

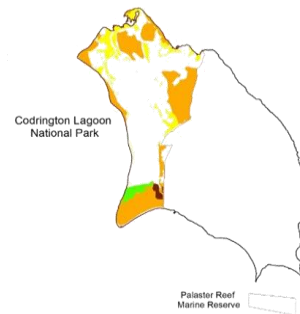
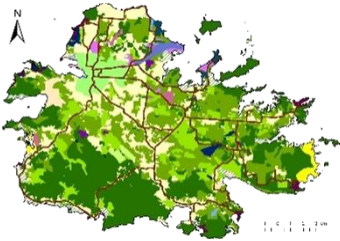
"Living in Harmony with Nature"



ANTIGUA AND BARBUDA
FIFTH NATIONAL REPORT
TO THE CONVENTION ON BIODIVERSITY



Fifth National Report to the Convention on Biodiversity



Government of Antigua and Barbuda



Report Prepared By: Environment Division



Antigua and Barbuda Fifth National Report

EXECUTIVE SUMMARY

The Environment Division, as the CBD Focal Point, guided the development of this fifth national report as in the case of the fourth national report. This report highlights the advances made since the last report through a review and analysis of available data. The report also charts the country's progress in meeting its biodiversity management obligations as outlined by the CBD. Both capacity and legislative frameworks have greatly improved since the last report however, consistent and periodic data collection continues to present a challenge.

Antigua and Barbuda's biodiversity contributes significantly to the country's economic and social development. Since the fourth national report, great strides have been made in the policy and legislative frameworks for biodiversity management to reduce pressures caused by anthropogenic activities. However, national biodiversity remains under threat given the rise in alien invasive species as well as impacts associated to climate change.

The 2001 draft Biodiversity Strategic Action Plan (BSAP) provided the framework that has enhanced national efforts towards biodiversity management. The government has initiated work in protected areas identification and their legal declaration. Efforts are now underway through a GEF funded project to demonstrate sustainable financing for protected areas management through investment in renewable energy. Additionally, the country has worked through a number of projects to develop a sustainable island resource management mechanism (SIRMM) for environmental management, including biodiversity, as well as to revise policies aimed at ensuring the protection of biodiversity. Most notably is the enactment of the Sustainable Island Resource Management Zoning Plan (SIRMZP) which serves as the National Physical Development Plan (NPDP), and the creation of an Environmental Information Management and Advisory System (EIMAS) which is a GIS based tool that enables geo-referencing of data sets used in the planning and use of land. Policymakers are now able to identify areas high in biodiversity richness as part of the development planning process.

Various legislations have been developed, as well as updated to safeguard the country's biological resources. The upcoming enactment of the Environment Protection and Management Bill (EPMB) signifies the country's progress towards environmental sustainability as well as biodiversity conservation. The draft bill covers protected areas management and establishes the framework to support ratification of the Nagoya Protocol. The draft bill is currently before the Office of the Attorney General for review and eventual presentation to the Parliament of Antigua and Barbuda. The recent update of the Fisheries Act and Regulations provides for the legislative protection of marine reserves and resources therein, including mangroves as well as increased fines for punitive damage. The Plant Protection Act now addresses elements of biosafety to preserve the country's gene bank and avoid genetic erosion.

Knowledge and awareness of biodiversity have improved significantly as well as advanced institutional capacity in its management. Given the number of public service announcements, environmental school competitions and the accessibility of information through a number of outlets including an online database, (www.gefantigua.org) and social media, an increased awareness of threats to natural resources have encouraged assistance from the public and private sector to volunteer to achieve national environmental priorities. The recent establishment of a national GEF small grants programme (SGP) highlights the growing efforts of residents to conserve biodiversity and assists in mobilizing community groups and NGOs in achieving national targets. Significant contributions have been made by NGOs, including the Antigua Conservation Society (ACS), Gilberts Agricultural Rural Development Centre (GARDC), Environmental Awareness Group (EAG) and Waitt Foundation, in data collection of



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biodiversity as well as rehabilitation efforts. Furthermore, the relocation of the offices of the Environment Division to the Botanical Gardens provided the opportunity for the Division to act as an information hub including the planned development of information kiosks established within the botanical gardens. It also includes the establishment of an afterschool center focused on environmental learning. It is envisaged that a variety of information will be provided for students, schools and the public on the environment and its related international agreements and concerns on a consistent basis through this media. These interactive media centers will feature important information from all aspects of the environment such as climate change, biodiversity, land degradation and marine resources.

Despite these advancements, there is still much work to be done, as there is still a large gap in the existing data that will require a complete understanding of the biodiversity of Antigua and Barbuda. Issues relating to periodic data collection and monitoring protocols remain outstanding, primarily due to insufficient technical capacity and finances. Furthermore, increased capacity and knowledge in taxonomy as well as maintaining a database of national biodiversity that consists of management and sustainable use plans is still lacking and will be achieved in the long term.

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List of Abbreviations

ACS	Antigua Conservation Society
APUA	Antigua Public Utilities Authority
BAA	Biomaterial Access Agreement
BSAP	Biodiversity Strategic Action Plan
CARDI	Caribbean Agricultural Research and Development Institute



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CBD	Convention on Biological Diversity
CMS	Convention on Migratory Species
DCA	Development Control Authority
EAG	Environmental Awareness Group
ED	Environment Division
EIMAS	Environmental Information Management Advisory System
FAD	Fish Aggregating Devices
FORCE	Future of Reefs in a Changing Environment
GAPs	Good Agricultural Practices
GARDC	Gilbert Agricultural and Rural Development Centre
GEF	Global Environment Facility
MoA	Ministry of Agriculture, Lands Housing and the Environment
NPDP	National Physical Development Plan
NBSAP	National Biodiversity Strategy and Action Plan
NCM	National Coordinating Mechanism
NEMMA	North East Marine Management Area
NGO	Non Governmental Organization
NP	National Park
OAS	Organization of American States
OICP	Offshore Island Conservation Program
PAs	Protected Areas
PAS	Protected Areas System
RAMSAR	The Convention on Wetlands (Ramsar, Iran)
SIDS	Small Island Developing State
SIRMM	Sustainable Island Resource Management Mechanism
SIRMZP	Sustainable Island Resource Management Zoning Plan
UNCBD	United Nations Convention on Biological Diversity
USAID	United States Agency for International Development
UWI	University of the West Indies



1 Biodiversity Status, Threats and Trends

This Chapter provides a brief overview on the state of the country’s biodiversity, observed trends as well as known threats and challenges being faced. This chapter also highlights the importance of national biodiversity and its contribution.

Figure 1: 2010 EIMAS image of ecosystem distribution in Antigua

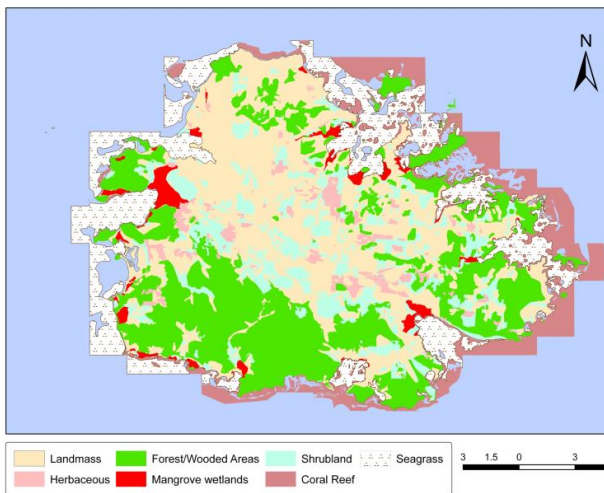
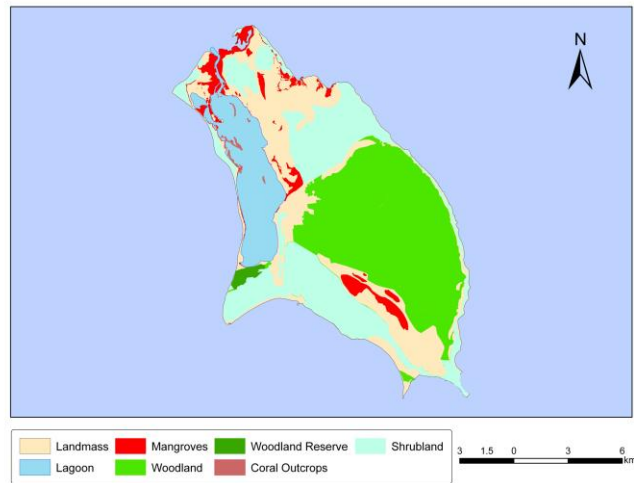


Figure 2: 2010 EIMAS image of ecosystem distribution in Barbuda



1.1 Introduction

Antigua and Barbuda is a twin island state that sits respectively on the southern and northern edges of the outer section of the Lesser Antillean Island Arc in the Caribbean Sea. There are several tiny uninhabited islands surrounding Antigua; Redonda (0.6 sq. miles or 1.6 sq km) is the largest of these. The weather of the Caribbean region strongly influences the soil conditions and to a greater extent, the characteristic vegetation while ecosystem variety is enhanced by the presence of caves in many sections of the islands, and by natural seasonal drainage channels and ponds. The twin island state is supported by ecosystems that include Mangrove, Coastal, Marine, and Forest habitats. Figures 1 and 2 highlights ecosystem distribution while Table 1 summarizes the national variety of species.

Antigua, being the main land, has three distinct geological regions namely:

- ✚ The Volcanic Region – the south and southwest section of the island where explosive eruptions formed the valleys while andesite and basalt flows shaped the hills. This is also the dominant region of biodiversity richness.
- ✚ The central plain that separates the volcanic and limestone regions and extends from the capital St. John’s in the northwest to Willoughby Bay in the southeast.



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- ✚ The Limestone Region, which includes the northern and eastern third of Antigua and many of the tiny islands off the northern coast. This region consists of different limestone types mostly derived from fine-grained particles of biogenic origin.

Barbuda is approximately 62sq. miles with a relatively uniform topography. Most of the island is about 10ft (3m) above sea level except in the highlands with maximum heights of 124ft (38m). Barbuda is unique with its coastal lagoon, extensive tidal flats, sand bars, underwater sand dunes, salt ponds, cliffs, caves, 'blue holes' and "highlands", all providing special habitats for wildlife. Some of which have developed physical, and behavioral adaptations to these habitats.

The small isolated, precipitous and rocky island of Redonda is likewise unique, however, at present, its biodiversity faces serious problems due to the activities of man. In previous years, seabirds nested abundantly on its shores; hermit crabs and lizards were also plentiful. The Burrowing owl (*Athene cunicularia amauro*) that became extinct in Antigua following the introduction of the mongoose, was still resident in Redonda. However within recent years, due to man's activities as well as through the introduction of invasive and non-native species, Redonda's biodiversity has been jeopardized.

