov.lc</a>	451-8746
David Dessir	Deputy Chief Planning Officer	Department of Planning, Ministry of Physical Development, Housing and Urban Renewal	ddesir@gosl.gov.lc	468 4437
Thomas Augustie		St. Lucia Meteorological Services	taugustie@gosl.gov.lc	450-1210
Shanna Emmanuel		Department of Fisheries, MAFPRD	shanna.emmanuel@govt.lc	468-4639
Patricia Anthia Joshua		MAFPRD	Anthia.joshua@govt.lc	468 4132
Deepa Girdouri		Ministry of Tourism	<a href="mailto:deepa.girdouri@govt.lc">deepa.girdouri@govt.lc</a> <a href="mailto:tgirdouri@gmail.com">tgirdouri@gmail.com</a>	468-4618



## ANNEX C: THREATENED SPECIES OF ST. LUCIA

### TABLE C1. IUCN RED LIST FOR ST. LUCIA

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
ANIMALIA	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008	stable
ANIMALIA	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008	stable
ANIMALIA	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008	decreasing
ANIMALIA	<i>Amazona guildingii</i>	St. Vincent Parrot	VU	2012	increasing
ANIMALIA	<i>Balistes vetula</i>	Queen Triggerfish	VU	1996	
ANIMALIA	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	VU	2006	decreasing
ANIMALIA	<i>Catharopeza bishopi</i>	Whistling Warbler	EN	2012	decreasing
ANIMALIA	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
ANIMALIA	<i>Chironius vincenti</i>	St Vincent Blacksnake	CR	1996	
ANIMALIA	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008	stable
ANIMALIA	<i>Dermochelys coriacea</i>	Leatherback	CR	2000	decreasing
ANIMALIA	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008	decreasing
ANIMALIA	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper	CR	2011	unknown
ANIMALIA	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
ANIMALIA	<i>Gonatodes daudini</i>	Grenadines Clawed Gecko	CR	2011	stable
PLANTAE	<i>Guaiaacum officinale</i>	Commoner Lignum Vitae	EN	1998	
ANIMALIA	<i>Hyporthodus flavolimbatus</i>	Yellowfinned Grouper	VU	2008	decreasing
ANIMALIA	<i>Hyporthodus nigrurus</i>	Black Grouper	CR	2006	unknown
ANIMALIA	<i>Hyporthodus niveatus</i>	Seabass	VU	2008	decreasing
ANIMALIA	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
ANIMALIA	<i>Kajikia albida</i>	White Marlin	VU	2011	decreasing
ANIMALIA	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
ANIMALIA	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
ANIMALIA	<i>Lutjanus cyanopterus</i>	Cuban Snapper	VU	1996	
ANIMALIA	<i>Makaira nigricans</i>	Blue Marlin	VU	2011	decreasing
ANIMALIA	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
ANIMALIA	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
ANIMALIA	<i>Montastraea faveolata</i>		EN	2008	decreasing
ANIMALIA	<i>Montastraea franksi</i>		VU	2008	decreasing
ANIMALIA	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008	unknown
ANIMALIA	<i>Mycteroperca interstitialis</i>	Harlequin Rockfish	VU	2008	decreasing
ANIMALIA	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008	unknown
ANIMALIA	<i>Physeter macrocephalus</i>	Sperm Whale	VU	2008	unknown
PLANTAE	<i>Picrasma excelsa</i>		VU	1998	
PLANTAE	<i>Pouteria semecarpifolia</i>		VU	1998	
ANIMALIA	<i>Pristimantis shrevei</i>		EN	2004	decreasing
ANIMALIA	<i>Pristis pectinata</i>	Smalltooth Sawfish	CR	2013	decreasing
ANIMALIA	<i>Rhincodon typus</i>	Whale Shark	VU	2005	decreasing
ANIMALIA	<i>Sphaerodactylus kirbyi</i>	Bequia Dwarf Gecko	VU	2011	unknown
ANIMALIA	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
ANIMALIA	<i>Sphyrna mokarran</i>	Hammerhead Shark	EN	2007	decreasing
PLANTAE	<i>Swietenia mahagoni</i>	American Mahogany	EN	1998	
ANIMALIA	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
ANIMALIA	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing
ANIMALIA	<i>Trichechus manatus</i>	West Indian Manatee	VU	2008	decreasing
ANIMALIA	<i>Typhlops tasmicris</i>	Grenada Bank Blindsnake	EN	2011	unknown

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSES

ST. VINCENT AND THE GRENADINES

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORK.....	2
LEGISLATION AND INSTITUTIONS.....	2
NON-GOVERNMENTAL ORGANIZATIONS.....	3
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	4
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	6
PROTECTED AREAS.....	6
THREATENED AND ENDANGERED SPECIES.....	7
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	8
TYPES OF FOREST.....	8
ECONOMIC IMPORTANCE.....	9
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	9
MANAGED NATURAL ECOSYSTEMS.....	9
EX-SITU CONSERVATION.....	10
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	10
DIRECT THREATS.....	10
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	12
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	14
FOCUS AREA 1.....	14
FOCUS AREA 2.....	14
FOCUS AREA 3.....	15
FOCUS AREA 4.....	15
CONCLUSIONS AND RECOMMENDATIONS.....	17
REFERENCES.....	19
ANNEX A: MAPS.....	21
FIGURE A1. ST. VINCENT LAND COVER (2005).....	21
FIGURE A2. PROPOSED PROTECTED AREAS OF NORTHERN ST. VINCENT MAINLAND.....	22
FIGURE A3. PROPOSED PROTECTED AREAS OF SOUTHERN ST. VINCENT MAINLAND.....	23
FIGURE A4. PROPOSED PROTECTED AREAS OF THE NORTHERN GRENADINES.....	24
FIGURE A5. PROPOSED PROTECTED AREAS OF THE SOUTHERN GRENADINES.....	25
ANNEX B: THREATENED SPECIES OF ST. VINCENT AND THE GRENADINES.....	26
TABLE B1. IUCN RED LIST FOR ST. VINCENT AND THE GRENADINES.....	26
TABLE B2. EXISTING AND PROPOSED PROTECTED AREAS FOR ST. VINCENT AND THE GRENADINES.....	28
ANNEX C: LIST OF CONTACTS.....	30
TABLE C1. CONTACTS.....	30

ANNEX D: NATIONAL NGOS OPERATING IN ST. VINCENT AND THE GRENADINES ..... 32  
ANNEX E: PHOTOS ..... 33

## REPORT FINDINGS

St. Vincent and the Grenadines (SVG) is located in the Lesser Antilles, in the southern portion of the Windward Islands. St. Lucia lies to the north, while Barbados is located east of SVG. Like many of the Windward Islands, SVG is characterized by steep slopes and volcanic soils and is at risk of hurricane and tropical storm damage. SVG is highly reliant on tourism, agriculture, and fisheries. However, all three of these sectors impact coral reefs, mangroves, seagrass beds, and forests.

SVG has relatively high levels of biodiversity and 29 percent of the land mass is covered by forests. There are 47 threatened species, of which 35 are marine species and 12 are terrestrial.

SVG is party to all of the international agreements concerning the conservation of biodiversity and tropical forests and many non-governmental organizations (NGOs) and institutions are actively involved in conservation in the country. The lead agency for conserving SVG's biodiversity and tropical forests is the Ministry of Agriculture, Industries, Forestry, Fisheries and Rural Transformation. The principal conservation NGOs in SVG are The Nature Conservancy, Sustainable Grenadines, AvianEyes, the Society for the Conservation and Study of Caribbean Birds, the Progressive Community Organization and the Union Island Environmental Attackers. Internationally funded conservation projects in SVG are the Global Climate Change Alliance, Integrated Watershed and Coastal Area Management, Caribbean Challenge Initiative, Caribbean Aqua-terrestrial Solutions, At the Water's Edge, and Grenadines Marine Resource Space-Use Information System.

As of 2010, SVG had established 38 protected areas (PAs), including 23 wildlife reserves, 10 marine conservation areas, three forest reserves, and one marine park: 47.2 percent of SVG's marine habitat,<sup>1</sup> 42 percent of its terrestrial habitat (Windward Island moist forest and Lesser Antillean dry forest), and 38 percent of its freshwater areas are encompassed within these PAs.

The principal direct threats to SVG's forests and biodiversity are inappropriate coastal zone and hillside land use planning, cultivation of marijuana, overharvesting of fish, mangroves, and other coastal resources, increasing frequency and magnitude of hurricanes and tropical storms, invasive species, and climate change.

The root causes of the threats are:

- Lack of reliable and accessible data on biodiversity distribution and status
- Limited financial resources to promote PA management
- Lack of government will to prioritize biodiversity conservation and management issues
- Lack of public awareness about the value of biodiversity
- Lack of a legal framework to promote environmental management and protection

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation

---

<sup>1</sup> According to the SVG Gap Analysis, marine habitat includes the following ecosystems: reef habitat, shelf slope, lagoonal habitat, rocky shore, beaches, and mangroves.

## LIST OF ACRONYMS

ADS	Automated Directives System
Aus Aid	Australian Aid
AWE	At the Water's Edge
CBD	Convention on Biological Diversity
CEHI	Caribbean Environmental Health Institute
CERMES	Centre for Resource Management and Environmental Studies
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EIA	Environmental Impact Assessment
HWE	Ministry of Health, Wellness and the Environment
IUCN	International Union for the Conservation of Nature
IWCAM	Integrated Watershed and Coastal Area Management
FAA	Foreign Assistance Act
FAO	Food and Agricultural Organization
GEF	Global Environment Facility
GIZ	<i>Gesellschaft für Internationale Zusammenarbeit</i> (Germany Society for International Cooperation)
JEMS	Junction Enhams, McCarthy and Stubbs (Progressive Community Organization)
MARSIS	Grenadines Marine Resource Space-use Information System Project
MEA	Multilateral Environment Agreements
NEAB	National Environmental Advisory Board
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Government Organization
NOAA	National Oceanic and Atmospheric Administration
NPA	National Parks, Rivers and Beaches Authority
OECS	Organization of Eastern Caribbean States
PA	Protected Area
PEPFAR	President's Emergency Plan for AIDS Relief
RDCD	Regional Development Cooperation Strategy
SusGren	Sustainable Grenadines
SVG	St. Vincent and the Grenadines
TNC	The Nature Conservancy
UNCBD	United National Convention on Biological Diversity
UNCCD	United Nations Convention on Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USAID	United States Agency for International Development
WRI	World Resource Institute



# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>2</sup> The purpose of this report is to provide these required analyses for the St. Vincent and the Grenadines (SVG) component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID/Eastern and Southern Caribbean Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* The principal information available and used in this assessment came from reports, interviews, and field observations conducted in SVG. The Assessment Team primarily used the following reports: The Third and Fourth National Reports to the Convention on Biodiversity (Ministry of Health and the Environment (MHE), 2006) and (MHE, 2010a), The National Parks Protected Area System Plan 2010 to 2014 (National Parks, Rivers and Beaches Authority, 2009), two ecosystem valuation and willingness to pay studies for marine protected areas (Inter-American Biodiversity Information Network, 2010) (Christie, 2012), the previous USAID Foreign Assistance Act (FAA) 118/119 Tropical Forests and Biodiversity Assessment for St. Vincent and the Grenadines (USAID, 2008), and the Global Forest Resources Assessment, Country Profile: St. Vincent and the Grenadines prepared by the Food and Agriculture Organization (FAO, 2010). Additional information used in this report is in the References section.

The Assessment Team interviewed 16 participants in a focus group discussion and 14 key contacts (See the List of Contacts in Annex C). The Assessment Team conducted site visits to:

- Vermont Nature Trail and Forest Reserve, St. Vincent
- Richmond Vale Academy and Hiking Center, St. Vincent
- World Health Organization (WHO) and USAID-supported Smart Hospital project in Georgetown, St. Vincent
- New airport construction site, St. Vincent
- The South Coast Marine Park, St. Vincent
- A sea water de-salinization plant, sea wall/boardwalk, and a former wetlands and mangrove site that has been filled in near the airport on Bequia Island
- The Tobago Keys Marine Park and the Ashton Wetlands, Union Island

*Information Gaps:* The Assessment Team found few data about the condition of SVG coral reefs and other marine ecosystems and species, and found no data about the genetic diversity of SVG's living organisms.

*General Country Description and Description of Ecosystem and Species Diversity:* SVG is located between St. Lucia to the north and Grenada to the south. The country has a total land area of 389 km<sup>2</sup> and is composed of the main island of St. Vincent (345 km<sup>2</sup>), and the Grenadines Archipelago (44 km<sup>2</sup>) located to the south of St. Vincent: Bequia, Mustique, Canouan, Mayreau, Union Island, Palm Island, Petit St. Vincent, and 28

---

<sup>2</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

uninhabited islets. The country's total population is estimated to be 103,220 (CIA Factbook, 2013). The capital, Kingstown, is the largest population center with approximately 28,000 people. Most towns and villages are established on the flat coastal regions along the eastern (windward) and western (leeward) coasts.

St. Vincent is a volcanic island dominated by a north-south axis of mountains; the highest peak is the volcano, La Soufriere at 1,234 m. The western coast is very rocky, whereas the eastern coast has a more gently sloping topography with many valleys and bays. The Grenadines are fairly low-lying islands with white sand beaches surrounded by offshore coral reefs. St. Vincent has a tropical climate with a dry season from December to May and a rainy season from May to October. The average annual rainfall is 3,800 mm inland, and 1,600 mm on the coast. The Grenadines, in contrast, have a much drier climate and may receive as little as 460 mm of rainfall/year.

The information about SVG's biodiversity found in the 2000 National Biodiversity Strategy and Action Plan (NBSAP) and the 2008 FAA 118/119 Assessment largely corresponds to the information in the Fourth National Report to the Convention on Biological Diversity (MHE, 2010a). Thus, the following information is a synthesis of the three reports.

Six vegetation communities are found in SVG: rainforest, elfin woodland, palm brake, mangrove forest, secondary rainforest, and dry scrub woodland. Forest covers approximately 29 percent of the country's total area.

The country's terrestrial biodiversity includes more than 1,150 species of flowering plants, 163 species of ferns, four species of amphibians, 16 species of reptiles, and 15 species of mammals. The marine ecosystem also has significant species diversity with at least 450 species of finfish, 12 species of whales and dolphins, four species of turtles, nine species of gastropods, 11 species of seaweed, and 30 species of coral.

## POLICY AND INSTITUTIONAL FRAMEWORK

### LEGISLATION AND INSTITUTIONS

The Ministry of Agriculture, Industries, Forestry, Fisheries and Rural Transformation is the lead agency in SVG for the conservation of biodiversity. Its Fisheries Division oversees the management and development of fisheries under the provisions of the Fisheries Act (1986) and Regulation (1987) as well as the Fish Processing Regulations (2001) and the High Seas Fishing Act (2001). Its Forestry Department implements the provisions of the Forestry Act (1945), Forest Resource Conservation Act (1992), and the Wildlife Protection Act (1987).

Under the Ministry of Health, Wellness and the Environment (HWE), the Environmental Management Department seeks to "monitor, regulate, improve and maintain the environmental health of all Vincentians by promoting sound environmental health practices, reducing the incidence of vector borne diseases and through the sustainable use and management protect, conserve, enhance and restore the natural resources of SVG" (Environmental Management Dept., 2013). Also under the Ministry of HWE, the Conservation and Sustainable Development Unit is responsible for "the implementation of the various multilateral environment agreements (MEAs) that St. Vincent and the Grenadines has signed." (Conservation and Sustainable Development Unit, 2013) It has a staff of five full-time professionals with Bachelor's and Master's degrees in various fields of natural resource management and short-course training in climate change and conservation of biodiversity.

Within the Ministry of Housing, Informal Human Settlements, Lands and Surveys and Physical Planning the Physical Planning Unit implements the Town and Country Planning Act (1992) and maintains a National Land Information System in collaboration with other public and private sector agencies (Ministry of Housing,

2013). A board whose members represent government agencies, the general public, and private sector business interests meets once a month to oversee its work.

Within the Ministry of Tourism, Sports and Culture, the National Parks, Rivers and Beaches Authority (NPA) established by the National Parks, Rivers and Beaches Authority Act (2002), makes "... further provision for the preservation, protection, management and development of the natural, physical, ecological resources and the historical and cultural heritage of St. Vincent and the Grenadines" by regulating activities within national parks and buffer zones and restoring marine ecosystems (MHE, 2010a).

An Environmental Management Act was developed in 2009, but has not yet been approved by cabinet. This act focuses on regulating several pressing environmental issues, such as marine and terrestrial pollution and compliments and coordinates other legislation in forestry, agriculture, and protected areas, among others. The National Environmental Advisory Board (NEAB) was created to coordinate multi-sector environmental activities among government agencies with environmental responsibilities, but does not meet regularly.

According to a government stakeholder, "very often agencies have environmental policies in place, but they have never been approved at cabinet level, which sometimes restricts their use and effectiveness. We need to...get them passed by Parliament to give them the teeth they need. Right now, we do a bit of biodiversity protection in fisheries, a bit in parks, a bit in forestry, but we are missing the coordination. It's an issue and has been an issue in my 28 or 29 years." Due to these legislative and regulatory gaps, and budgetary constraints, government agencies relevant to biodiversity and forest conservation and protection have not been wholly effective at fulfilling their mandates.

SVG is party to the following MEAs related to the conservation of biodiversity and tropical forests:

- Convention on Biological Diversity (CBD)
- Convention on Trade in Endangered species (CITES)
- Convention on Desertification (UNCCD)
- International Convention for the Regulation of Whaling
- International Plant Protection Convention
- Cartagena Protocol on Bio-Safety
- Convention on the Protection and Development of the Marine Environment in the Wider Caribbean (Cartagena Convention)
- Protocol Concerning Cooperation in Combating Oil Spills in the Wider Caribbean
- International Convention on Civil Liability for Oil Pollution Damage
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
- United Nations Convention on the Law of the Sea

The National Biodiversity Strategy and Action Plan (NBSAP), created for the CBD, is the guiding document that establishes the framework for biodiversity conservation and management in SVG. According to the Fourth National Report to the CBD, "implementation of the SVG NBSAP has been far from ideal." Most of the specific activities outlined under each of the priority areas in the NBSAP have not been implemented and the NBSAP does not routinely inform planning in key sectors.

## NON-GOVERNMENTAL ORGANIZATIONS

The Nature Conservancy (TNC) is the only international, conservation-focused non-governmental organization (NGO) with offices in SVG. TNC currently is working to "survey all of the Grenadines, identify threats and conservation strategies, and map priority sites in need of protection" (TNC, 2013) through the project, *At the Water's Edge: Climate Resilience in St Vincent and the Grenadines*. TNC is currently the principal source of funds for the national NGO Sustainable Grenadines (SusGren), which works in environmental

conservation of the coastal and marine environment and sustainable livelihoods. The national NGO, AvianEyes, supports nature conservation through birding, and conducts research and environmental education as part of the Society for the Conservation and Study of Caribbean Birds (Culzac-Wilson, 2008). The national Progressive Community Organization (JEMS) “...assists rural development through integrated self-help initiatives and empower[s] communities through training to maintain their natural resources sustainably” (Egbert, 1999). Residents of Union Island established the Union Island Environmental Attackers to improve garbage disposal and educate tourists and local people about conservation (Union Island Environmental Attackers, undated).

Indigo Dive, a scuba diving shop based out of the Buccamont Bay Resort in St. Vincent, has been leading a coordinated effort among different dive shops in SVG and the region to capture, kill, and eat the invasive lionfish (*Pterois volitans*). Using handheld spears and PVC tubes for collection, dive masters routinely capture lionfish during each dive they perform with tourists (Seager, per. obs.).

One contact noted that the success of national NGOs is largely dependent on individual “champions,” and that once these champions move on, or project funds are exhausted, these groups can become dormant and sometimes extinct and, consequently, national NGOs do not have much influence on long-term biodiversity conservation and management.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

On-going internationally funded projects that directly or indirectly contribute to biodiversity conservation in SVG are described in Table 1.

Table 1. Key Donor and NGO-implemented Biodiversity Conservation Projects

TITLE	FUNDING LEVEL (US\$)	DONOR AND IMPLEMENTING PARTNER	FOCUS
Global Climate Change Alliance (Global Climate Change Alliance, 2012)	US\$2 to 3 million	European Union (EU)	To improve the region’s natural resource base resilience to the impacts of climate change by effective and sustainable land management frameworks and practices, and through specific physical adaptation pilot projects
Integrated Watershed and Coastal Area Management (IWCAM) (Integrated Watershed and Coastal Area Management, 2013)	US\$2 million	Caribbean Environmental Health Institute (CEHI), Global Environment Facility (GEF)	Build capacity and support watershed management
Organization of East Caribbean States (OECS) Land Policy (Global Land Tool Network, 2012)	Information not available	Australian Aid (AusAid)	Support the national land title project to improve land policies and land management

TITLE	FUNDING LEVEL (US\$)	DONOR AND IMPLEMENTING PARTNER	FOCUS
Caribbean Challenge Initiative	Information not available	TNC	St. Vincent and the Grenadines has become a participating nation in the challenge to incorporate at least 20 percent of the nearshore marine and coastal environments in its national marine PA system by 2020.
Land and Coastal Resources Management Programme (2013 to 2017): marine biodiversity support component	Information not available	German Society for International Cooperation (GIZ) with Caribbean Environmental Health Institute	Improve the conservation and management of coastal resources and biodiversity, specifically through support for the South Coast Marine Conservation Area (SCMCA)
At the Water's Edge (AWE)	\$500,000	TNC	Ecosystem-based adaptation to climate change
OECS Climate Change Program	Information not available	USAID	The USAID climate change program assists the six OECS countries and Barbados with adaptation measures to mitigate the effects of climate change. Two critical areas are the focus: coastal zone management and resilience, and freshwater resources management. Funding is provided to relevant government agencies to ensure that climate change is better integrated into national development planning. The private sector, NGOs, and local communities are integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change.
Grenadines Marine Resource Space-use Information System Project (MarSIS) (Baldwin, undated)	Information not available	National Oceanic and Atmospheric Administration (NOAA), GEF, TNC, SusGren	MarSiS brings together a variety of social, economic, and environmental information drawn from both scientific and local knowledge into a single information system.

Interviewed contacts and reviewed literature indicate that international donor organizations have coordinated effectively with the government of SVG on biodiversity conservation and management initiatives.

In accordance with the Town and Country Planning Act of 1992, the Physical Planning Unit requires environmental impact assessments (EIA) for projects that take place in environmentally sensitive areas, are likely to cause pollution, or have adverse effects on the environment. EIAs are also required for Government projects with external funding (MHE, 2010a). However, according to the United Nations Environmental Programme's (UNEP's) National Environmental Summary (2010), project monitoring is not well enforced as

it falls under the mandate of the Ministry of HWE – and coordination between the Physical Planning Unit and HWE is not well established. This process is further weakened by the absence of mandated guidelines for EIA structure and content (Singh, 2010). In addition, prosecution of offenders who do not comply with land use restrictions or comply with EIA requirements remains a major challenge to the effectiveness of environmental controls. Evaluation of potential impacts on biodiversity in EIAs is considered inadequate (MHE, 2010a).

## STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

### PROTECTED AREAS

Figures A2 to A5 in Annex A show SVG’s existing and proposed Protected Areas (PAs). As of 2010, SVG had established 38 PAs, including 23 wildlife reserves, 10 marine conservation areas, three forest reserves, and one marine park. Approximately 47 percent of SVG’s marine habitat<sup>3</sup>, 42 percent of its terrestrial habitat (Windward Island Moist Forest and Lesser Antillean Dry Forest), and 38 percent of its freshwater areas (freshwater bodies and streams) are encompassed within these PAs (MHE, 2010b). Several terrestrial and marine species have been legally protected using total bans, quotas, closed seasons, size, weight and trade restrictions. Some of the protected species are the St. Vincent parrot, the armadillo, the Caribbean spiny lobster, the humpback whale, and all species of corals (MHE, 2010b).

The NPA is the principal agency charged with the management of all PAs in SVG. In 2009, the authority published the National Park and Protected Areas System Plan 2010 to 2014, in which it proposes the consolidation of existing and proposed PAs within a new PA system. This new proposed system includes 75 PAs (National Parks, Rivers and Beaches Authority, 2009); this would expand PA coverage, and provide guidelines for effective multi-stakeholder involvement in PA system and site management.

However, according to a stakeholder in the NPA, many currently declared sites lack the involvement of institutions, oversight, and finances to carry out proper site management, and the Protected Areas System Plan has not been effectively implemented. The stakeholder said, “Since 2009 we have not had one park established and very little of the plan has been carried out...the reason for this is principally a lack of finance.”

Given the large number of PAs and the plan to consolidate the PA system, the below paragraphs describe only the largest and most environmentally critical marine and terrestrial PAs.

The largest proposed PA is the Soufriere National Park, indicated by purple on Figure A2 in Annex A, in the rugged, unpopulated area of Soufriere volcano in north St. Vincent Island. Birdlife International has declared it an Important Bird Area. SVG has requested UNESCO to declare the park as a World Heritage site because it contains pre-Colombian archeological sites. The Richmond Forest Reserve (dark green on Figure A2) and Cumberland Forest Reserve (dark green on Figure A3) provide habitat for the endangered St. Vincent parrot (*Amazona guildingi*). The Forestry Department has carried out reforestation and natural resource management work with citizens living within the Richmond Forest Reserve, but no formal co-management mandate has been established between the department and the NPA. Illegal marijuana cultivation poses a threat to the forest ecosystems within all three of the aforementioned terrestrial PAs.

The Tobago Cays Marine Park (light blue on Figure A5) has “some of the most pristine and healthy reefs...for scuba diving in the eastern Caribbean” and due to education and enforcement programs has been

---

<sup>3</sup> According to the SVG Gap Analysis, Marine Habitat includes the following ecosystems: reef habitat, shelf slope, lagoon habitat, rocky shore, beaches and mangroves.



successful in establishing a no-catch zone. The Marine Park generates significant annual revenue from ecosystem goods and services<sup>4</sup> and is managed on a day-to-day basis by park rangers under the NPA. The South Coast Marine Park (light blue triangle on the southern coast of the mainland on Figure A3) includes the most widely used recreational beaches, and has the largest concentration of hotels and marine-based tourism activities on St. Vincent Island. The Calliaqua Fishing Centre, the second most productive fish landing facility in St. Vincent, is also located within the park (Kilgo, 2010).

As part of The Nature Conservancy's Caribbean Challenge Initiative, which is an effort to protect marine and coastal ecosystems in the Caribbean, St. Vincent and the Grenadines has committed to:

- Expand the MPA system to include at least 20 percent of its nearshore area by 2020;
- Develop conservation finance mechanisms (such as park entrance and user fees and concessions) to create sustainable funding for national protected area system;
- Develop innovative strategies and projects for climate change adaptation to help corals adapt to increasing stresses, including warmer waters and overuse.

According to a stakeholder in the NPA, an economic valuation study analyzing the value of goods and services provided by terrestrial and marine PAs in SVG was conducted in 2010 with United Nations Development Programme (UNDP) funds. However, the study had “contractual/qualitative issues which renders it null and void,” and was not made available to the Assessment Team.

## THREATENED AND ENDANGERED SPECIES

The International Union for Conservation of Nature (IUCN) Red List refers to species as ‘threatened’ if they fall within one of three Red List Categories: vulnerable, endangered, or critically endangered. Species that without conservation may become threatened are classified as near threatened. These Red List Categories indicate increasing degrees of threat of extinction of a species. According to the IUCN Red List, there are 47 threatened species in SVG (see Annex B), of which 35 are marine species and 12 are terrestrial. All the threatened marine species are animals; six are critically endangered, seven are endangered, and 22 are vulnerable. No marine plant species are threatened. Of the terrestrial threatened species, eight are animals and four are plants. Two animal species are critically endangered, three are endangered, and three are vulnerable. Two of the threatened plant species are endangered and two are vulnerable.

A number of endemic species are found in SVG including the piping frog (*Eleutherodactylus shervei*), the St. Vincent blacksnake (*Chironius vincenti*), and some regional endemic species such as the Barbour's tropical racer snake (*Mastigodryas bruesi*) and two lizards: the Underwood's spectacled tegu (*Gymnophthalmus underwoodi*) and the windward sphaero (*Sphaerodactylus vincenti*). Fifteen flowering plant species and two fern species are known endemics.

Among the 208 species of birds identified in SVG, two are endemic: St. Vincent Amazon (*Amazona guildingii*) and the whistling warbler (*Catharopiza bishopi*) respectively categorized as vulnerable and endangered in the IUCN Red List. Two subspecies are also endemic to the island: the St. Vincent solitaire (*Myadestes genibarisis*) and the house wren (*Troglodytes aedon*).

SVG's only special effort to conserve one of its threatened species has concerned the St. Vincent parrot, one of the Lesser Antilles four surviving Amazon parrots, whose population has been reduced by capture for sale (MHE, 2010a). The Cumberland and Vermont Forest Reserves provide habitat for the parrot, and biennial

---

<sup>4</sup> In an ecosystem goods and services valuation study conducted by the Inter-American Biodiversity Information Network (IABIN) in 2010, three distinct valuation methodologies were applied. Depending on which methodology applied, revenue from fishing, tourism and additional ecosystem goods and services ranged from US\$54.3 million to US\$141 million per year (Inter-American Biodiversity Information Network, 2010).



censuses of its population indicate that its population may be increasing. One of Union Island’s few remaining intact secondary subtropical/tropical dry forests in Chatham Bay provides habitat for endemic threatened reptile species including the critically endangered Grenadines clawed gecko, endangered Grenada bank blindsnake and vulnerable Grenadines sphaero (IUCN, 2012). Local NGOs and the Forestry Department have identified the Chatham Bay dry forest watershed as a site of conservation importance, but these groups lack the financial means to enforce its protection. Threats to these endemic species are resort and road construction and feral mammals. To mitigate these threats, resort construction should be confined to the beach; road construction should be diverted to lower elevations; and feral mammals should be controlled (IUCN, 2012).

## STATUS AND MANAGEMENT OF FOREST RESOURCES

### TYPES OF FOREST

Figure A1 in Annex A shows St. Vincent Island’s principal land uses, including its forest types. Table 2 presents the most recent available data, from 2001, of the area of SVG’s forest types. No land use map was available for the Grenadines.

Table 2. Forest Characteristics

FOREST TYPE	2001 AREA (ha)
Forest Dry Deciduous	3,304
Forest Semi-Deciduous	2,051
Forest Evergreen and Seasonal	14,436
Cloud Forest	3,879
Forest Cloud Elfin	290
Forest Cloud Transitional	1,961
Mangrove	37
<b>Total</b>	<b>25,960</b>

Source: (FAO, 2010)

In 2001, FAO estimates that there were 25,960.7 ha of forest in SVG, covering 29 percent of its total area, mostly on St. Vincent Island (Culzac-Wilson, 2008). Since 1980, about 1,000 ha of forest regenerated on former banana and sugarcane plantations and where ash fall from the eruption in 1979 of Soufriere Volcano destroyed forest (FAO, 2010). The forest types occur in an altitudinal gradient. At high elevations, in the center of St. Vincent Island, there are 3,880 ha of cloud forest. Below that are 2,905 ha of forest cloud elfin forest, 1,961 ha of forest cloud transitional forest, and 14,436 ha of evergreen and seasonal forest. The 3,304 ha of dry deciduous forest and 2,051 ha of semi-deciduous forest occur along the western coast. The 37 ha of mangrove forest occur in small patches along the southernmost coast (MHE, 2010a). Dry forest types cover most of the Grenadines and there are also some small patches of mangroves.

The Central Mountain Range of St. Vincent, comprised of evergreen, seasonal, cloud, cloud transitional, and cloud elfin forest, contains one of the largest remaining tracts of forest in the Lesser Antilles, and one of the few that maintains the full altitudinal corridor from sea level to 1,200 meters (MHE, 2010a). This 132 km<sup>2</sup> area supports populations of four globally threatened species and comprises all of the island’s key watersheds; providing the island’s total freshwater supply. The entire Central Mountain Range forest corridor is encompassed in the proposed National Parks Plan.

## ECONOMIC IMPORTANCE

The Forestry Department monitors and maintains the forest from which all the rivers in St. Vincent originate. According to a contact in the Forestry Department, in addition to providing all of the potable water to mainland St. Vincent, the rivers generate electricity that supplies 21 percent of the island's needs. Freshwater fish, crayfish, and small tri-tri fish are harvested from the rivers. Non-timber products (fruit, bush meat, and craft material like pandanas) are obtained from the forest. Tourism to forested areas, such as the Cumberland Forest Reserve and the Vermont Nature Trails, also generates income; although no studies exist that quantify the amount. Even small areas of mangrove forest have economic value, since they protect the coastline, preventing beach erosion, and provide habitat for some economically valuable species of marine organisms.

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

#### *Forest, Urban Areas, and Agriculture*

Figure A1 in Annex A and field observations indicate that forest is the predominant land cover on SVG, and covers the higher land away from the shoreline on most of these islands. On St. Vincent Island, Urban High Density and Urban Light Density areas occur along the southwest, south and west coasts, where roads provide access, while along their northwest coast, where there is no coastal road, there are no urbanized areas. Urban density varies between the Grenadine Islands; a few of them have towns and a scattering of houses in rural areas, while others are uninhabited or have only tourist resorts. Agricultural land occurs only on St. Vincent Island and is concentrated a short distance inland from the eastern and southwestern coasts. Some of the areas shown on Figure A1 as banana plantations may now be cultivated only for root crops or have regenerated to forest (SVG, 2008). Sixty-five percent of farmland plots are between 0.2 - 2 ha in area. Seventy-three percent of agricultural holdings are privately-owned and 22 percent are rented (SVG, 2008).

#### *Marine Ecosystems*

According to the World Resource Institute (WRI), St. Vincent's young coastline, volcanic sediment, and narrow marine shelf have prevented the development of extensive reefs. WRI states, "There are few reefs on the north and east coasts, but there is good coral growth on the rocks around headlands on the west coast" (Smith et al., 1998 as referenced in Burke, 2004). The Grenadine Islands contain considerable areas of coral reef, some of the best-developed reefs located around the small islands of the Tobago Cays. Land-based pollution affects the South Coast Marine Conservation Area and is a priority for conservation.

There is an active fishery in SVG; targeted fish species include hinds (groupers and seabasses), parrotfishes, squirrelfishes, grunts, surgeonfishes, and triggerfishes (FAO, 2010). Traps and handlines are typical fishing gear; the majority of 98 tonnes landed annually is exported. The spiny lobster fishery is an important component of the fishery, with 80 to 90 percent of the catch exported.

#### *Wetlands*

The small remaining mangrove ecosystems on St. Vincent Island are indicated in purple on Figure A1, and are located primarily along the very southern tip of the island. The Ashton wetland in the Ashton Harbour on Union Island is the largest wetland area in SVG (605 ha). Associated with the Ashton wetlands were mangrove and mudflat ecosystems, seagrass beds rich in lobster and conch, and coral reefs comprised of fringing, patch, and barrier reef types. These unique ecological resources were largely destroyed when a 300-boat marina project began at the lagoon in 1994 and was later abandoned when the developer filed for bankruptcy. The Union Island-based NGO SusGren is currently implementing a restoration project at the

wetlands, and is awaiting government permission to clear drainage channels of backfill thus restoring natural circulation and tidal flow of water in the lagoon, and carry out construction of a boardwalk and small docks to promote ecotourism at the site. The Ashton wetland is currently threatened by livestock grazing, development pressures, fuelwood harvesting, pollution from run-off; and indiscriminate dumping of garbage (Ashton Lagoon Restoration Project, 2012).

## *Beaches*

Black sand beaches are most common on St. Vincent while white sand beaches are primarily found in the Grenadines. Three species of turtles use SVGs beaches for nesting and/or coastal areas for foraging, the green turtle, the hawksbill, and the leatherback (Dow Piniak and Eckert, 2011). The beaches in SVG are impacted by hurricanes and tropical storms, high waves during winter months, sea level rise, sand mining, and coastal development. In addition, poorly planned sea walls, removal of stabilizing vegetation, and pollution from human activities also negatively impact SVG's beaches. Since 2000, several beaches in Bequia, the Tobago Cays, and Mustique have been monitored for changes. Hurricane Lenny dramatically altered several of the monitored beaches in 1999 (UNESCO, 2001).

## *Freshwater Resources*

As in many of the Caribbean islands, sources of freshwater are limited. There are approximately 339 rivers and streams in SVG. The geomorphology of SVG limits physical availability of freshwater reserves on the island. A drought in 2009 impacted water resources which, in turn, affected agricultural productivity. Freshwater quality is affected by land-based pollution, including sedimentation, agrochemicals, industrial and commercial discharge, liquid waste, and stormwater runoff.