Table 1: Species richness. Compiled from literary sources

Species Group	Count	Status
Fauna		
Amphibian	3	Tree Frog (<i>Eleutherodactylus johnstonei</i>) -native Cane Toad (<i>Bufo marinus</i>) introduced in the 1800's Cuban Tree Frog (<i>Osteopilus septentrionalis</i>) – accidentally introduced in the 1990's
Birds	182	60 Domicile/ 122 Migratory Endemic: the Broad-winged Hawk (<i>Buteo platypterus insulicola</i>); and a Barbuda endemic species Barbuda Warbler (<i>Dendroica subita</i>).
Terrestrial Mammals	17	7 Bat species European Fallow Deer (<i>Dama dama</i>) – introduced 2 Rat species – accidentally introduced and invasive Mongoose (<i>Herpestes auropunctatus</i>)– introduced in 1872 and became invasive
Marine Reptiles	26	4 Marine turtles: three endangered species of turtles which nest on the beaches, the hawksbill (<i>Eretmochelys imbricata</i>), green (<i>Chelonia mydas</i>) and leatherback (<i>Dermochelys coriacea</i>) (the loggerhead (<i>Caretta caretta</i>) is also known to traverse the waters).
Fresh Water Fish	71	
Sea water Fish	400	
Terrestrial Reptiles	23	18 indigenous and 4 introduced. The Antigua Racer Snake (<i>Alsophis antiguae</i>) critically endangered. The red footed tortoise (<i>Geochelone carbonaria</i>) – was introduced. 4 Geckos including the common woodslave (<i>Hemidactylus mabouia</i>); giant woodslave (<i>Thecadactylus rapicaudus</i>); dwarf gecko (<i>Sphaerodactylus elegantulus</i>)



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		and an unidentified <i>Spaerodactylus</i> found only on Redonda and may be a new species or subspecies ¹ Lesser Antillean Iguana (<i>Iguana delicatissima</i>) - <i>endangered</i> Anoli Lizard (<i>Anolis leachi</i>) – <i>endemic</i> Ground Lizard (<i>Ameiva griseivoldi</i>)
Flora		
Fern & Fern Allies	45	
Angiosperms (flowering Plants)	1,109	Approximately 197 species of flowering plants merit special conservation measures of which 22 are endemic to the Lesser Antilles, one of which <i>Pectis ericifolia</i> (from the sun flower family) may be endemic to Barbuda, and 73 are classified as rare.
Forests	7	Cactus scrub; Deciduous Seasonal forest; Evergreen Forests; Littoral woodland; Mangrove woodland; Semi-evergreen seasonal forest; Thorn woodland
Gymnosperms	4	

Biodiversity in Antigua and Barbuda is very important as it shapes the economic development and food security of the country. Given the quality and quantities of its coastal resources, mainly its sandy white beaches, in addition to its proximity to Europe and North America, the tourism industry became the largest economic driver. Tourism contributes to 77.8% of the GDP; of this percentage, Hotels account for 10% of this contribution². Consequently, this led to the industry becoming one of the biggest threats to biodiversity.

1.2 Agricultural Biodiversity

The Fourth National report cites national agricultural biodiversity as including cultivated crops, harvested and managed wild plants for food, domesticated animals, wild animals hunted for food, wild and farmed fish, pollinators (bees and butterflies), pests, predators, insects involved in the soil cycle, earthworms and micro-organisms (including rhizobia, fungi and disease-producing pathogens). Antigua and Barbuda's agriculture has changed drastically from a cash crop monoculture of the colonial era to one that is diverse, modern, prosperous and competitive.

Given the significant threats posed by climate change and the country's inherent vulnerabilities due to its size, location, and exposure to natural disasters, such as frequent hurricanes and droughts, the Government's overall goal in the agricultural sector is to "improve Antigua and Barbuda's food security and reduce poverty". To this end an agricultural policy was developed to guide the development of this important sector. The policy was formulated to ensure that the capability of the agricultural sector's strategic role in national development is sustained and enhanced in light of the new and emerging challenges facing agricultural. This is because global imperatives require agriculture to become

¹ Daltry J.C. 2007. An introduction to the herpetofauna of Antigua, Barbuda and Redonda, with some conservation recommendations. Fauna and Flora International

² Government of Antigua and Barbuda. 2011. Tourism Statistics



internationally competitive; unfortunately, not all areas in agriculture in Antigua and Barbuda can realistically become competitive. Thus, the policy focuses on new approaches to increase productivity and competitiveness, deepen linkages with other sectors, venture into new frontier areas as well as conserve and utilize natural resources on a sustainable basis.

Currently, the agriculture sector contributes approximately 3-4% to overall Gross Domestic Product (GDP) in Antigua and Barbuda. It is envisaged that the sector will increase its growth rate of 2.1 per cent per annum thereby increasing its contribution to the national GDP. New and emerging industries relating to agro-forestry, biotechnology and specialty natural products are expected to be a part of the envisaged growth.

Pivotal to the policy is the recommendation of the SIRMZP which requires that large tracks of land be set aside to foster the development of the island's agricultural land resources and increase productivity and livelihoods. The recently adopted SIRMZP also stipulates that all prime agricultural land (class II and III) be restricted for agricultural purposes.

1.3 Coastal and Marine Biodiversity: Critical Habitats

1.3.1 Coral Reefs

Antigua and Barbuda sits on a shallow rock-floored 'shell' covered by a variety of reefs. The edge of the 'shell' is at depths of 90 – 180 m where it drops to oceanic depths. Along the south coast of Antigua the shelf is very narrow; it drops to over 305 m within a mile (1.6 km) of the shore. The coral reefs thrive on this shelf. There are approximately 25.24 sq. km of reef coverage fringing around Antigua. On the windward east coast there is better reef development due to the high wave energy providing circulation of nutrients and flushing with absence of fine muddy sediment. However, on the leeward west coast the reefs are poorly developed because of lack of circulation and the abundance of fine sediment.

The estimated reef coverage varies from a high of 25.4519 km² to a low of 15.820 km². There are four main types of coral reefs found in Antigua and Barbuda. The first type is the barrier reef located on the Southern shore of Antigua parallel to a steep slope at the edge of the narrow shelf. The second type is the bank barrier reef that is predominant off shore Antigua and located on the North eastern and Southwestern flanks. The fringing reefs are the third type and are found protecting the eastern, northern and southern coast. Patch reefs are mainly found in Barbuda.

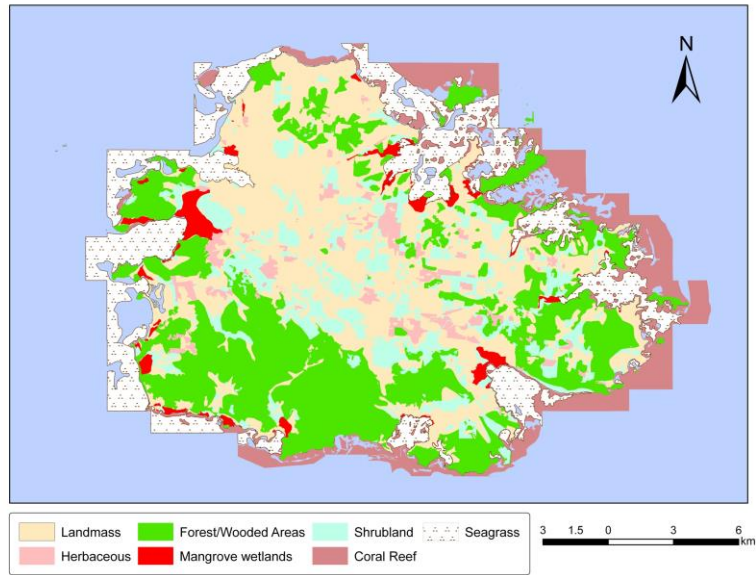


Figure 3: EIMAS image highlighting coral areas surrounding Antigua

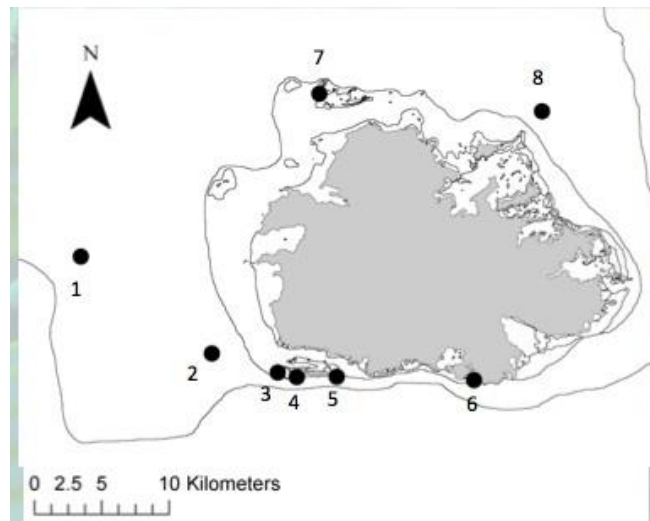


Figure 4: FORCE study sites - 1) Ariadne 2) Big & Sponge 3) Cades Reef 4) Cades Reef South 5) Big and Sponge, 6) Pillars of Hercules 7) Salt Fish Tail and 8) Three Fathoms

Assessments of Antigua’s coral reefs were conducted in 2011 by FORCE, see *figure 3 and 4 above*, for study sites. A total of eight (8) sites were assessed utilizing species diversity and coral recruitment to determine the health of corals; the presence of coral bleaching was also recorded. It was observed from the study that the dominant benthic substrate at all sites were algae (41%)³. The overall mean hard coral, soft coral, sponge and invertebrate cover was low. Furthermore a moderate number of fish variety and urchins was observed in areas with lower reef coverage.

These results have been captured below:

³ FORCE Project. 2011. Summary of Antigua ecological surveys.