## **EX-SITU CONSERVATION**

The SVG National Botanical Gardens are the oldest botanical gardens in the Caribbean, established in 1765. The botanical gardens are a popular tourist destination and are currently managed by the National Parks, Rivers and Beaches Authority. The Nicholas Wildlife Aviary Complex, located within the Gardens, maintains a captive breeding program to conserve the vulnerable St. Vincent parrot and has produced at least one new bird per year since its inception in 1990 (MHE, 2010a). Three small working germplasm collections are located in the Ministry of Agriculture, the Caribbean Agricultural Research and Development Institute, and the Taiwan Mission, to promote the conservation of plant species important to agriculture, and additional plant species that are less commercially profitable, but still important to the biodiversity of SVG (MHE, 2006).

## **MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION**

Through the focus group discussion and key contact interviews, a variety of threats to the conservation and improved management of biodiversity were raised. This section describes threats that were most frequently cited by stakeholders and described in the NBSAP and/or the Fourth National Report to the CBD.

### **DIRECT THREATS**

**(1) Inappropriate activities in the coastal zone and on hillsides** are a direct threat to the health of coral reefs and is a principal conservation issue in SVG. Soil erosion caused by construction, agriculture, and free-range grazing by goats cause most of the soil erosion, which is the source of sedimentation that directly impacts coral reefs. Construction of buildings next to the shoreline and of roads on steep slopes contribute to

soil erosion and sedimentation into rivers and marine ecosystems. Referring to a new villa construction project on Bequia Island, a key contact noted, “There has not been proper environmental impact analysis completed...we are worried about the siltation runoff to the ocean and erosion that will be caused by the construction phase and during the life of the settlement.”

**(2) Agro-chemical pollution.** A contact noted that farmers on the island of St. Vincent generally make heavy use of agrochemicals, which likely contaminates fresh and marine water bodies, affecting aquatic organisms, and also has impacts on terrestrial organisms. According to Murray (1997), some commonly used pesticides on banana plantations took between 60 and 180 days to effectively degrade in plantation soils, thus offering ample opportunity for chemical runoff during storms (Murray, 1997). In an interview, Murray also mentioned that research indicates that chemically polluted water runoff was affecting river crawfish. As the area of agriculture has shrunk on St. Vincent, however, the level of pollution with agrochemicals may have declined.

**(3) The cultivation of marijuana** on steep, forested slopes may be affecting biodiversity. Some farmers who lost their markets for bananas turned to the cultivation of marijuana, especially on remote, steep forested slopes within the area around the Soufriere Volcano in northern St. Vincent Island. Their small plots lose fertility quickly so the farmers clear forest land to make new plots every one or 2 years, which according to a contact poses a significant threat to the connectivity of the forest ecosystems and eliminates prime habitat for many of the island's endemic and endangered flora and fauna. A contact estimated that there are from 600 to 1,000 ha of marijuana on St. Vincent Island, and said, “We think we are losing 100 to 200 ha annually because of marijuana cultivation...which is a significant portion of our national forest cover lost.”

**(4) Overharvesting of fish, mangroves, and other coastal resources** is a direct threat to SVG biodiversity. According to the FAO, the lobster population is considered to be overexploited in near shore areas, and the Fourth National Report to the CBD list conch as a threatened fishery. A contact said that the government enforces closed seasons and catch size limits only on lobster and conch fishing. However, according to the Fourth National Report to the CBD, shallow-shelf and reef-fish resources are over-exploited. No additional data were available on the status of fishery resources in SVG. According to the Fourth National Report to the CBD, illegal removal of beach and dune sand for construction and cutting of mangroves for charcoal production also pose direct threats to biodiversity.

According to the WRI Reefs at Risk analysis, the 140 km<sup>2</sup> of reefs within the waters of SVG are threatened by human activities. The most pervasive threat is overfishing, however coastal development was rated as threatening almost two-thirds of the reefs, while marine-based pollution and sedimentation were estimated as threatening between 30 and 15 percent, respectively. Surface sea temperature rise and ocean acidification resulting from global climate change also threaten the health of the coral reef ecosystems. The economic values of coral reefs are related to coastal protection from storm surges and waves, the protection of beaches from erosion, provision of habitat for commercial marine organisms, and tourism.

Shallow water fisheries are threatened, even though management measures, including size and gear limits, closed areas and seasons, and modification of traps are in place. Fisheries management is limited by lack of enforcement capacity, control of land-based pollution, regulation of illegal fishing, impacts on habitat, and lack of data (FAO, 2002). Regulations prohibit use of dynamite, poisons, and other noxious substances, as well as trammel nets. According to a GIZ-CEHI report (2013), overfishing is a major concern and the need for alternative livelihoods for fishermen is one response to alleviate pressure on the resource.

**(5) Invasive species** are affecting SVG's biodiversity, although few data are available on the magnitude of their effects. One example, however, is how the feces of the invasive cattle egret (*Bubulcus ibis*) kill the roots of mangrove trees (MHE, 2010a). Another is how the invasive armadillo (*Dasylops novemcinctus*) has dug canals in the Vermont watershed, thereby increasing the rate of soil erosion and affecting native species (MHE, 2010a). A contact noted that invasive bamboos, grasses and vines prevent regeneration of forest on abandoned agricultural land. According to a key contact, potentially the most damaging invasive species in SVG is the

lionfish. In less than a decade, the Indo-Pacific lionfish (*Pterois volitans*) has become widely established in the Caribbean and poses a significant threat to reef biodiversity, as they out-compete many other species for food resources and have few known natural predators. The lionfish also threatens commercially important fish species such as grouper and snapper.

**(6) Climate Change:** Rising average surface sea temperatures as a result of climate change is considered one of the greatest threats to coral reefs in SVG (MHE, 2010a). In 2010, there was no research, monitoring, or implementation of specific measures in land use and coastal zone planning and strategies to strengthen local-level biodiversity resilience to climate change (MHE, 2010a). Increasing frequency and magnitude of hurricanes and tropical storms, associated with climate change is impacting biodiversity; according to a contact in the Forestry Department, “Three years ago, in hurricane Thomas, we lost a significant amount of old forest in certain areas. Before we could recover from this, heavy rains severely affected our watersheds and several communities were evacuated, road infrastructure was damaged.” Aerial photography taken after the hurricane and these landslides indicated that these natural disasters caused over 20 million Eastern Caribbean dollars in damages to forests and infrastructure. “We lost a lot of timber value, wildlife, and saw damages to riparian habitat.”

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity and is based upon the information and perspectives gathered from meetings with 31 key contacts, field visits to five coastal zone management and biodiversity protection project sites, as well as literature review. For long-term, sustainable results, the root causes of the threats to biodiversity must be addressed.

Table 3. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of reliable and accessible data on biodiversity distribution and status: Neither a coordinated effort on biodiversity data collection nor establishment of a central, accessible GIS has been carried out to date. This lack of data management makes it difficult for national government stakeholders, professionals and the public to make scientifically informed land-use planning, conservation and natural resource management decisions.	<ul style="list-style-type: none"> <li>• A permanent, comprehensive, and reliable system to obtain, process and analyze data on biodiversity and ecosystems, including a GIS database<sup>5</sup></li> <li>• A study to determine the value of SVG’s biodiversity, including studies on marine and terrestrial ecosystems</li> <li>• Research on wildlife trafficking to determine the extent of the threat and measures to control it, especially in the Grenadines where border control is much weaker than in St. Vincent Island</li> <li>• A study to determine the effects of invasive species on ecosystems and invasive species monitoring</li> </ul>
Limited financial resources to promote PA management: According to a contact in	<ul style="list-style-type: none"> <li>• Increased funding, personnel, monitoring, and enforcement for biodiversity-related agencies</li> </ul>

<sup>5</sup> The Department of Environmental Management is currently developing a proposal in conjunction with the International NGO Global Parks that seeks funding to carry out a complete terrestrial biodiversity inventory for mainland St. Vincent, including gathering information on species abundance, approximate distribution, and some ecological associations. The proposal includes producing portrayals of biological data in both tabular and spatial forms, and training the appropriate government of SVG staff in how to utilize and maintain the database and maps (Langdon, 2012).

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
<p>the NPA very few of the necessary actions identified in the National Parks and Protected Areas System Plan (2010 to 2014) have been implemented due to cuts in the NPA budget, as well as delayed funding disbursements.<sup>6</sup></p>	<ul style="list-style-type: none"> <li>• Establish user-fee ecosystem services charges for tourists, hoteliers and other private sector beneficiaries of ecological services</li> <li>• Support agency efforts to forge public-private partnerships for park management and attract international donor funding</li> </ul>
<p>Lack of Government will to prioritize biodiversity conservation and management issues: The government has prioritized development of the tourism sector over biodiversity and environmental management. This prioritization has led to the restriction of growth and even reduction of the budgets for agencies with mandates related to biodiversity protection.<sup>7</sup></p>	<ul style="list-style-type: none"> <li>• Demonstrate the economic and cultural value of biodiversity resources through willingness to pay and ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on St. Vincent and the Grenadines' biodiversity value (i.e., intact biodiversity)</li> <li>• Strengthen environmental NGOs so they can advocate for the environment and biodiversity conservation, and also for project implementation</li> </ul>
<p>Lack of public awareness about the value of biodiversity: Stakeholders interviewed and literature reviewed identified the need for enhanced awareness-building both at the general public and government levels about the importance of biodiversity conservation (MHE, 2010a).</p>	<ul style="list-style-type: none"> <li>• A comprehensive communication, education and public awareness strategy to clearly communicate to public and private sector stakeholders the linkages between the conservation and sustainable use of biodiversity and poverty alleviation</li> <li>• Attract students to government positions related to environmental protection and private sector eco-tourism positions</li> <li>• Involve local communities in all aspects of biodiversity conservation planning, management, administration, enforcement, and particularly through increased employment opportunities in conservation related activities</li> <li>• Using extension services, and other training and technology transfer, increase understanding of fishermen and others involved in the harvesting of marine resources of the need for sustainable use. Share regional experiences in sustainable fishery management.</li> <li>• Raise awareness of the impact of land-based activities on marine biodiversity</li> <li>• Promote selective fishing gear and practices that minimize waste in the catch of target species and minimize by-catch</li> </ul>

<sup>6</sup> A contact in the NPA said, “[The protected areas system] is not a priority area for the government. Since 2009, there has been drastic shortfall in funding. For this current 2012 fiscal year our budget is US\$2.4 million. We have actually only received 1.4 million...Our budget has actually been cut in recent years. We receive certain allocations on paper but never actually receive the monies. Sometimes we receive the monies one quarter into the next fiscal year.”

<sup>7</sup> According to one contact in the Ministry of HWE, “the Biodiversity Action Plan identified data collection, monitoring and reporting as an issue to improve. But we have never gotten the government support to do this kind of data collection and monitoring. In terms of looking at what are the chemicals used in the agricultural sector and what are the impacts upon species, or which species are indicator species and what is their status...these are all important questions that the government apparently supported in the NBSAP, but we have not received the financing needed.”

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Lack of legal framework to promote environmental management and protection: An Environmental Management Act was developed in 2009, but has not yet been approved by cabinet.	<p style="text-align: center;">of non-target species</p> <ul style="list-style-type: none"> <li>• Accelerate approval and implementation of other environmental laws and regulations that are currently not in place or are outdated, such as the Environmental Management Act, revision of EIA requirements</li> <li>• Apply and ramp up best practices (from demonstration projects and research) for the improved management and protection of marine resources</li> <li>• Support alternative agricultural-based livelihoods to marijuana cultivation in rural communities</li> <li>• Prosecute offenders who do not comply with land-use restrictions or comply with EIA requirements</li> <li>• Train in implementation, monitoring, and enforcement of EIA</li> </ul>
Lack of land use plan	<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect biodiversity and important ecosystems</li> <li>• Strengthen local and regional collaboration to develop land use guidance</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 4 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

**Global Climate Change:** The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, non-governmental organizations, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

**Citizen Security:** The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.



## FOCUS AREA 3

Economic Growth: Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

## FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 4. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• A permanent, comprehensive, and reliable system to obtain, process and analyze data on biodiversity and ecosystems, including a GIS database</li> <li>• A study to determine the value of SVG's biodiversity, including studies on marine and terrestrial ecosystems</li> <li>• Research on wildlife trafficking to determine the extent of the threat and measures to control it, especially in the Grenadines where border control is much weaker than in St. Vincent Island</li> <li>• A study to determine the effects of invasive species on ecosystems and invasive species monitoring</li> </ul>	<p>Focus Area 1: Global Climate Change will assist countries with adaptation measures to mitigate the effects of climate change, integrating the private sector, non-governmental organizations, and local communities.</p>
<ul style="list-style-type: none"> <li>• Increased funding, personnel, monitoring, and enforcement for biodiversity-related agencies</li> <li>• Establish user-fee ecosystem services charges for tourists, hoteliers and other private sector beneficiaries of ecological services</li> <li>• Support agency efforts to forge public-private partnerships for park management and attract international donor funding</li> </ul>	<p>Focus Area 1 Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identification and implementing adaptation measures.</p>
<ul style="list-style-type: none"> <li>• Demonstrate the economic and cultural value of biodiversity resources through willingness to pay and ecosystem services valuation studies in marine and terrestrial environments.</li> <li>• Disseminate information on St. Vincent and the Grenadines' biodiversity value (i.e., intact biodiversity)</li> <li>• Strengthen environmental NGOs so they can</li> </ul>	<p>Focus Area 1 Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</p>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<p>advocate for the environment and biodiversity conservation, and also for project implementation</p>	
<ul style="list-style-type: none"> <li>• A comprehensive communication, education and public awareness strategy to clearly communicate to public and private sector stakeholders the linkages between the conservation and sustainable use of biodiversity and poverty alleviation.</li> <li>• Attract students to government positions related to environmental protection and private sector eco-tourism positions</li> <li>• Involve local communities in all aspects of biodiversity conservation planning, management, administration, enforcement, and particularly through increased employment opportunities in conservation related activities.</li> <li>• Using extension services, and other training and technology transfer, increase understanding of fishermen and others involved in the harvesting of marine resources of the need for sustainable use. Share regional experiences in sustainable fishery management.</li> <li>• Raise awareness of the impact of land-based activities and impacts of fishing gear on marine biodiversity</li> </ul>	<p>Focus Area 3 Economic Growth will increase the ability of youth to participate in emerging market employment opportunities, enhance their lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime.</p>
<ul style="list-style-type: none"> <li>• Accelerate approval and implementation of other environmental laws and regulations that are currently not in place or are outdated, such as the Environmental Management Act, revision of EIA requirements</li> <li>• Apply and ramp up of best practices (from demonstration projects and research) for the improved management and protection of marine resources</li> <li>• Support alternative agricultural-based livelihoods to marijuana cultivation in rural communities</li> <li>• Prosecute offenders who do not comply with land-use restrictions or comply with EIA requirements</li> <li>• Train in implementation, monitoring, and enforcement of EIA to support planning and mitigation measures related to climate change.</li> </ul>	<p>Focus Area 1 Global Climate Change will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</p> <p>Focus Area 3 Economic Growth will increase the ability of youth to participate in emerging market employment opportunities, enhance their lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime.</p>
<ul style="list-style-type: none"> <li>• Develop a comprehensive land use plan to control coastal development and protect biodiversity and important ecosystems</li> <li>• Strengthen local and regional collaboration to develop land use guidance</li> </ul>	<p>Focus Area 1 will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.</p>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID's proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country's biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC's RDCS for 2014 to 2018. The recommendations reflect where USAID's support could have significant impact in advancing SVG's conservation of biodiversity and tropical forests.

Under Focus Area 1: Global Climate Change, the following are recommended for consideration by USAID.

- (1) Support the development of a permanent, comprehensive, and reliable system to obtain, process, and analyze data on biodiversity and ecosystems, including a GIS database. This could also be used to monitor the effects of invasive species on ecosystems and impacts of climate change on biodiversity resources.
- (2) Support the establishment of user-fee ecosystem services charges for tourists, resort operators, and other private sector beneficiaries of ecological services. Based on findings from recommendation #1 on the effects of climate change on biodiversity resources, tourists and resort operators could be charged a fee for coastal protection. The money raised would contribute to the conservation of mangroves, coral reefs, and other habitat that provides coastal protection.
- (3) Support development and implementation of a comprehensive communication, education, and public awareness strategy which would clearly communicate to public and private sector stakeholders the linkages between the conservation and sustainable use of biodiversity and poverty alleviation. This could include an awareness-raising component of the impact of land-based activities on marine biodiversity.
- (4) Strengthen institutional capacity for development and implementation of environmental policy and regulation. Capacity strengthening in EIA could be included in this program. A capacity strengthening program could be broadened to also include strengthening the environmental NGO sector, in particular with a focus on NGOs that involve youth in environmental projects and advocacy.
- (5) Support the development of a comprehensive land use plan to control coastal development and protect biodiversity and important ecosystems; and strengthen local and regional collaboration to develop land use guidance. This could be part of a demonstration project under the Climate Change Focus Area and could include the ramping up of best practices for the improved management and protection of marine resources.

Under Focus Area 3: Economic Growth, the following are recommended for consideration by USAID.

- (1) To attract students to government positions related to environmental protection and private sector eco-tourism positions, USAID could support an internship program to attract youth, in particular, at-risk youth.
- (2) Using extension services, and other training and technology transfer, increase understanding of fishermen and others involved in the harvesting of marine resources of the need for sustainable use. USAID has a comparative advantage in working region-wide in the natural resources, and therefore, is well placed to promote sharing of regional experiences in sustainable fisheries management. The program could also promote the use of selective fishing gear to minimize impacts on non-target species.
- (3) Support alternative livelihoods to marijuana cultivation in rural communities. This program could focus on attracting at-risk youth.

The SVG CCVA recommends the following that would also contribute to biodiversity and forest conservation:

(1) USAID should consider supporting the Tobago Cays Marine Park to achieve the following biodiversity conservation measures:

- Design and implement mechanisms to ensure adequate, stable financing (user-fee system, among other measures)
- Establish systematic procedures to involve fishing associations in park management
- Implement a marine spatial plan previously developed with funding from NOAA and TNC
- Establish regular, adequate, locally based research and monitoring
- Develop a model program to strengthen the park's institutional capacity
- Complete drafting and begin implementation of regulations for the use of the resources of the Tobago Cay Marine Reserve

## REFERENCES

Ashton Lagoon Restoration Project. 2012. Building Benefits for Birds and People. Available on the Internet at: <http://ashtonlagoonrestore.webs.com/>.

Baldwin, K. Undated. Grenadines MarSIS. Retrieved from Grenadines Marine Resource & Space-use Information System: <http://www.grenadinesmarsis.com/>

Burke, L. and J. Maidens. 2004. St. Vincent and the Grenadines, in Reefs at Risk in the Caribbean. World Resources Institute. Available on the Internet at: <http://www.wri.org/publication/content/7902>.

Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.

Christie, M. 2012. National-level Economic Valuation Study of the Environmental Services Provided by Marine Habitats in St Vincent and the Grenadines. Government of St. Vincent and the Grenadines.

CIA. 2013. The World Factbook: St Vincent and the Grenadines. Available on the Internet at: <https://www.cia.gov/library/publications/the-world-factbook/geos/vc.html>.

Conservation and Sustainable Development Unit. 2013. Ministry of Health, Wellness, and the Environment. Available on the Internet at: [http://www.health.gov.vc/index.php?option=com\\_content&view=article&id=95&Itemid=91](http://www.health.gov.vc/index.php?option=com_content&view=article&id=95&Itemid=91).

Culzac-Wilson, L. 2008. Important Bird Areas in the Caribbean: Key Sites for Conservation. Birdlife International.

Dow Piniak, W. E. and Eckert, K.L. 2011. Sea turtle nesting habitat in the Wider Caribbean Region. *Endangered Species Research* 15: 129–141.

The Nature Conservancy. 2013. Eastern Caribbean. Available from the Internet at: <http://www.nature.org/ourinitiatives/regions/caribbean/easterncaribbean/the-nature-conservancy-in-the-caribbean-grenada.xml>.

Egbert, C. 1999. Endangered Species Protection around the World. Retrieved from St. Vincent and the Grenadines: <http://mamba.bio.uci.edu/~sustain/h90/StVincentandGrenadines.htm>

Environmental Management Department. 2013. Ministry of Health, Wellness, and the Environment. Available on the Internet at: [http://www.health.gov.vc/index.php?option=com\\_content&view=article&id=91&Itemid=87](http://www.health.gov.vc/index.php?option=com_content&view=article&id=91&Itemid=87).

Food and Agriculture Organization of the United Nations (FAO). 2010. Global Forest Resources Assessment, Country Report: Saint Vincent and the Grenadines. Rome: United Nations.

Global Climate Change Alliance. 2012. Climate change adaptation and sustainable land management in the Eastern Caribbean. Available on the Internet at: <http://www.gcca.eu/regional-programmes/gcca-eastern-caribbean>.

Global Land Tool Network. 2012. Retrieved from Land Policy and Management in the Caribbean: <http://www.gltcn.net/index.php/projects/land-policy-and-management-in-the-caribbean>

Integrated Watershed and Coastal Area Management. 2013. Retrieved from Introduction to the GEF-IWCAM Project. Available on the Internet at: <http://iwcam.org/>.

Inter-American Biodiversity Information Network. 2010. Economic Valuation of Goods and Services Derived from Coral Reefs in the Tobago Cays Marine Park. Organization of American States.

IUCN. 2010. IUCN Red List of Threatened Species. Version 2012.2. Retrieved May 20, 2013, from IUCN Red List.

Kilgo, J. 2010. South Coast Marine Conservation Area AGRRA. The Nature Conservancy.

Langdon, K. 2012. Proposed: a Project of Biodiversity Discovery in Terrestrial Habitats of St. Vincent Island.

Ministry of Health and the Environment. 2006. Third National Biodiversity Report: St. Vincent and the Grenadines.

Ministry of Health and the Environment. 2010a. The Fourth National Biodiversity Report of St. Vincent and The Grenadines to the UNCBD. Kingstown, St. Vincent.

Ministry of Health and the Environment. 2010b. Willingness-To-Pay Study: St. Vincent and the Grenadines. Government of St. Vincent and the Grenadines.

Ministry of Housing, Informal Human Settlements, Lands & Surveys and Physical Planning (Ministry of Housing). 2013. Mission Statement. 2013. Available on the Internet at: <http://www.housing.gov.vc/index.php>.

Murray, R. 1997. Degradation of Pesticides Applied to Banana Farms Soil. Environmental Toxicology and Chemistry Volume, 16(1).

National Parks, Rivers and Beaches Authority. 2009. SVG National Parks and Protected Areas System Plan 2010-2014. Kingstown.

Singh, A. 2010. National Environmental Summary: St. Vincent and the Grenadines. UNEP.

Government of St Vincent and the Grenadines (SVG). 2008. Second country report on the state of plant genetic resources in St. Vincent and the Grenadines. United Nations Food and Agriculture Organization.

Union Island Environmental Attackers. Undated. Retrieved from About Us: <http://environmentalattackers.org/about/>.

UNEP. 2010. National Environmental Summary: Saint Vincent and the Grenadines. Available on the Internet at: <http://www.pnuma.org/publicaciones/FINAL%20NES%20St%20Vincent%20and%20Grenadines%20Nov%202010-%20edited.pdf>.

UNESCO. 2001. Wise Practices for Coping with Beach Erosion: St Vincent and the Grenadines. Available on the Internet at: <http://www.unesco.org/csi/act/cosalc/vinb.pdf>.

USAID. 2008. FAA 118/119 Tropical Forests and Biodiversity Assessment: Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & The Grenadines.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: St. Vincent and the Grenadines.



# ANNEX A: MAPS

## FIGURE A1. ST. VINCENT LAND COVER (2005)

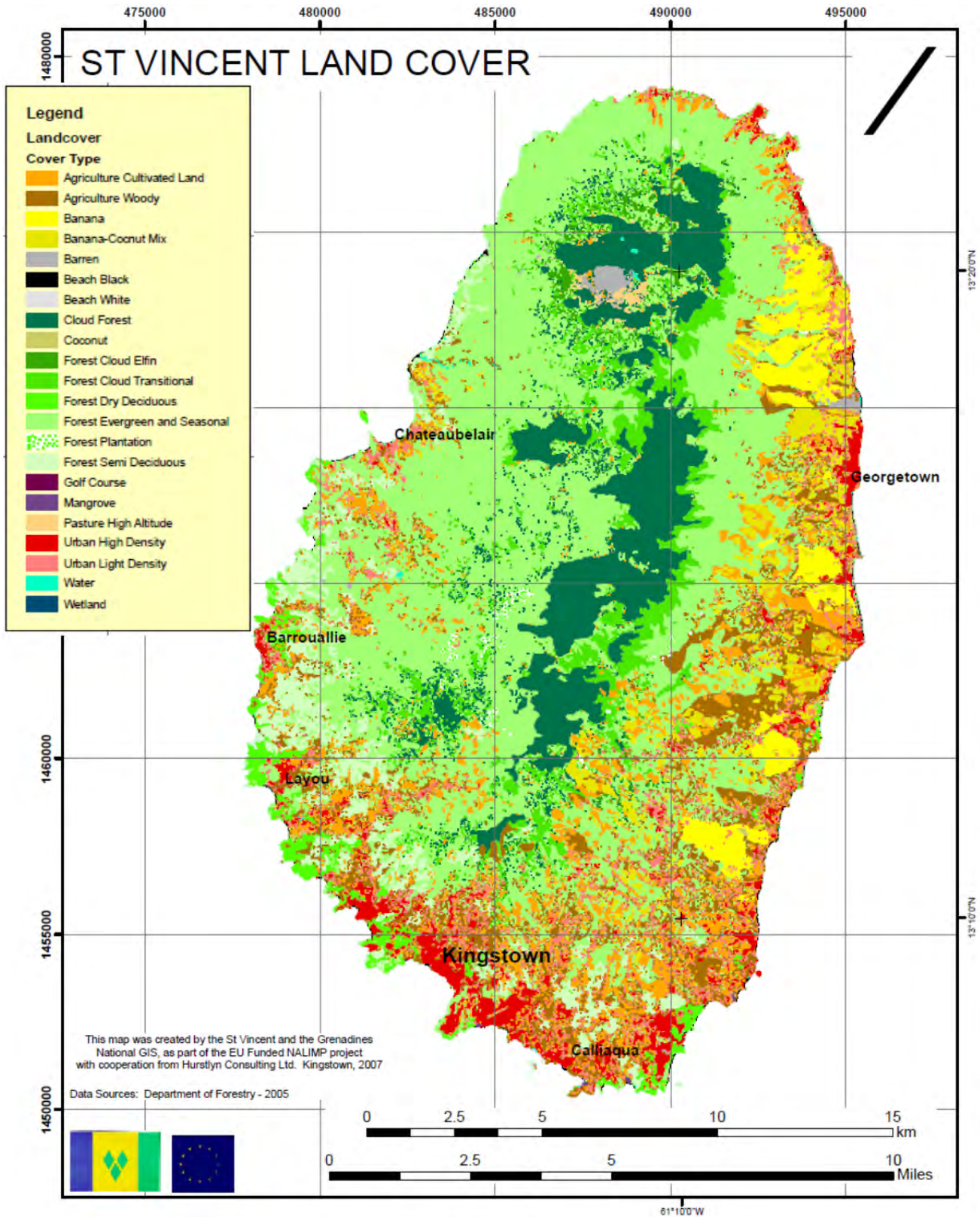




FIGURE A2. PROPOSED PROTECTED AREAS OF NORTHERN ST. VINCENT MAINLAND

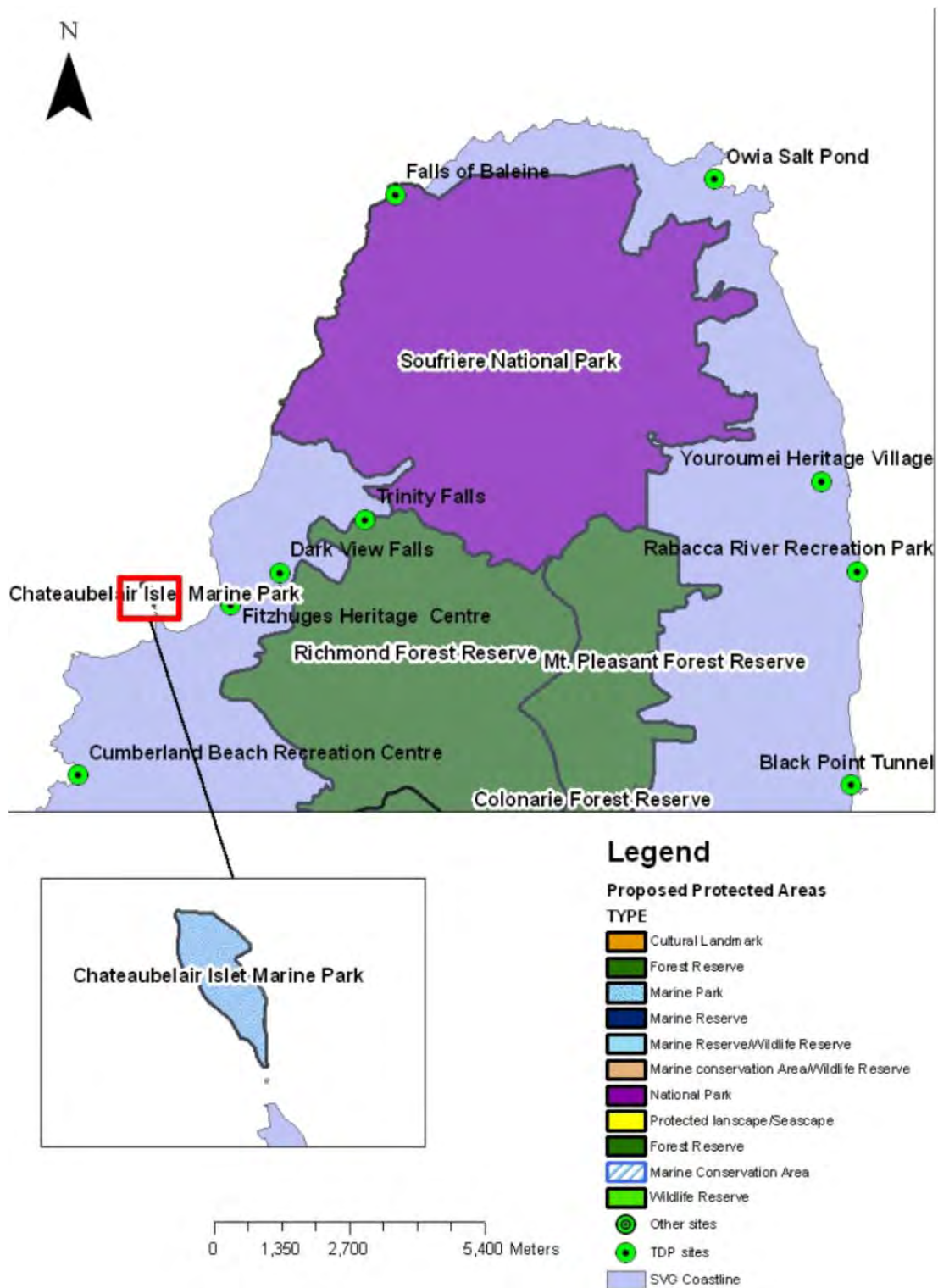


FIGURE A3. PROPOSED PROTECTED AREAS OF SOUTHERN ST. VINCENT MAINLAND

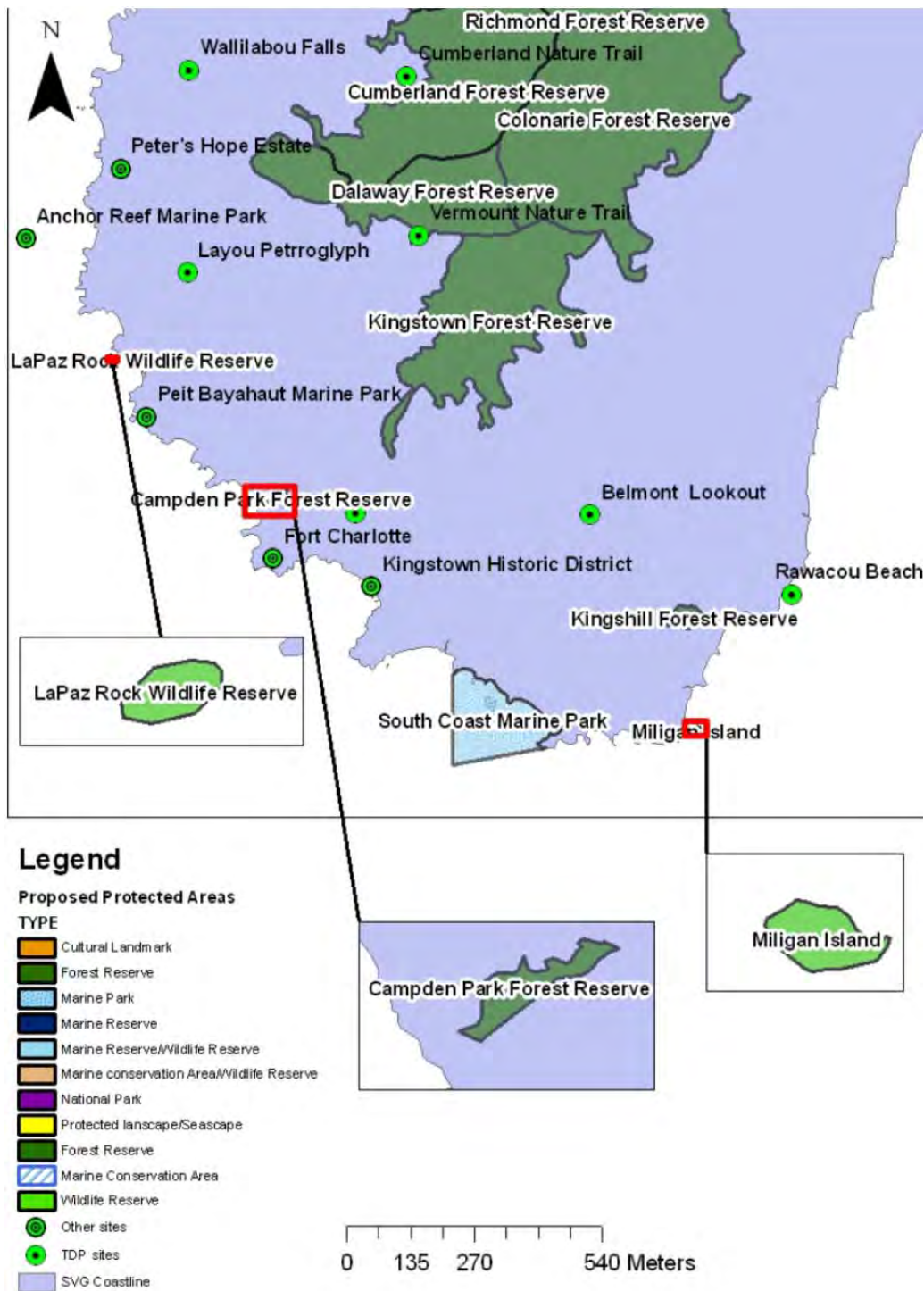


FIGURE A4. PROPOSED PROTECTED AREAS OF THE NORTHERN GRENADINES

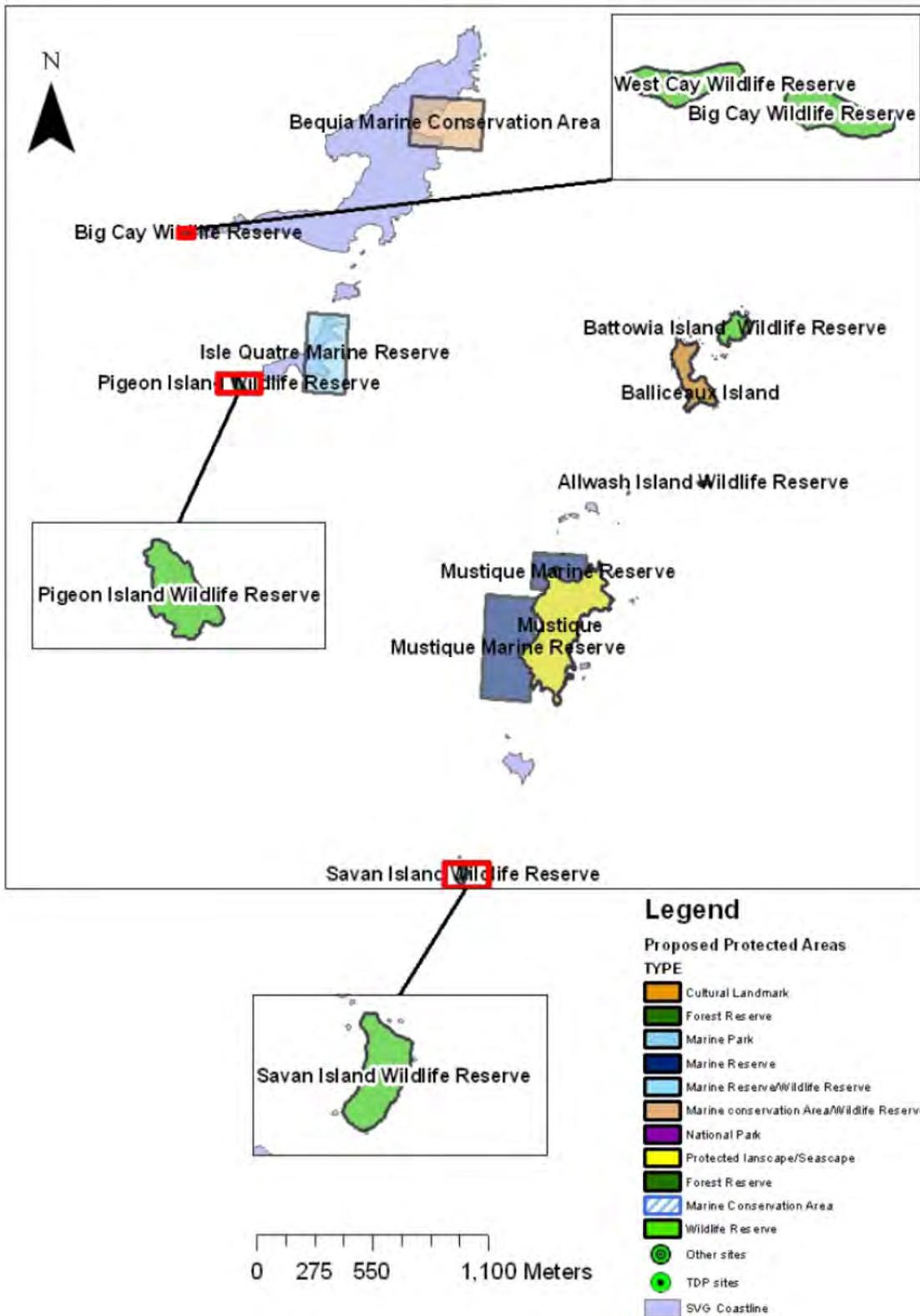
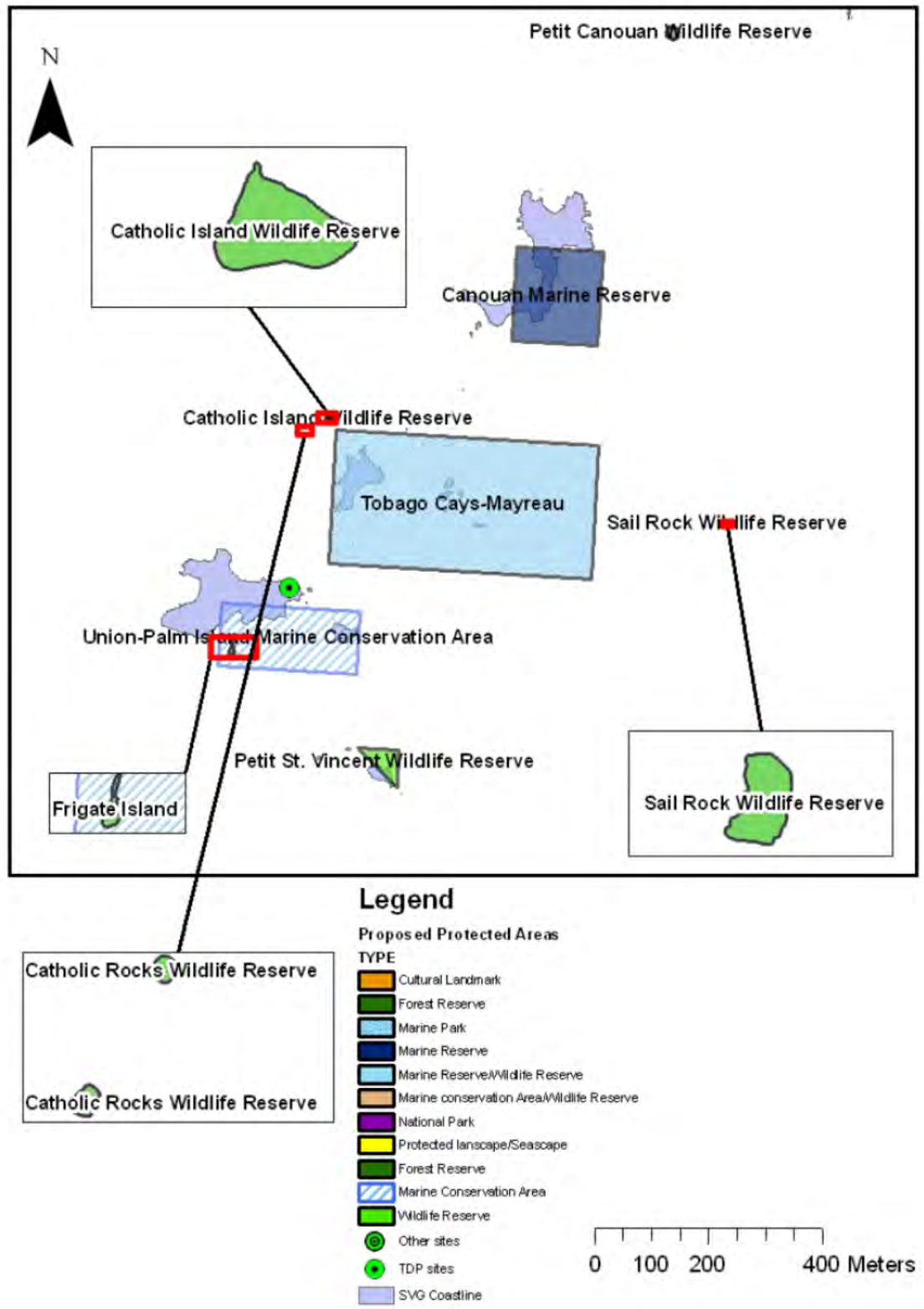


FIGURE A5. PROPOSED PROTECTED AREAS OF THE SOUTHERN GRENADINES





## ANNEX B: THREATENED SPECIES OF ST. VINCENT AND THE GRENADINES

TABLE B1. IUCN RED LIST FOR ST. VINCENT AND THE GRENADINES

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS	YEAR ASSESSED
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008
Animalia	<i>Acropora palmata</i>	Elkhorn Coral	CR	2008
Animalia	<i>Chironius vincenti</i>	St. Vincent Blacksnake	CR	1996
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011
Animalia	<i>Gonatodes daudini</i>	Grenadines Clawed Gecko, Union Island Gecko	CR	2011
Animalia	<i>Hyporthodus nigritus</i>	Black Grouper, Black Jewfish, Warsaw Grouper	CR	2006
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013
Animalia	<i>Catharopeza bishop</i>	Whistling Warbler	EN	2012
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008
Animalia	<i>Montastraea faveolata</i>		EN	2008
Animalia	<i>Pristimantis shrevei</i>		EN	2004
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011
Animalia	<i>Typhlops tasymicris</i>	Grenada Bank Blindsnake	EN	2011
Animalia	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008
Animalia	<i>Amazona guildingii</i>	St. Vincent Amazon, St. Vincent Parrot, St. Vincent Amazon, St. Vincent Amazon, St. Vincent Parrot	VU	2012
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS	YEAR ASSESSED
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008
Animalia	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012
Animalia	<i>Montastraea franksi</i>		VU	2008
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008
Animalia	<i>Oculina varicose</i>	Large Ivory Coral	VU	2008
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Sperm Whale, Sperm Whale	VU	2008
Animalia	<i>Rusa unicolor</i>	Sambar, Sambar Deer	VU	2008
Animalia	<i>Sphaerodactylus kirbyi</i>	Bequia Dwarf Gecko, Bequia Sphaero, Grenadines Sphaero	VU	2011
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008
Plantae	<i>Guaiacum officinale</i>	Commoner Lignum Vitae, Guaiac Tree	EN	1998
Plantae	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998
Plantae	<i>Picrasma excels</i>		VU	1998
Plantae	<i>Pouteria semecarpifolia</i>		VU	1998

**TABLE B2. EXISTING AND PROPOSED PROTECTED AREAS FOR ST. VINCENT AND THE GRENADINES**

PROTECTED AREA DESIGNATION	PROTECTED AREA NAME	IUCN CLASSIFICATION
National Park	1. Soufriere National Park	II
Forest Reserves	1. Campden Park Forest Reserve 2. Colonarie Forest Reserve 3. Cumberland Forest Reserve 4. Dalaway Forest Reserve 5. Kings Hill Forest Reserve 6. Kingstown Forest Reserve 7. Mt. Pleasant Forest Reserve 8. Richmond Forest Reserve	IV
Wildlife Reserves	1. All Awash Island Wildlife Reserve 2. Battowia Island Wildlife Reserve 3. Big Cay Wildlife Reserve 4. Catholic Island Wildlife Reserve 5. Catholic Rock Wildlife Reserve 6. Frigate Island Wildlife Reserve 7. Isle de Quatre Wildlife Reserve 8. Lapaz Rock Wildlife Reserve 9. Milligan Cay Wildlife Reserve 10. Northern Bequia Wildlife Reserve 11. Palm Island Wildlife Reserve 12. Petit Canouan Wildlife Reserve 13. Petit St. Vincent Wildlife Reserve 14. Pigeon Island Wildlife Reserve 15. Sail Rock Wildlife Reserve 16. Savan Island Wildlife Reserve 17. West Cay Wildlife Reserve	IV
Cultural Landmarks	1. Layou Petroglyph 2. Black Point Tunnel 3. Fort Charlotte Peninsula 4. Fort Murray, Union Island 5. Balliceaux 6. Fitzhughes Heritage Center 7. Youroumei Heritage Village 8. Peter's Hope Estate 9. The Casson House 10. Cobblestone Inn 11. Montague House 12. Bishop's Court 13. Gonsalves Building 14. Police Headquarters 15. Botanic Gardens 16. HM Prison, Kingstown	III



PROTECTED AREA DESIGNATION	PROTECTED AREA NAME	IUCN CLASSIFICATION
	17. Court House, Kingstown 18. Carnegie Building 19. Blue Caribbean Building 20. Government House 21. Jacob's Galleried House 22. Frangipani Hotel, Bequia 23. Lime Kiln, Bequia 24. Spring Estate, Bequia 25. Cotton House, Mustique	
Natural Landmarks	1. Trinity Falls 2. Dark View Falls 3. The Botanic Gardens 4. Falls of Baleine 5. Vermont Nature Trail 6. Cumberland Nature Trail	III

## ANNEX C: LIST OF CONTACTS

### TABLE C1. CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE
Sylvester Lynch	National Project Coordinator	Ministry of Health, Wellness and the Environment (Biosafety)	<a href="mailto:tosyllynch@yahoo.com">tosyllynch@yahoo.com</a>	457-1729
Glenroy Gaymes	Forestry Supervisor	Forestry Department	<a href="mailto:glenroygaymes@yahoo.com">glenroygaymes@yahoo.com</a>	457-8594
Jennifer Gruickshark - Howard	Chief Fisheries Officer	Fisheries Division	<a href="mailto:fishdiv@vincysurf.com">fishdiv@vincysurf.com</a>	456-2738
Andrew Lockhart	Superintendent Marine and Terrestrial Parks	National Parks Authority	<a href="mailto:andylockhart65@yahoo.com">andylockhart65@yahoo.com</a>	457-1003
Amos Glasgow	Forestry Supervisor	Forestry Department	<a href="mailto:matthiasglasgow@gmail.com">matthiasglasgow@gmail.com</a>	457-8594
Fitzgerald Providence	Director	Forestry Department	<a href="mailto:fitzpro@yahoo.com">fitzpro@yahoo.com</a>	457-8594
Rhonda Sutherland	Communication	Ministry of Agriculture	<a href="mailto:rhondafun71@gmail.com">rhondafun71@gmail.com</a>	457-2452
Andrew Wilson	Director	National Parks Authority	<a href="mailto:nationalparkssvg@gmail.com">nationalparkssvg@gmail.com</a>	457-1003
Joan Ryan	Public Relations	Central Water and Sewerage Authority	<a href="mailto:jryan@cwsasvg.com">jryan@cwsasvg.com</a>	456-2946
Anthony Patterson	EHSO	VINLEC	<a href="mailto:apatterson@vinlec.com">apatterson@vinlec.com</a>	
Casmus McLeod	Forestry Supervisor	Forestry	<a href="mailto:watershedmgnt@hotmail.com">watershedmgnt@hotmail.com</a>	457-8594
Yasa Belmar	Environmental Analyst	Environmental Management Department	<a href="mailto:yasa.belmar@gmail.com">yasa.belmar@gmail.com</a>	457-1729
Nyasha Hamilton	Environmental Educator	Environmental Management Department	<a href="mailto:nyakkh@gmail.com">nyakkh@gmail.com</a>	457-1729
Cornelius Richard	Senior Forest Supervisor	Forestry	<a href="mailto:cornierich@yahoo.com">cornierich@yahoo.com</a>	457-8594
Andrew Bramble		Nation Emergency Management Organization	<a href="mailto:bramble5@hotmail.com">bramble5@hotmail.com</a>	456-2975

NAME	POSITION	ORGANIZATION	EMAIL	PHONE
Phillip Jackson	Science and Technology Coordinator	Office of the Prime Minister	<a href="mailto:pcjackson@gov.vc">pcjackson@gov.vc</a>	456-1703
Nadine Agard	Business Facilitation Manager	Invest SVG		
Martin Barriteau	Project Manager	Sustainable Grenadines	<a href="mailto:susgrenpm@vincysurf.com">susgrenpm@vincysurf.com</a>	485-8779
Matthew Harvey	President	Union Island Fishing Cooperative		
Herman Belmar	Bequia Island Representative	Office of the Prime Minister		
Colin Campbell	Town Planner	Physical Planning Unit		
Kenneth Williams	Operations Manager	Tobago Cays Marine Park		
Benjamin Wilson	Park Ranger	Tobago Cays Marine Park		
Leroy Noel	Assistant Operations Manager	Tobago Cays Marine Park		
Cornelius Richards	Senior Forestry Supervisor	Forestry Department	<a href="mailto:cornierich@yahoo.com">cornierich@yahoo.com</a>	457-8594
Casmus McLeod	Forestry Supervisor	Forestry Department	<a href="mailto:watershedmgt@hotmail.com">watershedmgt@hotmail.com</a>	457-8594
Glenroy Caymens	Agroforestry Supervisor	Forestry Department	<a href="mailto:glenroygaymes@yahoo.com">glenroygaymes@yahoo.com</a>	457-8594
Joel Poyer	Forestry Officer	Forestry Department		457-8594
Amos Glasgow	Forestry Supervisor	Forestry Department	<a href="mailto:matthiasglasgow@gmail.com">matthiasglasgow@gmail.com</a>	457-8594
Andrew Lockhart	Superintendent Marine and Terrestrial Parks	National Parks Authority	<a href="mailto:andylockhart65@yahoo.com">andylockhart65@yahoo.com</a>	457-1003
Stina Herberg	Director	Richmond Vale Academy	<a href="mailto:stina@richmondvale.org">stina@richmondvale.org</a>	492-4058

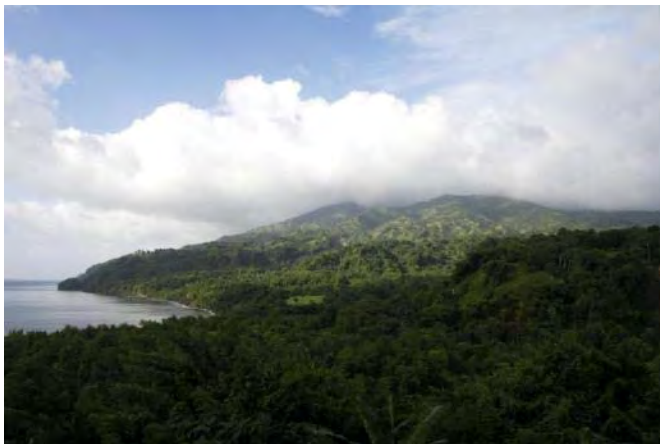
## ANNEX D: NATIONAL NGOS OPERATING IN ST. VINCENT AND THE GRENADINES

NAME OF NGO	LOCATION/GEOGRAPHIC SCOPE	FOCUS
JEMS	South East of St. Vincent	Protectors of Kings Hill forest. Work on beach protection in Brighton and Diamond.
Sustainable Grenadines (Sus Gren)	Union Island, Southern Grenadines and Grenada	Marine spatial planning to develop a trans-boundary marine multi-use zoning plan for the Grenadine Islands (NOAA-funded), Ashton Lagoon Restoration Project
Richmond Vale Academy	North Western area of St. Vincent, in particular the Richmond Vale town and surrounding communities	Environmental education, climate change, organic gardening and ecotourism
North Windward Disaster Committee	North Eastern area of St. Vincent	Strong in advocacy and capacity development
Union Island Attackers	Union Island –Southern Grenadines	Multi focus, environmental protection
AvianEyes	St. Vincent and the Grenadines at large	Promotes conservation of birds and habitat; education, research and documentation on flora and fauna with specific emphasis on avians.

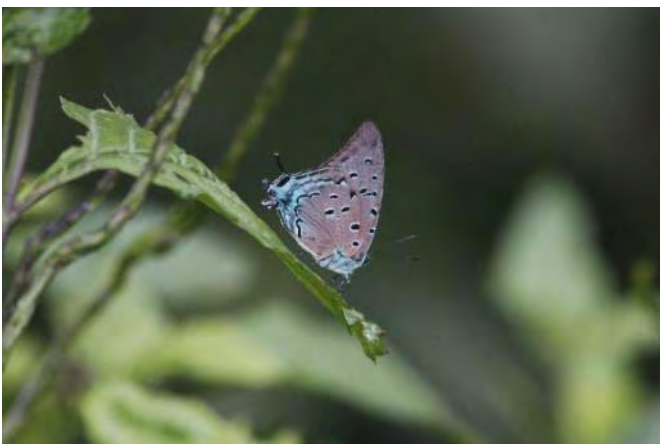
## ANNEX E: PHOTOS



The St. Vincent parrot (*Amazona guildingii*) perches on a tree in its natural habitat in the Vermont Forest Reserve. Photo credit: Mike Seager



The Mt. Soufriere Volcano is located at the northern-most end of St. Vincent. Photo credit: Mike Seager



The endemic St. Vincent hairstreak (*Pseudolycaena cybele*). Some researchers believe the percent of species endemic to just St. Vincent's island could exceed 30 percent (Langdon, 2012). Photo credit: Mike Seager



A drainage canal on Bequia Island dumps trash and sediment 50 m inland from the shoreline. Photo credit: Mike Seager



Hillside agriculture in the "Mesopotamia Valley" on mainland St. Vincent. Photo credit: Mike Seager



A marijuana plantation on the slopes of the Mt. Soufriere Volcano. Photo credit: Mike Seager

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSIS

SURINAME

(FAA 118/119)



# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	2
LEGISLATION.....	2
GOVERNMENT.....	3
NON-GOVERNMENTAL ORGANIZATIONS.....	4
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	6
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	9
PROTECTED AREAS.....	9
THREATENED AND ENDANGERED SPECIES.....	11
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	13
TYPES OF FOREST.....	13
MANAGEMENT OF FORESTS.....	13
ECONOMIC IMPORTANCE.....	15
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	15
MANAGED NATURAL ECOSYSTEMS.....	15
<i>EX-SITU</i> CONSERVATION.....	17
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	18
DIRECT THREATS.....	18
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	19
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	22
FOCUS AREA 1.....	22
FOCUS AREA 2.....	22
FOCUS AREA 3.....	22
FOCUS AREA 4.....	22
CONCLUSIONS AND RECOMMENDATIONS.....	25
REFERENCES.....	27
ANNEX A: MAPS.....	29
FIGURE A1. PROTECTED AREAS IN SURINAME.....	29
FIGURE A2. ECOSYSTEMS OF SURINAME IN THE FOURTH NATIONAL REPORT TO THE CBD (2012).....	31
FIGURE A3. GENERALIZED MAP SHOWING FOREST TYPES IN SURINAME AND LOCATION OF FOREST BELT BOUNDED IN GREEN LINE.....	32
ANNEX B: THREATENED SPECIES OF SURINAME.....	33
TABLE B1. IUCN RED LIST FOR SURINAME.....	33
ANNEX C: LIST OF CONTACTS.....	37
TABLE C1. CONTACTS.....	37

## REPORT FINDINGS

Suriname is located in the humid tropics with a landmass predominately covered by tropical rainforest. The forest cover in Suriname is one of the highest in the world at over 90 percent. The Fourth National Report to the Convention on Biological Diversity (CBD) states that over 80 percent of the land surface, approximately 164,000 km<sup>2</sup>, is covered by tropical rainforest. Since tropical rainforests harbor some of the richest biodiversity in the world, Suriname has significant species richness for all major groups of organisms. According to Ouboter (2002), a rough estimate of the number of plants is 6,100 with about 5,782 species known today. For invertebrates, only about 1,600 species are currently known, but experts anticipate between 600,000 and 1,000,000 actually exist in Suriname. Best known are the vertebrates with 1,890 species, while about 2,040 species are expected to occur in Suriname. There are significant gaps in information on the condition and status of Suriname's environment as well as general lack of data on the effectiveness of international donor funded programs or the status of implementation of pertinent international agreements or conventions. The following forest types are found in Suriname: high dryland forest (rainforest), dry evergreen forest, low savanna forest, high swamp forest, low swamp forest, mangroves, marsh forest, and ridge forest.

According to the International Union for the Conservation of Nature Red List of Threatened Species, species listed as critically endangered, endangered, and vulnerable are considered threatened. Forty-nine animal and twenty-six plant species meet these criteria in Suriname. Most species on the list have declining populations with the exception of one bird described as stable. For 32 species (six animals and 26 plants), no population status was given and for seven species (all animals), status is described as unknown.

Environmental legislation in Suriname is mostly non-existent or outdated, and there is limited enforcement of the legislation that does exist. For example, there is no Environmental Framework Law, and the Nature Preservation Law of 1979 and Game Law of 1954 need to be updated. Suriname has no national legislation for Environmental Impact Assessment (EIA), however, the National Institute for Environment and Development (NIMOS) works under guidelines, which give the mandate to NIMOS to review and approve EIAs. EIA legislation is included in the Environmental Framework Law, which was presented to the Council of Ministers three times, and was sent back for revisions two times.

Suriname has 16 protected areas (PAs) and four proposed PAs covering approximately 14.6 percent of the total land area of the country (WWF, 2012). Suriname falls short of the 2020 objective of the Convention on Biological Diversity of effectively managing 17 percent of total land surface in PAs. Suriname's PA system has three categories, Multiple Use Management Areas (MUMA, these are areas on the coast); Nature Parks, and Nature Reserves. The 12 nature reserves covering approximately 14 percent of the land area and four MUMAs are aimed at preserving Suriname's biodiversity.

The donor and non-governmental organization (NGO) landscape is complex. This is a direct reflection of the high interest in Suriname's biodiversity, forestry, and situation with respect to indigenous peoples and maroons. Tensions exist between some indigenous NGOs and other national and international NGOs related to protection of biodiversity versus indigenous peoples' use of biodiversity.

The Assessment Team noted the following direct threats to biodiversity and forests: mining, illegal and over-exploitation of wildlife and wildlife products (the illegal wildlife trade), illegal and over-fishing, habitat alteration/destruction, climate change, introduction of invasive species, and forest degradation.

The following are the root causes of the threats:

- Lack of political will to conserve biodiversity
- Non-existent, outdated, and limited enforcement of legislation
- Data needed for decision making and management of biodiversity is deficient
- Limited resources and capacity
- Lack of planning
- Lack of public awareness that biodiversity has economic benefits (lack of appreciation of biodiversity values and lack of incentives to conserve biodiversity)

The Conclusions and Recommendations section includes recommendations for strengthening USAID's support for biodiversity and forest conservation.

## LIST OF ACRONYMS

ADS	Automated Directives System
CBD	Convention on Biological Diversity
CBSI	Caribbean Basin Security Initiative
CCDA	Climate Compatible Development Agency
CCVA	Climate Change Vulnerability Assessment
CELOS	Centre of Agricultural Research in Suriname (translated from the Dutch)
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	CELOS Management System
CSNR	Central Suriname Nature Reserve
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
EIA	Environmental Impact Assessment
EN	Endangered, as designated by the IUCN Red List of Threatened Species
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization
FSC	Forestry Stewardship Council
GDP	Gross domestic product
GEF	Global Environment Facility
GIS	Geographic information systems
GoS	Government of Suriname
IUCN	International Union for Conservation of Nature
LBB	Lichtwet en Bosbeheer (Suriname Forest Service, translation from the Dutch)
MUMA	Multiple Use Management Area
NBAP	National Biodiversity Action Plan
NGO	Non-governmental organization
NIMOS	National Institute for Environment and Development (translation from the Dutch)
NTFP	Non-timber forest product
PA	Protected area
PEPFAR	President's Emergency Plan for AIDS Relief
RAP	Rapid assessment procedure
RDCS	Regional Development Cooperation Strategy
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
SBB	Stichting voor Bosbeheer en Bostoezicht (Foundation for Forest Management and Forest Control, translation from the Dutch)
SCF	Suriname Conservation Foundation
STINASU	Stichting Natuurbehoud Suriname (Foundation for Nature Conservation, translation from Dutch)
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
VIDS	Association of Indigenous Village Leaders in Suriname (translation from the Dutch)

VU Vulnerable, as designated by the IUCN Red List of Threatened Species  
WWF World Wildlife Fund

# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Suriname component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* For this Foreign Assistance Act (FAA) 118/119 Assessment, the Assessment Team held in-country stakeholder consultations from June 7 to June 13, 2013 (Annex C contains the List of Contacts). The Assessment Team convened a focus group in Suriname (the List of Contacts shows focus group participants) to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. This FAA 118/119 Assessment also involved an extensive review of documents and websites. The Assessment Team visited the coastal area to the north of Paramaribo to see the impacts of the seawall that resulted in destruction and degradation of the mangrove swamp along the coast.

*Information Used and Gaps:* The main documents the Assessment Team used for this FAA 118/119 Assessment are: Suriname's National Biodiversity Action Plan (NBAP), 2012 to 2016, submitted to the Convention on Biological Diversity (CBD) in February 2013; Assessment of Existing Information on Protected Areas and Wildlife (Ouboter, 2002); the Fourth National Report to the CBD (submitted December 2012); Suriname's Biodiversity Strategy (2006 to 2020) several World Wildlife Fund (WWF) and Tropenbos publications; and Websites, as cited in the References section.

The Guiana Shield, which includes Suriname, is noted as the region with the highest biodiversity and most limited human footprint (WWF, 2012), and therefore, many studies have been undertaken, but significant gaps in biodiversity knowledge remain (as illustrated by the RAP, see below). For example, actual biodiversity and species richness are hardly known for most taxa, except for the vertebrates and flowering plants and some selected and usually small groups of invertebrates (Ouboter, 2002). This still remains the case since Ouboter's report was written in 2002. Another gap is illustrated by the forest cover map (see Annex A, Figure A2), which shows  $\frac{3}{4}$  of the country as green but contrary to the map, this is not homogeneous forest; forest type has not yet been mapped.

*General Country Description and Description of Ecosystem and Species Diversity:* Officially known as the Republic of Suriname, the country is bordered by French Guiana to the east, Guyana to the west, Brazil to the south, and the Atlantic Ocean to the north. At just under 165,000 km<sup>2</sup> (64,000 mi<sup>2</sup>), Suriname is the smallest sovereign state in South America. (French Guiana, while less extensive and populous, is an overseas department of France.) Suriname has a population of approximately 560,000 (CIA World Factbook, 2012), most of whom live on the country's north coast, where the capital, Paramaribo, is located.

Suriname is located in the zone of the humid tropics, with most of the land covered by tropical rainforest. The forest cover in Suriname is one of the highest in the world, over 90 percent. The balance of land cover

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

includes some hydrophytic (wet) forest and xerophytic (dry) forest. Cultivated land is less than 1 percent of land use. The Fourth National Report to the CBD states that over 80 percent of the land surface, approximately 164,000 km<sup>2</sup>, is covered by tropical rainforest. Since tropical rainforests harbor some of the richest biodiversity in the world, Suriname has significant species richness for all major groups of organisms. According to Ouboter (2002), a rough estimate of the number of plants is 6,100 with about 5,782 species known today. For invertebrates, between 600,000 and 1,000,000 are expected to be found in Suriname, but only about 1,600 species are currently known. Best known are the vertebrates with 1,890 species, while about 2,040 species are expected to occur in Suriname.

According to Ouboter (2002), ecosystem inventories are limited to a 1978 and 1980 inventory of the vegetation of the coastal and savanna belt and a separate 1993 characterization of the freshwater ecosystems. The terrestrial ecosystems of the interior are insufficiently known, and so can only be organized in rough categories.

As an indication of how little is actually known of the biodiversity in Suriname, Conservation International (CI) undertook rapid biodiversity assessments (rapid assessment procedure or RAP) in target areas. In August to September 2010, a RAP was conducted in the southern part of Suriname (near the village of Kwamalasamutu), which found organisms new to Suriname in the following categories:

- Plants (8)
- Aquatic beetles (45)
- Dung beetles (5)
- Dragonflies and damselflies (14)
- Katydid and grasshoppers (29)
- Fishes (2)
- Reptiles and amphibians (2)
- Birds (4)
- Small mammals (220)

Several species were identified during the RAP as species new to science, including aquatic beetles (16 to 26), dung beetles (10 to 14), dragonflies and damselflies (4), katydids and grasshoppers (7), fishes (8), and reptiles and amphibians (1).

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

Much of the legislation related to management of natural resources and the environment in Suriname is non-existent or outdated, and, where legislation exists, there is limited enforcement. For example, there is no Environmental Framework Law, and the Nature Preservation Law of 1979 and Game Law of 1954 need to be updated. Currently, the Government of Suriname (GoS) has engaged a consultant to update these laws. The Planning Act of Suriname was developed in 1973, but has never been fully implemented.

The Fish Protection Law for inland waters protects eight fish species by setting limits on the size to be captured. It also determines non-fishing seasons for certain species. The Sea Fisheries Law (for the territorial sea and the economic zone) contains the framework for sea fisheries law, e.g. establishing quota for certain species in certain fishing areas. The Law on Forest Management regulates the exploration and exploitation of timber in forest areas. The law also regulates the collection and export of non-timber forest products (NTFPs) (including medicinal plants).

The GoS is developing and revising several pieces of legislation, and some laws are awaiting approval. The GoS is developing a National Strategy on Biodiversity, a National Environmental Action Plan, and a Methodology for Ecological Economic Zoning. The Environmental Framework Law was submitted in 2002, but approval of that law is still pending. A multi-year development plan by sector (i.e., culture, economy,



environment, etc.) is underway, called “Suriname in Transformation.” The National Forest Policy and the Interim Strategic Action Plan for the Forest Sector are in development.

The second NBAP was sent to the CBD Secretariat in March 2013.

## GOVERNMENT

The National Council for the Environment was founded in 1998 as a policy advisory body, followed by the founding of the executing body, the National Institute for Environment and Development (NIMOS). Eight offices comprise NIMOS: Administration, Environmental & Social Assessment, Environmental Monitoring & Enforcement, Environmental Legal Services, Environmental Planning & Information, Environmental Public Education & Outreach, Environmental Funding & Investments, and Environmental Research. Table 1 shows the institutions involved in forest and biodiversity conservation.

The GoS has plans to establish an Environmental Management Agency, however relevant legislation has not been developed. The GoS also aims to establish a single authority for the management of production and protection of forests, the Forest and Nature Management Authority (BOSNAS), but the formation of this authority is still pending. Suriname is in the process of introducing new technology for land use planning, zoning, and monitoring of land use, but needs substantial institutional support.

Table 1. Institutions Involved in the Management and Conservation of Biological Resources

INSTITUTION	KEY ROLE(S)
SBB	Manage production forests
National Institute for Environment and Development in Suriname	<ul style="list-style-type: none"> <li>• Develop environmental laws</li> <li>• Oversight of EIAs</li> </ul>
Directorate for Environment, Ministry of Labour, Technological Development & Environment	<ul style="list-style-type: none"> <li>• Monitor policy</li> <li>• NBAP</li> <li>• Develop databases for biodiversity</li> </ul>
STINASU – Stichting Natuurbehoud Suriname (Foundation for Nature Conservation)	<ul style="list-style-type: none"> <li>• Declare nature reserves</li> <li>• Promote conservation of nature objects which are not yet or are insufficiently protected</li> <li>• Utilization of reserves for educational, recreational, and economic purposes</li> <li>• Promote, coordinate, and co-financing of scientific exploration and utilization of already existing nature reserves</li> <li>• Program and steer research</li> </ul>
Suriname Forest Service	<ul style="list-style-type: none"> <li>• Protected Areas (PAs) and wildlife</li> <li>• Three categories of PA (Multiple Use Management Area, Nature Park, and Nature Reserves)</li> <li>• Data collection on wildlife including telemetry</li> </ul>
Ministry of Physical Planning, Land and Forest Management	Development and oversight of planning policies and oversight of land use
Nature Protection Commission	Studies conservation problems and proposes legislation concerning nature conservation

INSTITUTION	KEY ROLE(S)
Ministry of Agriculture, Animal Husbandry and Fisheries	Collects statistics for the agricultural sector, manages agricultural data management system, and agricultural sector development within the country
National Planning Bureau	Responsible for regional and physical planning as well as zoning and land use planning

Suriname is a signatory to the following principal international conventions related to the conservation of biodiversity and tropical forests, protected areas, pollution, and invasive species:

- Montreal Protocol
- UN Convention on the Law of the Sea
- UN Framework Convention on Climate Change
- Convention on Biological Diversity
- The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Protocol Concerning Specially Protected Areas and Wildlife
- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean
- Convention on Migratory Species
- Amazon Cooperation Treaty
- Caribbean Environment Program, including the Cartagena Convention
- MARPOL
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

## NON-GOVERNMENTAL ORGANIZATIONS

Several non-governmental organizations (NGOs) are active in Suriname (Table 2). They implement programs that range from primary research documenting biodiversity to mapping of culturally important resources and outreach regarding the impacts of mining. The substantial interest in Suriname is a direct reflection of Suriname's important biodiversity and forests, and situation with respect to indigenous peoples and maroons. Tensions exist between some indigenous NGOs and other national and international NGOs related to protection of biodiversity versus indigenous peoples' use of biodiversity.