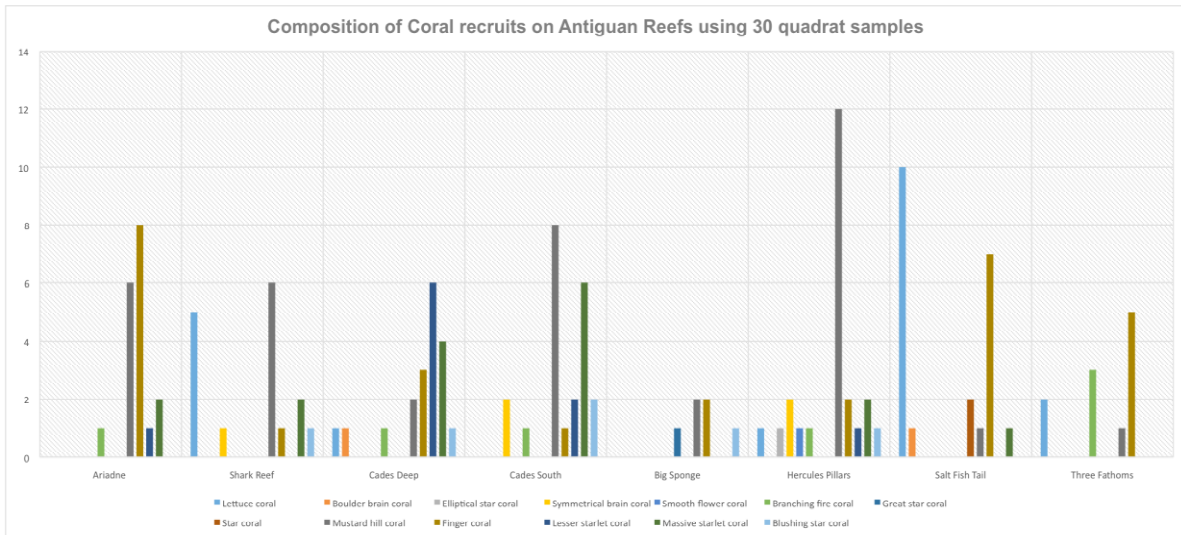


Figure 5: Composition of Coral recruits on Antigua. Derived from FORCE 2011 Report

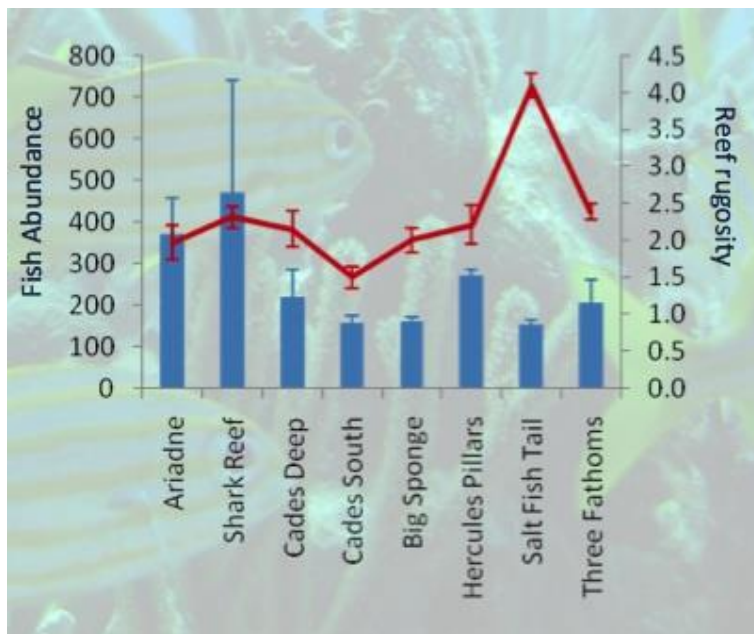


Figure 6: Antigua's variation in reef rugosity (red line) and fish abundance (blue bar)

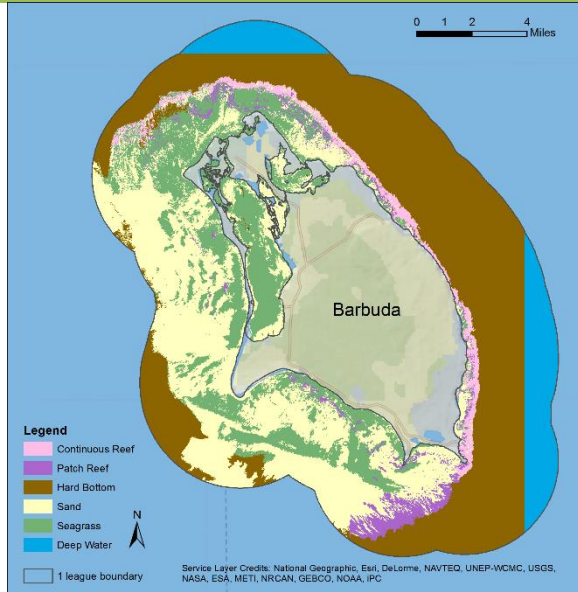


Figure 8: Habitat Map in Barbuda highlighting coral coverage and type. Courtesy Waitt Foundation

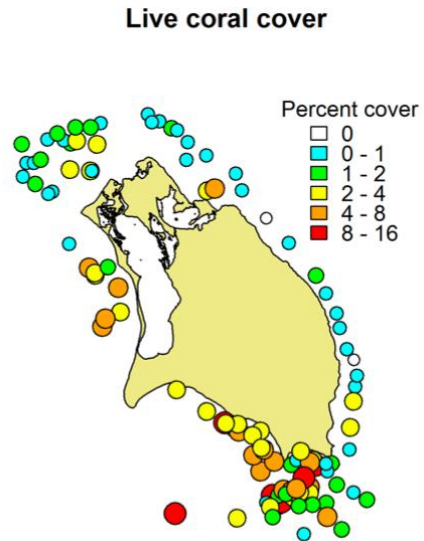


Figure 7: Coral Coverage percentage in Barbuda. Courtesy Waitt Foundation

Although the data provided does not highlight the frequency of hurricanes and storms which further contribute to the destruction of coral reefs, the following table below is indicative of the destructive pressures that the islands coral reefs have been exposed to. The frequent occurrences of extreme weather events weaken the resilience of coral reefs in addition to land base sources of pollution. However, systematic data monitoring and analysis of coral reefs would need to be conducted prior to and post such disasters.

Table 2: Incidences of Extreme Events

Name	Date	Year	Category	Type of Strike
Doria	23-Aug	1971	Tropical Depression	Hit
Christine	03 - 04 Sep	1973	Tropical Storm	Direct Hit
Carmen	29 - 30 Aug	1974	Tropical Depression	Hit
Eloise	14 - 15 Sep	1975	Tropical Depression	Brushed
Claudette	17-Jul	1979	Tropical Storm	Hit
David	29 - 30 Aug	1979	Hurricane Category4	Brushed
Frederic	3-Sep	1979	Tropical Storm	Hit
Floyd	03 - 04 Sep	1981	Tropical Depression	Direct Hit
Gert	8-Sep	1981	Tropical Storm	Hit
Arthur	01 - 03 Sep	1984	Tropical Depression	Hit
Chris	23 - 24 Aug	1988	Tropical Depression	Hit
Dean	3-Aug	1989	Hurricane Category1	Brushed
Hugo	17-Sep	1989	Hurricane Category4	Hit
Klaus	04 - 07 Oct	1990	Hurricane Category1	Direct Hit
Iris	27 - 28 Aug	1995	Tropical Storm	Direct Hit
Luis	05 - 06 Sep	1995	Hurricane Category4	Hit



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Marilyn	15-Sep	1995	Hurricane Category1	Hit
Sebastien	24-Oct	1995	Tropical Depression	Brushed
Bertha	8-Jul	1996	Hurricane Category1	Hit
Hortense	07 - 08 Sep	1996	Tropical Storm	Hit
Erika	6-Sep	1997	Hurricane Category1	Brushed
Bonnie	21-Aug	1998	Tropical Storm	Brushed
Georges	21-Sep	1998	Hurricane Category3	Direct Hit
Jose	20 - 21 Oct	1999	Hurricane Category2	Direct Hit
Lenny	18 - 20 Nov	1999	Hurricane Category3	Direct Hit
Chris	19-Aug	2000	Tropical Depression	Brushed
Debby	22-Aug	2000	Hurricane Category1	Hit
Helene	17-Sep	2000	Tropical Depression	Hit
Jeanne	13 - 14 Sep	2004	Tropical Storm	Hit
Chris	2-Aug	2006	Tropical Storm	Hit
Dean	17-Aug	2007	Hurricane Category3	none
Omar	16-Oct	2008	Hurricane Category4	none
Ana	16 - 17 Aug	2009	Tropical Depression	Hit
Erika	02 - 03 Sep	2009	Tropical Storm	Hit
Earl	29 - 30 Aug	2010	Hurricane Category2	Hit
Fiona	1-Sep	2010	Tropical Storm	Brushed
Irene	21-Aug	2011	Tropical Storm	Direct Hit
Maria	10 - 11 Sep	2011	Tropical Storm	Direct Hit
Ophelia	25 & 27 Sep	2011	Tropical Storm	Brushed
Isaac	22 -23 Aug	2012	Tropical Storm	Brushed
Rafael	13 - 14 Oct	2012	Tropical Storm	Brushed

Key

Date: Date the storm affected Antigua (Dates are in Universal Coordinated Time (UTC))

Stage: Stage of the cyclone when it affected Antigua

Direct Hit: The cyclone centre passed over land or at most 15 nautical miles from land

Hit: The cyclone centre passed between 15 and 65 nautical miles from land

Brushed: The cyclone centre passed between 65 and 105 nautical miles from land

None: The cyclone passed over 105 nautical miles from land but still caused storm conditions

The islands coral reef ecosystems are therefore in need of immediate attention with a strong focus on regeneration. Coral reefs around Antigua and Barbuda contribute to the country's fisheries and tourism sectors, as well as assist with coastal protection from storm surges and the generation of sand.

In 2010, the Fourth national report highlighted that Antigua and Barbuda's coral reefs were declining significantly as a number of manmade and natural activities were forcing their continued depletion. This is still in effect as highlighted in the IUCN's recent report, "Status and Trends of *Caribbean Coral Reefs: 1970 -2012.*" The report also highlighted a decline in reef fish variety. The findings of IUCN, captured below, coincide with that of FORCE 2011 previously highlighted. Live coral coverage is estimated to be at 3.8% based on sampled areas.