Table 2. NGOs Involved in the Management and Conservation of Biological Resources

ORGANIZATION	ACTIVITIES AND PROGRAMS
Conservation International – Suriname	<ul style="list-style-type: none"> <li>• Research on medicinal plants with maroons and indigenous peoples</li> <li>• Rapid assessments</li> <li>• Forest cover classification and forest inventory</li> <li>• Valuation</li> </ul>
Tropenbos International Suriname	<ul style="list-style-type: none"> <li>• Programs aim to increase knowledge in the forest sector to support decision making at policy level and at all management levels.</li> <li>• Tropenbos focuses on the themes of Forest Management, Nature Conservation, and Forest-Dependent Livelihoods.</li> </ul>

ORGANIZATION	ACTIVITIES AND PROGRAMS
Suriname Conservation Foundation	<ul style="list-style-type: none"> <li>• Finance nature reserves and other Protected Areas (PAs), e.g. Central Suriname Nature Reserve (CSNR)</li> <li>• Major activities are fundraising, asset management, and financing of projects</li> <li>• Fund managed through United Bank of Switzerland</li> </ul>
World Wildlife Fund Guianas	<ul style="list-style-type: none"> <li>• Marine turtle conservation</li> <li>• Sustainable fisheries</li> <li>• Land use planning and PAs</li> <li>• Payment for ecosystem services</li> <li>• Gold mining pollution abatement</li> <li>• Education and communication</li> <li>• Greening of economy</li> <li>• Support for special sites (Bigi Pan, Brownsberg)</li> </ul>
National Zoological Collection of Suriname/Center for Environmental Research - University of Suriname	<ul style="list-style-type: none"> <li>• Collection, research, and development of databases on fauna</li> <li>• Impact of logging, mining, dams, and other activities on animal species</li> </ul>
Green Heritage Fund Suriname	Sloth rescue, rehabilitation and release into the wild
Amazon Conservation Trust	<ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Education (schools as well as materials)</li> <li>• Health (mix of western and traditional medicine)</li> <li>• Indigenous park rangers</li> <li>• Land rights</li> </ul>
Vereniging van Inheemse Dorpshoofden in Suriname (VIDS) Association of Indigenous Village Leaders in Suriname	<ul style="list-style-type: none"> <li>• Management plan for East Suriname - Lower Marowijne</li> <li>• Demarcation of Wayambo in West Suriname for land use</li> <li>• Support of communities (Galibi, Cupido) in discussions with oil companies</li> <li>• Advocacy for indigenous peoples rights in negotiation REDD+ project from Forest Carbon Partnership Facility</li> <li>• Delegation of the Organisation of Kalin'a and Lokono peoples in Marowijne (KLIM) from Suriname travelled to the South Central and Deep South regions of Guyana to visit the Wapichan and Makushi people (united in SCPDA, the South Central Peoples Development Association) to exchange experiences and approaches related to community resource mapping and territorial management planning</li> <li>• Implementation of a multi-year program</li> <li>• Land and other collective rights</li> <li>• Strengthen the traditional authority system</li> <li>• Support for autonomous sustainable community development</li> <li>• Strengthen socio-political participation</li> <li>• Promote intercultural education</li> <li>• VIDS is constrained by lack of funds.</li> </ul>

ORGANIZATION	ACTIVITIES AND PROGRAMS
University of West Virginia, Kansas University, Kent University in partnership with University of Suriname	Rapid Assessment Program
Suriname Conservation Foundation (SCF) SCF supports coastal zone protection and shorebird protection: Suriname is midway point between US and Brazil. Guyana's wetlands were destroyed by construction of a dyke, so conservation of remaining shorebird resting areas in Suriname is especially important. The wetlands have not yet been defined as an IBA.	<p>Five main activities of SCF:</p> <ul style="list-style-type: none"> <li>• Implement management program for CSNR. For support to CSNR, Ministry submits proposal to SCF for review and approval. For example, one recent proposal is for ranger posts and living space for rangers to help address illegal hunting and trafficking. Management of CSNR also includes a community management component.</li> <li>• Mangrove project: SCF funded the university to purchase mangroves and replant. Also trying to convince the government not to extend the seawall.</li> <li>• Conservation of coastal birds (focus on scarlet ibis)</li> <li>• Medicinal plants: in the interior to demonstrate economic value, that trees are more valuable left standing than when harvested. SCF is trying to conserve the forest by finding replacements for building materials and promote NTFPs, such as ecotourism, bamboo, and medicinal plants.</li> <li>• Bigi Pan wetland: ecotourism site. Trying to establish an entrance fee to help cover maintenance of wetland.</li> </ul>

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

Table 3 shows the key donors and other international organizations working on biodiversity and forest conservation in Suriname. When the Assessment Team was able to obtain the funding amount, it is provided below.

Table 3. Key Donor and International Organization-implemented Biodiversity Conservation Projects

ORGANIZATION	ACTIVITY	VALUE
World Bank – Forest Carbon Partnership Facility	Climate Compatible Development Agency (CCDA) REDD+ Readiness Preparation Proposal (R-PP) under the World Bank's Forest Carbon Partnership Facility (FCPF)	Total project cost: US\$345,950 Guyana Shield Facility contribution: US\$295,950
Fonds Français pour l'Environnement Mondial (FFEM) funding for the FFEM was formalized by contract with l'Office National des Forêts (ONF) [the French Forestry Commission], at the l'Agence Française de	Support the development of technical skills in the forestry services in the countries of the Guiana Plateau, to provide tools to support local policy making on REDD+ mechanisms	EU€1 million

ORGANIZATION	ACTIVITY	VALUE
Développement (AFD) [the French Development Agency]		
Guiana Shield Facility Funders: European Union and The Government of Netherlands. Executing Organization: United Nations Development Programme (UNDP)	Support for Climate Compatible Development Agency (CCDA)	Unknown
Global Environment Facility (GEF)	GEF 5th replenishment period (July 2010 - June 2014): <ul style="list-style-type: none"> <li>• Suriname Coastal Protected Area Management</li> <li>• The Development of Renewable Energy, Energy Efficiency and Electrification of Suriname</li> <li>• The Conservation of Globally Significant Forest Ecosystems in Suriname's Guyana Shield Bio-region</li> </ul> Initiated the Suriname Conservation Fund	<ul style="list-style-type: none"> <li>• US\$3 million in biodiversity</li> <li>• US\$2 million in climate change</li> <li>• US\$550,000 in land degradation</li> <li>• To February 2012 US\$4.84 million utilized</li> </ul>
GEF-SGP	<ul style="list-style-type: none"> <li>• Various projects</li> <li>• Projects include capacity strengthening component</li> </ul>	<ul style="list-style-type: none"> <li>• US\$950,538</li> <li>• US\$100,000</li> </ul>
Kansas University, University of West Virginia, Kent University, in partnership with University of Suriname, with support from CI	Rapid Assessment Program	Unknown
Food and Agriculture Organization of the United Nations (FAO) with CI	<ul style="list-style-type: none"> <li>• Forest governance, spatial planning, training government to use software, supporting GoS with tools and information for REDD+ readiness. Funded by German Development Bank. Also did an historical forest assessment, 2000, 2005, 2009. This project is almost completed.</li> <li>• Southern part of Suriname-establishment of a corridor to link a Suriname Nature Reserve to Parque Amazonia in French Guiana and Brazil. Also doing ecosystem services mapping, i.e., looking at how the ecosystem is used by local communities. This was completed in March 2013; findings will be available in August 2013.</li> <li>• SBB is doing a natural forest inventory in the south. The historical assessment should show deforestation rate, 2000 to 2010 (final in August).</li> </ul>	Unknown

ORGANIZATION	ACTIVITY	VALUE
	<ul style="list-style-type: none"> <li>• Forest cover map was produced (2010), Wageningen University with CI and German Development Bank (KfW) funding.</li> <li>• Outside of CSNR, in the north, identifying type of management structure to use (i.e., sustainable landscape, extractive reserve).</li> </ul>	
International Tropical Timber Organization (ITTO)	Monitoring deforestation, logging and land use change in the Pan Amazonian Forest – PANAMAZON II	Governments of the Netherlands and Germany US\$1.12 million
United Nations Forum on Forests (UNFF)		US\$190,000 between 2008 to 2010
WWF Guianas	<ul style="list-style-type: none"> <li>• Protected Areas and Sound Land Use Planning</li> <li>• Payment for Ecosystem Services</li> <li>• Gold Mining Pollution Abatement</li> <li>• Marine Turtle Conservation</li> <li>• Sustainable Fisheries</li> <li>• Preparation of Living Guianas Report</li> </ul>	Unknown
UNDP Suriname	<ul style="list-style-type: none"> <li>• Training on Planning, Monitoring and Evaluation for Development</li> <li>• Projects (coastal management, phasing out of mercury in mining, sustainable industries)</li> <li>• Improved capacity for three Rio Conventions</li> <li>• Support from the Regional Service Centre for Latin America and the Caribbean (RSC-LAC Panamá)</li> </ul>	Unknown
US Embassy: Caribbean Basin Security Initiative (CBSI)	Rule of law funds: This fund may be used for a proposed program to deter wildlife traffickers by training police and national park guards.	Unknown

Suriname has no national legislation for EIA, however, NIMOS works under guidelines which give the mandate to NIMOS to review and approve EIAs. EIA legislation is included in the Environmental Framework Law, which was presented to the Council of Ministers three times, yet was sent back for revisions two times. Without the framework, EIAs are still done, but the sector lacks direction. Regardless, donors are expected to prepare EIAs and to coordinate this with NIMOS.

# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

Suriname has 23 PAs and four proposed PAs covering approximately 14.6 percent of the total land area of the country (WDPA, 2013). Suriname falls short of the 2020 objective of the CBD of effectively managing 17 percent of total land surface in PAs. Suriname's PA system has three categories, Multiple Use Management Areas (MUMA, these are areas on the coast); Nature Parks, and Nature Reserves. Annex A, Figure A1 shows the proposed and declared PAs as of 2002. Table 4 lists PAs, and Table 5 presents additional detail on selected PAs. Marine PAs represent 22.9 percent of territorial waters in Suriname (World Bank, 2013). The marine areas are located in eight terrestrial PAs that have marine estuarine or marine components. These areas are flagged in Table 4 and the Nature Conservation Division (NCD) list below (Encyclopedia of Earth, 2009).

Table 4. Protected Areas

SITE NAME	MARINE OR TERRESTRIAL	TOTAL AREA (ha)	TOTAL MARINE AREA (ha)
Bigi Pan Multiple Use Management Area	Both	68,320	89,048
Boven-Coesewijne Nature Reserve	Terrestrial	27,000	
Brinck-heuvel Nature Reserve	Terrestrial	6,000	
Brownsberg Nature Park	Terrestrial	8,400	
Central Suriname Nature Reserve (CSNR)	Terrestrial	1,600,000	
Copi Nature Reserve	Terrestrial	28,000	
Coppename Monding Nature Reserve	Both	12,000	23,135
Eilerts de Haan Nature Reserve	Terrestrial	245,000	
Galibi Nature Reserve	Both	4,000	2,114
Hertenrits Nature Reserve	Both	100	
Kaboeri Kreek Nature Reserve	Terrestrial	68,000	
Mac Clemen Forest Reserve	Terrestrial	6,000	
Nani Nature Reserve	Terrestrial	54,000	
Noord Coronie Multiple Use Management Area	Both		35,228
Noord Saramacca Multiple Use Management Area	Both	15,000	66,950
North Commewijne - Marowijne Multiple Use Management Area	Both		138,362
Peruvia Nature Reserve	Terrestrial	31,000	
Raleighvallen-Volzberg Nature Reserve	Terrestrial	54,600	



SITE NAME	MARINE OR TERRESTRIAL	TOTAL AREA (ha)	TOTAL MARINE AREA (ha)
Sipaliwini Nature Reserve	Terrestrial	100,000	
Snake Creek Forest Reserve	Terrestrial	4,000	
Tafelberg Nature Reserve	Terrestrial	140,800	
Wane Kreek Nature Reserve	Terrestrial	45,400	
Wia-Wia Nature Reserve	Both	36,000	15,463

Table 5. Descriptions of Key Protected Areas

PROTECTED AREA	REASON FOR PROTECTION	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
Central Suriname Nature Reserve (CSNR) (1,600,000 ha)	In 2000, the United Nations Educational, Scientific, and Culture Organisation (UNESCO) named the reserve a World Heritage Site for its pristine tropical rainforest ecosystem and 16,000 km <sup>2</sup> of both mountain and lowland primary tropical forest, including sections of the Guianas highlands.	In 1998, the Surinamese government set aside 10 percent of land to create this NR.	<ul style="list-style-type: none"> <li>The NCD, Ministry of Physical Planning is responsible for PA management. SCF supports CSNR management. Management of CSNR also includes a community component.</li> <li>According to a 2008 WWF publication, Protected Areas of the Guianas, there are no immediate threats to the CSNR.</li> </ul>
Brownsberg Nature Park (12,200 ha)	High biodiversity value forest; more than 1,000 plant species of which more than 85 are rare or endemic.	Declared in 1970, expanded in 2002	<ul style="list-style-type: none"> <li>NCD, Ministry of Physical Planning is the management authority.</li> <li>Management Plan is from 2005/6</li> <li>Threats: gold mining, hunting, illegal logging (WWF, 2008)</li> </ul>
Peperpot Nature Park and Corridor (700 ha private PA)	The corridor was established to provide wildlife connectivity to the hinterlands.	Established in 2011	The first private PA in Suriname. It is a regenerating swamp forest, formerly a coffee and cocoa plantation.
Bigi Pan MUMA, covers two districts, Coronie and Nickerie (67,000 ha terrestrial and 67,000 ha estuarine zone)*	<ul style="list-style-type: none"> <li>An important site for migratory and resident birds, including rare and endemic species. Mangroves cover 45 percent of Bigi Pan and provide natural protection of the coast and a nursery for fish. Home to one of the world's largest scarlet ibis breeding colonies.</li> <li>An International Bird Area and in 1989, it was listed as a Western Hemisphere Shorebird</li> </ul>	Declared in 1987	<ul style="list-style-type: none"> <li>NCD, Ministry of Physical Planning is the management authority.</li> <li>Management Plan prepared in the 1990s.</li> <li>Threats: illegal expansion of rice cultivation, illegal hunting, pesticide contamination, fertilizer pollution, and changes in salinity as a result of agricultural activities (WWF, 2008). Scarlet ibis are hunted for their meat.</li> </ul>

PROTECTED AREA	REASON FOR PROTECTION	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
	Reserve.		
Coppename Monding Nature Reserve (12,000 ha)*	Wetlands of international importance (Ramsar site).	Declared in 1966	<ul style="list-style-type: none"> <li>NCD, Ministry of Physical Planning is the management authority.</li> <li>Management Plan prepared in the 1990s</li> </ul>
Galibi Nature Reserve (4,000 ha)*	<ul style="list-style-type: none"> <li>Most important nesting beach for marine turtles in the western Atlantic region. Contains typical vegetation along the coastline: riparian woodland on sandy beaches. Approximately ½ the world’s viable populations of leatherbacks nest in this and the adjacent reserve, Amana in Guyana.</li> </ul>	<ul style="list-style-type: none"> <li>Declared in 1969</li> </ul>	<ul style="list-style-type: none"> <li>NCD, Ministry of Physical Planning is the management authority.</li> <li>Management Plan prepared in the 1990s</li> <li>Threats: egg poaching and incidental catch of turtles in fishermen’s nets.</li> </ul>

\*Includes marine protected area.

Based on the PAs declared as of 2002, Ouboter found that, “for most protected areas it is hardly known what species live there, and as far as we know, only a very limited percentage of species is protected per area.”

## THREATENED AND ENDANGERED SPECIES

According to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, species listed as critically endangered (CR), endangered (EN), and vulnerable (VU) are considered threatened. Forty nine animal and twenty six plant species meet these criteria as shown in Annex B. Table 6 summarizes the numbers of plants and animals in each category. Of the 75 threatened species, nine are mammals, seven are birds, five are reptiles, one is an amphibian, 26 are fishes, and 22 are plants. No mollusks are threatened, but one other invertebrate species is threatened.

Most species on the list have declining populations with the exception of one bird described as stable. For 32 species (six animals and 26 plants), no population status was given and for seven species (all animals), status is described as unknown.

Table 6. Summary of Threatened Animals and Plants based on IUCN Red List

RED LIST STATUS	ANIMALS	PLANTS
CR	6	1
EN	8	2
VU	35	23

The Game Act (Government Bulletin 1954, No. 25), amended in 1982, fully protects all mammals, birds, sea turtles, and two caiman species, except those designated as game animals, cage birds, and predominantly harmful species. The Conservation Division categorizes wildlife into game species, caged species, and fully

protected species, but the Act is only applicable in the western and northern part of the country, and therefore, it does not cover most communities whose livelihoods rely on fishing and hunting (in the south).

Of the fully protected species, many are internationally threatened, and are on the IUCN Red List for Suriname; data specific to Suriname are lacking on many species. Based on Assessment Team interviews, a bird in the caged species category, the *twa twa*, should probably be on the fully protected list, but the data are unavailable to justify the move. Ouboter states that knowledge of the threats to plants is limited. Several high value and popular species of trees are being logged and are becoming rare. Vulnerable ecosystems are those with a small surface area, such as cloud forests, inselbergs, and forest-islands within other open ecosystems. Cloud forests are likely to contain special communities of plants, amphibians, and other species, including some endemics, yet data is lacking on these forests.

According to Ouboter (2002), of the listed species/groups, only the following are seriously threatened with decline and/or extinction:

- *Dendrobatus azureus* (blue poison-arrow frog): Distribution limited to small forest-islands in the Sipaliwini Savanna, therefore, highly vulnerable. Export prohibited, but smuggling for the pet trade occurs.
- *Lepidochelys olivacea* (olive ridley sea turtle): In Suriname nesting almost exclusively on Galibi Beach in limited numbers. The number of nesting olive ridleys is declining.
- *Crotalus durissus* (South American rattlesnake): Distribution limited to savannas and sandy ridges near the coast. Killed as vermin. Already disappeared from most of the Savanna Belt.
- *Cairina moschata* (Muscovy duck): Over-hunted. Already disappeared from most of the coastal area.
- *Harpia harpyja* (harpy eagle): Is becoming extremely rare; hunted by Amerindians for the feathers.
- *Oryzoborus crassirostris* (large-billed seed-finch): Very popular as songbird, especially locally. Disappeared from the coastal area and is becoming rare in the Sipaliwini Savanna.
- *Aletes paniscus* (black spider monkey): Popular game animal. Disappeared from all areas that are visited often by man.
- *Pteronura brasiliensis* (giant river otter): Eats large amounts of fish, with a preference for erynithrinid species, which are predators. Therefore vulnerable to mercury pollution. May disappear from all streams draining the Greenstone Belt.

Poaching of turtle eggs is a problem in Suriname, where they are considered a delicacy, especially by the Javanese community.

## STATUS AND MANAGEMENT OF FOREST RESOURCES

Suriname boasts one of the largest tracts of contiguous tropical forest in the world. According to the Fourth National Report (2012), approximately 90 percent of Suriname’s total land area is classified as forest land (14.8 million ha). Of that, the majority is primary forest, while 5 percent is naturally regenerated forest. Forest coverage has remained fairly constant since 1990, with a 0.02 percent decrease in coverage between 1990 and 2000.

### TYPES OF FOREST

As part of the Amazon biome, the forest in Suriname is predominantly moist tropical forest with small areas of floodplain forest, swamp forest, and palm forest. The vegetation of Suriname has been traditionally classified into three main types: *hydrophytic*, *xerophytic*, and *mesophytic* (Table 7). The mesophytic forest is considered the most economically valuable forest.

Table 7. Forest Characteristics

VEGETATION TYPE	AREA (HA)
<b>HYDROPHYTIC VEGETATION</b>	
Mangrove forest	115,000
<b>SWAMP FOREST</b>	
Low swamp forest	240,000
<i>Triplaris</i> forest	210,000
<i>Virola</i> / mixed swamp	275,000
Ridge forest	35,000
Marsh forest	470,000
<b>XEROPHYTIC VEGETATION</b>	
Savanna / Low savanna forest	18,000
High savanna forest	132,000
<b>MESOPHYTIC VEGETATION</b>	
Lowland high forest	13,360,000
<b>TOTAL</b>	<b>14,855,000</b>

### MANAGEMENT OF FORESTS

The 1987 Constitution gives ownership of all forests, except those on privately owned land, to the State. More than one million ha have been allocated as private concessions. The Constitution does not provide for collective rights or the collective use of land, but indigenous peoples and the maroons claim these rights (a landmark court decision upheld this claim, and another case is pending).

Ninety-nine percent of forests are publicly owned in Suriname. As of 2005, 85 percent of management was administered by public entities, 2 percent by individuals, 8 percent by business entities, and 3 percent by communities. As of 2010, 45 percent of forest area remains in a permanent forest estate and 14 percent is within a PA.

Logging activities take place in the forest belt (ca. 4.5 million ha with a productive area of 2.5 million ha). This belt is delineated as the northern and easily accessible part of the country. Annex A, Figure A2 shows a map with the location of the forest belt. Forest function according to the Food and Agriculture Organization of the United Nations (FAO, 2010) was primarily in production (27 percent), conservation of biodiversity (15 percent), and multiple use (4 percent) with the remainder classified as “unknown” or “no designated function.”

The *Stichting voor Bosbeheer en Bostoezicht* (SBB) manages commercial forestry in Suriname. The SBB monitors logging using an automated system, the Log Production Management Information System (LogPro). LogPro was set up to collect data in the field, and enables fast processing and cross-check of log data. This system has enabled Suriname to bring production under tight control as virtually each tree cut and log produced can be tracked in a geographic information system (GIS)-enabled database.

In addition to this database, the Centre of Agricultural Research in Suriname (CELOS) management system (CMS) is used for low impact intervention, harvesting of single large stems, and restoration time after logging to allow forest recovery (See Werger et al., 2011 for details). Government, NGOs, and indigenous peoples are involved in forest management (Table 8).

Table 8. Organizations Involved in Forest Management

SECTOR/GROUP	DESCRIPTION
Government	SBB (Foundation for Forest Management and Forest Control) <i>Lichtwet en Bosbeheer</i> (LBB) or Suriname Forest Service) NCD
Private including NGO	Concession holders (64 in 2011) for 1.35 million ha
Rural	Not determined
Indigenous peoples	Forest-dependent tribal communities <ul style="list-style-type: none"> <li>• Maroons</li> <li>• Indigenous peoples</li> </ul> 80 community cutting licenses have been issued for 584,400 ha, and 114,000 ha (2010 estimate) have been designated as community forests for indigenous and maroon communities.

Forest on private land covers less than 50,000 ha. For timber production, the government grants timber concessions and in certain cases short-term incidental wood cutting licenses. In accordance with the Forest Management Act (1992), the concessions are granted varying in size and duration as follows:

- Short term: <5,000 ha (1 to 5 years)
- Medium term: 5,000 to 50,000 ha (5 to 10 years)
- Long term: 50,000 to 150,000 ha (10 to 20 years)

Each of these types of concessions can be extended once for the same duration as the concessions have been granted.

## ECONOMIC IMPORTANCE

Forest products are an important component of economic activity in Suriname (Table 9). The value of timber and NTFPs in 2005 was US\$131 million.

Table 9. Economic importance of forests

PRODUCT/SERVICE AREA	IMPORTANCE/CONTRIBUTION
Wood	Industrial roundwood – 190,000 m <sup>3</sup> in 2009 Sawnwood – 65,000 m <sup>3</sup> per year in 2009 Plywood – 1,000 m <sup>3</sup> in 2009 Veneer – 3,000 m <sup>3</sup> in 2009
NTFPs	Wildlife especially birds worth US\$404,000 in 2007. This was higher in the past. 55,000 kg of medicinal plants valued at US\$453,000 exported to Netherlands in 2006
Subsistence	Medicines, building materials, fibers, wild animals, fruit, seeds, and nuts
Tourism	Central Suriname Forest Reserve, Brownsberg Nature Park
Ecosystem Services	Climate regulation (carbon sequestration) – 50 billion tonnes of carbon. Biodiversity Freshwater – 10 to 15 percent of global freshwater supply in Guiana Shield

Several inventories, covering a total area of 683,700 ha, have been carried out by Suriname's Forest Service (LBB) and the Food and Agriculture Organization (FAO) of the United Nations in the period 1949 to 1986. Based on these, an average net commercial volume of 22 to 30 m<sup>3</sup>/ha has been calculated. In 2010, timber production was 247,000 m<sup>3</sup>. Companies owned by foreign investors account for proximately 15 percent of that production. An average of 20 percent of the total processed and unprocessed wood is exported.

According to the Forest Stewardship Council (FSC), Suriname has 89,124 ha that are managed and certified to FSC standards (FSC, 2012).

## CONSERVATION OUTSIDE OF PROTECTED AREAS

### MANAGED NATURAL ECOSYSTEMS

#### *Agricultural Systems*

Agricultural activities, including fishing and logging, contribute a relatively small share of gross domestic product (GDP), averaging 5 to 7 percent annually. Much of this comes from rice and banana production and shrimp and fish exports amounting to about US\$40 to 50 million per year (10 to 12 percent of total export earnings) while lumber is equivalent to about 1 percent of export earnings.

With 1.5 million ha of arable land, only a small percentage of the population is engaged in agriculture, estimated at 15 percent of the labor force. Rice accounts for about half of all cultivated lands; Suriname is a major exporter of rice to Caribbean community countries (CARICOM) and the European Union.

In spite of its low contribution to GDP, agriculture remains critical to national socio-economic development. Suriname is targeting the fruit, vegetable, and ornamental flower export markets.

## Fisheries

Suriname's 380 km long coastline supports an active fisheries sector. According to the FAO (2008), fish for direct consumption caught in Suriname was 15,856 liveweight tonnes in 2008. The sector employs 5,169 people, both in primary and secondary sectors. The value of fisheries exports in 2006 was US\$45.7 million.

Fisheries vessels in Suriname are characterized as multi-species and multi-gear with trawlers, snapper boats, open or decked wooden vessels and canoes. Trawlers target both shrimp and finfish in nearshore and offshore areas. Conflicts between artisanal fishers and trawlers commonly occur in the nearshore areas.

Offshore target species are seabob (a type of shrimp), scarlet shrimp, snapper, and tuna. The snapper fishery is owned and operated by foreign fishermen, while the tuna trawlers were North American vessels. These stopped operating in 2001.

Artisanal fishing is composed of coastal and inland fleets, the coastal drifting gillnet, and the inland canoe that uses Chinese seines. The coastal artisanal fishery targets finfish, while the inland fishery targets finfish and seabob. The coastal fishery has reached maximum sustainable yield for finfish. Management recommendations include restricting access by limiting the number of licenses and regulating illegal fishing.

Fisheries management is regulated under Decree C-47 (1980) and a Fisheries Law was drafted and submitted to Parliament in 1998; in 2008, it had yet to be approved. The law would support the development of a Fisheries Management Plan. Enforcement capacities in Suriname are very limited.

## Mangroves

Fringe mangroves are found along most of the coast and are typically fronted by wide mudflats. Estuarine mangroves are well-developed and typically transition inland to swamp or lagoon systems. Mangroves form 10 to 25 m tall forests, which are divided into two types: the parwa, along the coast which is primarily composed of *Avicennia germinans* and typical mangrove forest along the major rivers, with *Rhizophora mangle* and patches of *Laguncularia racemosa*. Suriname's low population density exerts little pressure on mangroves. However, the seawall north of Paramaribo has destroyed a large swathe of mangroves. In addition, small areas of mangroves have been cleared for rice cultivation and as a result, there is some contamination by pesticides.

The coast of Suriname receives riverine deposits from the Amazon in the east, the Orinoco in the west and numerous rivers in between. The abundant freshwater and sediment input limit development of extensive coral reefs and seagrass beds in coastal areas of Suriname. Data are limited on these ecosystems.

## Beaches

Four species of sea turtles nest in Suriname, including the leatherback, the green, the olive ridley, and the hawksbill. Some of the most important nesting beaches in the world for endangered leatherbacks (*Dermochelys coriacea*) are located in Suriname. In particular, the coastal area around the Galibi Nature Reserve is internationally important as a nesting site for green and leatherback turtles, and is historically the only place in the Atlantic where olive ridleys nest in mass "arribadas." Sand mining and beach development threaten the habitat and feeding areas for wildlife that depend on beach habitat.

## Wetlands

Important wetland areas are located in several existing nature reserves: the Wia-Wia Nature Reserve (36,000 ha); Coppename River Mouth Nature Reserve (12,000 ha); and the Sipaliwini Nature Reserve (100,000 ha). Important wetlands are also found at; Nani (46,000 ha); Peruvia (32,000 ha); Kaboerikreek (65,000 ha); and



Upper Coesewijne (25,000 ha). Many of the wetlands in Suriname remain relatively undisturbed and many are inaccessible to humans. Conversion of wetlands into agricultural lands and pesticide use are two primary threats to wetlands in Suriname.

## Freshwater

Suriname and other countries in the Guiana Shield are thought to contain as much as 10 to 15 percent of the world's fresh water. Suriname has abundant fresh water resources and is considering schemes for export of water to water-scarce countries. Urban areas rely on groundwater for water supply, while rural areas primarily use surface water (US Army Corps of Engineers, 2001). Lack of a national water sector law is a root cause of threats (i.e., saltwater intrusion, sanitation, mercury contamination) to the freshwater supply.

## EX-SITU CONSERVATION

The University of Suriname has a zoology collection and a herbarium. The National Herbarium Suriname (NHS) and the National Zoological Collection Suriname (NZCS) are active and well managed, but lack financial means and human capacity. The resources include a plant collection of around 35,000 specimens, a wood species collection of around 8,000 specimens, a collection of 900 specimens of flowering plants, mainly orchids, a collection of fungi and mosses, and a library of around 3,500 books, journals, magazines, reports, and reprints.

The Botanical Garden supports conservation of plant species, which were documented by Teunissen in 1982. Additionally, a large part of the focus on *ex-situ* conservation is on agriculture and food crops, in particular rice. Table 10 describes the main *ex-situ* conservation efforts in Suriname.

Table 10. Conservation Outside of Protected Areas & *Ex-Situ* Conservation

LOCATION	ORGANIZATION(S)	ACTIVITY
La Poule and Dirkshoop Experiment Stations	Ministry of Agriculture, Animal Husbandry and Fisheries	Agricultural species, such as citrus, mango, coffee, cacao, and coconut, are being grown and used in field trials or are kept for future research activities.
"Hinterland"	Centre for Agricultural and Forestry Research (CELOS)	Collection of 74 cassava accessions
Anne van Dijk Rice Research Centre Nickerie (ADRON)	Foundation National Rice Research Institute (SNRI).	True seed bank for rice lines and varieties
In-vitro laboratory for research and teaching purposes	Faculty of Technology of the ADEK University of Suriname	In-vitro collection of <i>Musa acuminata</i> and <i>Ananas comosus</i>
Anton de Kon University	National Herbarium Suriname (NHS) and the National Zoological Collection Suriname (NZCS)	1,500 boxes with specimens containing 80 to 90 percent of all existing plant species of Suriname
Botanical Garden in Paramaribo	Stichting Natuur Parken (STINAPA) – Foundation Nature Parks	

# MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

The Assessment Team identified the following threats and root causes from documents (Ouboter, 2002; WWF publications), from Websites, and from stakeholder consultations.

## DIRECT THREATS

**(1) Mining:** Most stakeholders agreed that mining is the biggest threat to biodiversity, and in particular, small-scale gold mining is of greater concern than large-scale. The Fourth National Report (2012) highlights illegal small-scale gold mining and the associated use of mercury as one of the major threats to biodiversity.

Over 25,000 small-scale miners mine gold in the Greenstone Belt, in the east and center of Suriname. Amalgamation is usually done with mercury of which most is lost to the environment. One stakeholder stated that the area where gold mining occurs has tripled in the past 5 years. Gold mining has impacted many small creeks by changing drainage patterns and destroying original banks, and by polluting land, air, and water. Mercury travels on tradewinds to all parts of Suriname, and even in the CSNR, mercury has been found in fish, far from where mining occurs. Miners not only impact biodiversity directly through their mining activities, they also hunt for food, and often forests in the vicinity of gold mines will be “empty forests”—empty of wildlife.

Bauxite mining is also a threat to biodiversity and has affected east and central Suriname. In the central part, mined areas have become lakes; in the east, very poor shrub vegetation has developed. At one bauxite concession, several endemics are found; two species of fish found in only one stream on top of the mountain are considered super-endemics and one endemic frog is also found there, *Atelopus hoogmoedi nassaui*. Alcoa, the concession holder, determined that mining would not be economically feasible, so currently has no plans to mine, but this could change. Notably, the significant biodiversity present was not what deterred the mining company.

**(2) Illegal and over-exploitation of wildlife and wildlife products:** According to Ouboter (2002), many people from Paramaribo and coastal villages hunt, and due to lack of compliance and enforcement of regulations, hunting has caused the decline of hunted mammals, birds, and reptiles in almost all accessible areas (along roads, along much frequented streams, and along the coast). In addition, Amerindian and maroon tribes hunt almost daily, and even this subsistence hunting is a threat to wildlife. Population has grown, and modern techniques, such as outboard motors and rifles increase the efficiency of hunting. These developments have caused wide areas around villages to be almost devoid of game species. One example is the absence of caimans up to 60 km from the Amerindian village of Kwamalasamutu, a village of about 1,100 inhabitants (Ouboter, 1989, 1996 in Ouboter, 2002).

In addition, poaching turtle eggs is a threat to marine turtles. In particular, Amerindians and Javanese harvest sea turtle eggs.

The illegal wildlife trade also threatens biodiversity. Although data are lacking on wildlife that is traded (numbers, locations), most stakeholders mentioned this as a major threat to biodiversity. One stakeholder stated that since there is no actual information on population size, if the export quota is reached, the quota is raised the following year; this is not based on actual numbers of animals.

The wildlife trade is concentrated on amphibians, reptiles, and birds. For the export of wildlife, both CITES listed and non-CITES listed, a permit from the NCD is required. Stakeholders agreed, the impact of the wildlife trade on wildlife populations is largely unknown.

**(3) Illegal and over-fishing:** In 2012, a study of illegal fishing found that fish production by illegal Surinamese and Brazilian boats is at least two times higher than the legal local production (WWF, 2012). Especially during the dry season, fish is poached by putting many gill nets in the river to catch a fish supply to last the year. Gill nets have significant impacts on fish populations, especially on larger predators. Species killed in gillnets include sea- and freshwater turtles, caimans, water snakes, water birds, whales, manatees, and otters (Ouboter, 2002).

The industrial fleet consists of outrigger trawlers and stern trawlers and is mainly owned by foreign companies, whose targets are shrimp and demersal fish. Trawlers scrape the bottom of the sea clean of living organisms.

Fishing in freshwater habitats is limited. Commercial freshwater fishing occurs only in a few localities in blackwater rivers and swamps and is mostly done with gill nets. A 1994 study noted that local populations of armored catfishes (*Hoplosternum* spp.) are over-fished, as the specimens sold in the markets were all small sized (Ouboter and Mol, 1994).

**(5) Habitat alteration/destruction:** This is mainly a threat on the coast, where 92 percent of the population lives. The most common habitat change is the conversion of swamps and forest to agricultural land and residential areas.

**(6) Climate change:** The Fourth National Report notes that droughts and floods are affecting forests in Suriname. In addition, Suriname's low-lying coastal zone is highly susceptible to the effects of climate change. Suriname is already experiencing changing weather patterns, which have resulted in floods, coastal erosion, salt water intrusion, and land degradation. The Suriname Climate Change Vulnerability Assessment (CCVA) (a report produced simultaneous with this FAA 118/119 Assessment) cites increased drought, coastal erosion, and precipitation changes as major impacts of climate change in Suriname. Changes in precipitation and increased drought periods may directly impact flora, including Suriname's forests, and indirectly impact fauna. Changes in habitat due to coastal erosion may directly impact both flora and fauna.

**(7) Introduction of invasive species:** Ouboter (2002) states that introduced tilapia (*Oreochromis mossambicus*) have suppressed the local fauna. It occurs in such high densities, that most local fish disappear from water bodies where tilapia has been introduced. The NBAP (2013) states that tilapia affect native species by eating many indigenous fish and their food.

**(8) Forest degradation:** Forest degradation rather than wholesale deforestation is the current concern. Degradation results from mining for bauxite, oil, gold, and poor logging practices (Fourth National Report, 2012). A stakeholder explained that an indigenous community can get a license to harvest timber, and they may sell the license to a third party. Even though the third party is required to follow commercial timber harvesting regulations/guidelines, that typically fails to happen. According to guidelines, a commercial forest enterprise can harvest only a limited area. But illegal operators usually combine licenses so they can harvest more than the maximum, and illegal operators usually harvest using destructive, unsustainable practices.

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats. "Actions necessary" are derived from stakeholder consultations and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 11. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
<p>Lack of political will to conserve biodiversity Wealthy, influential people in Suriname are involved in mining, residential developments, and other activities that may impact biodiversity, and no different than other countries, politicians are loath to act against a powerful constituency.</p>	<p>Disseminate information on Suriname’s biodiversity value (i.e., intact biodiversity). (According to several stakeholders, this is the most difficult root cause to address. The Assessment Team discussed with stakeholders some of the typical measures, such as raising awareness of and study tours to countries that successfully conserve biodiversity; study tours to highly impacted areas; and strengthening advocacy NGOs, yet for various reasons, interviewees were pessimistic that any would address this root cause.)</p>
<p>Non-existent, outdated, and limited enforcement of legislation  For example, there is no Environmental Framework Law; the Nature Preservation Law of 1979 and Game Law of 1954 need to be updated. A consultant to the GoS is currently updating these.</p>	<p>Pass the Environmental Framework Law. Accelerate approval and implement environmental laws and regulations. Develop guidelines for species re-introduction and for the eradication and monitoring of alien invasive species. Strengthen local and regional collaboration to ensure effective monitoring and enforcement of fisheries conservation rules and management programs. Apply and ramp up best practices (from demonstration projects and research) for the improved management and protection of marine resources. Promote alternatives to gold mining and hunting in rural communities (i.e., breeding in captivity and other income generation within rural and coastal areas).</p>
<p>Data needed for decision making and management of biodiversity is deficient  There are many publications, but most are from the 1980s and 1990s. Practical, applied research rarely takes place. Baseline data on vegetation and wildlife are deficient. Data compilation is in analog form. Forests in the northern part of the country are mapped; the map dates from the late 1970s, so it is out of date. Forests in the southern part are not mapped.</p>	<p>Develop a GIS database. Support research for climate change monitoring and assessment (i.e., about effects of changes in rainfall amounts and intensity). Develop a CITES database with data on wildlife populations, trade, threats, status utilizing updated data on population trends and status of relevant species. Develop an electronic permit system for CITES (Customs has started a system to monitor and trace.) Promote regional integration with Caribbean, South American, and US universities with Suriname, especially to attract students interested in working in remote areas. Support research on wildlife trafficking to determine the extent of the threat and measures to control it. Conduct a study to determine the value of Suriname’s biodiversity. Support ecosystem studies in the interior of Suriname (Only a few</p>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
	locations in the interior have been investigated, and much of this area remains unknown, yet has rare and potentially unique habitats.)
<p>Limited resources and capacity For example, the Ministry of Physical Planning is responsible for enforcing the Game Law throughout the country, yet only 40 game wardens are employed.</p>	<p>Fund production of satellite imagery to supplement game warden gaps.</p> <p>Attract students to government positions and other public service positions related to environmental protection.</p> <p>Provide more funding, personnel, monitoring, and enforcement for biodiversity-related agencies.</p> <p>Provide training for Customs officers in recognition of birds and other wildlife species.</p> <p>Provide better technical education for students at university</p> <p>Support regional integration with Caribbean, South American, and US universities with Suriname, especially to attract students interested in working in remote areas (also addresses data deficiencies).</p> <p>Participate in regional and global initiatives on the management of marine biological resources (with the aim of seeking financial and technical assistance to increase capacity to manage these resources)</p>
<p>Lack of planning Decisions regarding biodiversity and land use in general are made on an ad hoc basis. One stakeholder said, "There is no planning."</p>	<p>Develop an LUP/Spatial Plan with a focus on: (1) Land use planning in central and south Suriname to set aside areas for the Amerindian and maroon communities, and define the areas to be set aside for biodiversity and landscape protection. (2) Land use planning in the north to control rampant development and destruction of mangroves and other coastal areas, wetlands, and freshwater ecosystems.</p> <p>Provide training in implementation, monitoring, and enforcement of the LUP.</p>
<p>Lack of public awareness that biodiversity has economic benefits; lack of appreciation of biodiversity values (economic and other); lack of incentives to conserve biodiversity. The public is largely unaware that biodiversity has economic benefits, and that it is not only worth conserving in its own right, but also for livelihood and other benefits. Incentives work against conservation. The public also lacks appreciation for aesthetic and other non-economic values of biodiversity.</p>	<p>Deliver a coordinated, targeted message about biodiversity conservation in Suriname</p> <p>Raise awareness on the value of NTFPs in Suriname</p> <p>Involve local communities in all aspects of biodiversity conservation planning, management, administration, and enforcement, particularly through increased employment opportunities in conservation related activities.</p> <p>Use extension services and other training and technology transfer to increase understanding of fishermen and others involved in the harvesting of marine resources of the need for sustainable use.</p> <p>Raise awareness of the impact of land-based activities on marine biodiversity.</p>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119 d (2). Since the Regional Development Cooperation Strategy (RDCCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 12 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCCS.

### FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

Economic Growth: Under the new RDCCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID/BEC region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

### FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID’s HIV/AIDS program will continue to be funded through the President’s Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 12. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
Disseminate information on Suriname’s biodiversity value (i.e., intact biodiversity)	No proposed USAID actions meet this need.
Pass the Environmental Framework Law.	No proposed USAID actions meet this need.
Accelerate approval and implement environmental laws and regulations.	No proposed USAID actions meet this need.
Develop guidelines for species re-introduction and for the eradication and monitoring of alien invasive species.	No proposed USAID actions meet this need.
Strengthen local and regional collaboration to ensure effective monitoring and enforcement of fisheries conservation rules and management programs.	No proposed USAID actions meet this need.
Apply and accelerate best practices (from demonstration projects and research) for the improved management and protection of marine resources.	Focus Area 1: Global Climate Change: demonstration projects under the new RDCS
Provide alternatives to gold mining and hunting in rural communities (i.e., breeding in captivity and other income generation within rural and coastal areas).	Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.  Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.
Develop a GIS data base.	Focus Area 1: Global Climate Change will assist the 10 countries with adaptation measures to mitigate the effects of climate change.
Support research for climate change monitoring and assessment.	Focus Area 1: Global Climate Change will assist the 10 countries with adaptation measures to mitigate the effects of climate change.
Develop a CITES database with data on wildlife populations, trade, threats, status.	No proposed USAID actions meet this need.
Develop an electronic permit system for CITES (Customs has started a system to monitor and trace.)	No proposed USAID actions meet this need.
Support regional integration with Caribbean, South American, and US universities with Suriname, especially to attract students interested in working in remote areas.	No proposed USAID actions meet this need.



ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
Support research on wildlife trafficking to determine the extent of the threat and measures to control it.	No proposed USAID actions meet this need.
Support a study to determine the value of Suriname's biodiversity.	No proposed USAID actions meet this need.
Support ecosystem studies in the interior of Suriname.	No proposed USAID actions meet this need.
Develop satellite imagery to supplement game warden gaps.	No proposed USAID actions meet this need.
Attract students to government positions and other public service positions related to environmental protection.	<p>Focus Area 2: targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</p> <p>Focus Area 3: increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.</p>
Provide more funding, personnel, monitoring, and enforcement for biodiversity-related agencies.	No proposed USAID actions meet this need.
Train Customs officers in recognition of birds and other wildlife species.	No proposed USAID actions meet this need.
Provide better technical education for students at university.	The Citizen Security Focus Area will target at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.
Support regional integration with Caribbean, South American, and US universities with Suriname, especially to attract students interested in working in remote areas (also addresses data deficiencies).	Focus Area 3 will involve the private sector's active involvement in curriculum-building relative to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.
Participate in regional and global initiatives on the management of marine biological resources (with the aim of seeking financial and technical assistance to increase capacity to manage these resources)	No proposed USAID actions meet this need.
Develop an LUP/Spatial Plan.	Focus Area 1 will assist the 10 countries with adaptation measures to mitigate the effects of climate change.

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
Train in implementation, monitoring, and enforcement of the LUP.	Focus Area 1 will assist the 10 countries with adaptation measures to mitigate the effects of climate change.
Deliver a coordinated, targeted message about biodiversity conservation in Suriname	No proposed USAID actions meet this need.
Raise awareness on the value of NTFPs in Suriname	No proposed USAID actions meet this need.
Involve local communities in all aspects of biodiversity conservation planning, management, administration, and enforcement, and in particular, support increased employment opportunities in conservation related activities.	No proposed USAID actions meet this need.
Use extension services and other training and technology transfer to increase understanding of fishermen and others involved in the harvesting of marine resources of the need for sustainable use.	No proposed USAID actions meet this need.
Raise awareness of the impact of land-based activities on marine biodiversity	No proposed USAID actions meet this need.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Suriname’s conservation of biodiversity and tropical forests.

- (1) Under the Climate Change Focus Area, support demonstration projects that ramp up best practices for the improved management and protection of marine resources.
- (2) Under Focus Areas 2 and 3, support a program to train youth to participate in alternative income generation activities to gold mining and hunting. This would especially target youth in rural communities, and could help develop alternatives such as breeding in captivity and aquaculture).
- (3) Under Focus Area 1, as part of mitigating the effects of climate change, support research and monitoring to determine actual impacts of climate change.
- (4) Focus Areas 2 and 3 could support internships and other measures to attract youth to government positions and other public service positions related to environmental protection.
- (5) The Citizen Security Focus Area could target at-risk youth to gain technical training to fill resource gaps such as game warden jobs and other natural resources-related positions, especially where shortages of staff are critical.
- (6) Under Focus Areas 2 and 3, support collaboration with regional and U.S. universities to address labor market shortages, in particular, the shortage created by an unwillingness to work in remote areas. USAID

could support training of indigenous and maroon youth, through partnering with external universities. This type of training could invigorate interest in working in remote areas and could help youth be prepared to enter the job market.

(7) Under Focus Area 1, as part of demonstration projects to mitigate effects of climate change, support the development of a Land Use Plan, especially for central and south Suriname, to define indigenous areas and areas for conservation; and on the coast to encourage controlled development and conservation of mangroves. A model LUP could be undertaken, and the process could be ramped up with support from GoS or other donors, to other parts of the country. USAID could leverage influence to encourage others, including the GoS, to support this.

Based on the Assessment Team's research, interviews, and analyses, the following is a priority action for support:

(1) Given the significant impact of gold mining to Suriname's biodiversity, USAID should consider providing support to the GoS in their efforts to bring small-scale gold miners into the legal sphere and under the umbrella of large companies and to phase out use of mercury in gold mining.

The Suriname CCVA provides the following recommendations that would support biodiversity and forest conservation.

(1) Support implementation of a pilot activity and targeted research on the impacts of climate change on Suriname's forests and biodiversity and identify appropriate climate adaptation strategies.

(2) Support coordination and implementation of a national climate change public awareness strategy.

(3) Improve access and exchange of data and information on climate change and its related impacts.

(4) Integrate climate assessment, mitigation, and adaptation measures into institutions, especially as related to climate-related development criteria.

## REFERENCES

- Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.
- CIA World Factbook. 2012. Suriname. Available on the Internet at: <https://www.cia.gov/library/publications/the-world-factbook/geos/ns.html>.
- Encyclopedia of Earth. 2009. Protected areas of Suriname. Retrieved from <http://www.eoearth.org/view/article/155414>
- Food and Agriculture Organization of the United Nations (FAO). 2008. Suriname Fishery Country Profile. Available on the Internet at: [ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI\\_CP\\_SR.pdf](ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_SR.pdf).
- FAO. 2010. Global forest resources assessment 2010: Main report. Rome: Food and Agriculture Organization of the United Nations. Available on the Internet at: <http://www.fao.org/docrep/013/i1757e/i1757e.pdf>.
- Forest Stewardship Council (FSC). 2012. Market Info Pack 2012: Facts and Figures on FSC growth and markets. Available on the Internet at: <https://ic.fsc.org/market-information.345.htm>.
- Milton, P. 2009. Plant genetic Resources of Suriname. Country Report. Available on the Internet at: <ftp://ftp.fao.org/ag/agp/countryreports/SurinameFinalCR.pdf>.
- Ministry of Natural Resources. 1992. Forest Management Act of 1992. Official Gazette of the Republic of Suriname. 1992 No. 80. Available on the Internet at: <http://www.ecolex.org/ecolex/ledge/view/RecordDetails.jsessionid=2978E12858F6FA403A91947015299A11?id=LEX-FAOC032831&index=documents>.
- Ouboter, P. 2002. Assessment of Existing Information on Protected Areas and Wildlife. Report submitted to NIMOS for the UNDP Project: Formulation of a National Biodiversity Action Plan.
- Ouboter, P. E. & Mol, J. H. 1994. Ex-situ sustainable use of fish and wildlife in Suriname. *Interactie* 2, 5-18.
- Republic of Suriname. The Ministry of Labor, Technological Development and Environment. 2013. National Biodiversity Action Plan (NBAP), 2012-2016. Convention on Biodiversity. Available on the Internet at: <http://www.cbd.int/doc/world/sr/sr-nbsap-v2-en.pdf>.
- Republic of Suriname. The Ministry of Labor, Technological Development and Environment. 2012. Suriname: The Fourth National Report to the Convention on Biodiversity. Available on the Internet at: <https://www.cbd.int/reports/nr4/default.shtml>.
- Stichting Planbureau Suriname (SPS). 1988. Suriname Plant Atlas. Stichting Planbureau Suriname. Department of Regional Development, OAS, Washington DC, USA.
- Werger, M. J. A. 2011. Sustainable management of tropical rainforests: The CELOS Management System. Paramaribo, Suriname: Tropenbos International. Available on the Internet at:

<http://www.tropenbos.org/publications/sustainable+management+of+tropical+rainforests:+the+celos+management+system>.

World Bank. 2013. World Development Indicators. Available online at:

<http://data.worldbank.org/country/suriname>

World Wildlife Fund (WWF). 2012. Living Guianas Report 2012: State of the Guianas, Drivers and Pressures, Towards Green Economies. Available on the Internet at:

[http://awsassets.panda.org/downloads/living\\_guianas\\_report\\_web\\_version.pdf](http://awsassets.panda.org/downloads/living_guianas_report_web_version.pdf).

WWF. 2008. Protected Areas of the Guianas.

[http://www.wwfguianas.org/our\\_work/areas\\_land\\_use\\_planning/wwf\\_guianas\\_and\\_pas\\_in\\_suriname/](http://www.wwfguianas.org/our_work/areas_land_use_planning/wwf_guianas_and_pas_in_suriname/)

World Database on Protected Areas. 2013. World Database on Protected Areas. Available online at:

<http://www.wdpa.org/Statistics.aspx>

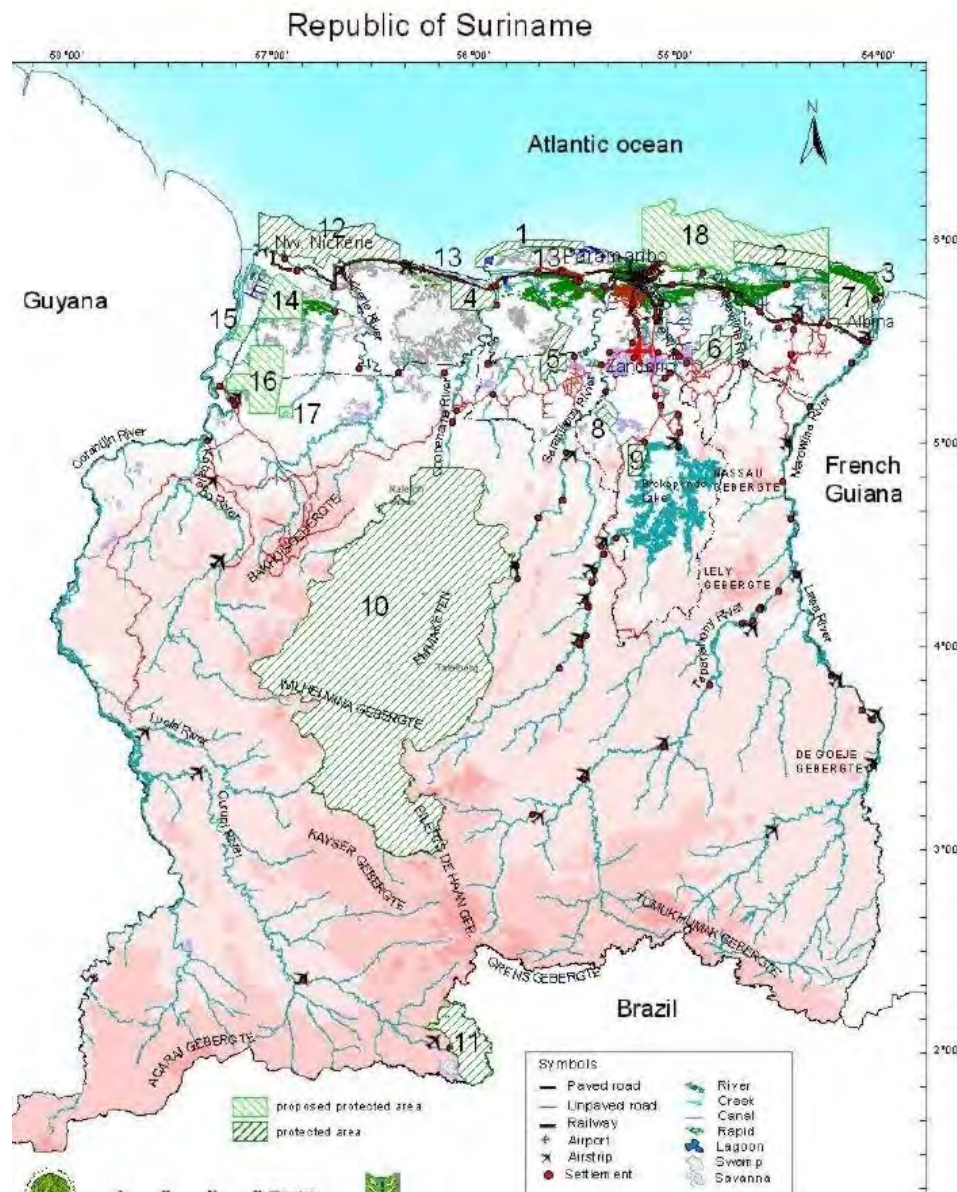
US Army Corps of Engineers Mobile District and Topographic Engineering Center December 2011, Water Resources Assessment of Suriname

<http://suriname.wedd.de/docs/Suriname%20Water%20Resources%20Assessment.pdf>

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Suriname.

## ANNEX A: MAPS

### FIGURE A1. PROTECTED AREAS IN SURINAME



Source: Ouboter, 2002.

### Map key

#### Existing protected areas

1. Coppename Monding Nature Reserve (12,000 ha)
2. Wia Wia Nature Reserve (36,000 ha)
3. Galibi Nature Reserve (4,000 ha)
4. Peruvia Nature Reserve (31,000 ha)
5. Boven Coesewijne Nature Reserve (27,000 ha)
6. Copi Nature Reserve (18,000 ha)

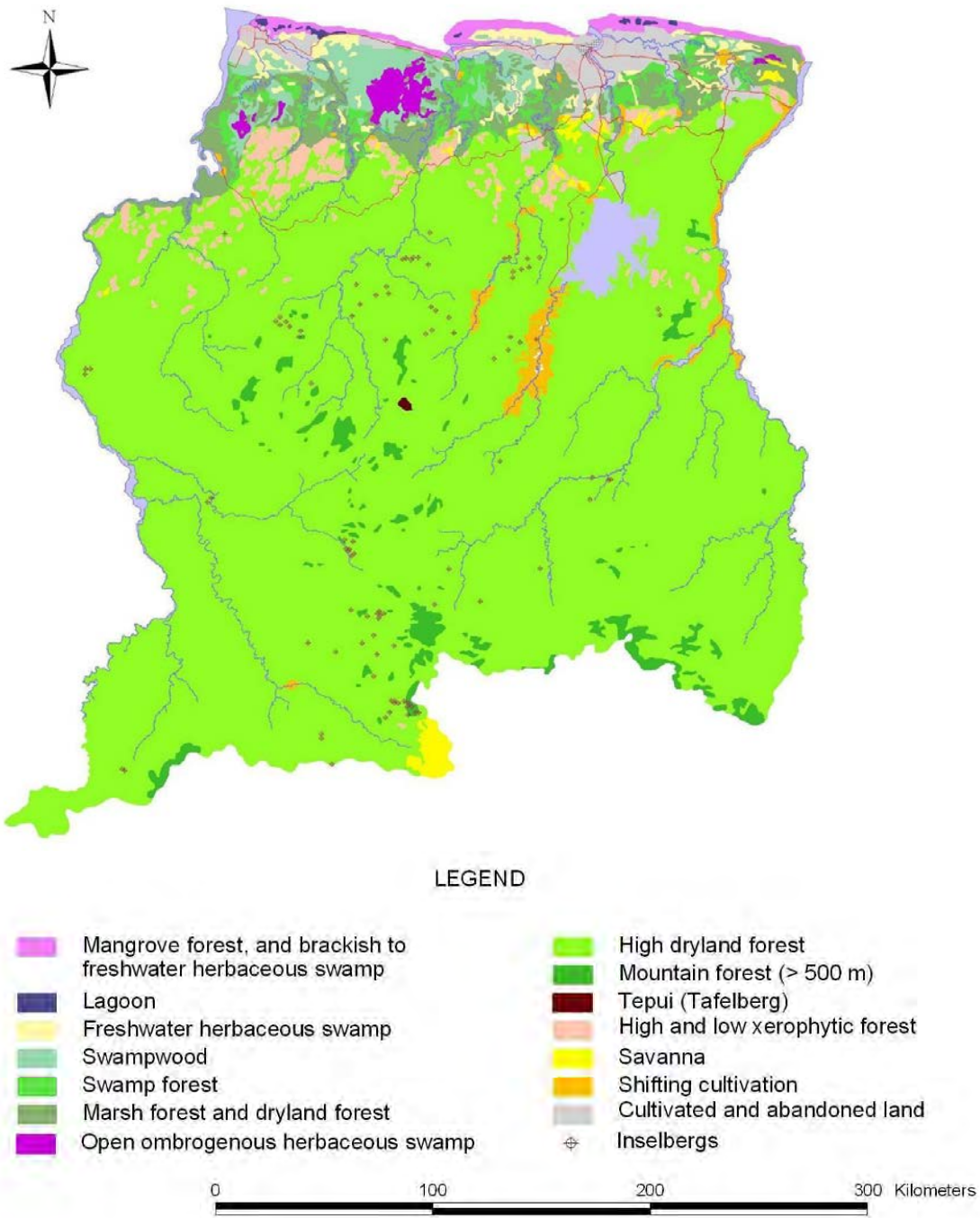
7. Wane Kreek Nature Reserve (45,000 ha)
8. Brinckheuvel Nature Reserve (6,000 ha)
9. Brownsberg Nature Park (8,400 ha)
10. Centraal Suriname Nature Reserve (1,600,000 ha)
11. Sipaliwini Nature Reserve (100,000 ha)
12. Bigi Pan Multiple-Use Management Area (68,300 ha)
13. Coronie/Saramacca Estuarine Multiple-Use Management Area (recently established)

**Proposed protected areas**

14. Nani Nature Reserve (54,000 ha)
15. Mac Clemen Forest Reserve (12,000 ha)
16. Kaboeri Kreek Nature Reserve (68,000 ha)
17. Snake Kreek Forest Reserve (3,000 ha)
18. Commewijne/Marowijne Multiple-Use Management Area

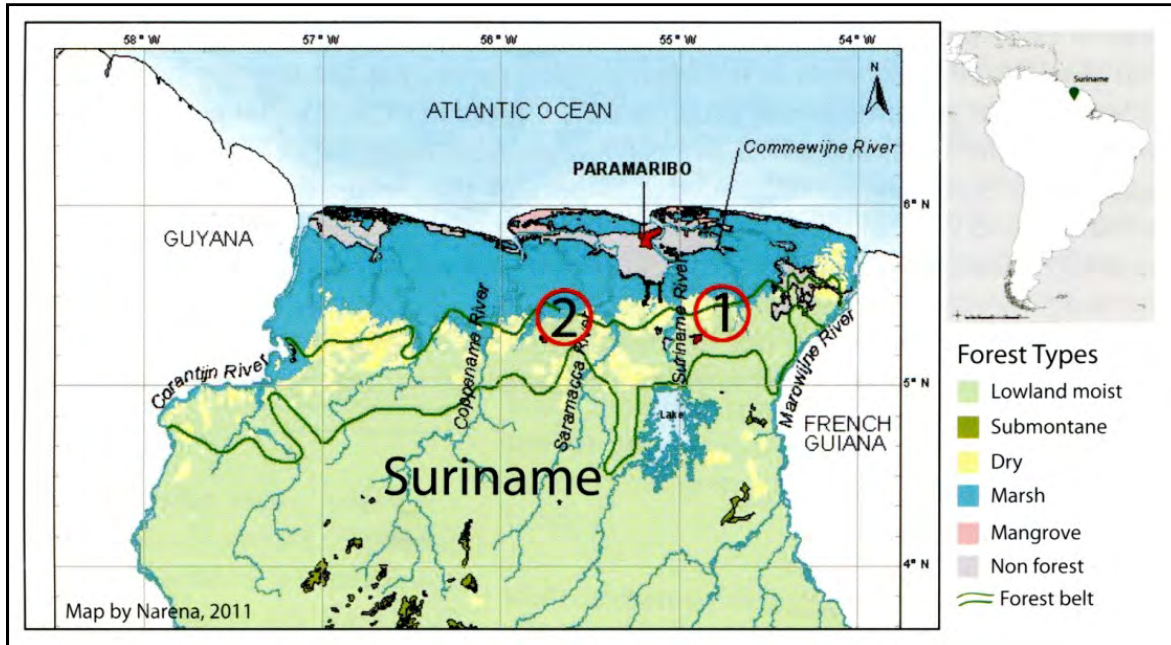


FIGURE A2. ECOSYSTEMS OF SURINAME IN THE FOURTH NATIONAL REPORT TO THE CBD (2012)



Source: Adapted from SPS, 1988

FIGURE A3. GENERALIZED MAP SHOWING FOREST TYPES IN SURINAME AND LOCATION OF FOREST BELT BOUNDED IN GREEN LINE



## ANNEX B: THREATENED SPECIES OF SURINAME

### TABLE B1. IUCN RED LIST FOR SURINAME

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Agamia agami</i>	Agami Heron	VU	2012	unknown
Animalia	<i>Alopias vulpinus</i>	Common Thresher Shark	VU	2009	decreasing
Animalia	<i>Ateles paniscus</i>	Black Spider Monkey, Guiana Spider Monkey, Red-faced Black Spider Monkey	VU	2008	decreasing
Animalia	<i>Atelopus spumarius</i>		VU	2010	decreasing
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996	
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006	decreasing
Animalia	<i>Carcharhinus obscurus</i>	Dusky Shark	VU	2009	decreasing
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
Animalia	<i>Chelonoidis denticulata</i>	Brazilian Giant Tortoise, Forest Tortoise, South American Tortoise, South American Yellow-footed Tortoise, Yellow-footed Tortoise	VU	1996	
Animalia	<i>Crax alector</i>	Black Curassow	VU	2012	decreasing
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000	decreasing
Animalia	<i>Diplobatis pictus</i>	Variiegated Electric Ray	VU	2006	unknown
Animalia	<i>Dysithamnus leucostictus</i>	White-spotted Antwreio, White-streaked Antwreio	VU	2012	decreasing
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011	unknown
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
Animalia	<i>Gymnura altavela</i>		VU	2007	decreasing
Animalia	<i>Hyporthodus flavolimbatus</i>	Grouper, Poey's Grouper, White Grouper, Yellowedge Grouper, Yellowfinned Grouper	VU	2008	decreasing
Animalia	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Isogomphodon oxyrinchus</i>	Daggernose Shark	CR	2006	decreasing
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011	decreasing
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
Animalia	<i>Leopardus tigrinus</i>	Little Spotted Cat, Little Tiger Cat, Oncilla, Tiger Cat	VU	2008	decreasing
Animalia	<i>Lepidochelys olivacea</i>	Olive Ridley, Pacific Ridley	VU	2008	decreasing
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996	
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
Animalia	<i>Micrathyria coropinae</i>		EN	2009	unknown
Animalia	<i>Myrmecophaga tridactyla</i>	Giant Anteater	VU	2010	decreasing
Animalia	<i>Myrmotherula surinamensis</i>	Guianan Streaked Antwren, Guianan Streaked-Antwren	VU	2012	stable
Animalia	<i>Narcine bancroftii</i>	Caribbean Electric Ray	CR	2007	unknown
Animalia	<i>Pagrus pagrus</i>	Common Seabream, Common Sea Bream, Couch's Sea-bream, Couch's Sea Bream, Porgy, Red Porgy	EN	1996	
Animalia	<i>Patagioenas subvinacea</i>	Ruddy Pigeon	VU	2012	decreasing
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008	unknown
Animalia	<i>Picumnus spilogaster</i>	White-bellied Piculet	VU	2012	decreasing
Animalia	<i>Pipile cumanensis</i>	Blue-throated Piping-guan, Blue-throated Piping-Guan	VU	2012	decreasing
Animalia	<i>Podocnemis unifilis</i>	Yellow-headed Sideneck, Yellow-spotted River Turtle, Yellow-spotted Sideneck Turtle	VU	1996	
Animalia	<i>Priodontes maximus</i>	Giant Armadillo	VU	2010	decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Pristis perotteti</i>	Largetooth Sawfish	CR	2007	decreasing
Animalia	<i>Pristis pristis</i>	Largetooth Sawfish	CR	2013	decreasing
Animalia	<i>Pteronura brasiliensis</i>	Giant Brazilian Otter, Giant Otter	EN	2008	decreasing
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007	decreasing
Animalia	<i>Sphyrna tudes</i>	Curry Shark, Golden Hammerhead, Smalleye Hammerhead Shark	VU	2006	decreasing
Animalia	<i>Tapirus terrestris</i>	Brazilian Tapir, Lowland Tapir, South American Tapir	VU	2008	decreasing
Animalia	<i>Tayassu pecari</i>	White-lipped Peccary	VU	2013	decreasing
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008	decreasing
Plantae	<i>Aniba percoriacea</i>		VU	1998	
Plantae	<i>Aniba rosaeodora</i>		EN	1998	
Plantae	<i>Asterophorum mennegae</i>		VU	1998	
Plantae	<i>Bertholletia excelsa</i>	Brazil-nut Tree, Para Nut	VU	1998	
Plantae	<i>Cedrela odorata</i>	Cigar-box Wood, Red Cedar, Spanish Cedar	VU	1998	
Plantae	<i>Copaifera epunctata</i>		VU	1998	
Plantae	<i>Corythophora labriculata</i>		VU	1998	
Plantae	<i>Couratari guianensis</i>	Fine-leaf Wadara	VU	1998	
Plantae	<i>Couratari sandwithii</i>		VU	1998	
Plantae	<i>Duguetia schulzii</i>		VU	1998	
Plantae	<i>Eschweillera boltenii</i>		VU	1998	
Plantae	<i>Inga calanthoides</i>		VU	1998	
Plantae	<i>Inga leptingoides</i>		VU	1998	

KINGDOM	SCIENTIFIC NAME	COMMON NAME(S)	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Plantae	<i>Macrobium amplexans</i>		VU	1998	
Plantae	<i>Macrobium stenopetalum</i>		VU	1998	
Plantae	<i>Marila saramaccana</i>		VU	1998	
Plantae	<i>Mezilaurus itauba</i>		VU	1998	
Plantae	<i>Persea julianae</i>		VU	1998	
Plantae	<i>Poecilanthe ovalifolia</i>		VU	1998	
Plantae	<i>Sloanea acutiflora</i>		VU	1998	
Plantae	<i>Sloanea gracilis</i>		VU	1998	
Plantae	<i>Styrax tafelbergensis</i>		VU	1998	
Plantae	<i>Swartzia rediviva</i>		VU	1998	
Plantae	<i>Syagrus stratincola</i>		VU	1998	
Plantae	<i>Virola surinamensis</i>	Baboonwood	EN	1998	
Plantae	<i>Vouacapoua americana</i>		CR	1998	

## ANNEX C: LIST OF CONTACTS

### TABLE C1. CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM
Rudi van Kanten	Programme Director	Tropenbos Intl. Suriname	<a href="mailto:ptl_tropenbossuriname@yahoo.com">ptl_tropenbossuriname@yahoo.com</a>		GM
Madhani Ramdin	Communications Officer	Tropenbos Intl. Suriname	<a href="mailto:communication.tbisur@yahoo.com">communication.tbisur@yahoo.com</a>		GM
John Goedschalk	Climate Change Advisor to the President	Cabinet of the President	<a href="mailto:jgoedschalk@me.com">jgoedschalk@me.com</a>	(597) 862 8236	GM
Cedric Nelom	General Director a.i.	National Institute for Environment and Development in Suriname	<a href="mailto:cnelom@nimos.org">cnelom@nimos.org</a>		GM
Armand Moredjo	Acting Executive Director	Conservation International -Suriname	<a href="mailto:amoredjo@conservation.org">amoredjo@conservation.org</a>	(597) 878-1235	IM
Aaron Irmeline	Deputy Director - Finance Dept.	Stichting voor Bosbeheer en Bostoezich (SBB)	<a href="mailto:irmelineaaron@yahoo.com">irmelineaaron@yahoo.com</a>	(597) 077-0919	GM
Pearl Jules	CEO	Stichting voor Bosbeheer en Bostoezich (SBB)	<a href="mailto:pearljules@yahoo.com">pearljules@yahoo.com</a>	(597) 881-1213	GM
René Somopawiro	Director - Research & Development	Stichting voor Bosbeheer en Bostoezich (SBB)	<a href="mailto:renesomo@hotmail.com">renesomo@hotmail.com</a>	(597) 880-7914	GM
Rewie Matai	Forest Economist	Stichting voor Bosbeheer en Bostoezich (SBB)	<a href="mailto:zewiematai@yahoo.com">zewiematai@yahoo.com</a>		GM
Guno Malon	Deputy Director - Forest Management	Stichting voor Bosbeheer en Bostoezich (SBB)			GM
Claudine Sakimin		NCD	<a href="mailto:claudinesakimin@yahoo.com">claudinesakimin@yahoo.com</a>		GM
Hesdy Esajas	Head	Suriname Forest Service	<a href="mailto:hesdyesayas@gmail.com">hesdyesayas@gmail.com</a>		GM
Robby Dragman	Chairman	STINASU - Foundation for Nature Conservation			GM
Roy Ho Tsoi		Suriname Forest Service	<a href="mailto:rhotsoi@gmail.com">rhotsoi@gmail.com</a>	(597) 871-4930	GM
Marie Djosetro	Deputy Permanent	Ministry of Physical Planning, Land and	<a href="mailto:mdjosetro@yahoo.com">mdjosetro@yahoo.com</a>		GM



NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM
	Secretary	Forest Management			
Katia Delvoye	Education & Biodiversity Coordinator	Amazon Conservation Trust	<a href="mailto:k.delvoye@act-suriname.org">k.delvoye@act-suriname.org</a>	(597) 710-7688	IM
Chris Healy	IPD	Amazon Conservation Trust	<a href="mailto:culturecom@sc.net">culturecom@sc.net</a>		IM
Josée Artist	Community Development Bureau	Vereniging van Inheemse Dorpshoofden in Suriname (VIDS) Association of Indigenous Village Leaders in Suriname	<a href="mailto:joseeartist@yahoo.com">joseeartist@yahoo.com</a>	(597) 823-8244	GM
Max Ooft	Policy Officer	Vereniging van Inheemse Dorpshoofden in Suriname (VIDS) Association of Indigenous Village Leaders in Suriname	<a href="mailto:max.ooft@vids.sr">max.ooft@vids.sr</a>		GM
Henna Uiterloo	Permanent Secretary, Environment	Directorate for Environment, Ministry of Labour, Technological Development & Environment	<a href="mailto:henna.uiteroo@atm.gov.sr">henna.uiteroo@atm.gov.sr</a>		IM
Bryan Drakenstein	Programme Specialist Environment	UNDP - United Nations Suriname	<a href="mailto:bryan.drakenstein@undp.org">bryan.drakenstein@undp.org</a>		GM
Thomas Gittens	Country Director	UNDP - United Nations Suriname	<a href="mailto:thomas.gittens@undp.org">thomas.gittens@undp.org</a>		GM
Paul Ouboter	Director	National Zoological Collection of Suriname/Center for Environmental Research - University of Suriname	<a href="mailto:p.ouboter@uvs.edu">p.ouboter@uvs.edu</a>		GM
Jan Mol	Fish Ecologist	University of Suriname	<a href="mailto:fisheco@celos.sr.org">fisheco@celos.sr.org</a>		GM
Leonard Johanns	Executive Director	Suriname Conservation Foundation	<a href="mailto:johanns@sr.net">johanns@sr.net</a>		IM
Gerold Zondervan	Regional Advisor	World Wildlife Fund Guianas	<a href="mailto:gzondervan@wwf.sr">gzondervan@wwf.sr</a>		IM

GM – Group meeting

IM – Individual meeting

TROPICAL FOREST AND BIOLOGICAL  
DIVERSITY ANALYSES

TRINIDAD AND TOBAGO

(FAA 118/119)

# TABLE OF CONTENTS

INTRODUCTION.....	1
POLICY AND INSTITUTIONAL FRAMEWORKS.....	3
LEGISLATION.....	3
GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS.....	5
BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS.....	8
STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES.....	10
PROTECTED AREAS.....	10
THREATENED AND ENDANGERED SPECIES.....	14
STATUS AND MANAGEMENT OF FOREST RESOURCES.....	15
TYPES OF FOREST.....	15
MANAGEMENT STRUCTURE.....	16
ECONOMIC IMPORTANCE.....	16
CONSERVATION OUTSIDE OF PROTECTED AREAS.....	17
MANAGED NATURAL SYSTEMS.....	17
EX-SITU CONSERVATION.....	18
MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION.....	19
DIRECT THREATS.....	19
IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION.....	21
EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS.....	23
FOCUS AREA 1.....	23
FOCUS AREA 2.....	23
FOCUS AREA 3.....	24
FOCUS AREA 4.....	24
CONCLUSIONS AND RECOMMENDATIONS.....	26
REFERENCES.....	28
ANNEX A: GOVERNMENT AND NON-GOVERNMENT INSTITUTIONS.....	31
STAKEHOLDER AGENCIES.....	31
NON-GOVERNMENT ORGANIZATIONS.....	32
ANNEX B: THREATENED SPECIES OF TRINIDAD AND TOBAGO.....	34
TABLE B1. RED LIST FOR TRINIDAD AND TOBAGO.....	34
FIGURE B1. NUMBERS AND CATEGORIES OF THREATENED SPECIES IN TRINIDAD AND TOBAGO.....	37
ANNEX C: MAPS.....	40
FIGURE C1. MAP OF TRINIDAD PROHIBITED AREAS.....	40
FIGURE C2. EXISTING AND PROPOSED ENVIRONMENTALLY SENSITIVE AREAS IN TRINIDAD AND TOBAGO.....	41

ANNEX D: LIST OF CONTACTS..... 42  
TABLE D1. TRINIDAD CONTACTS..... 42  
TABLE D2. TOBAGO CONTACTS ..... 43

## REPORT FINDINGS

Trinidad and Tobago, an island nation in the southeasterly region of the Antilles, is located just north of the northeastern coast of Venezuela and south of Grenada. Its close proximity to the South American mainland (11 km at its closest point) links it to South America, both geologically and in terms of biodiversity. The islands have diverse topography, including a mix of mountains and plains. The highest point, El Cerro del Aripo, is 940 m about sea level.