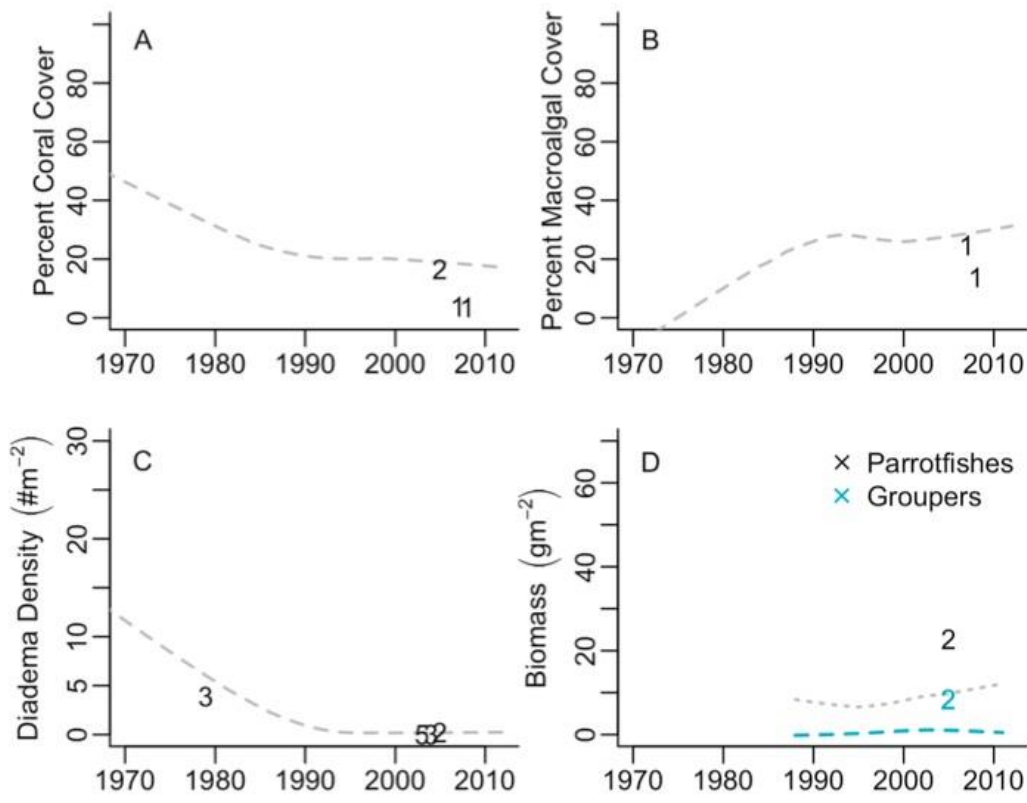


Figure 9: (A) - Average percent cover of live coral and (B) Macroalgae. (C) - Density of *Diadema anfilitarum*; (D) – biomass of parrotfishes and groupers in Antigua and Barbuda. Dotted line represents the average of Caribbean data collected for the IUCN's report. Source: Status and Trends of Caribbean Coral Reefs: 1970 -2012, Part II, pp. 161

Photo 1: Dead and dying coral reefs found in Antigua.

1.3.2 Mangroves

Chart 1 below highlights a recessive trend in Antigua's mangrove population as attempts to maintain restorative efforts are crippled by the frequent occurrences of hurricanes and major storms. Mangroves are needed to support the local fishing industry as mangroves function as nurseries, breeding grounds and habitats for both marine and terrestrial wildlife. Given the demand



for economic growth entrenched in coastal development linked to the tourism sector, mangroves were previously destroyed at an alarming rate, however with the increase in knowledge and awareness of its intrinsic values and enforcement of legislation within designated marine reserves, and EIA procedures, loss of mangroves through anthropogenic activities have been significantly reduced. Unfortunately the



loss was compounded due to the country's exposure to frequent hurricanes and storms; the island has experienced multiple extreme weather events in a single year, as in 1979, 1995, 2000 and 2011 where three or more events were experienced. *Chart 2* below demonstrates this. The frequent occurrence of extreme weather events may have affected the data collected as the regenerative capacity of mangroves would have been hindered making the population relatively stagnant despite the reduction in major coastal developments.

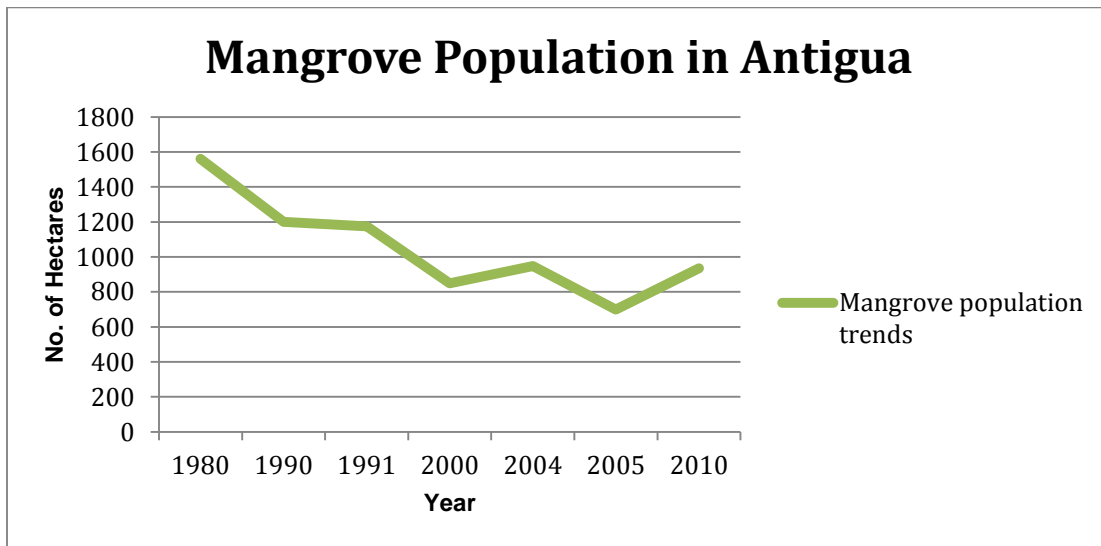


Chart 1: Mangrove population trend in Antigua based on data sourced from FAO and EIMAS

Most Reliable, Recent mangrove area estimate		Mangrove Area estimates		Mangrove area estimates		Mangrove area estimates		Mangrove Area estimates	
Ha	Year	Ha	Year	Ha	Year	Ha	Year	Ha	Year
1175	1991	1570	1980	1200	1990	850	2000	700	2005

Source: Forestry Department. Global forest resources assessment 2005: Thematic study on mangroves Antigua

Hectares	Year	Hectare	Year
946.92	2004	934.	2010

Source: Environment Division EIMAS mangrove data layer analysis.

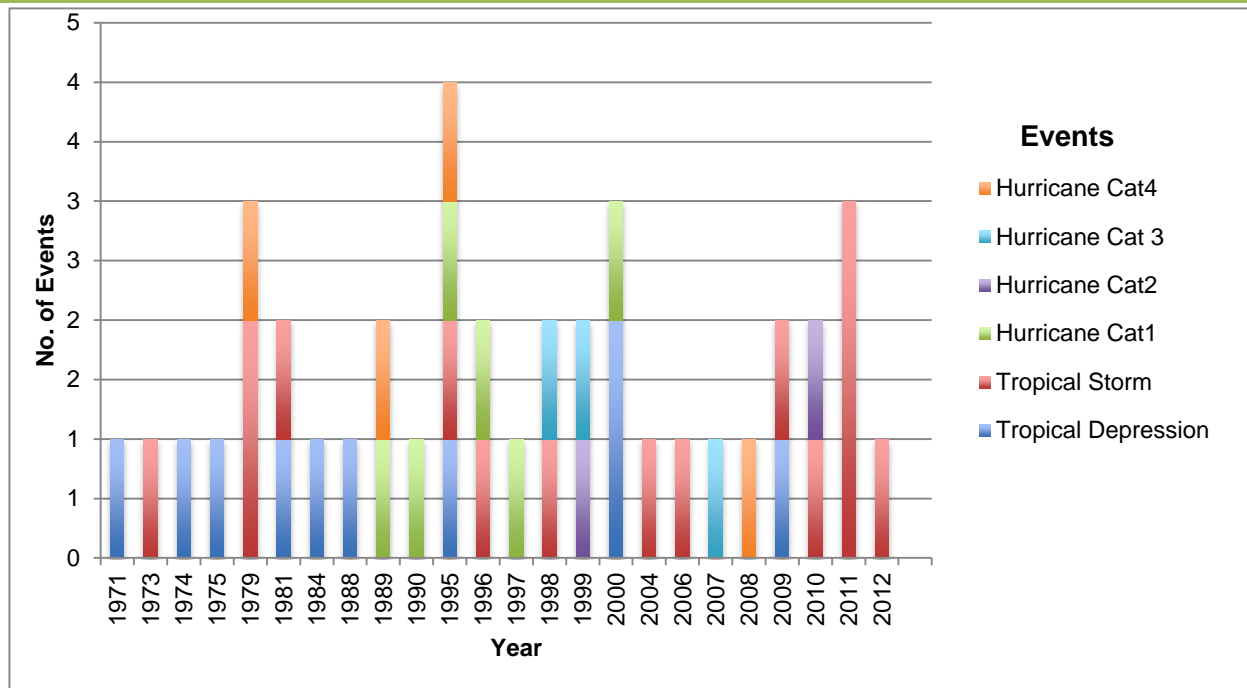


Chart 2: Frequency of extreme weather events

1.3.3 Sea grass bed

There are extensive areas of sea grass beds in shallow waters around the coasts of Antigua and Barbuda. Turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*) are common in these shallow coastal areas (less than 20 m deep). The sea grass beds have many functions one of which is to stabilize loose sand and retard coastal erosion. Additionally, the grasses are extremely important to the fishing and other marine industries as they provide shelter for the juveniles of the commercially important queen conch (*Strombus gigas*) and spiny lobster (*Panulirus argus*). Sea grasses also act as a source of food for some herbivores and provides surfaces for epiphytic plants, which are food for other species. Thirdly, calcareous algae (*Halimeda spp*) are found among sea grasses and are believed to be a major source of white sand, a precious commodity for a country that prides itself as having 365 beaches; one for each day of the year. Extensive sea grass beds can be found in Nonsuch Bay, Falmouth Harbour, and Willoughby Bay in Antigua, and in Codrington Lagoon in Barbuda.

For Antigua and Barbuda, the Coral Reefs and Sea Grass beds are already vulnerable to climate change. In fact, they are currently succumbing to bleaching and further increases in sea temperature and sea level as well as decreases in the ocean’s pH balance will likely result in the eventual complete destruction of the reefs. The predicted 3% to 11%⁴ increase in intensity of storms could lead to the rapid demise of an already stressed reef system and sea grass bed. Evidence of this is already being seen. For example, after intense storm surges from hurricanes in the region it is not uncommon for some of this sea grass to appear washed up on the seashores. Once the reefs are gone the shores will be even more open to the greatly damaging effects of the pounding waves.

⁴ <http://www.gfdl.noaa.gov/global-warming-and-hurricanes>



1.4 *Main Threats to Biodiversity*

Threats to national biodiversity have been primarily due to human activities in pursuit of economic and social development. However, in addition to human development activities, the country is facing more emerging threats mainly in the form of invasive species and climate change associated impacts. Addressing these threats have become increasingly difficult given the country's small size and human population of 86,656⁵ and inherent challenges. The biodiversity challenges faced by the country are relatively similar to that of many other SIDS. The major challenges include:

- Fragile terrestrial and marine ecosystems such as mangrove wetlands and coral reefs endangered by development projects, pollution and misuse.
- Vulnerability to external economic and natural environmental events, such as economic recessions, hurricanes, and climate change; Droughts and hurricanes have severely impacted the bird population, as well as vegetative communities and their dependent fauna.
- Lack of human resource capacity in key biodiversity areas.
- Conflicting land use pressures, especially among housing, tourism and agricultural activities.
- Land degradation due to uncontrolled grazing; and limited institutional capacity to manage the development process due to the presence of weak and fragmented land use and development control mechanisms.