Trinidad and Tobago contains a wide array of biologically rich ecosystems. A number of these ecosystems have been identified for global and regional priority, are considered among the World Wildlife Fund's "Global 200" list of top priority ecoregions, and have been designated as Ramsar sites. Trinidad and Tobago's terrestrial ecosystems include evergreen seasonal, semi-evergreen seasonal, deciduous seasonal, littoral woodlands, lower montane rainforests, seasonal montane forests, montane rainforests, elfin woodlands, swamp forests (including mangrove woodlands), palm swamps, marshes, and savannas. These support approximately 2,160 species of flowering plants, 110 of which are endemic; 433 species of birds (411 in Trinidad and 210 in Tobago); 100 mammals; 37 amphibians; and 93 reptiles including 47 snakes (44 in Trinidad and 21 in Tobago). Marine systems include the water masses; mud bottoms; coral reefs and communities; sandy bottoms; rocky shores; seagrass beds; and mud flats. These support a range of macro and microbiota including a large array of commercially important fish species and 36 species of reef building corals.

Trinidad has limited coral communities due to its proximity to the Orinoco River, which transports nutrients and sediment into its marine waters. Tobago is more isolated from the Orinoco's influence; as a result, patch and fringing reefs are located along the coastline. Tobago's reefs provided approximately US\$120 million or 42 percent of the island's gross domestic product in 2006 through tourism, recreation, fisheries, and shoreline protection. Threats to reefs are similar to stressors in the region – nutrient and sediment runoff from coastal development, sewage pollution, climate change, tourism, and overfishing.

The non-governmental organization (NGO) sector in Trinidad and Tobago is well-developed and active in conservation activities. NGOs support biodiversity conservation by taking part in restoration projects, and also act as special interest groups, such as the Orchid Society, and strengthen public awareness of biodiversity and the importance of conservation. There are several NGO-led projects that focus on habitat restoration and reforestation, species conservation, and research in Trinidad and Tobago. While the legislative framework for environmental management in Trinidad and Tobago is well developed, institutional challenges for environmental management arise due to unclear jurisdiction, lack of staff capacity and training, and lack of enforcement capacity. Environmental impact assessments (EIAs) are required for development projects, however, lack of staff trained in EIA procedures limits their efficacy. Finally, Trinidad and Tobago's close proximity to South America makes fisheries management challenging.

The Assessment Team noted the following direct threats to biodiversity and forests: quarrying for limestone, gravel, sand, and aggregate; hunting; invasive species; squatters; mismanaged development; trade in plants and wildlife; loss of indigenous/traditional crops; climate change; fire; logging; chemical and solid waste pollution from sewage, heavy metals, toxic waste, nutrients, persistent organic pollutants, and solid waste; and over-fishing.

The following are the root causes of the threats:

- Outdated legislation
- Lack of monitoring, compliance, enforcement/implementation of regulations
- Activities fall through the environmental review net. For example, quarrying is not covered by a certificate of environmental clearance issued by the EMA.

- Lack of coordination between ministries, agencies, and policies; and limited communication between agencies
- Lack of political will
- Land tenure issues, a significant amount of land is in private hands
- Public awareness of the importance of biodiversity and ecosystem services is low

The Conclusions and Recommendations section contains recommendations to strengthen USAID's support for biodiversity and tropical forest conservation.

## LIST OF ACRONYMS

ADS	Automated Directives System
CARDI	Caribbean Agricultural and Development Institute
CBD	Convention on Biological Diversity
CBO	Community based organizations
CBSI	Caribbean Basin Security Initiative
CCVA	Climate Change Vulnerability Assessment
CDM	Clean development mechanism
CEHI/GIZ	Caribbean Environmental Health Institute/German International Cooperation
CITES	Convention on Trade in Endangered Species of Wild Fauna and Flora
CR	Critically endangered, as designated by the IUCN Red List of Threatened Species
DNRE	Department of Natural Resources and Environment
EIA	Environmental impact assessment
EMA	Environmental Management Authority
EN	Endangered, as designated by the IUCN Red List of Threatened Species
ESA	Environmentally sensitive area
ESS	Environmentally sensitive species
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
GDP	Gross domestic product
GEF SGP	Global Environment Facility Small Grants Programme
ICZM	Integrated coastal zone management
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
MOU	Memorandum of understanding
NGO	Non-governmental organization
NFP	National Focal Point
PA	Protected area
PEPFAR	President's Emergency Plan for AIDS Relief
PoWPA	Programmes of Work on Protected Areas
RDCS	Regional Development Cooperation Strategy
SPAW	Specially Protected Areas and Wildlife
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
USAID/BEC	USAID Mission to Barbados and the Eastern Caribbean
UWI	University of the West Indies
VU	Vulnerable, as designated by the IUCN Red List of Threatened Species



# INTRODUCTION

USAID regulations require that all country strategic plans include analyses of the actions that are needed to conserve tropical forests and biodiversity in the country and the extent to which current or proposed USAID actions will meet these needs.<sup>1</sup> The purpose of this report is to provide these required analyses for the Trinidad and Tobago component of the USAID/Barbados and Eastern Caribbean Mission Regional Program for 2014 to 2018.

Under the new strategy period, 2014 to 2018, the USAID Regional Program will have four components. The Climate Change Focus Area will finance demonstrations of adaptation to climate change. The Citizen Security Focus Area will provide education and training for youth and will improve legal systems for juvenile justice. The Economic Growth Focus Area will increase youth capabilities for gaining employment and avoiding criminal activities. HIV/AIDS will reduce HIV infections and strengthen health facilities.

*Methodology:* For the Trinidad and Tobago Foreign Assistance Act (FAA) 118/119 Assessment, in-country stakeholder consultations took place from June 3 through June 6, 2013 (Annex D contains the List of Contacts). The Assessment Team traveled to Tobago on June 5. The Assessment Team convened focus groups in both Trinidad and Tobago (the List of Contacts shows focus group participants) to encourage discussion about the status and gaps in biodiversity and forest conservation, threats, and actions needed to address the threats. This FAA 118/119 Assessment also involved an extensive review of documents and websites (see References). The Assessment Team conducted site visits to:

- In Trinidad, Caroni Swamp, a Ramsar site, and a leatherback turtle nesting beach in the northeast.
- In Tobago, the Assessment Team took a circuit tour of the island to see tourism developments, quarries, and other impacts to biodiversity and forests.

*Information Used and Gaps:* For this FAA 118/119 Assessment, the 2010 Fourth National Report provided the foundation for the description of biodiversity, threats, and actions needed. The Assessment Team also consulted online resources and policy documents. While there are gaps in biodiversity data (for example, the terrestrial invertebrate fauna is poorly documented) and quantitative data on climate change is limited (several stakeholders noted that no climate change research is being done, and climate change issues are known only by observation), there were very few gaps in the information needed for preparation of this Tropical Forest and Biodiversity Assessment.

*General Country Description and Description of Ecosystem and Species Diversity:* Officially known as the Republic of Trinidad and Tobago, this island country lies just off the coast of northeastern Venezuela and south of Grenada. It shares maritime boundaries with other nations including Barbados to the northeast, Grenada to the northwest, Guyana to the southeast, and Venezuela to the south and west. The country covers 1,980 mi<sup>2</sup> and consists of two main islands, Trinidad and Tobago and numerous smaller landforms including Chacachacare, Monos, Huevos, Gaspar Grande (or Gasparee), Little Tobago, and St. Giles Island. Trinidad is 4,768 km<sup>2</sup> (1,841 mi<sup>2</sup>) in area (comprising 93 percent of the country's total area) with an average length of 50 miles and an average width of 37 miles. Tobago has an area of about 300 km<sup>2</sup> (120 mi<sup>2</sup>), or 5.8 percent of the country's area, and is 25 miles long and 7.5 miles at its greatest width.

Because of its recent separation from the South American mainland, the ecology of Trinidad reflects that of equatorial South America (unlike the other Windward Islands, which have ecosystems dominated by island

---

<sup>1</sup> USAID Automated Directives System (ADS) Chapter 201.3.9.2 Technical Analysis for Developing Long-Term Plans, Environmental Analysis-Biodiversity and Tropical Forests and ADS Chapter 204 Environmental Procedures, derived from the provisions of the Foreign Assistance Act (FAA) of 1961, as amended in Sections 118, Tropical Forests, and 119, Endangered Species.

endemic species). Additionally, topographical features and associated microclimate variability (rainfall and temperature), and other factors such as soil types and human activities influence the country’s biodiversity. Trinidad and Tobago contains a wide array of biologically rich ecosystems. Some of these ecosystems have been identified for global and regional priority, are considered among the World Wildlife Fund’s “Global 200” list of top priority ecoregions, and have been designated as Ramsar sites.

The information below is from Trinidad and Tobago’s 2010 Fourth National Report and a Government of Trinidad and Tobago website (2012a).

Trinidad and Tobago’s terrestrial ecosystems include evergreen seasonal, semi-evergreen seasonal, deciduous seasonal, littoral woodlands, lower montane rainforests, seasonal montane forests, montane rainforests, elfin woodlands, swamp forests (including mangrove woodlands), palm swamps, marshes, and savannas. These support approximately 2,160 species of flowering plants, 110 of which are endemic; 433 species of birds (411 in Trinidad and 210 in Tobago); 100 mammals; 37 amphibians; and 93 reptiles including 47 snakes (44 in Trinidad and 21 in Tobago). Marine systems include the water masses; mud bottoms; coral reefs and communities; sandy bottoms; rocky shores; seagrass beds; and mud flats. These support a range of macro and microbiota including a large array of commercially important fish species and 36 species of reef building corals.

According to the 2010 Fourth National Report, with a recently published checklist, plant diversity in Trinidad and Tobago is now well documented with about 3,300 species (59 endemic) recorded. Prior to this checklist, approximately 2,500 species had been recorded in about 175 families. The species diversity of Trinidad and Tobago is summarized in Table 1.

**Table 1. Species Diversity in Trinidad and Tobago**

MAJOR GROUP	NUMBER OF SPECIES
Vascular Plants	2,160
Birds	450
Mammals	95
Reptiles	85
Snakes	55
Amphibians	30
Freshwater fishes	45
Marine fishes	354
Butterflies	600
Nematodes	200-300

Source: CBD’s Biosafety clearing-house site on biodiversity, undated.

In terms of numbers of species the largest families are the ferns and their allies with approximately 310 species; the grasses, legumes and orchids each with about 200 species; and the sedges, madders, melastomes, composites, and euphorbs, each with about 90 species. Table 2 shows some of the larger plant families. (These data were generated prior to the updated checklist of 3,300 species.)

Table 2. Major Plant Families of Trinidad and Tobago

FAMILY	GENERA	SPECIES
Ferns & allies	66	310
Grasses	74	214
Legumes	75	202
Orchids	68	190
Sedges	22	111
'Rubes' (Rubiaceae)	48	97
Melastomes	22	95
Composites	45	86
Euphorbs	27	82

Trinidad and Tobago's fauna is also rich. Approximately 45 species of freshwater fish, excluding sea run and peripheral species, are found in Trinidad and Tobago's waters. Although there have been no recent taxonomic surveys of the marine fish of Trinidad and Tobago, approximately 400 to 500 species in several dozen orders and families are expected to be found in Trinidad and Tobago's marine environment.

Amphibians constitute the smallest group of vertebrates. In Trinidad there are 37 species in 10 families, in a single order, while Tobago has only about one third the number in fewer families. One frog species is likely an endemic, the golden tree frog (*Phyllodytes auratus*). There are approximately 93 species of reptiles found in Trinidad and Tobago, including marine turtles; and one crocodilian, the spectacled caiman. Two species of tortoise are found, one native and one introduced, but both are extremely rare in the wild.

The avifauna of Trinidad and Tobago is extremely well-documented. Birds constitute the largest group of vertebrates. In Trinidad, 411 species have been recorded (a later estimate is 433 species of birds, 250 of which breed locally). For Tobago, 210 species have been recorded. Terrestrial mammals in Trinidad and Tobago are well-documented. Nine orders and about 27 families are represented, with approximately 100 indigenous species. Bats and rodents predominate. Bats account for over half of the mammalian fauna. Marsupials, edentates, a single armadillo, several rodents, primates, a few carnivores, deer, and manatee constitute the rest of the mammalian group.

The insects and arachnids dominate the terrestrial fauna. Knowledge of the groups is very uneven.

## POLICY AND INSTITUTIONAL FRAMEWORKS

### LEGISLATION

Trinidad and Tobago has a well-developed and comprehensive, but fairly recent regulatory structure for environmental management and biodiversity conservation. Implementation and enforcement of these policies and regulatory processes require development of capacity at all levels of society – within government, civil society, and other stakeholder groups. The legislative and policy framework for biodiversity conservation and sustainable forest management is summarized below (Table 3).

The Green Fund is an innovative measure that levies a 0.1 percent tax on gross sales receipts on businesses operating in Trinidad and Tobago. These funds are used for remediation, reforestation, environmental education and public awareness, and conservation of the environment (see below).

Among other challenges, Trinidad and Tobago needs greater technical capacity for review of environmental impacts and for environmental input into other development issues.

Table 3. Legislative and Policy Profile

LAWS AND POLICIES	PURPOSE
Comprehensive Economic Development Plan for Tobago: Clean, Green, Safe, and Serene	The Plan sets out the strategies and development initiatives for Tobago for a 4-year period
Climate Change Policy (2011)	Policy guidance for the development of an appropriate administrative and legislative framework
National Environmental Policy (2006)	Focuses on greenhouse gases particularly as Trinidad and Tobago is a hydrocarbon producing country
National Integrated Water Resources Management Policy (2005)	Pursue modern scientific strategies for water resources management in which the water sector and the environment is considered in an integrated manner
National Policy and Programmes on Wetland Conservation for Trinidad and Tobago (2002)	Recognize the importance of wetlands to the natural environment of Trinidad and Tobago as well as their commercial importance
National Protected Areas Policy (2011)	Protected Areas (PAs) are recognized as very important tools towards achieving sustainable development
National Forest Policy (2011)	Addresses the relationship between large-scale forest removal and climate change
Biodiversity Strategy and Action Plan for Trinidad and Tobago (2011)	Provides support to the Government of the Republic of Trinidad and Tobago to plan for the conservation and sustainable use of the country's biodiversity, within the context of its socio-economic development programs
National Tourism Policy (2010)	Seeks to guide and foster the sustainable development and promotion of the tourism sector through effective public, private, and community partnerships
Trinidad and Tobago Tourism Master Plan (1995)	Tourism land use plan to guide investment for both the public and private sectors
North East Tobago Management Plan	Addresses concerns regarding the potential negative environmental impacts of the proposed rehabilitation of a link road between the communities of L'Anse Fourmi and Charlotteville in Tobago.
National Action Programme to Combat Land Degradation in Trinidad and Tobago 2006 to 2020 (2006)	Addresses the physical, biological, and socio-economic aspects of land degradation
Working for Sustainable Development in Trinidad and Tobago 2012	Government policy in Trinidad and Tobago on sustainable development; focuses on green economy
Draft Air Pollution Rules (2010)	Regulate air pollution in Trinidad and Tobago
Environmental Management Act (2001)	Provision for the management of the environment within Trinidad and Tobago and the protection of its natural resources

LAWS AND POLICIES	PURPOSE
Certificate of Environmental Clearance Rules (2001)	Process for obtaining a certificate of environmental clearance
Standards Act (1997)	General authority to promulgate standards that improve environmental performance
Environmentally Sensitive Areas Rules (2001)	Authority to designate a defined portion of the environment as an environmentally sensitive area
Draft Waste Management Rules (2008)	Regulation of waste, storage, and disposal of hazardous waste
Forests Act	Use and management of forests and forest products
Town and Country Planning Act	Planning and development for urban and rural areas
Fisheries Act	Regulates fishing in the waters of Trinidad and Tobago, including marine and freshwater
Marine Areas (Preservation and Enhancement)	Protection and management of marine areas
Draft National Wildlife Policy	Guidance on sustainable management of undomesticated animals and plants, whether introduced, resident, or migratory
Water Pollution Rules (2006)	Regulation of pollution into waters of Trinidad and Tobago
National Programme of Action for the Protection of the Coastal and Marine Environment from Land-based Sources and Activities (2008 to 2013)	Adoption of measures aimed at preventing, reducing, and controlling pollution of coastal and marine areas from land-based sources and activities
Green Fund	Government fund available to community groups and organizations focusing on remediation, reforestation, or conservation of the environment

Source: GreenT&T.org, undated.

## GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

A number of government and non-governmental organizations (NGOs) are involved in biodiversity conservation (see Table 4). Aspects of management of biodiversity, climate change, and tropical forest management fall under the jurisdiction of the Ministry of Environment and Water Resources, Ministry of Planning and Sustainable Development, Ministry of Tourism, Ministry of Tobago Development, Ministry of Trade, Industry, and Investment, and Ministry of Works and Infrastructure. The Wildlife Division is the focal point for the Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES) while The Forestry Division is responsible for CITES reporting. The Ministry of the Environment and Water Resources is the National Focal Point (NFP) for the Convention on Biological Diversity (CBD). The Ministry implements its biodiversity-related policies and programs through the following agencies and divisions: Environmental Policy and Planning Division, Forestry Division, Environmental Management Authority, and Institute of Marine Affairs. (See Annex A for more information on institutions involved in biodiversity and forest conservation.)

Table 4: Institutions Involved in the Management and Conservation of Biological Resources

INSTITUTION	KEY ROLE(S)	ENABLING LEGISLATION
Environment and Physical Planning Division, Min. of Environment and Water Resources	<ul style="list-style-type: none"> <li>• Coordination, oversight and policy</li> <li>• Climate Change</li> <li>• Biodiversity</li> <li>• Environment</li> </ul>	
Biodiversity Unit, Environmental Management Authority	<ul style="list-style-type: none"> <li>• Research</li> <li>• Education</li> <li>• Enforcement</li> <li>• Coordination</li> <li>• PAs</li> <li>• Protected species</li> </ul>	<ul style="list-style-type: none"> <li>• Statutory body</li> <li>• Subsidiary legislation:</li> <li>• Sensitive Areas Rule and Sensitive Species Rule. These are subsidiary legislation, whereas Fisheries and Forestry operate under the primary legislation.</li> </ul>
Fisheries Division	<ul style="list-style-type: none"> <li>• Fisheries management plans</li> <li>• Inland and marine species monitored and assessed (in conjunction with researchers)</li> <li>• Promotion of aquaculture</li> </ul>	<ul style="list-style-type: none"> <li>• Fisheries Act 1916, Amended 1975</li> </ul>
Green Fund Executing Unit	<ul style="list-style-type: none"> <li>• The Green Fund was established under the Finance Act 2004, Part XIV – Green Fund Levy by the GoRTT. The Fund is capitalized by a tax on the gross sales and receipts of corporate companies operating in Trinidad and Tobago.</li> </ul>	<ul style="list-style-type: none"> <li>• Finance Act 2000, Amended in 2004; 2010</li> <li>• Green Fund Regulations 2007; Amended 2011</li> </ul>
Forestry Division	<ul style="list-style-type: none"> <li>• Forest resource inventory</li> <li>• Forest cover assessment</li> <li>• Management of forest reserves</li> <li>• Agroforestry</li> <li>• Protective and production forestry</li> </ul>	<ul style="list-style-type: none"> <li>• Forests Act, 1915 amended 1999</li> <li>• National Forestry Policy was revised in 2011 (It was 100 years old)</li> <li>• Forestry Division is transitioning to the National Forestry &amp; Protected Area Authority, which will consolidate responsibilities now covered by several natural resource agencies.</li> </ul>
Department of Natural Resources and Environment (DNRE)- Tobago	<ul style="list-style-type: none"> <li>• Environmental permits and environmental impact assessments (EIAs)</li> <li>• Wildlife management</li> <li>• Watershed management</li> <li>• Parks and PAs</li> </ul>	<ul style="list-style-type: none"> <li>• Established 1998. Special municipal arrangement between islands of Trinidad and Tobago</li> <li>• Conservation of Wildlife Act, 1958 last amended 1980</li> <li>• Memorandum of understanding (MOU) with Environmental Management Authority (EMA) in Trinidad Protected Areas Policy is new as of 2011. Previously</li> </ul>

INSTITUTION	KEY ROLE(S)	ENABLING LEGISLATION
		declaration of PAs was done ad hoc.
Tobago House of Assembly	<ul style="list-style-type: none"> <li>• Mission is “to effect the sustainable management of all our natural resources, the skilled development of our human resources, and increased use of relevant technology to facilitate trade and a dynamic agro-business sector.”</li> <li>• Subdivisions: Agriculture, Marine Resources and Fisheries and Natural Resources and Environment</li> </ul>	<ul style="list-style-type: none"> <li>• Established by Act No. 37 of 1980 for the purpose of “making better provision for the administration of the island of Tobago and for matters therewith.”</li> </ul>

Trinidad and Tobago is a signatory to the principal international conventions related to the conservation of biodiversity, tropical forests, and protected areas (PAs), and pollution control, including the following:

- Convention on Biological Diversity (CBD)
- Convention on Wetlands of International Importance, especially as waterfowl habitat (Ramsar Convention)
- Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean (SPAW Protocol)
- Convention on Migratory Species
- United Nations (UN) Framework Convention on Climate Change
- UN Convention on the Law of the Sea
- Montreal Protocol
- Kyoto Protocol
- International Tropical Timber Agreement

The NGO sector in Trinidad and Tobago is well-developed and active in conservation activities. NGOs support biodiversity conservation by taking part in restoration projects, and also act as special interest groups, such as the Orchid Society, and strengthen public awareness of biodiversity and the importance of conservation. There are several NGO-led projects that focus on habitat restoration and reforestation, species conservation, and research. Most notable of these projects is the Nariva Swamp Restoration Project aimed at restoring 1,339 ha of degraded coastal wetland. The project is implemented in partnership with the University of West Indies and Ducks Unlimited with financing from the World Bank’s BioCarbon Fund. Several of the NGO projects link biodiversity with livelihoods, including the Trust for Sustainable Livelihoods, SOS, and Turtle Village Trust. Table 5 provides a brief summary of the main regional and local NGOs operating in Trinidad and Tobago. A comprehensive list of conservation NGOs working in Trinidad and Tobago is available online via Green TnT.



Table 5. Key Regional and Local Environmental NGOs in Trinidad and Tobago

NGO	ACTIVITIES
Environment Tobago AFWEPO	Environmental projects (reforestation, coastal vegetation restoration)
Trinidad and Tobago Field Naturalists Club Orchid Society CANARI	Species conservation
North East Sea Turtle (NEST) Save out Sea Turtles (SOS) Turtle Trust	Species conservation
CARIBSAVE Partnership	Addresses the impacts and challenges of climate change, environment, economic development, tourism, and community livelihoods across the Caribbean Basin
University of the West Indies (UWI)	Wide ranging research (biodiversity, forestry, fisheries, ecosystems, climate change)
Darwin Initiative	Supports biodiversity conservation, studies, and ecotourism projects.
ASA Wright Nature Centre	“Not-for-Profit” Trust established in 1967 to protect part of the Arima Valley and create a conservation and study area for the protection of wildlife. Education, conservation, and ecotourism are the three focal areas.

## BILATERAL, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

International donors and agencies have played a vital role in many of the environmental initiatives in Trinidad and Tobago. The World Bank, United Nations Environment Programme (UNEP), and the Global Environment Facility (GEF) are among the major donors to the environment sector. The majority of funding is focused on project implementation, development of markets for ecosystem services, and restoration.

US Government assistance in Trinidad and Tobago focuses on the development of professional military and security forces to strengthen rule of law, increase accountability and interagency cooperation, and improve maritime safety and border security. Programs to advance security and citizen safety through the Caribbean Basin Security Initiative (CBSI) complement and enhance U.S. bilateral assistance.

Table 6. Key Donor and NGO-implemented Biodiversity Conservation Projects

ORGANIZATION	ACTIVITY	VALUE
10 to 11 Community Based Organizations (CBOs) from the communities of Plum Mitan, Kernahan, Cascadou and Biche along with EMA, Forestry Dept., UWI (carbon sequestration component)	Nariva Swamp Carbon Sequestration Restoration and Livelihoods Project	TT\$68.5 million Market: Voluntary Over-the-Counter Market (OTC) Clean Development Mechanism (CDM) Credit Buyers: World Bank BioCarbon Fund, Tranche 2

ORGANIZATION	ACTIVITY	VALUE
GEF Small Grants Programme (SGP)	14 current projects	US\$562,890
UWI and The Cropper Foundation (TCF)	Project for Ecosystem Services (Pro Eco Serv) Other countries involved: Chile, Vietnam, South Africa/Lesotho	US\$6.3 million UNEP as main financing US\$19.6 million co-financing US\$25.9 million – total value US\$150,000 The Cropper Foundation as cash (0.6 percent of total project value) US\$489,915 – in kind UWI US\$144,500 – in kind TCF
United States Forest Service	Mapping of tropical forests of Trinidad and Tobago with Landsat imagery	
United States Fish and Wildlife Service	Nariva Swamp Ramsar Site – Habitat Restoration Initiative	
United Nations Development Programme (UNDP)	Programs emphasize capacity development, government accountability, civil society and private sector collaboration with the government, and gender equity	2006 to 2011 US\$16.3 million

Major donor-funded projects are required to prepare environmental impact assessments (EIAs). EIAs are submitted to the Environmental Management Authority (EMA), and a certificate of environmental clearance is issued upon successful review. The National Environmental Policy, 2005 states that projects may require environmental clearance if they fall within the following broad categories:

- |  |   |
|--|---|
| a) Agriculture/horticulture                              | i) Oil and gas exploitation             |
| b) Electricity generation, transmission and distribution | j) Telecommunications                   |
| c) Engineering operations                                | k) Tourism and recreational development |
| d) Food and beverage industry                            | l) Transport systems infrastructure     |
| e) Heavy manufacturing industries                        | m) Waste management                     |
| f) Light manufacturing industries                        | n) Water and sewage systems             |
| g) Metal smelting and reforming                          | o) Storage and warehousing              |
| h) Mineral mining and processing                         | p) Other service-oriented activities    |
|  | q) Land reclamation                     |

As mentioned above, EIA review is constrained by the limited number of trained staff.

# STATUS AND MANAGEMENT OF PROTECTED AREAS AND ENDANGERED SPECIES

## PROTECTED AREAS

In 2012, Trinidad and Tobago developed an Action Plan for the Programmes of Work on Protected Areas (PoWPA). It will be a primary tool for conservation of genetic diversity, species, ecosystems, and natural habitats. In addition, it will track populations of vulnerable species and their habitats. The Forestry Division under the Ministry of Environment and Water Resources leads the effort in Trinidad while the Tobago House of Assembly leads efforts in Tobago. Additionally, Trinidad and Tobago is developing a new National System of Protected Areas for Wildlife to increase resilience to climate change. Based on the International Union for Conservation of Nature (IUCN) categories, in this new system, the PA categories are:

- Scientific Reserves
- Special Conservation Reserves
- National Parks
- Natural Landmarks
- Habitat or Species Management Reserves
- Protected Landscape of Seascape
- Sustainable Use Reserves

The new PA system will be under the jurisdiction of the new Forestry and Protected Areas Authority. (This will be similar to the Environmental Management Authority, a semi-autonomous authority.) Once the transition is complete, issues with fragmentation of legislation and overlap are expected to be resolved. For example, currently the EMA (acting under subsidiary legislation) and Fisheries and Forestry Departments (under primary legislation) can designate PAs and protected species, resulting in overlap. Also, the new system will bring protection to forest areas, such as the pristine northern forests, that currently have no protection.

Currently, the Forestry Department manages forest reserves (the Northern Range) and game reserves (wildlife areas). Forested wetlands, such as mangrove forests are also under Forestry Department's jurisdiction (Nariva Swamp). The National Parks Section of the Forestry Division manages park sites. In Tobago, the Parks and Protected Area Unit in the Department of Natural Resources and Environment (DNRE) manages PAs. (This function was transferred from the Department of Agriculture 7 years ago.)

The EMA has declared three Environmentally Sensitive Areas (ESAs; Annex C, Figure C2, shows proposed and declared ESAs; also see Table 7). Besides ESAs, Trinidad and Tobago's other categories of PAs currently are National Parks (1), Recreation Parks (7), Historic Sites (4), Wildlife Sanctuaries (3), Game Sanctuaries<sup>2</sup> (9); Prohibited Areas (21), Protected Marine Areas (2.8 percent of the country's marine area is protected in 16 Marine PAs), Forest Reserves (39), Nature Conservation Reserves (4), Scientific Reserves (9), Natural Landscapes (1), Scenic Landscapes (5). Annex C (Figure C1) shows a map of Prohibited Areas which illustrates the current overlap among PA categories. Some of the Prohibited Areas are Forest Reserves, some are Ramsar sites, others are ESAs. Of the 16 Marine PAs, most are marine components of terrestrial PAs.

Given the large number of PAs and the plan to consolidate the PA system, Table 7 shows only ESAs, which include some of the largest and most environmentally critical PAs. Information in Table 7 is mainly from the EMA's Administrative Record for each ESA declaration.

---

<sup>2</sup> Hunting is prohibited in Game and Wildlife Sanctuaries.

Table 7. Trinidad and Tobago's Declared and Proposed ESAs

PROTECTED AREA (PA)	REASON FOR PROTECTION	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
TRINIDAD			
Aripo Savannas Strict Nature Reserve	High scientific value, it is the best remaining example of the types of ecosystems it encompasses, and it possesses characteristics not seen elsewhere in the country. The NR has a high density of rare, threatened, endemic and possible endemic species. 457 plant species have been identified and 38 are restricted to the Aripo Savannas with 16 to 20 that are rare or threatened, and two endemic floral species.	Declared in June 2007	The day-to-day management is by officers attached to the National Parks Section. In addition, an Aripo Savannas Stakeholders Management Committee (ASSMC) has been convened as a multi-stakeholder advisory body under the ESA Rules (2001). In 2003, a Working Group was set up focused on the management of the Aripo Savannas to put forward recommendations that could be implemented by the Forestry Division to properly manage the NR.
Matura National Park: Composed largely of the Matura and St. David forest reserves, and about 10 percent private lands, most of which were formerly cocoa, coffee and tree crop estates that have been abandoned for decades. Altitude varies from 0 to 575 m, with Trinidad's Northern Range traversing the park in an east-west direction. About 5 percent of the national park area is currently inhabited and/or farmed. The park is surrounded by 14 coastal	One of the few remaining areas of natural forest still in almost pristine condition. It includes watersheds of the Rio Seco, Salybia, Grande Riviere, and Shark rivers. The National Park has important biodiversity value with over 200 species of trees and lianas as well as five distinct plant communities have been recorded there. Over 80 percent of the area is undisturbed tropical forest: evergreen seasonal forest or Mora forest at lower elevations and montane forest at higher elevations. Seven endemic trees and one endemic tree fern occur in this ESA. Three of the endemic trees occurring in the park, <i>Clusia aripoensis</i> , <i>Clusia tocuchensis</i> , and <i>Macrolobium trinitense</i> , were assessed as endangered according to the IUCN Red Data List criteria; and <i>Ocotea trinidadensis</i> was	Declared in 2004	After the ESA was designated, the EMA formed a committee. This Stakeholder Management Committee (SMC) oversees management of the park to achieve the objectives of its designation as an ESA. Members of this committee include representatives of the EMA, Forestry Division (FD), the Matura to Matelot network (M2M) (representing local communities), the Council of Presidents of the Environment (COPE), which is the umbrella organization representing environmental NGOs, the Ministry of Tourism and the Sangre Grande Regional Corporation.

PROTECTED AREA (PA)	REASON FOR PROTECTION	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
communities, with a total population of 5325, whose livelihoods depend partially on the resources of this PA.	assessed as vulnerable. Matura National Park ESA is also home to Trinidad's endemic and endangered bird, the Pawi ( <i>Pipile pipile</i> ) and other endangered animals such as the ocelot ( <i>Leopardus pardalis</i> ), anteater, and river otter.		
Nariva Swamp Managed Resource: a largely freshwater swamp, located midway along the eastern coast of Trinidad. The area is approximately 11,340 ha in size and is the largest and most ecologically diverse wetland in Trinidad and Tobago. Agricultural areas add to the variety, and a small area at the northwestern tip was leased to local farmers.	This is one of Trinidad's Wetlands of International Importance under the Ramsar Convention. The area is exceedingly rich in biological resources, with over 175 species of birds recorded out of the total 433 bird species for Trinidad and Tobago. The swamp provides habitat for waterfowl and for the West Indian manatee ( <i>Trichechus manatus</i> ). Red howler monkeys, caimans, numerous species of parrots, including both the blue-and-gold macaw and red-bellied macaws and some species of snakes (e.g. anacondas, boa constrictors) are found. It also includes a wide variety of vegetation types: tropical forest, swamp forest, palm swamp forest, mangrove areas, marshland, and open waters.	Declared in December 2006	Forestry Division
Maracas National Park	Watershed protection	Proposed ESA	Forestry Division
Caroni Swamp National Park (Caroni Swamp Prohibited Area)	The Caroni Swamp is the largest mangrove wetland in Trinidad and Tobago. It is an important tourist attraction and provides important habitat for the scarlet ibis ( <i>Eudocimus ruber</i> ), one of the national birds of Trinidad and Tobago.	Declared a National Park in 1987; Proposed ESA	

PROTECTED AREA (PA)	REASON FOR PROTECTION	DECLARED/ PROPOSED	MANAGEMENT AUTHORITY & PARTNERS MANAGEMENT PLAN
TOBAGO			
Buccoo Reef Marine PA/Bon Accord Lagoon	Reef system and associated marine species and mangroves	Declared a Marine Park in 1973; Proposed ESA	
Speyside Reef	Abundant reef flora and fauna with 44 species of coral and over 60 species of fish	Proposed ESA	
Main Ridge Forest Reserve/National Park	Watershed preservation; home to many of Tobago's 201 birds, mammals, and reptiles, including the endangered white-tailed sabrewing, blue-backed manikins, wild hog (quenk), and the endemic red snake.	Oldest legally protected FR in the western hemisphere, designated in 1776. Proposed ESA	Parks and Protected Area Unit, Forestry Division

Source: Protected Planet, 2013 EMA, 1997.

### *Principal Threats to Protected Areas*

In Aripo Savannas Strict Nature Reserve, a comparison of aerial photographs from 1969 and 1994 shows that the marsh forest and palm marsh in the Aripo Savannas have significantly deteriorated. The major threats to the area are fires, quarrying, residential and agricultural squatting, and poaching.

Threats to Matura National Park are principally related to hunting pressure, however lack of data on fauna make this difficult to quantify. Local communities as well as visitors use the park primarily for hunting, logging, gardening, and recreation. In Nariva Swamp a small area at the northwestern tip was leased to local rice farmers and illegally expanded.

Pollution, physical damage, and climate change have degraded much of the reef system at Buccoo Reef PA. At Speyside Reef sediment run-off caused by land-based development, deforestation, and associated soil erosion have negatively impacted the reef.

Within the Main Ridge National Park the main threats include over-hunting, which has driven the ocelot and red-brocket deer to local extinction, illegal logging, land development, soil erosion, and landslides, which impact coral reefs.

## THREATENED AND ENDANGERED SPECIES

According to the IUCN Red List of Threatened Species, species listed as critically endangered (CR), endangered (EN), and vulnerable (VU) are considered threatened. Fifty-four animal and one plant species meet these criteria as shown in Annex B. Table 8 provides a breakdown of the numbers of plants and animals in each category. Most species on the list have declining populations with the exception of three corals, two frogs, and a bird described as stable. For six species (five animals and one plant), no population status was given for seven species (all animals), their status is described as unknown.

Table 8. Summary of Threatened Animals and Plants based on IUCN Red List

RED LIST STATUS	ANIMALS	PLANTS
CR	9	-
EN	11	1
VU	34	-

Of all organisms threatened in Trinidad and Tobago, fish have the highest number of threatened species, likely due to habitat loss and fishing pressure. Other at risk species are the manatee, the golden tree frog, the crab-eating raccoon, and the blue and yellow macaw (CBD, undated).

The Environmentally Sensitive Species (ESS) Rules (2001) allow the EMA to provide species that are threatened with extinction with special protection through the ESS designation. ESSs may be indigenous to Trinidad and Tobago or, if not, they must be present on these islands for part of their life or reproductive cycle. An ESS may also be an animal or plant that, throughout all or a part of its range is, or is likely to become, in danger of extinction and whose survival is unlikely if the threats persist.

To date, the West Indian manatee (*Trichechus manatus*), the Trinidad piping guan or pawi (*Pipile pipile*), and the white-tailed sabrewing hummingbird (*Campylopterus curvipennis*) have been granted ESS designation. According to (Government of Trinidad and Tobago, 2012b), since their designation as ESSs in 2007, the level of awareness and protection, especially by involvement of local communities, is preventing further declines. Detailed information on these species is provided in Annex B.

The Environmentally Sensitive Areas, Species and Biodiversity Work Plan aims to declare 10 ESSs and to develop and implement management plans for them. Candidate species for ESS designation are five marine turtles, ocelot, stony corals, the golden tree frog, and tayra, a member of the weasel family.

Several gaps and overlaps in responsibilities for threatened species exist. For example, manatees are under the jurisdiction of the Forestry Division when they are in river swamp, yet when they move up the coast they are under Fisheries. Also, currently, no law governs threatened freshwater resources. With the new policy framework (forest, wildlife, and PA policies), legislation on threatened and endangered species will be consolidated and gaps will be filled.



# STATUS AND MANAGEMENT OF FOREST RESOURCES

## TYPES OF FOREST

Forest types in Trinidad and Tobago are evergreen seasonal forest, semi-evergreen seasonal forest, deciduous seasonal forest, dry evergreen forest, montane forest, mangrove forest, herbaceous swamp, palm marsh, and marsh forest. Approximately 21 percent (28,000 ha) of the Forest Reserves in Trinidad are currently designated as “production forests.” This includes 13,000 ha of teak and pine plantations, with the rest consisting of natural forests that are managed using the “open range” and “block” systems. The percent of land under forests is shown in Table 9. Of these forests, 28 percent consists of primary forest, 64 percent is secondary growth forest, and 8 percent is planted forest. The planted forest is primarily composed of introduced species used for timber products.

Table 9. Forest Characteristics

Cover Type	1,000 ha	PERCENT OF LAND AREA
Land Area – Forest	226	44
Land Area – Other Wooded Land	84	16
Land Area – Other Land	203	37
Inland Water	0	0
<b>Total Country Area</b>	<b>513</b>	-

Fifty-four percent of state forestlands are designated as forest reserves while 37 percent are designated as other state lands. In Trinidad there are 35 proclaimed Forest Reserves with a total area of 131,430 ha and eight un-declared Forest Reserves (State Land that is managed by Forestry Division but not legally designated as Forest Reserves) totaling 11,650 ha. The Tobago Main Ridge Forest Reserve, reputedly the oldest in the western hemisphere, totals 3,937 ha in size. Permanent forest reserves, comprising 63 percent of forested area, all have management plans in Trinidad and Tobago.

Forest Reserves include areas that have been simultaneously designated as:

- Wildlife Sanctuaries
- Prohibited Areas
- Marine Parks
- ESAs
- Ramsar sites

The official forest cover data for Trinidad and Tobago are not current and more recent unofficial estimates suggest significant loss of forest since the 1940s. The last official forest inventory for Trinidad and Tobago, was based on 1969 aerial photos, and estimated over 50 percent forest cover (259,000 ha). This figure is still used in official communications. More recent analysis (EMA, 2004) notes that 1996 aerial photography shows 48 percent (246,240 ha) forest cover, while 2000 MODIS satellite imagery estimates 44 percent (229,000 ha) forest cover. These data suggest that almost 6 percent of forests were lost from 1969 to 2000. Data from the Food and Agriculture Organization (FAO) of the United Nations Forest Resource Assessment (2010), covering 1990 to 2010, indicate rates of forest loss between -0.30 percent to -0.32 percent representing some 15,000 ha of forest.

## MANAGEMENT STRUCTURE

The National Forest Policy, 2011 indicates that the State owns over 50 percent of the land in Trinidad and Tobago and 80 percent of the forested areas. Approximately 20 percent the total forested area of Trinidad and Tobago is in private ownership. The FAO (2010) estimates public ownership at 76 percent and private ownership at 24 percent, while the government holds 100 percent of management rights.

## ECONOMIC IMPORTANCE

The average harvest of timber, fisheries, and game is valued at over \$150 million annually in Trinidad and Tobago (CBD, undated). The most important forest product is lumber. In 2000, domestic log production was 71,994 m<sup>3</sup> while sawn timber was 29,800 m<sup>3</sup>, and exports were approximately 1,000 m<sup>3</sup>. Half the industrial timber originating from natural forests comes from private forests. Most production from tree plantations comes from State lands. Of the 226,000 ha of forest area, forest function is assigned as follows: production (34 percent), protection of soil and water (23 percent), conservation of biodiversity (9 percent), social services (4 percent), and multiple use (32 percent). Table 10 summarizes the uses of forests in Trinidad and Tobago.

Table 10. Importance of forests

Product/Service Area	Importance/Contribution
Wood	TT\$85.7 million
Non-Timber Forest Products	Food and food additives (edible nuts, mushrooms, fruits, herbs, spices, and condiments, aromatic plants, game animals); fibers (used in construction, furniture, clothing, and utensils); resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes (e.g. beekeeping); plants for landscaping and horticultural use
Subsistence	Stakes; charcoal; wood for sculpting; raw materials for handicraft
Tourism	Nature tourism
Ecosystem Services	Carbon sequestration; watershed protection; erosion control; supply of water

### *Forest Certification*

Participation in forest certification programs is mentioned in the Forest Policy 2011. Exported lumber has a certificate that states the wood came from sustainably managed forests using International Tropical Timber Organization (ITTO) guidelines. According to available data, only one timber company is Forest Stewardship Council (FSC)-certified in Trinidad and Tobago. The government supports a forestry incentive program to promote sustainable forestry, reforestation and conservation, which may assist in future certification efforts.

# CONSERVATION OUTSIDE OF PROTECTED AREAS

## MANAGED NATURAL SYSTEMS

### *Agricultural Systems*

Agriculture accounted for only about 0.5 percent of gross domestic product (GDP) in 2009, however the sector directly employs approximately 3.8 percent of the population. About 28 percent of the total land area was arable, mostly in Trinidad. Agriculture typically is large-scale commercial agriculture or small farms. Common crops include corn, rice, peas, beans, potatoes, other vegetables, and fruits. The large estates grow for export, mainly sugar, cocoa, and ornamental flowers. Coffee is also produced, but production has steadily declined.

Agricultural diversification has been focused in three areas (a) adoption of improved technologies, varieties and new commodities, (b) improving efficiency and effectiveness of marketing and agricultural health and food safety systems, and (c) linkages with agro-industry. Efforts to develop organic agricultural systems are underway.

### *Wetlands/Mangroves*

The most important wetland types are mangrove swamps, fresh to brackish coastal lagoons, swamps, and swamp forest in the floodplains of larger rivers and low-lying coastal areas. In the early 1980s, swamps and swamp forests comprised 16,000 ha in Trinidad and 58 ha in Tobago. The National Wetlands Policy 2002 indicates that over 50 percent of the original wetlands of Trinidad and Tobago have disappeared. Principal wetlands are: Caroni Swamp, South Oropuche Swamp, Roussillac Swamp, Los Blanquizales Swamp, Iacos Basin, Nariva Swamp, North Oropuche Swamp, Kilgwyn Swamp, and Bon Accord Lagoon. According to a Government of Trinidad and Tobago website (2012c), Trinidad and Tobago has three Ramsar sites totaling 15,919 ha.

The two most important wetlands for waterfowl are the Caroni and Nariva Swamps as they contain representatives of all the wetland plant communities and waterfowl species found in the country. Additionally, these areas are important nursery grounds for marine fisheries and the Caroni Swamp is important for wildlife-related tourism. Major studies have been completed on the country's wetland ecosystems, including ecology, floral and faunal inventories, and socio-economic studies (James et al., undated).

Principal threats to wetlands in Trinidad and Tobago are development pressure, human use, hunting, agricultural expansion, aquaculture, and pollution from fertilizers and pesticides. Urban and suburban sprawl are particularly severe on the west coast, and have had major impacts on wetlands.

### *Seagrass*

Seagrass flats are limited in Trinidad and Tobago. Tobago has two sites with significant seagrass beds, in the Bon Accord Lagoon on the southwestern portion of the island and east of Crown Point on the southern side. The dominant seagrass is turtle grass (*Thalassia testudinum*); the ecosystem also contains macroalgae, sea urchins, mollusks, oysters, and sea cucumbers (Laydoo et al., undated).

## Coral Reefs

Trinidad has limited coral communities due to its proximity to the Orinoco River, which transports nutrients and sediment into the marine waters near Trinidad. Tobago is more isolated from the Orinoco's influence; as a result, patch and fringing reefs are located along 90 km off the coastline (Bouchon et al., 2008). Tobago's reefs provided approximately US\$120 million or 42 percent of the island's GDP in 2006 through tourism, recreation, fisheries, and shoreline protection.

Threats to reefs are similar to stressors in other parts of the region – nutrient and sediment runoff from coastal development, sewage pollution, climate change, tourism, and overfishing. The reefs at Buccoo Reef were affected by a mass-bleaching event in 2005, leading to development of coral disease on many of the bleached coral colonies. A management plan for the reef was developed in 1995, but never implemented. Since the bleaching event, mean coral cover has declined from 21 percent to 15 percent and many of the reefs have become dominated by macroalgae, particularly downstream from urban centers on the Atlantic side.

## Beaches

Beaches ranging in size from a few hundred feet to over 2.5 miles long are present in Trinidad and Tobago. Beaches are important foraging habitat for shorebirds, nesting sites for marine species, and protect coastal areas from wave action. In particular, beaches are threatened by coastal erosion, negatively impacting nesting habitat for five species of sea turtles that frequent coastal waters and beaches. In particular, the leatherback, hawksbill, and green sea turtles nest on Trinidad and Tobago's beaches. Efforts to preserve the beaches include beach nourishment and hard engineering structures (Kahn, 2012).

## Freshwater

Inland freshwater systems are primarily used for potable water and commercial use. Waterways serve as drainage and outfalls for domestic and commercial effluents; these are sources of significant negative impacts to biodiversity. A number of watersheds in Trinidad and Tobago show signs of degraded surface water quality.

Freshwater fishing occurs mainly for subsistence and recreation; there is no exploitation of freshwater fish for commercial purposes. Fish fauna of the country is diverse and total species richness has been estimated between 37 to 40 species within four distinct zones. Over 70 percent of fish species are classified as rare in the islands (Phillip, 1998). To conserve these species, restoration and management of aquatic habitats is needed.

Freshwater ecosystems provide flood regulation, drinking water, biodiversity services, recreation, and nutrient cycling, however freshwater ecosystems are under pressure from deforestation, invasive species, agricultural expansion, improper waste disposal, and use of pesticides. Most drinking water is extracted from watersheds in the Northern Range (Trinidad), and the Main Ridge (Tobago).

## EX-SITU CONSERVATION

Trinidad and Tobago maintains several sites for *ex-situ* conservation and research. Organizations involved in *ex-situ* conservation include the Herbarium of Trinidad and Tobago, Emperor Valley Zoo, the Royal Botanic Gardens, and La Pastora Plant Propagation Center.

There is little information on the genetic diversity of species in Trinidad and Tobago with the exception of its commercial application in the agriculture sector (CBD's Biosafety clearing-house site on biodiversity,

undated). There have been important advances in the development of genetic stock for sugar and cocoa. Trinidad possesses one of the world's leading gene bank collections for the cocoa industry.

The emphasis at the Emperor Valley Zoo is on local fauna. Although the zoo showcases some exotic species, visitors can see many of the mammals, birds, reptiles, and fish that are found in Trinidad and Tobago and the adjacent South American continent. In addition to the animal displays the facility provides care for and rehabilitation for animals seized by the Wildlife Section, Forestry Division, which are part of the illegal pet trade. Another service provided is emergency rescues of wildlife, such as caimans, monkeys, snakes, and red brocket deer. The zoo provides a valuable public service through ongoing communication, education, public participation, and public awareness activities.

Royal Botanic Gardens consist of approximately 700 trees of which 13 percent are indigenous to Trinidad and Tobago. The objectives of the Royal Botanic Gardens are conservation, education, research, and recreation.

Some forested private lands are also privately protected, including approximately 526 ha of mainly forested land in the Arima and Aripo Valleys under the management of the Asa Wright Nature Centre. Several private forest reserves (e.g. Adventure Farm, Englishman's Bay Estate, Arnos Vale, Charlotteville Estate, and Grafton Sanctuary) exist in Tobago.

## MAJOR ISSUES IN TROPICAL FOREST AND BIOLOGICAL DIVERSITY CONSERVATION

### DIRECT THREATS

The Assessment Team identified the following key threats to biodiversity and forests from stakeholder consultations and review of literature, in particular the 2010 Fourth National Report.

(1) **Quarrying for limestone, gravel, sand, and aggregate.** This threat includes legal and illegal quarries, found on many hillsides, and sand removal on the coast. The 2010 Fourth National Report states that, "The increase in certain types of quarries, such as sand and gravel, blue limestone and plastering sand has occurred to meet the local 'boom' in the construction industry, and it was driven mainly by government-led infrastructural development." Quarry development is governed by the Minerals Act and the Water Pollution (Amendment) Rules 2006, but, as the 2010 Fourth Report states, "the approach to the establishment, operation and rehabilitation of quarries is still regarded as unsustainable. As such, quarrying continues to have significant, deleterious effects in such areas as the Northern Range (e.g. the Arima Valley and in the Valencia area)."

(2) **Hunting.** According to the 2010 Fourth National Report, wildlife hunting, an activity which is regulated by law, is becoming increasingly popular in Trinidad and Tobago. Between 1999 and 2008, the number of animals killed increased by about 100 percent. Five species of mammals can be hunted legally. But according to one stakeholder, 12,000 permits/year are given with no bag limits, and three out of the five species can be hunted with the one permit. This will change under the new Wildlife Act. While legal hunting can pose a threat under some circumstances, poaching is the main threat. The pawi (*Pipile pipile*) is categorized by the IUCN Red List as critically endangered, and only 200 are left, yet they are still being poached. In Tobago, a main threat is hunting of protected species such as sea birds (frigate birds, boobies, pelicans). The 2010 Fourth National Report states that signs of unsustainable levels of harvesting are found in Tobago, such as declines in populations of peccaries (*Tayassu tajacu*) and spotted paca or lappe (*Cuniculus paca*) and the vulnerability of other species that are illegally hunted - monkeys (the red howler monkey (*Alouatta seniculus*

*insularis*) and the white-fronted capuchin (*Cebus albifrons trinitatis*). The ocelot (*Leopardus pardalis*), the least common of the land dwelling mammals in the country, is also sometimes illegally killed by hunters.

(3) **Invasive species.** Some of the invasive species of concern are the house sparrow, lionfish, Mexican creeper, red palm mite (Trinidad only), and greater African snail (Trinidad only). The country's approach to dealing with invasive species has been piecemeal, according to one stakeholder. For example, the Agriculture Department deals with agriculture pests, while the DNRE deals with forest pests.

(4) **Squatters.** Several stakeholders cited squatters as one of the main threats to the country's forests. Squatters can build a house in one day, clearing a swathe of forest in the process. Many squatter settlements are located in remote areas, difficult to patrol.

(5) **Mismanaged development.** Some of the impacts of poorly planned development are filling of wetlands, pollution of wetlands, conversion of forests, land-based pollution, and erosion. Mismanaged development destroys and fragments habitat. For example, in the south, a pipeline with a right-of-way of 150 feet creates a swathe through the forest. One of the effects of habitat fragmentation is genetic decay; agouti albinos are becoming more common due to fragmentation of habitat (Personal communication, Tobago Focus Group, 2013). As mentioned above, waterways serve as drainage and outfalls for domestic and commercial effluents; these are sources of significant negative impacts to biodiversity.

(6) **Trade in plants and wildlife.** The main species traded are parrots, orchids, aquarium fish, butterflies (morphos), tarantulas, and snakes. All of these can be exported legally except for parrots, which must be captive bred to be legally exported. The 2010 Fourth National Report notes that data on seizures of illegally captured species are inconsistent, and that demand comes from both local and foreign markets, mainly the U.S.

(7) **Loss of indigenous/traditional crops.** One stakeholder commented that traditional crops are being lost, yet interest in conserving them takes a back seat to commercial production of agriculture and commercial varieties. An indigenous animal, the buffalypso, a buffalo bred for muscle, has disappeared in Trinidad, yet they are still found in Colombia. Trinidad is home to the scorpion hot pepper, the hottest pepper in the world, and has the finest cocoa in the world, yet there is little focus on conserving these crop varieties.

(8) **Climate change.** According to the 2010 Fourth National Report, a recent paper (Sutherland et al., 2008 in the Fourth National Report, Government of Trinidad and Tobago, 2010) reported that from 1984 to 1992, sea level around Trinidad and Tobago rose by 1.6 mm to 3.0 mm. One of the main effects of climate change in Trinidad and Tobago is sea level rise, which would impact coastal ecosystems, the livelihoods of coastal communities, coastal development, and human well-being in general (Fourth National Report, Government of Trinidad and Tobago, 2010). Stakeholders noted other impacts: Some plants that used to flower one time are now flowering 2 to 3 times a year and this affects the whole food chain, including pollinators; 2 years ago, for the first time, the giant grasshopper affected the forest (this was assumed to be weather-related, but there are no data); and sea level rise is causing freshwater wetlands to become saline. This is especially an issue in the rice growing area of Nariva Swamp. Animals adapted to freshwater are being lost. According to the Climate Change Vulnerability Assessment (CCVA) for Trinidad and Tobago (a USAID-commissioned report prepared simultaneous to this FAA 118/119 Assessment), climate change is already impacting on a broad range of sectors (tourism, forestry, agriculture etc.), but the professionals in these sectors have very little climate-related expertise. Trinidad and Tobago should be considered two separate entities for climate vulnerability. Tobago is the more vulnerable of the two; coral reefs are an important part of Tobago's tourist industry, yet they are significantly affected by climate change. In terms of climate change effects on biodiversity in Trinidad and Tobago, there is limited information on climate change and effects on individual species.

(9) **Fire.** According to the 2010 Fourth National Report, “Every year, fires destroy significant tracts of vegetation throughout Trinidad and Tobago. None of the fires are thought to be started by natural factors (such as lightning). Rather, fires are most often initiated through malicious acts, slash and burn agriculture, hunting, smoking and other acts of negligence (Singh 2003 in Northern Range Assessment 2005 in the Fourth National Report, Government of Trinidad and Tobago, 2010).”

(10) **Logging,** especially illegal logging, contributes to loss of forest cover in Trinidad and Tobago. According to the 2010 Fourth National Report, in 1998 and 1999, only a small percentage of logs were removed from natural forests on state lands - most were from plantations (such as teak – *Tectona grandis* - and pine – *Pinus caribaea*). However, from 2000, the proportion of sawnlogs originating from natural forests began to increase. The average removal from natural forests has been approximately 80 percent (of total logs harvested) for the last several years, resulting in destroyed and degraded natural forest.

(11) **Chemical and solid waste pollution from sewage, heavy metals, toxic waste, nutrients, persistent organic pollutants, and solid waste.** The 2010 Fourth National Report cites this is a key threat, and states that pollution affects both aquatic (freshwater and coastal/marine) and terrestrial biodiversity.

(12) **Over-fishing.** The 2010 Fourth National Report states that offshore fisheries in territorial waters “face major threats from commercial vessels that target high value species such as tuna and crustaceans. Often fishing gear from long liners and trawlers become damaged and remain in fishing grounds where they continue to “ghost fish” (i.e., trap marine species), in addition to which the commercial fishing effort usually results in a high degree of by-catch which is disposed of at sea. Marine turtles en route to nesting sites are an outstanding example of by-catch caught by trawlers.”

## IDENTIFICATION OF PRIORITY ACTIONS TO PROMOTE TROPICAL FOREST AND BIODIVERSITY CONSERVATION

This section addresses FAAs 118 and 119 d(1), actions necessary to conserve tropical forests and biodiversity, and is based on the above analysis of threats. “Actions necessary” are derived from stakeholder consultations and document review. For long-term, sustainable results, the root causes of the threats must be addressed. The Assessment Team sifted through many biodiversity needs; the following are the ones deemed critical to address the root causes and to conserve biodiversity and forests.

Table 11. Root Causes and Actions Needed

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
Outdated legislation, for example, the fine for poaching is 200 TT; Forest Department can only charge a fine for squatting based on royalty value of trees but not for actual squatting; for over 10 years, Environment Tobago has been working with DNRE on Kilgwyn wetland management with no co-management agreement-legislation does not yet cover this.	<ul style="list-style-type: none"> <li>• Update key legislation, for example, hunting legislation should be aligned to breeding patterns and fines for poaching should be increased.</li> <li>• Amend legislation to include co-management arrangements.</li> </ul>
Lack of monitoring, compliance, enforcement/implementation of regulations.	<ul style="list-style-type: none"> <li>• Provide support for/implement community-based forestry projects and co-management of marine and PA resources, including technical assistance in</li> </ul>



ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
	<p>implementation of co-management.</p> <ul style="list-style-type: none"> <li>• Increase staff numbers in Forestry Department and Fisheries Department.</li> <li>• Improve collaboration between government and other groups (NGOs and other private sector), such as the Hunters Association (to collaborate on patrolling).</li> </ul>
<p>Activities fall through the environmental review net. For example, quarrying is not covered by a certificate of environmental clearance issued by the EMA.</p>	<ul style="list-style-type: none"> <li>• Revise EIA legislation to include all activities that impact the environment.</li> </ul>
<p>Lack of coordination: between ministries, agencies, and policies; among agencies; limited communication between agencies.</p>	<ul style="list-style-type: none"> <li>• Develop a research agenda for biodiversity which is aligned to the decision-making process and clearly identify the roles of different agencies in research and monitoring.</li> <li>• Cross collaboration on specific, key issues, such as Fisheries collaboration with Forestry and Wildlife on threatened fish species.</li> <li>• Training/capacity strengthening in collaborative approaches.</li> </ul>
<p>Data are in scattered locations, and in some cases, data are deficient. For example, in Tobago lack of data on wildlife composition; in Trinidad and Tobago, lack of data on effects of climate change. Research has been conducted in many cases, but often the information is not left in the country.</p> <p>The 2010 Fourth National Report states that, "The UWI and the UTT have taken steps to ensure that environmental research projects can help to fill some of the gaps in national biodiversity research. The 2010 Fourth National Report also states that: It is recognized and accepted that monitoring of Trinidad and Tobago's biodiversity is not done within a comprehensive or systematic framework, resulting in:</p> <ul style="list-style-type: none"> <li>• major data gaps</li> <li>• out-of-date datasets that are not indicative of the current situation</li> <li>• no established indicators which could be used to consistently track changes in biodiversity, resulting in limited data and information on trends</li> </ul>	<ul style="list-style-type: none"> <li>• Return research data and results to Trinidad and Tobago (Smithsonian is now sending data back to UWI).</li> <li>• Make research studies and findings available online and widely available.</li> <li>• Fill gaps in baseline data.</li> <li>• Conduct applied research, such as population surveys of game animals so that hunting permits can be based on actual data; "populate" the threatened &amp; endangered species list with data on population numbers; climate change research.</li> <li>• Catalog indigenous knowledge and make available online.</li> </ul>

ROOT CAUSES	ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY
<ul style="list-style-type: none"> <li>• conflicting information from different data sources</li> <li>• limited accessibility to data, especially in a format to support national decision-making</li> </ul>	
Lack of political will: a co-management agreement was drawn up with Environment Tobago and DNRE but politicians did not approve it.	<ul style="list-style-type: none"> <li>• Use science-based/data-driven management (knowledge-based management) to encourage politicians to consider biodiversity conservation in decision making.</li> </ul>
Land tenure: a significant amount of land is in private hands. The largest watershed (Colon), with high percentage of privately owned land, is the most degraded watershed.	<ul style="list-style-type: none"> <li>• Provide support for/implement community-based forestry projects.</li> <li>• Improve collaboration between government and other groups. A model: In the Colon watershed, DNRE teamed with AFEEPO, a CBO, and together they have had success implementing conservation activities such as promoting good farming practices: checkdams, terraces, vetiver, agroforestry.</li> </ul>
Public awareness of the importance of biodiversity and ecosystem services is low.	<ul style="list-style-type: none"> <li>• Environmental education in schools and for adults, including climate change adaptation. Also use radio and television (Environment Tobago has had success with this).</li> <li>• Raise public awareness on integrated coastal zone management (ICZM), including ecosystem services.</li> </ul>

## EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAAs 118 and 119 d(2). Since the Regional Development Cooperation Strategy (RDCS) was unavailable to the Assessment Team, the “extent to which” discussion below makes several assumptions about USAID’s program. First, USAID’s program, 2014 to 2018 is briefly described, and then, Table 12 describes the “extent to which proposed actions meet the needs.”

### FOCUS AREA 1

Global Climate Change: The Climate Change focus area under the new RDCS will be similar to the current strategy. The program will assist the 10 countries with adaptation measures to mitigate the effects of climate change. The private sector, NGOs, and local communities will be integrated into the process to ensure that they are prepared for and able to adapt to the impacts of climate change. Climate change demonstration projects will be emphasized in the new RDCS.

### FOCUS AREA 2

Citizen Security: The Citizen Security focus area under the new RDCS will also be similar to the current strategy. The emphasis will be on at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job

placements. Additionally, the program will seek to reduce rates of repeat offenses among youth offenders with a focus on supporting legal frameworks, capacity building within the juvenile justice system, and building public awareness on juvenile justice reform.

### FOCUS AREA 3

Economic Growth: Under the new RDCS, USAID will continue to support the growth of the economies of the 10 countries in the USAID Mission to Barbados and the Eastern Caribbean (USAID/BEC) region. The goal will be to increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, and obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth. This will involve the private sector's active involvement in building curriculum relevant to the demands of the labor market thereby improving the opportunities for trained youth to successfully enter the job market or create their own sustainable businesses, and ultimately contribute to economic growth and regional security.

### FOCUS AREA 4

HIV/AIDS: Under the new strategy, USAID's HIV/AIDS program will continue to be funded through the President's Emergency Plan for AIDS Relief (PEPFAR), and as previously, will be implemented through the Caribbean Regional Partnership Framework. In the USAID/BEC region, USAID will continue to work as a part of the interagency team to implement activities towards the achievement of the Partnership Framework objectives with specific emphasis on HIV prevention, strategic information, laboratory strengthening, human capacity development and sustainability, and health systems strengthening.

Table 12. Proposed Actions Related to Needs

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• Update key legislation, for example, hunting legislation should be aligned to breeding patterns and fines for poaching should be increased.</li> <li>• Amend legislation to include co-management arrangements.</li> </ul>	<p>No proposed USAID actions meet this need.</p>
<ul style="list-style-type: none"> <li>• a) Provide support for/implement community-based forestry projects and co-management of marine and PA resources, including TA in implementation of co-management</li> <li>• b) Increase staff numbers in Forest Department and Fisheries Department</li> <li>• c) Improve collaboration between government and other groups (NGOs and other private sector), such as the Hunters Association (to collaborate on patrolling).</li> </ul>	<ul style="list-style-type: none"> <li>• Need b) Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</li> <li>• Need b) Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.</li> <li>• Need a &amp; c) The Climate Change Focus Area will integrate the private sector, NGOs, and</li> </ul>

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
	local communities into the process of identifying and implementing adaption measures.
Revise EIA legislation to include all activities that impact the environment.	Focus Area 1: Global Climate Change will assist with adaptation measures to plan for and mitigate the effects of climate change.
<ul style="list-style-type: none"> <li>• Develop a research agenda for biodiversity which is aligned to the decision-making process and clearly identify the roles of different agencies in research and monitoring</li> <li>• More cross collaboration on specific, key issues, such as Fisheries collaboration with Forestry and Wildlife on threatened fish species</li> <li>• Training/capacity strengthening in collaborative approaches</li> </ul>	No proposed USAID actions meet this need.
<ul style="list-style-type: none"> <li>• Return research data and results to Trinidad and Tobago (Smithsonian is now sending data back to UWI)</li> <li>• Make research studies and findings available online and widely available</li> <li>• Fill gaps in baseline data</li> <li>• Conduct applied research, such as population surveys of game animals so that hunting permits can be based on actual data; “populate” the threatened &amp; endangered species list with data on population numbers; climate change research.</li> <li>• Catalog indigenous knowledge and make available online.</li> </ul>	No proposed USAID actions meet this need.
Use science-based management (knowledge-based management) to encourage politicians to consider biodiversity conservation in decision making.	The Climate Change Focus Area will assist the 10 countries with adaptation measures to mitigate the effects of climate change.
<ul style="list-style-type: none"> <li>• Provide support for/implement community-based forestry projects</li> <li>• Improve collaboration between government and other groups. A model: In the Colon watershed, DNRE teamed with a CBO, and together they have had success implementing conservation activities such as promoting good farming practices: checkdams, terraces, vetiver, agroforestry.</li> </ul>	The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaption measures.

ACTIONS NECESSARY TO CONSERVE TROPICAL FORESTS AND BIODIVERSITY	EXTENT TO WHICH PROPOSED ACTIONS MEET THE NEEDS
<ul style="list-style-type: none"> <li>• a) Environmental education in schools and for adults, including climate change adaptation. Also use radio and television (Environment Tobago has had success with this.)</li> <li>• b) Public awareness raising on ICZM, including ecosystem services.</li> </ul>	<ul style="list-style-type: none"> <li>• Need a) Focus Area 2 targets at-risk youth, and will support life skills development, basic education assistance, technical and vocational training, business skills development, internships, and assistance with job placements.</li> <li>• Need a) Focus Area 3 will increase the ability of youth to participate in emerging market employment opportunities, enhance their healthy lifestyles, obtain quality education and training, thereby reducing the allure of involvement in drug trafficking and crime by youth.</li> <li>• Need b) The Climate Change Focus Area will integrate the private sector, NGOs, and local communities into the process of identifying and implementing adaptation measures.</li> </ul>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the actions necessary to conserve tropical forests and biodiversity and USAID’s proposed strategy, this section identifies priority actions that are appropriate for USAID support. With implementation of these proposed actions, USAID will meet many of the country’s biodiversity and tropical forest conservation needs. These are strategic recommendations and are in line with USAID/BEC’s RDCS for 2014 to 2018. The recommendations reflect where USAID’s support could have significant impact in advancing Trinidad and Tobago’s conservation of biodiversity and tropical forests.

Under Focus Area 1, USAID should consider:

(1) Providing support for demonstration projects which integrate the private sector, NGOs, and communities for improved collaboration on natural resources management, including development of climate change adaptation measures, and co-management of forest, fishery, and other marine resources, and PAs.

(2) That to address lack of political will, USAID-supported climate change adaptation measures should illustrate how science-based management can be used in decision-making by administrators and politicians (rather than making decisions on an ad hoc basis or for political expediency). A model for using science for decision making on climate change adaptation could also be useful in other natural resources-related areas, such as wildlife (setting hunting quotas), threatened species (identifying critical habitat and conservation measures), fisheries (issuing licenses, setting quotas), and EIA (identifying mitigation).

(3) As part of the Climate Change Focus Area’s support for adaptation measures, support efforts to raise public awareness on Integrated Coastal Zone Management (ICZM) and ecosystem services. USAID should refer to Environment Tobago’s awareness raising program for a successful model.

Under Focus Areas 2 and 3, USAID should consider:

- (1) Supporting training and internships for at-risk youth to work in the Forestry and Fisheries Department to supplement staff shortages.
- (2) Supporting environmental education in schools, including adult education, to encourage youth to participate in and gain qualifications for careers in environmental fields.

Based on in-country consultations, site visits, and analyses of the situation for biodiversity and tropical forest conservation in Trinidad and Tobago, in addition to the above, the Assessment Team recommends:

- (1) USAID should consider strengthening the capacity of Trinidad and Tobago's NGO community so they can take better advantage of the Green Fund. The main challenge to disbursing the significant funds in the Green Fund is lack of local NGO and CBO capacity to develop proposals and implement projects. USAID's comparative advantage in civil society capacity strengthening could help overcome this challenge, so that the Green Fund could more quickly and effectively distribute the funds already available for biodiversity conservation.

The Trinidad and Tobago CCVA recommends the following that would also contribute to biodiversity and forest conservation:

- (1) Support the ICZM Strategy process and implementation of ICZM activities to help solidify/legitimize the ICZM strategy as a tool to better manage coastal areas and the threats posed by climate change. As the bulk of the country's economic activity takes place in coastal areas and it is the area where the majority of the population resides—and it contains significant biodiversity—there are many possible activities that could be supported.
- (2) Provide technical support and guidance to enable the Green Fund to support climate resilience-related activities through training to enable candidate organizations to develop project submissions for the Green Fund.
- (3) Support targeted research on climate adaptation-related issues that would improve adaptation strategies in the public, non-profit, and private sectors. Such projects may include research on species at risk, understanding threats to the tourist trade, innovation in the agricultural sector, and construction standards and practices.
- (4) Develop a specific assistance plan for Tobago that could enhance climate change adaptation, especially in the tourism sector.

## REFERENCES

Bouchon, C., Portillo, P., Bouchon-Navaro, Y., Louis, M., Hoetjes, P., De Meyer, K., Macrae, D., Armstrong, H., Datadin, V., Harding, S., Mallela, J., Parkinson, R., Van Bochove, J.-W., Wynne, S., Lirman, D., Herlan, J., Baker, A., Collado, L., Nimrod, S., Mitchell, J., Morrall, C., Isaac, C. 2008. "Status of Coral Reefs of the Lesser Antilles: The French West Indies, The Netherlands Antilles, Anguilla, Antigua, Grenada, Trinidad and Tobago." Chapter 19 of Status of the Coral Reefs of the World: 2008. Available on the Internet at: [http://www.academia.edu/436338/Status\\_of\\_Coral\\_Reefs\\_of\\_the\\_Lesser\\_Antilles\\_The\\_French\\_West\\_Indies\\_The\\_Netherlands\\_Antilles\\_Anguilla\\_Antigua\\_Granada\\_Trinidad\\_and\\_Tobago](http://www.academia.edu/436338/Status_of_Coral_Reefs_of_the_Lesser_Antilles_The_French_West_Indies_The_Netherlands_Antilles_Anguilla_Antigua_Granada_Trinidad_and_Tobago).

Caribbean Environmental Health Institute (CEHI)/German International Cooperation (GIZ). 2013. Project on Improving Management of Coastal Resources and the Conservation of Marine Biodiversity in Selected CARICOM Countries: Executive Summary. Available on the Internet at: <http://www.cehi.org/lc/index.php/projects/10-programmes-a-projects/27-iwcam>.

Convention on Biological Diversity. Undated. Trinidad and Tobago - Country Profile. Available on the Internet at: <http://www.cbd.int/countries/profile/default.shtml?country=tt#status>.

Convention on Biological Diversity's Biosafety Clearing-House. Undated. Biodiversity in Trinidad & Tobago. Available on the Internet at: <http://tt.biosafetyclearinghouse.net/0003.shtml>.

Convention on Biological Diversity's Biosafety Clearing-House. Undated. Stakeholder Agencies. Available on the Internet at: <http://tt.biosafetyclearinghouse.net/0004.shtml>.

Environmental Management Authority (EMA). 1997. State of the Environment: 1997 Report. Republic of Trinidad and Tobago. Available on the Internet at: [http://www.ema.co.tt/cms/index.php?option=com\\_content&task=view&id=107&Itemid=112](http://www.ema.co.tt/cms/index.php?option=com_content&task=view&id=107&Itemid=112).

EMA. 2004. Report of an Assessment of the Northern Range of Trinidad and Tobago. Republic of Trinidad and Tobago. Available on the Internet at: [http://www.ema.co.tt/cms/index.php?option=com\\_content&task=view&id=107&Itemid=112](http://www.ema.co.tt/cms/index.php?option=com_content&task=view&id=107&Itemid=112).

Food and Agriculture Organization of the United Nations. 2010. Global forest resources assessment 2010: Main report. Rome: Food and Agriculture Organization of the United Nations. Available on the Internet at: <http://www.fao.org/docrep/013/i1757e/i1757e.pdf>.

Government of the Republic of Trinidad and Tobago. 2002. National Policy and Programmes on Wetland Conservation for Trinidad and Tobago. Available on the Internet at: [http://www.ramsar.org/cda/en/ramsar-news-archives-2002-national-wetland-21182/main/ramsar/1-26-45-87%5E21182\\_4000\\_0](http://www.ramsar.org/cda/en/ramsar-news-archives-2002-national-wetland-21182/main/ramsar/1-26-45-87%5E21182_4000_0).