Threats

- The loss of habitat primarily through the sub-division of lands for housing, tourism development, agriculture and the mining and dredging of sand.
- Fragmentation of natural communities by road-ways, and other man-made features that form barriers to the movement and dispersal of species.
- The introduction of non-native species, like the Giant African Snail, mongoose, lemon grass and Lion Fish that have a detrimental effect on native wild species by acting as predators, parasites or competitors.
- Overgrazing by livestock mainly goats, sheep, cattle and donkeys that pose a serious threat, particularly in upper watershed areas.
- Pollution as a result of excessive nutrients or sewage discharge into coastal waters, as well as the unregulated and excessive use of pesticides.

⁵ Government of Antigua and Barbuda. 2014. 2011 Population and Housing Census. Statistics Division



- Natural and anthropogenic activities that stress coral reefs (directly and indirectly including through overfishing)

The table below (3) provides an overview of the threats facing critical natural resources and ecosystems based on stakeholder consultation.

Table 3: Perceptions of Biodiversity status and trends

Ecosystem/Resources	Status	Pressures	Drivers
Beaches	Increased rates of Erosion	Integrity compromised due to demand for Tourism Developments Erosion related to reef loss Sand mining	Commercial and Residential growth Climate change impacts
Coral Reefs	Majority of Coral Reefs destroyed by frequent hurricanes and storm as well as land based sources of pollution	Demand for Tourism development Improper sewage/liquid waste disposal practices Invasive species Increased occurrences of soil erosion, runoff of fertilizers and other chemicals	Land based developments to support economic, and residential developments Climate change impacts
Fisheries	Declining near shore fisheries. Pelagics largely untouched	Habitat loss related to reef and mangrove decline. Over exploitation of near shore species Introduction and lack of regulation of FADs. Illegal fishing by foreign vessels	Economic demand Climate change impacts
Mangroves	Relatively constant after major destruction of Mangroves for tourism development; some filled in or blocked thereby hindering ecosystem functions	Demand for Tourism development, marinas and private docks Frequent occurrence of extreme weather event	Employment & Economic demands Preferred investment areas. Climate change impacts
Forests	Initial mass clearance during colonial era. Modern situation is slow decline.	Invasive Species Forest Fires	Indiscriminate land clearing for agriculture, commercial and residential developments Climate Change Impacts



1.4.1 Anthropogenic Activities

The purpose of development is to improve the quality of human life through utilization of and access to the resources provided by biodiversity. Instead, the main trend shows that growing demands and unsustainable use of resources is destroying the biodiversity of the country, ironically it is on the sustainability of these resources upon which the strength and endurance of the economy depends. For both Antigua and Barbuda, the sea turtle populations are being impacted by the destruction of critical nesting and foraging habitats through coastal construction, sand mining, pollution and over-fishing. Additionally, the regulatory mechanisms, though effectively enhanced with the enactment of the new Fisheries Act and its accompanying Regulations, are rendered less efficient as the necessary capacity to enforce these laws to protect nesting and foraging turtles and their habitats is inadequate.

In Barbuda, the sustainable use and protection of the Codrington Lagoon and its mangroves are critical to the biodiversity of Barbuda, particularly the conservation of the Frigate Bird Sanctuary and nursery areas for commercially significant species such as the spiny lobster. Yet, efforts to protect this important natural feature, until recently, were minimal at best. Today, with an increased awareness of the impact of climate change and the importance of the country's natural resources to its economic survival, renewed efforts have been undertaken to prioritize the protection of such natural resources in the country. This has had significant successes as the government, in partnership with a number of international and regional organizations, has begun the necessary steps to establish protected areas, implement a system of protected areas and develop other policies for natural resource protection and management.

Sea grass ecosystems that provide food for fish and turtles and that function as nurseries for young conch, spiny lobsters, shrimp and a variety of fish are being destroyed. Coral reef ecosystems are in very poor condition, stressed by high sedimentation, and activities like over-fishing, destruction by the anchoring of boats, improper placement of fish traps, garbage, breakage by recreational diving, and the release of partly treated sewage from coastal holiday developments directly into the sea. These impacts are exacerbated by climate change impacts including temperature rise, ocean acidification, and extreme weather events.

In general, fishing and tourism are the main activities that directly impact Antigua and Barbuda's marine biodiversity. However, sand mining still constitutes a significant threat to coastal areas and resources. Agro-diversity is being destroyed through the over-use and misuse of herbicides and pesticides, though the number of different kinds of pesticides and the amount of pesticides used are now better managed through the Pesticides Control Board. Still, one concern is the disposal of obsolete chemicals and other hazardous wastes.

1.4.2 Invasive Alien Species

Over the past 16 years, almost 20 invasive species have been known to be introduced into Antigua and/or Barbuda. Currently, Antigua and Barbuda is facing major challenges in addressing the impacts caused by the Lionfish, the Giant African Snail, the Lemon Grass, and the lethal yellowing and budrot diseases of palms. *Table 2* below outlines the most problematic invasive species presently found in both Antigua and Barbuda. The table also highlights their known habitats and the noted impacts.



Table 4: Recorded alien invasive species and impact

Species Name	Common Name	Type	Introduction	Habitat	Impact
<i>Achatina fulica</i>	Giant African Snail	Snail	Accidental through the agro-industry	Jolly Hill/ Bolans, Burma and Cooks	Very destructive for local agricultural farms. There is also the health risk of Meningitis
<i>Pterois volitans</i>	Lionfish	Fish	Accidental Introduction	Sea	Causing damage to the fishing industry as it has no natural predators here
<i>Cymbopogon spp</i>	Lemon Grass	Grass		Body Ponds and other areas in Antigua	Inhibits the natural growth of native species and is highly flammable
<i>Osteopilus septentrionalis</i>	Cuban Tree Frog	Frog	Accidental introduction		Displaces native frog species
<i>Helogate parvula</i>	The Mongoose	Small Carnivorous Mammal	Intentional Introduction for pest control in the plantation era		Attacks and eats native species. Was responsible for the near annihilation of the Antiguan Racer Snake population
Plant Hopper (<i>Myndus crudus</i>)	Lethal Yellowing	Plant Disease spread by a bacteria known as the Plant Hopper (<i>Myndus Crudus</i>)			Destruction of palms and coconut trees
<i>Rattus rattus</i>	Black Rat	Small omnivorous mammals	Ships		Carry disease. Prey on local wildlife
<i>Rattus norvegicus</i>	Brown Rat	Small omnivorous mammals	Ships		Carry disease. Prey on local wildlife



Photo 2: Invasive Lionfish



Photo 3: Giant African Snail consuming parts of a cassava plant



On Redonda, for example, the presence of rats and goats, both introduced by man has resulted in this important landmark (historically, culturally, and environmentally) being left in a severely degraded state. The once abundantly nesting Seabirds now exist in numbers significantly below the thousands that once nested there. Only a few old trees still exist and they themselves are in danger of extinction. This spells even further disaster for the seabirds and the Redonda tree lizard; they need these trees to nest and/or dwell in. Additionally, the soil has become severely overgrazed and unstable. The reptiles found on Redonda are no longer abundant. In fact, some have become extinct, and one (not yet formally described gecko) is considered critically endangered. There are no longer any hermit crabs on Redonda (EAG, 2013). To help replenish the island with its once bountiful biodiversity, the EAG has been working with other agencies on varying programs including a rat eradication program.

There have been some success stories in addressing the issue of invasive species over the last few years however, and these need special mention. Firstly, the government, through its Plant Protection Unit with assistance from the Environment Division has undertaken an eradication program aimed at removing the Giant African Snail from the four areas currently inhabited. This two-pronged program involves both the government agencies as well as the local farmers who have combined their efforts in baiting the farms near contamination sites and ensuring the physical collection of the snails on a regular basis from the farms and surrounding areas. This is a very tedious task, however the Plant Protection Unit, through the assistance of the Environment Division, and other volunteers collect the snails as part of an ongoing program to eliminate this threat, over two thousand snails were frequently collected during hunts. However, the process has been difficult to manage because of the reproduction rate of this pest and the inadequate number of volunteers to continue the removal process.



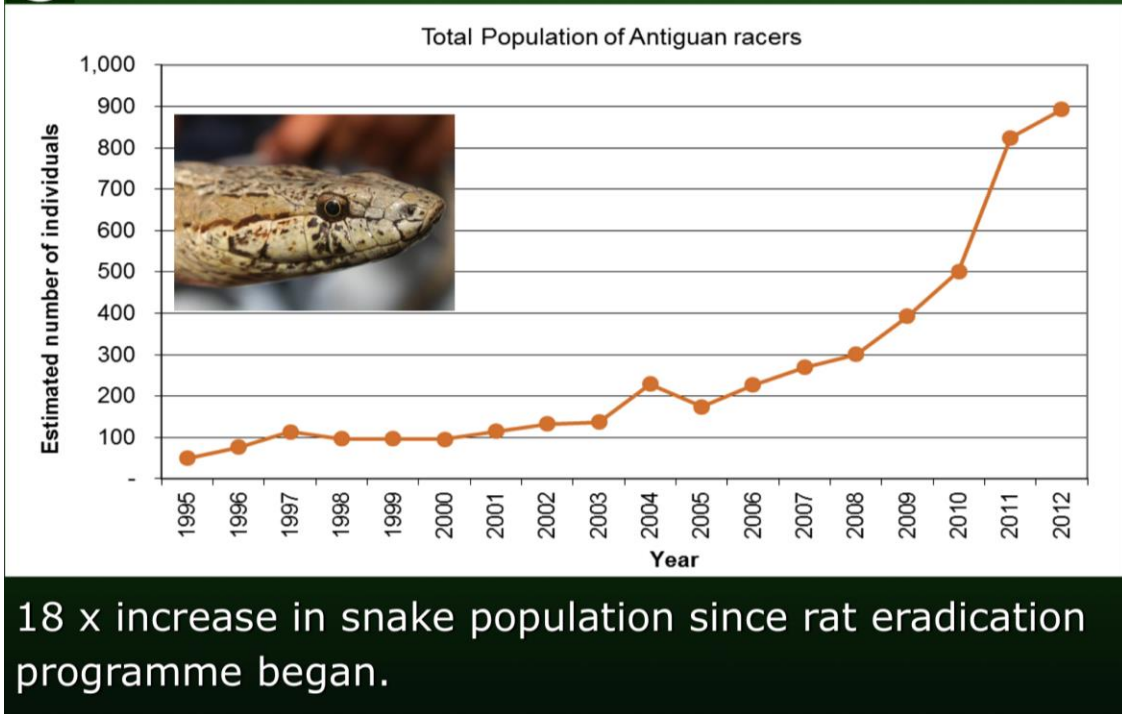
Photo 4: Bags (55gallon) of Giant African Snails during snail hunts which were part of WED activities in 2013 (photo by Delamine Andrew)

Another program aimed at reducing the impact of an invasive rat species on the biodiversity of Antigua and Barbuda which has garnered some success is the work undertaken by the Offshore Islands Conservation Program (OICP) in protecting the Antiguan Racer snake, nesting seabirds and other fauna and flora on the offshore islands of Antigua and Barbuda. Through the eradication program initiated and executed by the OICP however, there has been a resounding success in preservation of this critically endangered racer snake and various bird species as well.