Government of the Republic of Trinidad and Tobago. 2006. National Environmental Policy. Available on the Internet at: [http://www.ema.co.tt/cms/index.php?option=com\\_content&task=view&id=126&Itemid=126](http://www.ema.co.tt/cms/index.php?option=com_content&task=view&id=126&Itemid=126).

Government of the Republic of Trinidad and Tobago. 2009. Conservation of Wildlife Act. Chapter 67:01. Available on the Internet at: [http://rgd.legalaffairs.gov.tt/laws2/alphabetical\\_list/lawspdfs/67.01.pdf](http://rgd.legalaffairs.gov.tt/laws2/alphabetical_list/lawspdfs/67.01.pdf).

Government of the Republic of Trinidad and Tobago. 2009. Forests Act. Chapter 66:01. Available on the Internet at: [http://rgd.legalaffairs.gov.tt/laws2/alphabetical\\_list/lawspdfs/66.01.pdf](http://rgd.legalaffairs.gov.tt/laws2/alphabetical_list/lawspdfs/66.01.pdf).



Government of the Republic of Trinidad and Tobago. 2010. Fourth National Report of Trinidad and Tobago to the Convention on Biological Diversity. Available on the Internet at: <http://www.cbd.int/doc/world/tt/tt-nr-04-en.pdf>.

Government of the Republic of Trinidad and Tobago. 2011. National Forest Policy. Available on the Internet at: [http://www.biodiversity.gov.tt/home/images/stories/pdf/forest\\_policy.pdf](http://www.biodiversity.gov.tt/home/images/stories/pdf/forest_policy.pdf).

Government of the Republic of Trinidad and Tobago. 2011. National Protected Areas Policy. Available on the Internet at: [http://www.biodiversity.gov.tt/home/images/stories/pdf/final\\_protected\\_areas\\_policy\\_2011.pdf](http://www.biodiversity.gov.tt/home/images/stories/pdf/final_protected_areas_policy_2011.pdf).

Government of the Republic of Trinidad and Tobago. 2012a. Trinidad and Tobago Biodiversity. Available on the Internet at: [http://www.biodiversity.gov.tt/home/index.php?option=com\\_content&view=article&id=91&Itemid=127](http://www.biodiversity.gov.tt/home/index.php?option=com_content&view=article&id=91&Itemid=127).

Government of the Republic of Trinidad and Tobago. 2012b. Environmentally Sensitive Species (ESS). Available on the Internet at: <http://www.biodiversity.gov.tt/home/protected-areas-and-species/environmentally-sensitive-species-ess.html>.

Government of the Republic of Trinidad and Tobago. 2012c. Ramsar Sites. Available on the Internet at: <http://www.biodiversity.gov.tt/home/protected-areas-and-species/ramsar-sites.html>

Government of the Republic of Trinidad and Tobago. 2013. Draft National Wildlife Policy. Available on the Internet at: <http://www.biodiversity.gov.tt/home/images/stories/pdf/dnwp.pdf>.

GreenT&T.org. Undated. Environmental Laws and Policies in T&T. Available on the Internet at: <http://greentnt.org/ELP>. Accessed 7/24/13.

James, C., Nathai-Gyan, N., and G. Hislop. Undated. Trinidad and Tobago. Available on the Internet at: [http://ramsar.wetlands.org/Portals/15/Trinidad\\_and\\_Tobago.pdf](http://ramsar.wetlands.org/Portals/15/Trinidad_and_Tobago.pdf)

Kahn, Kevin. 2012. Coastal Erosion Mitigation Around Trinidad and Tobago. Presented at the Institute of Marine Affairs 12<sup>th</sup> Research Symposium, Managing Coastal Resources, September 26-27, 2012. Port of Spain, Trinidad. Available on the Internet at: [http://www.ima.gov.tt/home/images/pdf/p5\\_kevin\\_khan.pdf](http://www.ima.gov.tt/home/images/pdf/p5_kevin_khan.pdf)

Laydoo, R.S., Bonari, K., and G. Alleng. Undated. Buccoo Reef and Bon Accord Lagoon, Tobago, Republic of Trinidad and Tobago. Available on the Internet at: <http://www.unesco.org/csi/pub/papers/laydoo.htm>

Pantin, D., and J. Ram. 2010. Facilitating Financing for Sustainable Forest Management in Small Islands Developing States and Low Forest Cover Countries. United Nations Forum on Forests. Available on the Internet at: <http://www.un.org/esa/forests/pdf/ahég/ahég1/Mali%20ENG.pdf>.

Personal communication. 2013. Tobago Focus Group: Department of Natural Resources and the Environment. June 5, 2013 in Tobago,

Phillip, Dawn A. 1998. Biodiversity of freshwater fishes of Trinidad and Tobago, West Indies. Thesis, University of St Andrews, Scotland. Available on the Internet at: <http://research-repository.st-andrews.ac.uk/handle/10023/2832>.

Protected Planet. 2013. Trinidad and Tobago Protected Areas. Available on the Internet at:

[http://www.protectedplanet.net/search?country\\_id=222&marine=1&page=1](http://www.protectedplanet.net/search?country_id=222&marine=1&page=1).

Shim, David. (2004). Review of National Policies, Plans, and Reports: National Capacity Self Assessment (NCAS) Trinidad and Tobago. The Trust for Sustainable Livelihoods.

USAID. 2013. Rapid Climate Change Vulnerability Assessment: Trinidad and Tobago.

# ANNEX A: GOVERNMENT AND NON-GOVERNMENT INSTITUTIONS<sup>3</sup>

## STAKEHOLDER AGENCIES

### **Environmental Management Authority (EMA)**

The Environmental Management Authority (EMA) is a statutory body aimed at ensuring the protection, conservation and enhancement of the environment of Trinidad and Tobago. The EMA is the National Executing Agency (NEA) for the Biosafety Framework Project and the Focal Point for the Biosafety Clearing House (BCH).

[www.ema.co.tt](http://www.ema.co.tt)

### **The Ministry of Planning, Housing and the Environment (MPHE)**

The MPHE is the Focal Point for the CBD and for the Cartagena Protocol on Biosafety.

[www.phe.gov.tt](http://www.phe.gov.tt)

### **Ministry of Agriculture Lands and Marine Resources (MALMR)**

The Ministry of Agriculture, Land and Marine Resources is responsible for the sustainable development of agriculture, fisheries and food production in Trinidad and Tobago through a range of agricultural services consistent with state policy and the expectation of all stakeholders and the use of modern technology. The MALMR is also responsible for monitoring plant and animal health issues.

[www.agriculture.gov.tt](http://www.agriculture.gov.tt)

### **The University of the West Indies (UWI)**

UWI has been conducting biotech research and has biotechnology laboratory facilities. Biotech expertise at the University is vital to the country's biotech advances.

[sta.uwi.edu](http://sta.uwi.edu)

### **Food and Drugs Division (FDD)**

The Division is the body responsible for the administration of the Food and Drugs Act and Regulations and the Pesticides and Toxic Chemicals Act and Regulations. The role of the Food and Drugs Division is to:

- Ensure safe quality of an equitable standard for use by consumers of food, drugs, cosmetics and medical services;
- Ensure safety in use, the proper management and acceptable standards for pesticides and toxic chemicals;
- Provide technological and laboratory services in the areas of food, drug, cosmetics, medical devices, pesticides and toxic chemicals.

[www.health.gov.tt](http://www.health.gov.tt)

### **Customs and Excise Division**

The Customs and Excise Division of the Ministry of Finance is responsible for approving all imports to and exports from Trinidad and Tobago.

[www.customs.gov.tt](http://www.customs.gov.tt)

### **Tobago House of Assembly (THA)**

The THA's Department of Natural Resources and the Environment has a mission to protect, preserve and enhance Tobago's environment and promote the sustainable use and management of air, land, and water for

---

<sup>3</sup> CBD's Biosafety Clearing-House site on Stakeholder Agencies, undated.

the benefit of current and future generations.

[www.tha.gov.tt/agriculture.html](http://www.tha.gov.tt/agriculture.html)

### **The Consumer Affairs Division**

CAD is a consumer protection agency with responsibility for providing advice and information to consumers. CAD is also responsible for the enforcement of a wide range of consumer protection laws, providing the consumer with certain protections regarding the quality of goods and services.

[www.consumer.gov.tt](http://www.consumer.gov.tt)

### **Ministry of Trade and Industry**

The Ministry's responsibility is the promotion and development of trade activities, with an emphasis on generating sustainable export-led growth and development, by securing enhanced access to foreign markets for local companies.

[www.tradeind.gov.tt](http://www.tradeind.gov.tt)

### **Caribbean Agricultural and Development Institute (CARDI)**

A major responsibility for carrying out of an effective Technology and Information System within the region is CARDI's responsibility as the sole regional R & D institution amongst CARICOM member countries.

[www.cardi.org](http://www.cardi.org)

### **CABI**

CABI improves people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment.

[www.cabi-bioscience.org](http://www.cabi-bioscience.org)

### **Ministry of Foreign Affairs**

Trinidad and Tobago's foreign policy seeks to maintain, develop or enhance relations with strategic countries at the bilateral, regional and multilateral levels and to participate actively in the multilateral arena (the United Nations, its Specialised Agencies; the Non-aligned Movement; the Group of 77; the Commonwealth; the Organization of American States; the African, Pacific and Caribbean Group of states (ACP); World Trade Organization (WTO), etc).

[www.foreign.gov.tt](http://www.foreign.gov.tt)

### **Ministry of Legal Affairs**

The premier public service organization dedicated to the delivery of comprehensive Legal, Consumer, Intellectual property and Registration services to members of the public in an enabling environment, thereby facilitating social and economic development.

[www.legalaffairs.gov.tt](http://www.legalaffairs.gov.tt)

## **NON-GOVERNMENT ORGANIZATIONS**

The 2010 Fourth National Report identified the more prominent NGOs operating in Trinidad and Tobago, including:

- Fondes Amandes Community Reforestation Project The Toco Foundation
- Stakeholders Against Destruction (SAD) Environment Tobago
- Foundation for the Enhancement and Enrichment of Life Protectors of the Environment
- Grande Riviere Environmental Awareness Trust Nature Seekers
- Council of Presidents of the Environment The Tropical Re-Leaf Foundation Cropper Foundation
- Caribbean Forest Conservation Association Pointe a Pierre Wild Fowl Trust

- Asa Wright Nature Centre Field Naturalist Club
- Caribbean Network for Integrated Rural Development (CNIRD) Caribbean Natural Resources Institute (CANARI) The Trust of Sustainable Livelihoods Agricultural Society of Trinidad and Tobago
- Trinidad and Tobago Organic Agriculture Movement Trinidad and Tobago Orchid Society
- Trinidad and Tobago Zoological Society Hunters Associations
- Sawmills Association
- Various Church, Community and Village Councils

## ANNEX B: THREATENED SPECIES OF TRINIDAD AND TOBAGO

### TABLE B1. RED LIST FOR TRINIDAD AND TOBAGO

KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Acropora cervicornis</i>	Staghorn Coral	CR	2008	stable
Animalia	<i>Acropora palmate</i>	Elkhorn Coral	CR	2008	stable
Animalia	<i>Agamia agami</i>	Agami Heron	VU	2012	unknown
Animalia	<i>Agaricia lamarcki</i>	Lamarck's Sheet Coral	VU	2008	decreasing
Animalia	<i>Balistes vetula</i>	Old Wife, Ol'wife, Queen Triggerfish, Triggerfish, Turbot	VU	1996	
Animalia	<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark, Whitetip Oceanic Shark, White-tipped Shark, Whitetip Shark	VU	2006	decreasing
Animalia	<i>Carcharhinus plumbeus</i>	Sandbar Shark	VU	2009	decreasing
Animalia	<i>Carduelis cucullata</i>	Red Siskin	EN	2012	decreasing
Animalia	<i>Chelonia mydas</i>	Green Turtle	EN	2004	decreasing
Animalia	<i>Chelonoidis denticulate</i>	Brazilian Giant Tortoise, Forest Tortoise, South American Tortoise, South American Yellow-footed Tortoise, Yellow-footed Tortoise	VU	1996	
Animalia	<i>Dendrogyra cylindrus</i>	Pillar Coral	VU	2008	stable
Animalia	<i>Dermochelys coriacea</i>	Coffin-back, Leatherback, Leathery Turtle, Luth, Trunkback Turtle, Trunk turtle	CR	2000	decreasing
Animalia	<i>Dichocoenia stokesii</i>	Elliptical Star Coral	VU	2008	decreasing
Animalia	<i>Diplobatis guamachensis</i>	Brownband Numbfish	VU	2006	unknown
Animalia	<i>Epinephelus itajara</i>	Atlantic Goliath Grouper, Goliath Grouper, Jewfish	CR	2011	unknown
Animalia	<i>Epinephelus striatus</i>	Nassau Grouper	EN	2003	decreasing
Animalia	<i>Eretmochelys imbricate</i>	Hawksbill Turtle	CR	2008	decreasing
Animalia	<i>Flectonotus fitzgeraldi</i>		EN	2004	decreasing
Animalia	<i>Hyalinobatrachium orientale</i>	Eastern Glass Frog	VU	2004	decreasing
Animalia	<i>Hyporthodus</i>	Grouper, Poey's Grouper, White	VU	2008	decreasing

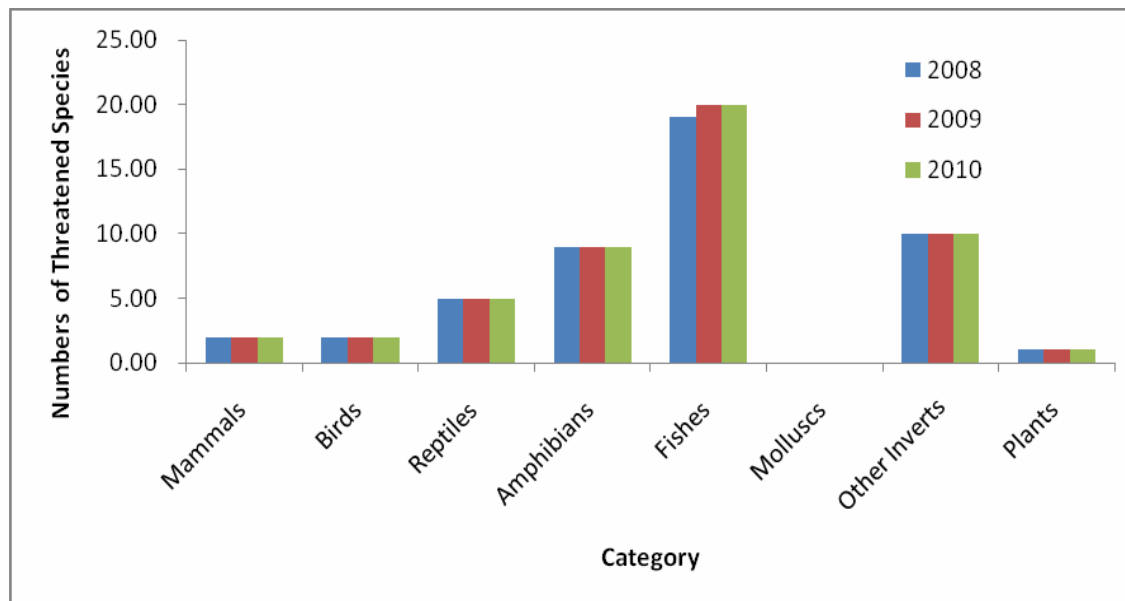
KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
	<i>flavolimbatus</i>	Grouper, Yellowedge Grouper, Yellowfinned Grouper			
Animalia	<i>Hyporthodus niveatus</i>	Seabass, Snowy Grouper, Spotted Grouper	VU	2008	decreasing
Animalia	<i>Isogomphodon oxyrinchus</i>	Daggernose Shark	CR	2006	decreasing
Animalia	<i>Isurus oxyrinchus</i>	Shortfin Mako	VU	2009	decreasing
Animalia	<i>Kajikia albida</i>	Marlin, Skilligalee, White Marlin	VU	2011	decreasing
Animalia	<i>Lachnolaimus maximus</i>	Hogfish	VU	2010	decreasing
Animalia	<i>Lepidochelys olivacea</i>	Olive Ridley, Pacific Ridley	VU	2008	decreasing
Animalia	<i>Leptodactylus nesiotus</i>		VU	2004	stable
Animalia	<i>Lutjanus analis</i>	Mutton Snapper	VU	1996	
Animalia	<i>Lutjanus cyanopterus</i>	Canteen Snapper, Cuban Snapper, Cubera Snapper, Gray Snapper, Guasinuco	VU	1996	
Animalia	<i>Makaira nigricans</i>	Blue Marlin	VU	2011	decreasing
Animalia	<i>Mannophryne olmonae</i>	Bloody Bay Poison Frog, Bloody Bay Stream Frog, Tobago Stream Frog	VU	2013	stable
Animalia	<i>Mannophryne trinitatis</i>	Yellow-throated Frog	VU	2010	decreasing
Animalia	<i>Manta birostris</i>	Chevron Manta Ray, Giant Manta Ray, Oceanic Manta Ray, Pacific Manta Ray, Pelagic Manta Ray	VU	2011	decreasing
Animalia	<i>Megalops atlanticus</i>	Tarpon	VU	2012	decreasing
Animalia	<i>Montastraea annularis</i>	Boulder Star Coral	EN	2008	decreasing
Animalia	<i>Montastraea faveolata</i>		EN	2008	decreasing
Animalia	<i>Montastraea franksi</i>		VU	2008	decreasing
Animalia	<i>Mycetophyllia ferox</i>	Rough Cactus Coral	VU	2008	unknown
Animalia	<i>Mycteroperca interstitialis</i>	Crossband Rockfish, Grey Mongoose, Hamlet, Harlequin Rockfish, Princess Rockfish, Rockfish, Salmon Grouper, Salmon Rock Fish, Scamp, Yellowmouth Grouper	VU	2008	decreasing
Animalia	<i>Oculina varicosa</i>	Large Ivory Coral	VU	2008	unknown



KINGDOM	SCIENTIFIC NAME	COMMON NAMES	RED LIST STATUS	YEAR ASSESSED	POPULATION TREND
Animalia	<i>Pagrus pagrus</i>	Common Seabream, Common Sea Bream, Couch's Sea-bream, Couch's Sea Bream, Porgy, Red Porgy	EN	1996	
Animalia	<i>Physeter macrocephalus</i>	Cachelot, Pot Whale, Spermacet Whale, Sperm Whale	VU	2008	unknown
Animalia	<i>Phytotriades auratus</i>		CR	2004	decreasing
Animalia	<i>Pipile pipile</i>	Common Piping Guan, Trinidad Piping-guan, Trinidad Piping-Guan, Trinidad White-headed Curassow, Trinidad White-headed Piping Guan	CR	2012	decreasing
Animalia	<i>Pristimantis turpinorum</i>		VU	2004	stable
Animalia	<i>Pristimantis urichi</i>		EN	2004	decreasing
Animalia	<i>Pristis pectinata</i>	Smalltooth Sawfish, Wide Sawfish	CR	2013	decreasing
Animalia	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	2007	unknown
Animalia	<i>Sphyrna mokarran</i>	Great Hammerhead, Hammerhead Shark, Squat-headed Hammerhead Shark	EN	2007	decreasing
Animalia	<i>Sphyrna tudes</i>	Curry Shark, Golden Hammerhead, Smalleye Hammerhead Shark	VU	2006	decreasing
Animalia	<i>Thunnus obesus</i>	Bigeye Tuna	VU	2011	decreasing
Animalia	<i>Thunnus thynnus</i>	Atlantic Bluefin Tuna	EN	2011	decreasing
Animalia	<i>Touit huetii</i>	Scarlet-shouldered Parrotlet	VU	2012	stable
Animalia	<i>Trichechus manatus</i>	American Manatee, West Indian Manatee	VU	2008	decreasing
Plantae	<i>Swietenia mahagoni</i>	American Mahogany, Cuban Mahogany, Small-leaved Mahogany, West Indian Mahogany	EN	1998	

## FIGURE B1. NUMBERS AND CATEGORIES OF THREATENED SPECIES IN TRINIDAD AND TOBAGO

(2008, 2009 and 2010)



Source: IUCN 2010

## CURRENTLY LISTED ENVIRONMENTALLY SENSITIVE SPECIES OF TRINIDAD AND TOBAGO<sup>4</sup>

### *Trinidad Piping-guan (pawi)*

Pawis are forest birds that nest in trees. Little information is known about the seasonality of breeding and the location of nesting sites of the pawi. The University of the West Indies, St. Augustine has been involved with research on the pawi since 2004, as part of a Pawi Study Group.

**Population estimate:** 70 to 200

**Population trend:** Decreasing

**Range estimate:** 260 km<sup>2</sup> (breeding/resident)

**Country endemic:** Yes

**Threats:** Illegal hunting and habitat loss/destruction through timber extraction and conversion to plantation agriculture.

**Range:** These birds were once abundant throughout the Northern Range and the southern Trinity Hills, and also in lowland areas such as the Nariva Swamp and Aripo Savannas. They are now extinct in the lowland areas, and almost certainly extinct in the Trinity Hills (surveys have failed to find the species since 1994), and the western end of the Northern Range, east to the Arima-Blanchisseuse Road. The only extant population is in the eastern portion of the Northern Range, where just c.150 km<sup>2</sup> of suitable habitat remains.

<sup>4</sup> Government of Trinidad and Tobago, 2012b.

## *West Indian Manatee*

**Population estimate:** 25 to 30 (UNEP/CEP 1995). Very little information is available on the current manatee population.

**Population trend:** Decreasing

**Country endemic:** No

**Threats:** Most manatee mortalities are human-related and usually occur from collisions with watercraft. Other causes of human-related manatee mortalities include ingestion of fish hooks, litter and monofilament line; and entanglement in crab trap lines. Ultimately, however, loss of habitat is the most serious threat facing manatees today.

**Range:** Manatees inhabit warm waters of the Caribbean from Florida to Brazil where they live in coastal waters, freshwater inlets, and river mouths. During summer, these large mammals have even been found as far north as Rhode Island. Although their range is quite large, manatees today exist only in a few small, isolated populations. They once were widespread in rivers and along coasts in their range, but they were hunted extensively in the 18th and 19th centuries. Coastal development has further reduced their populations.

The destruction of the swampland habitat for development and agricultural uses has annihilated local populations. Now, less than a hundred manatees live in the Nariva Swamp, a protected area.

**Current measures being taken:** Much of the present range is within forest reserves and state forests, but the laws protecting both species and areas are generally not enforced. The Matura National Park is protecting a large area since 2006 when the necessary legislation was passed. Species-specific ecotourism is having a positive effect in the northern area of Grande Riviere, providing financial support for local communities and developing a sense of collective responsibility.

**Proposed measures:** There are plans to use radio-telemetry to learn more about the manatee's biology. There are also plans to survey areas of historic occurrence to determine its status in these areas as well as monitor the population in areas of known occupancy. Ecological requirements and breeding biology are also to be determined. The protection of current forest reserves are to be more stringently enforced. Further education/public awareness campaigns are also to be developed in order to ensure the success of site protection.

## *White-tailed saber wing hummingbird*

**Population estimate:** 500 to 1,000

**Population trend:** Decreasing

**Country endemic:** No

**Threats:** Loss of habitat from deforestation, death by natural disasters, e.g. hurricanes. The EMA funded a research project on the saber wing in Tobago; additional support has been received from the Tobago House of Assembly and UWI, St. Augustine. Other current research on the saber wing uses mist netting, trail surveys and behavioral observations to continue study of this vulnerable species, which was declared one of the first three ESSs by the EMA in 2005.

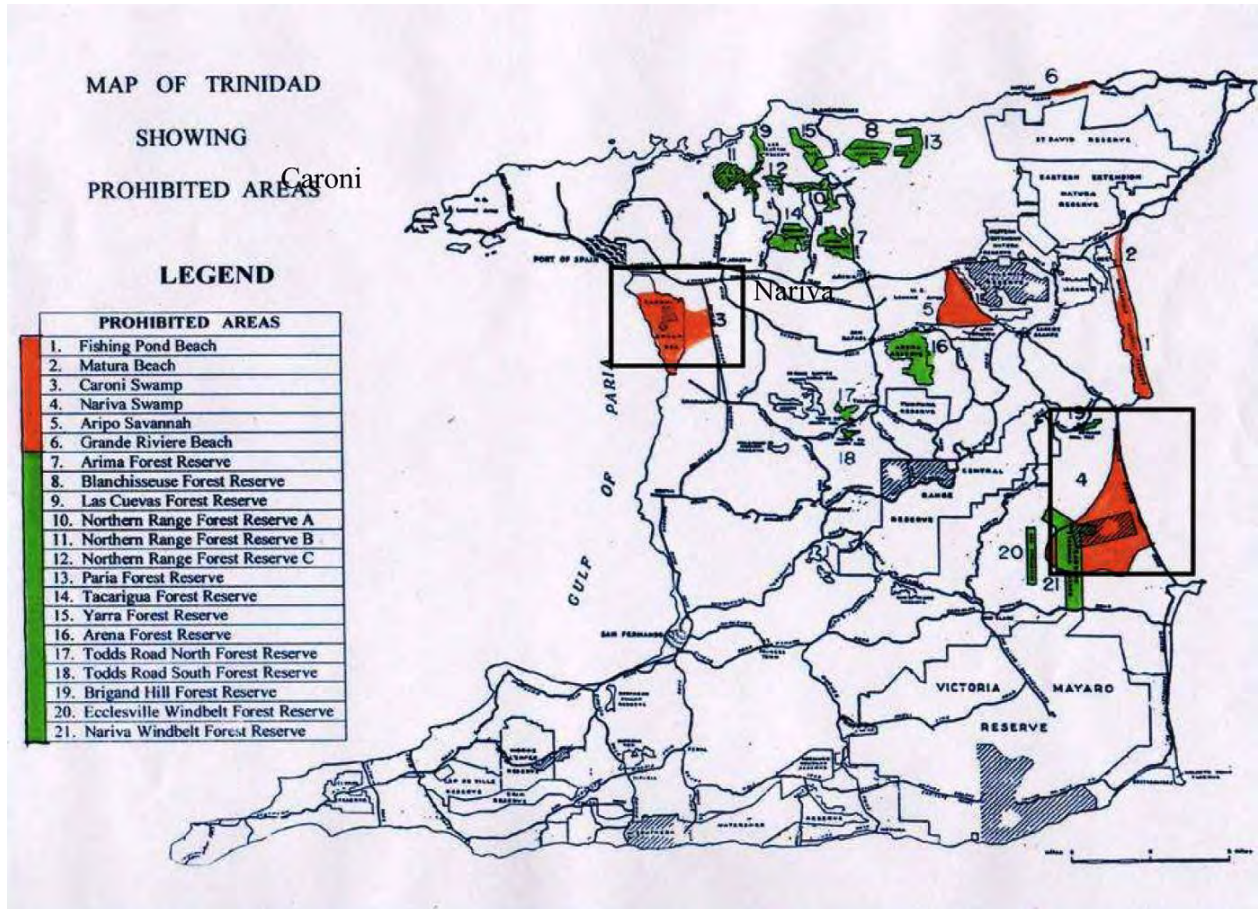
**Range:** This bird inhabits mature montane forest, edges of clearings, shade coffee and abandoned plantations and regenerating forest less than 15 m tall in the Cordillera de Caripe (at 760 - 1,830m) and Paria peninsula (at 400 - 1,200m) in northeast Venezuela, and the Main Ridge down to 100m on Tobago.

The Tobago population was thought to be extinct after hurricane Flora hit the Island in 1963 when almost all the island's forest was destroyed. The species was then rediscovered in 1974, although it remains absent from the southwest (Hillsborough Reservoir) and north-east (Pigeon Peak) portions of its former range. The Venezuela population is also under threat by widespread deforestation.

Saber wings in Tobago were found in mature montane forest at elevations above 280 m, in open areas such as the edges of clearings, in patches of forest in abandoned plantations, and in regenerating forest less than 15 m tall, suggesting plasticity in ecological requirements.

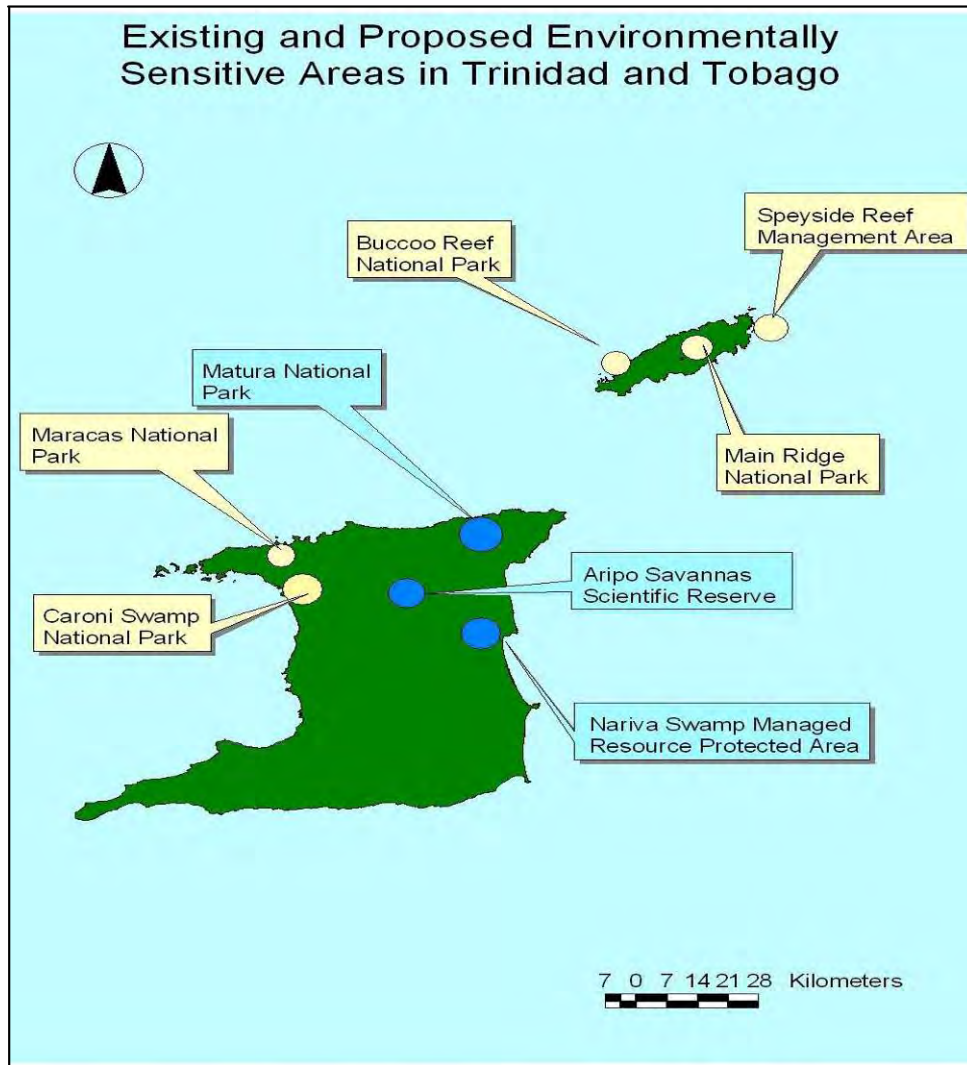
# ANNEX C: MAPS

## FIGURE C1. MAP OF TRINIDAD PROHIBITED AREAS



Source: Gibbes, C., Southworth, J., and Keys, E. 2009. Wetland conservation: Change and fragmentation in Trinidad’s protected areas. *Geoforum* 40 (2009) 91–104.

FIGURE C2. EXISTING AND PROPOSED ENVIRONMENTALLY SENSITIVE AREAS IN TRINIDAD AND TOBAGO



Source: EMA (2008) in the 2010 Fourth National Report (Government of Trinidad and Tobago, 2010)  
Parks in white boxes are proposed ESAs; parks in blue boxes are declared ESAs.



## ANNEX D: LIST OF CONTACTS

### TABLE D1. TRINIDAD CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Mario Fortune	Chief Technical Officer	Min. of Food Production	<a href="mailto:mfortune@fplma.gov.tt">mfortune@fplma.gov.tt</a>	(868) 628-1293	IM
Darshanjit Narang	Biodiversity Officer III	Biodiversity Unit, Environmental Management Authority	<a href="mailto:dnarang@ema.co.tt">dnarang@ema.co.tt</a>		IM
Julius Smith	Environmental Biologist	EPPD, Min.of Environment and Water Resources	<a href="mailto:julius.smith@gov.tt">julius.smith@gov.tt</a>	(868) 623 3158 extn 216	FG
Floyd Homer	Biodiversity Specialist	EPPD, Min.of Environment and Water Resources	<a href="mailto:floyd.homer@gov.tt">floyd.homer@gov.tt</a>	(868) 623 3158 extn 216	FG
Jewel Batchasingh	Climate Change Specialist	EPPD, Min.of Environment and Water Resources	<a href="mailto:jewel.batchasingh@gov.tt">jewel.batchasingh@gov.tt</a>	(868) 623 3158 extn 216	FG
David Persaud	Environmental Manager	EPPD, Min.of Environment and Water Resources	<a href="mailto:david.persaud@gov.tt">david.persaud@gov.tt</a>	(868) 623 3158 extn 213	FG
Harnarine Lalla	Fisheries Officer	Fisheries Division	<a href="mailto:h.lalla@hotmail.com">h.lalla@hotmail.com</a>	(868) 623-6028	FG
Vieanna Tirbanie	Aquaculture Assistant	Fisheries Division	<a href="mailto:v.tirbanie@gmail.com">v.tirbanie@gmail.com</a>	(868) 623-6028	FG
Recardo Mieux	Fisheries Officer	Fisheries Division	<a href="mailto:rmieux@gov.tt">rmieux@gov.tt</a>	(868) 623-6028	FG
Christine Chan Ashing	Director	Fisheries Division	<a href="mailto:chanashing@gov.tt">chanashing@gov.tt</a>	(868) 623-5989	FG
Donna-May Sakura-Lemessy	Deputy Director - Research	Institute of Marine Affairs	<a href="mailto:dslemessy@ima.gov.tt">dslemessy@ima.gov.tt</a>		FG
Junior Darsan	Principal Research Officer - Oceanography and Coastal Processes	Institute of Marine Affairs	<a href="mailto:jdarsan@ima.gov.tt">jdarsan@ima.gov.tt</a>	(868) 726-9171	FG



NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Rahanna Juman	Principal Research Officer - Biodiversity and Ecology	Institute of Marine Affairs	<a href="mailto:rajuman@ima.gov.tt">rajuman@ima.gov.tt</a>	(868) 634-4291-4	FG
Sharda Surujdeo-Maharaj	Consultant	Water Resources Agency of the Water and Sewerage Authority	<a href="mailto:smaharaj@wasa.gov.tt">smaharaj@wasa.gov.tt</a>		IM
Richard Laydoo	Programme Coordinator	Green Fund Executing Unit	<a href="mailto:richard.laydoo@gov.tt">richard.laydoo@gov.tt</a>	(868) 625-2660	IM
Johnny Seepersad	Director	Forestry Division	<a href="mailto:johnnyseepersad29@gmail.com">johnnyseepersad29@gmail.com</a>	+ 868 622 4860	IM

IM-Individual Meeting

FG-Focus Meeting

## TABLE D2. TOBAGO CONTACTS

NAME	POSITION	ORGANIZATION	EMAIL	PHONE NUMBER	FORUM*
Linford Beckles	Director	Dept. of Natural Resources and Environment (DNRE)	<a href="mailto:linfordbeckles@yahoo.com">linfordbeckles@yahoo.com</a>	(868) 735-4300	FG
Sehoyn Davis	Forester	DNRE	<a href="mailto:sd96630@gmail.com">sd96630@gmail.com</a>	(868) 348-3104	FG
Darren Henry	Forester	DNRE	<a href="mailto:darren_tours@yahoo.com">darren_tours@yahoo.com</a>	(868) 767-9298	FG
William Trim	Acting Conservator of Forests	Watershed Management Unit, DNRE	<a href="mailto:trim20031@gmail.com">trim20031@gmail.com</a>	(868) 660-2079 or 326-4364	FG
Patricia Turpin	President	Environment Tobago	<a href="mailto:pturpin@tstt.net.tt">pturpin@tstt.net.tt</a>	(868) 299-9355	FG
Juliana Antoine	Manager	Environment Tobago	<a href="mailto:juliana.antoine@environmenttobago.net">juliana.antoine@environmenttobago.net</a>	(868) 660-7462	FG
Alex Browne	Information Officer	Tobago Emergency Management Agency	<a href="mailto:nematobago@gmail.com">nematobago@gmail.com</a>		IM

IM-Individual Meeting

FG-Focus Meeting