	<p><u>Methods:</u></p> <ul style="list-style-type: none"> • Use commercial bait stations for rats. • Stations raised off ground to exclude crabs. • Contain Klerat™ 0.005% brodifacoum • 80 stations, checked every 5-6 weeks. 		<p>Offshore Islands Conservation Programme, Antigua</p> <p><u>Methods:</u></p> <ul style="list-style-type: none"> • Cut grid (10x10m or 20x20m) across each island (4-6 weeks). • Placed brodifacoum briquettes (Klerat™) on grid intersections (3 weeks). • 100% effective on every island.
<p>Permanent bait stations used since 2001. Designed to detect and kill invading rats.</p>		<p>Rat eradication programme began in 1995. Forestry staff and NGO volunteers eradicated rats from Great Bird Island and neighbouring islands.</p>	

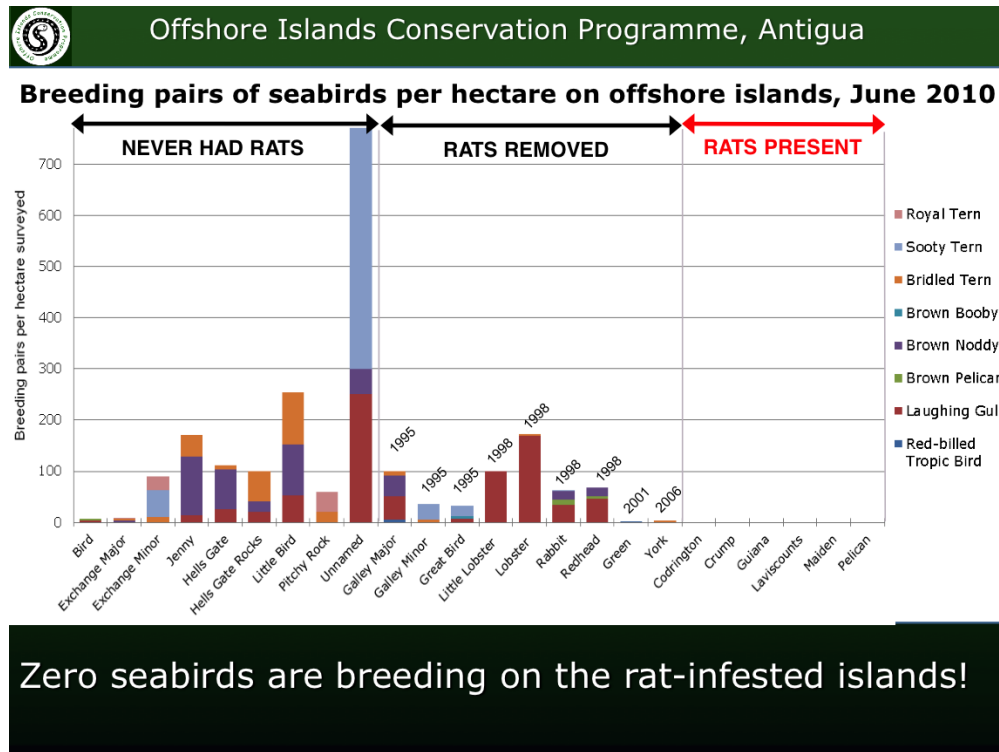
Photo 5: EAG members installing baiting stations. Source: EAG Offshore Conservation program

Since the beginning of the program there has been a noted increase in the number of bird species frequenting the offshore islands. In previous years the islands were known for their habitation of large numbers of bird species however the presence of the rats lead to their near disappearance as their eggs and young fell prey to these invasive rats. Today, not only has the bird presence improved but there is noted improvement in the vegetation, native snail population and turtle nesting activities on the islands as well.



18 x increase in snake population since rat eradication programme began.

Figure 10: Eradication Program impact on the Antiguan Racer population. Courtesy of the EAG



Zero seabirds are breeding on the rat-infested islands!

Figure 11: Eradication Program's impact on bird population of the off shore islands. Courtesy EAG.

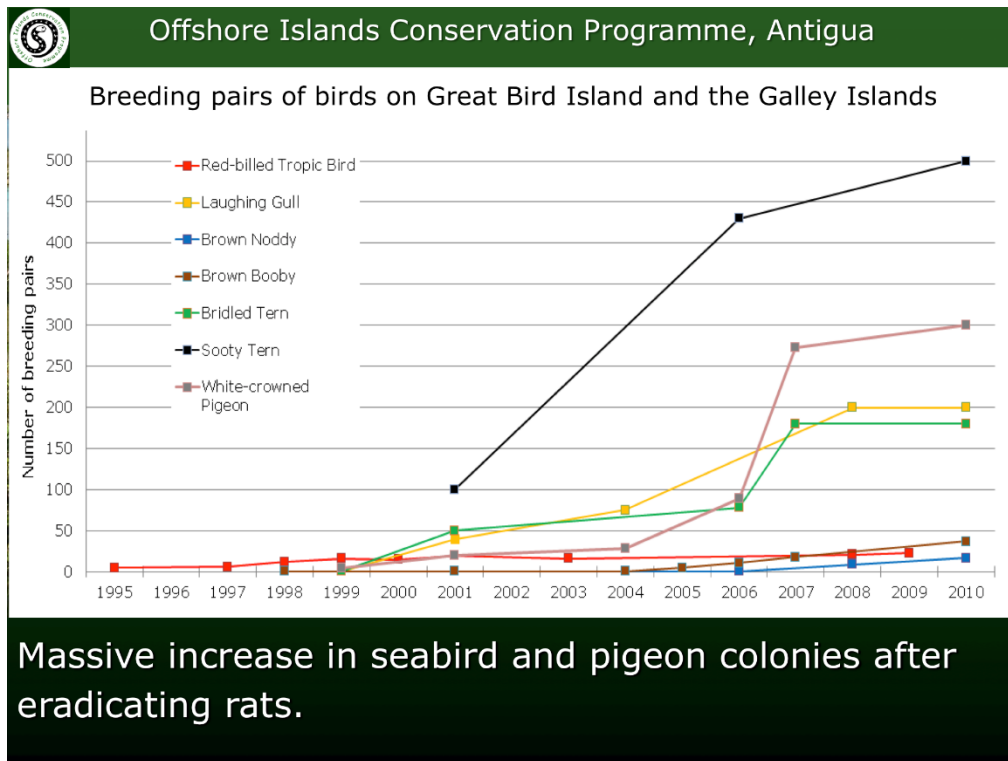


Figure 12: impact on seabird population. Courtesy EAG



Photo 6: 1995 and 2011 photos showing significant changes in vegetation biomass on islands cleared of rats.

(Photos courtesy of the OICP)



1.4.3 Climate Change

As previously captured, many of the country's biological resources are further destroyed by the occurrence of extreme weather events associated with climate change impacts. Climate modelling projections for Antigua and Barbuda have highlighted significant increases in temperature, precipitation, sea surface temperature and increased occurrences of extreme weather events.

Box 1: Climate Modelling Projections for Antigua and Barbuda. Source: Final Risk Profile: CaribSave Climate change Risk Atlas (2012)

Temperature: Regional Climate Model (RCM) projections indicate an increase in mean annual temperatures spanning 2.4 °C and 3.2°C by the 2080s, in higher emissions scenario.

Precipitation: General Circulation Model (GCM) projections of rainfall span both overall increases and decreases, ranging from of -31 to +13mm per month by 2080 under the higher emissions scenario. Most projections tend toward decreases. The RCM projections, driven by HadCM3 boundary conditions, indicate large decrease in annual rainfall (-18%) when compared to simulations based on ECHAM4 (-5%)

Sea Surface Temperature (SST): GCM projections indicate increases in SST throughout the year. Projected increases range from +0.7°C and +2.8°C by the 2080s across all three emissions scenarios.

Tropical Storms and Hurricanes: North Atlantic hurricanes and tropical storms appear to have increased in intensity over the last 30 years. Observed and projected increases in SSTs indicate potential for continuing increases in hurricane activity, and model projections indicate that this may occur through increases in intensity of events but not necessarily through increases in frequency of storms.

These projections have varying impacts on the island's ecosystems with some more severe than others. For instance, increases in temperature will not have a likely adverse impact on the islands mangroves and wetlands, however, the damage to coral reefs as a result of temperature rise will expose mangroves to greater wave action. According to McLeod and Salm (2006), sea level rise, on the other hand, will pose the greatest threat to mangroves.

Both the increases in sea level rise and extreme weather events will adversely impact beaches as the shorelines retreat inwards. The IPCC's 5th Assessment Report (AR5) highlighted that coastal systems are expected to experience adverse impacts attributed to climate change. The report further highlights submergence, coastal flooding, and coastal erosion due to sea level rise. Antigua and Barbuda, with predominant coastal systems that contribute to critical economic sectors such as tourism and fisheries, has begun to experience these adverse impacts, particularly along the western coast of the island. Additionally, coastal erosion will also impact marine turtles nesting along the beach. This also threatens the survival of these species, most of which are IUCN categorized "endangered," in addition to human stressors.

Moreover, the island's coastal areas have been projected to experience severe impacts given the innate exposure to wind, tides, wave, and current in addition to anthropogenic activities such as sand mining. This will in turn significantly affect the tourism market given the reduced "beach" amenity value from



beach erosion due to sea level rise. The estimated annual reductions in the contribution of tourism to Antigua and Barbuda’s national GDP as a result of this ranges between US \$102 million in 2050 to over US \$340 million in 2080 (based on a mid-range SLR scenario)⁶.

The table below captures the rate of erosion experienced along the western coast.

Table 5: Beach loss along four resorts. Source: Caribsave Climate Change Risk Atlas

SLR Scenario	Dickenson Bay - Sandals		Dickenson Bay - West		Runaway Bay		Fort Bay Beach	
	Beach Area Lost To SLR m ²	Beach Area Lost (%)	Beach Area Lost To SLR m ²	Beach Area Lost (%)	Beach Area Lost To SLR m ²	Beach Area Lost (%)	Beach Area Lost To SLR m ²	Beach Area Lost (%)
0.5m	2671	12%	829	11%	6317	24%	3665	18%
1.0m	5470	38%	1991	38%	6858	50%	6581	51%
2.0m	12896	98%	4021	92%	12025	95%	9564	99%
3.0m	538	100%	619	100%	1220	100%	115	100%

Changes in the temperature and precipitation have been known to affect forest ecosystems, not much research has been done on the projected impacts on terrestrial biodiversity. However, climate related variables would most likely increase human pressures on forest ecosystems. Antigua and Barbuda faces frequent drought periods that will in turn reduce the vegetation cover and as a result when the rains resume, there is an increased occurrence of soil erosion and consequently, sedimentation of coastal waters. Further, during periods of drought, terrestrial habitats are more prone to forest fires, particularly in areas affected by the invasive lemon grass.

As previously captured, coral reefs surrounding Antigua and Barbuda have been subjected to a number of extreme weather events, in addition to increased temperatures. In 2005, the Pan-Caribbean bleaching event appears to have significantly reduced coral cover in Antigua and Barbuda as mentioned earlier. However, the frequency of extreme weather events as in the number and intensity of hurricanes and storms in the Caribbean region can cause extensive structural damage to coral reefs.

It is evident that the impacts of climate change further compounds the challenge of biodiversity management as natural resources, upon which the economy depends, become increasingly subjected to natural forces in addition to anthropogenic stressors. Like many SIDS, the impacts of global warming and climate change on Antigua and Barbuda are severe due to the country’s size, location and pre-existing development challenges, previously captured.

⁶ Derived from CaribSave Climate Change Risk Atlas Analysis



1.5 *Conclusion*

Although many strides have been made in the data collection and establishment of monitoring programs in biodiversity, efforts to rehabilitation, conservation and sustainable use have been somewhat slow in many areas. This may be primarily due to the increased threats posed by alien invasive and climate change that may be seen as surpassing or compounding anthropogenic activities against biodiversity. However, the approved SIRMZP is a major step towards addressing the drivers or man made threats to biodiversity.

2 Antigua and Barbuda Biodiversity Strategic Action Plans

This chapter provides an overview of the national efforts both in the NBSAP and support mechanisms to meet the objectives of the Convention. This section recalls the core strategic objectives and assesses national efforts to advance these objectives thereby establishing the foundations and way forward for the updated strategy. It summarizes the achievements made thus far as well as highlights constraints and gaps for increased effectiveness in the sustainable management of national biodiversity.

2.1 Meeting the Convention

The government of Antigua and Barbuda has embarked on number of programs aimed at the sustainable use, protection and conservation of the islands' biodiversity. Since the 4th National Report and BSAP (2001), the government has initiated work in protected areas identification, legalization and development for example. Additionally, the country has worked through a number of projects to develop a sustainable island resource management mechanism (SIRMM) for biodiversity, the revision of policies to ensure the completion of EIAs prior to development so effective measures to conserve biodiversity during development can be implemented. Although the initial BSAP was not adopted in 2001, it was used to develop facets of biodiversity management and meeting national obligations to the UN CBD.

One of the most notable accomplishments was enhancing institutional capacity by establishing the Environment Division, now currently under the Ministry of Health and Environment. The development of a GIS based platform, the EIMAS, through the SIRMM project provided a critical tool for decision makers in land use planning and biodiversity considerations. It also establishes a spatial analysis platform of natural resources. Partnership with NGOs and community groups have greatly contributed to the knowledge, management and monitoring of specific species and habitats. Further data collection to update GIS data layers including data on critical ecosystems and species. The approval of the country's National Environmental Management Strategy (NEMS) 2004-2010 is also an indication of the country's pledge to the management of biodiversity.

During a stock taking consultation for the preparation of the NBSAP, the following table was compiled and captures national activities aimed at meeting both the obligations of the convention as well as the initial BSAP.

Table 6: Efforts undertaken since initial BSAP 2001 and 4th National Report

Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
Objective One: A national system, including protected areas, for the management and conservation of biodiversity is developed and established	Articles 7,8,9,10,14,15	1.1 Establish a Protected areas System for terrestrial and marine conservation in Antigua and Barbuda	Identify critical habitats and species for conservation and limited sustainable use (Terrestrial and Marine)	On-Going – A total of 9 protected areas (Marine & Terrestrial) have been declared. A red list for plant species as well as Pteridophytes was completed by the EAG. The EAG also facilitates the housing of plant herbarium samples in the UWI St. Augustine.	Much work has been done in identifying individual species, habitats and ecosystems vulnerable to human disturbances. However further efforts are need in taxonomy and programmed monitoring.
			Identify, map and characterize areas to be included in a Protected Areas System (Terrestrial and Marine)	Completed – Declared and proposed PAs have been mapped and exists within the EIMAS.	A system plan was developed and will be updated to characterize all the areas to be included in the system. Sustainable and strategic management and rehabilitative efforts have not yet begun. The SPPARE Project will demonstrate the management structure.
			Develop and implement management plans for protected areas (terrestrial and Marine)	On-Going - Management plans have been developed for the NEMMA, the Cades Bay Marine	The Nelson’s Dockyard national Park needs to be revised.



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
				Reserve, Codrington Lagoon National Park and the proposed Wallings Protected areas.	
		1.2 Identify and develop management plans for critical habitats and species (terrestrial and marine) that may be used sustainably	Review available information to identify the individual species, habitats and ecosystems that can be used, and develop recommendations for their sustainable use	Incomplete	A few reports exist on particular species, such as bats, turtles and birds and the Antiguan racer. However, work remains outstanding in identifying utilized natural resources and their subsequent sustainable use plans.
			Undertake relevant investigations to determine sustainable levels of use of biodiversity	Not yet initiated	An overall biodiversity capacity assessment has not been completed
			Develop and implement plans for fisheries, agriculture and eco-tourism development, and establish appropriate limits (carrying capacity) for the sustainable use by these activities	On-going	Plans have been developed for agriculture, however Fisheries and Tourism are currently being developed
			Develop and implement, where appropriate, pilot projects to demonstrate	On-going	Continuous efforts are made. Examples of this, IWCAM – Proper sewage



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			sustainable practices that are compatible with biodiversity conservation		management practices; SIRMM - Resource management, particularly for critical ecosystems; SPPARE – Biodiversity management
			Initiate a Mariculture Development Program to reestablish over-fished areas, and to increase the use of available and not fully utilized natural species	Not yet initiated	Currently, the Fisheries department encourages the development of aquaponic farms
			Adopt measures to prevent over-fishing including a ban on destructive fishing gear and spear-gun fishing	On-going	Measures have been adopted in marine PAs and declared reserves
			Promote collaboration with the private sector to develop eco-tourism	On-going	Both the EAG and Ministry of Tourism have been promoting eco-tourism. The EAG has recently developed a new birding trail in the Christian Valley area as well as in the Body Ponds watershed. Canopy tours within the Wallings area as well as plans for a co-management strategy between the local



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
					community group and the Government.
		1.3 Develop and implement a system for monitoring changes in use patterns and the status of the ecosystems (terrestrial and Marine)	Identify appropriate parameters, criteria and methods of monitoring biodiversity	On-going	Currently, monitoring is done for sea turtles, and bats, snakes, and nesting birds. This is done by NGOs however there is need for a more formal protocol.
			Collect relevant baseline and other data on relevant biodiversity components	On-going	Collection of some Information has begun and is being included into the EIMAS.
			Collect periodic surveys of threatened species of flora and fauna	On-going	Information collected by research students and other agencies is provided to the Environment Division. However, national surveys are not regularly collected
			Establish and maintain a national bio-geographic (ecosystem) database	On-going	EIMAS is in the process of being enhanced and constantly updated.
			Evaluate and mitigate the activities that threaten biological diversity	On-going	Through the development plan process and use of EIMAS, development plans are evaluated based on their proximity to critical habitats and mitigations measures



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
					recommended.
			Provide accurate and timely information on the specifics of population size and trends especially of threatened species	On-going	Information on populations for the Antiguan racer snake, sea turtles, birds and bats are regularly submitted to the ED.
			Take appropriate legal and regulatory action when the measures governing the protection and sustainable use of the areas selected under activities 1.1 and 1.2 are infringed	Incomplete	Currently, the Fisheries Division exercises legal jurisdiction and enforcement controls for marine PAs and reserves. The EPMB is pending enactment to protect all ecological resources.
		1.4 Conserve, protect and or sustainably use the genetic resources of Antigua and Barbuda	Conserve medicinal plants and protect vegetative communities that provide habitats to these plants: Starting with the collection housed in the museum investigate use of medicinal plants, catalogue and improve the recording of such uses and make the info more readily available to the general public	Initiated	In 1995 a Country Report was submitted to FAO on Plant Genetic Resources. There have been no further updates to this. Both the GARDC and the Analytical Services Department (Dunbars Lab) established a medicinal herb garden but these have since been destroyed.
			Maintain viable populations of local crop and livestock races:	On- going	The ED is managing the development of the Botanical Gardens and is



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			<p>establish seed banks and relevant guidelines, plant nurseries (forest and agriculture in particular), botanical gardens reestablished to include an expanded collection of plants, expand the herbarium initiated by the EAG and forestry division</p>		<p>managing a successful plant nursery. The Ministry of Agriculture through its Crop Research Unit, agricultural stations and Livestock Division maintains a database and monitors crop and livestock production</p>
			<p>Develop and implement guidelines for controlling access to genetic resources</p>	On-going	<p>Through the Plant Protection Act, access and control of GMOs is addressed. The Plant Protection Unit issues a biomaterial access Agreement (BAA) for the research and removal of genetic resources in and out of the country. The country is also signatory to the International Standards on Phytosanitary Measures and as such are bound to those regulations.</p>
<p>Two: The capacity of governmental natural resources management institutions as well as non-governmental organizations, to support the objectives</p>	<p>Articles 11,12,16</p>	<p>2.1 Develop and enhance the capacity to manage protected areas and areas identified for sustainable use</p>	<p>Establish an appropriate policy and institutional framework including capacity building for management and protection of the</p>	On-going	<p>The NEMS to 2010, previously developed, has concluded and will be reviewed and updated for a further 10 years.</p>



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
and achieve the overall aim of the BSAP is strengthened		together with their associated biodiversity	country's biodiversity: obtain policy document from cabinet on the protection of the environment		
			Conduct institutional review for the effective protection of the country's biodiversity. Based on the review establish an appropriate framework for natural resource management	On-going	The SIRMM, NEMS and draft NBSAP enables the review and establishment of appropriate resource management framework.
			Provide training to facilitate the conservation and sustainable use of the country's biodiversity	On-going	Training and awareness programs are conducted as part of the Environment Education Unit within the ED. Training for mapping natural resources are done three times a year. The EAG has conducted training internships for regional and local students in the management of offshore islands.
		2.2 Conduct research on the inter-relationships between abiotic, biotic and anthropogenic factors	Identify gaps in current information required for making conservation management decision and recommend	Incomplete	Although regular reports are done on various issues and species, they need to be consolidated and utilized in policy



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
		affecting biodiversity, and develop recommendations for the mitigation of these effects	appropriate research programs to address them		more efficiently.
			Collect baseline data required to ascertain gaps	Completed	Gaps have been identified through a variety of projects and reports, notably the SIRMM Project, GEF Protected Areas and the IWCAM Project.
			Conduct research on the ecological requirements of priority species and communities, especially those that are rare and endangered	On-going	Research done for the Antigua Racer snake, migratory and wetland birds.
			Provide an information sharing forum for improving conservation of biodiversity	Completed	This is achieved through the Environment Division's website.
			Identify current and future risks associated with biotechnology and make recommendations for policy development	Undone	This has not yet been undertaken
		2.3 Facilitate national financing for biodiversity conservation	Review sectoral and national budgets for biodiversity conservation in the context of proposed institutional changes required to implement the BSAP	Incomplete	Although budgetary biodiversity allocations were made, this has since drastically reduced given economic recession.



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			Examine options for cross-budget schemes to promote the conservation and sustainable use of biodiversity by other agencies	On-going	This has been recognized by the NCM but no formal policy or instruments exist.
			Maximize resources by bringing projects that have the same objectives together to coordinate and synchronize their activities and objectives	Ongoing/Completed	All projects are managed through a national technical advisory committee that reports to a project management committee. This facilitates synergies and avoids duplication of efforts.
			Seek assistance from the private and NGO sectors to finance specific aspects of the BSAP	On-going	The Ministries of Agriculture and Environment have and continue to collaborate with NGOs and CBOs.
			Consider feasibility of the introduction of user fees for at least some aspects of eco-tourist activity	On-going	User fees are already in existence for the National Parks Authority and other user fee systems are under development for other areas of high ecological value.
			Conduct training for key ministry employees and	On-going	Through the Ministry of Social Transformation



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			NGOs in project development and grants applications suitable for national and international donors		and Community development as well as the ED and the National SGP, training sessions are undertaken to build the capacity of NGOs and CBOs in project development.
			Continue to seek international assistance for the conservation and sustainable use of the country's biodiversity	On-going	The country continues to access GEF Funds and other international donors through project development grants to address biodiversity, climate change, and land degradation.
		2.4 develop and implement policies to promote sharing of appropriate technologies	Develop international and bilateral agreements to facilitate the sharing of appropriate technologies	Initiated	Consultation held and the country has applied to UNEP to undertake a technology needs assessment.
			Develop appropriate protocols to facilitate technical and scientific cooperation	Not Done	
			Ratify other conventions that complement the implementation of the BSAP (CITIES, RAMSAR, TRIPS etc)	Completed	The country has ratified a number of conventions, <i>see annex 1.</i>
			Utilize the monitoring regime established in 1.3	Incomplete	There is no formal monitoring process



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			to facilitate the country's reporting obligations under a number of international conventions treaties and agreements (including equipment and training)		established. Data is often collected randomly and most often based on project related requirements.
			Develop and implement protocols to regulate the import and export of endangered species, in line with international agreements (CITIES)	Completed	Permits are applied for through the ED, Plant Protection Unit and Fisheries Division.
			Develop and formalize regional agreements relating to cooperation in conservation of biological resources.	On-going	
Three: Ecological legislation that provides adequate protection of biological diversity is developed, improved, enacted and enforced		3.1 Establish the necessary policy and legal framework to facilitate the management sustainable use and protection of the country's biodiversity	Review, update and enact legislation to support the general policy statement/ decision from Cabinet and Parliament regarding the protection of the environment developed under activity 2.1. Review the draft forestry and wild life act (1988), pesticide and toxic chemicals act, enact legislation for	On-going	EPMB is now pending enactment.



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			<p>endangered species, provide legal protection for great bird island, improve beach protection, regulations for biodiversity use, regulations for activities in sensitive areas, training for those involved in legislative aspects of the management framework</p> <p>Review impact assessment procedures to take into account specific impacts on biodiversity</p> <p>Provide direct incentives to promote positive biodiversity conservation through incentive packages, tax privileges policies, develop and implement an annual competition for nationally recognized awards for environmentally friendly management by business, service organizations etc.</p>	<p>Ongoing</p>	<p>EIA Procedures established under the Physical Planning Act 2003, in addition to the SIRMZP development planning guidelines.</p>



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			Establish disincentives relating to negative impacts on biodiversity, the polluter pays principle reviewed and implemented, capacity building to implement disincentive measures for relevant agencies, regulations to curb the importation of potentially invasive species that pose a danger to biodiversity		Under the Plant Protection Act, applications are required and screened by the Plant Protection Unit for the importation of any non-native species.
		3.2 develop the legal and institutional framework necessary to ensure the safety of biotechnology as well as to ensure that maximum benefits accrue to Antigua and Barbuda from the exploitation of its biological resources	Establish a policy on GMOs that will ensure maximum benefits to the country, ensure safety, develop a policy to address biotechnology in relation to relevant international instruments, develop and implement the legal and institutional framework to govern the safety of biotechnology and equitable sharing of benefits	On-going	The enacted Plant Protection Act addresses the issue of GMOs. Formal policy procedures have also been established through the Plant Protection Unit.
Four: Public awareness of	Articles	Increase public	Develop collaborative	Completed/ On-going	Through the ED, a public



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
<p>environmental issues, ecological education and public participation in decision-making is strengthened.</p>	<p>13,17,18</p>	<p>awareness of the benefits to be derived from biodiversity</p>	<p>public education programmes and campaigns to increase public awareness of the importance of biodiversity to everyday life: provide resources relating to environmental education to the ministry of education, develop innovative public education materials, develop special programs targeting specific groups and service organizations that contribute to public education and stakeholder awareness</p>		<p>awareness, communications and education strategy has been developed and is updated annually. The on-going development of the ED's botanical gardens will feature issues relevant to the Rio Conventions.</p>
			<p>Develop public awareness of policies and laws relating to biodiversity through radio and television programs, print media etc.</p>	<p>Completed/ Ongoing</p>	<p>A number of education awareness programs have been implemented through the Education Unit of the ED as well as through partnerships with NGOs, CBOs, etc.</p>
			<p>Develop mechanisms for inter-sectoral biodiversity information sharing including the repatriation of information held within other nations, develop</p>	<p>Not Done</p>	



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Objectives	Link to the CBD	Activities	Activities Breakdown	Status	Comments
			and implement protocols to clarify rights of accessibility to and ownership of biodiversity information and specimens that are collected by foreign agents		
NBSAP Management		Determining the way forward in managing the NBSAP	Establish a coordinating mechanism or entity for environmental management and implementation of the BSAP	On-going	The establishment of the Environment Division as lead coordinating entity. The National Coordinating Mechanism and technical advisory committee also facilitate the coordination and mainstreaming of policies.
			Monitor and report on the implementation of the BSAP annually, nationally and internationally	On-going	Reports sent as required by the UN CBD.
			Carry out periodic evaluations of the implementation of the NBSAP and other environmental strategies and action plans.	To be initiated	With the submission of this document, further strategies and programs implemented will be regularly evaluated.



2.2 *Review of the NBSAP*

Since the completion of the draft NBSAP in 2001, the Government of Antigua and Barbuda has taken many strides to sustainably manage national biodiversity and meet its obligations under the Convention on Biological Diversity. The review and development process of the recently completed NBSAP was a participatory, an interactive process that led to consensus and agreement on the aims, objectives and activities of the Plan, as well as its indicators of progress. This participatory process ensured the Plan benefited from different knowledge levels, skills and resources of interested persons. In this process, stakeholders were able to enhance their awareness of problems, resources and opportunities at a national level, and shared their ideas and suggestions for solutions to the problems. The review also entailed the 20 Aichi Targets and their applicability to Antigua and Barbuda. Three consultations were held and a final suite of targets and indicators was deliberated and agreed upon. Compared to the level of awareness and interest exhibited in 2000 when the first NBSAP public consultations were held, awareness levels have improved drastically and this has been helpful in ensuring the final revision of the NBSAP is reflective of the situation in country.

Table 3 below summarizes the national targets established.

Table 7: Aichi Targets set against strategic goals and national targets for Biodiversity

Strategic Goals	Aichi Targets	National Targets
<p>Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</p>	<p>Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.</p>	<p>Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably</p>
	<p>Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate and reporting systems.</p>	<p>Target 2: By 2020, biodiversity values have been integrated in national physical development plans and local area plans and the millennium development initiatives for Antigua and Barbuda</p>
	<p>Target 3: By 2020, at the latest, incentives including subsidies harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into national socio-economic conditions.</p>	<p>Target 3: By 2020, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations taking into account national socio economic conditions.</p>
	<p>Target 4: By 2020, at the latest, Government, business and stakeholders at all levels have taken steps to achieve or have implementation plans for sustainable production and consumption have kept the impacts of use of natural resources well within safe ecological limits.</p>	<p>Target 4: By 2020 at the latest, all stakeholders, (public, private, and civil) have taken steps to implement plans for sustainable production and consumption of natural resources keeping impacts within safe ecological limits as far as possible.</p>
	<p>Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.</p>	<p>Target 5: By 2020 an effective monitoring protocol for critical habitats, mainly forests, mangroves and coral reefs has been implemented to assist in reducing degradation and fragmentation and measures developed and undertaken to reduce the rate of loss by 10%.</p>



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Strategic Goals	Aichi Targets	National Targets
<p>Reduce the direct pressures on Biodiversity and promote sustainable use</p>	<p>Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stock, species and ecosystems are within safe ecological limits.</p>	<p>Target 6: By 2020 Policies and sustainable use plans are put in place for the sustainable management of Fisheries resources.</p>
	<p>Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably ensuring conservation of biodiversity</p>	<p>Target 7: By 2020 The capacity of governmental natural resources management institutions as well as non-governmental organizations, to support the objectives and achieve the overall aim of the NBSAP is strengthened</p>
	<p>Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</p>	<p>Target 8: By 2020, 20% of pollution, including from excess nutrients within specific demonstration areas, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</p>
	<p>Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.</p>	<p>Target 9: By 2020 invasive alien species and pathways are identified and prioritized, priority species are controlled, measures are in place to manage pathways to help prevent their (re)introduction and (re)establishment as far as possible.</p>
	<p>Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.</p>	<p>Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems such as the NEMMA, Cades Bay and Codrington Marine Reserves impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.</p>



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Strategic Goals	Aichi Targets	National Targets
<p>Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</p>	<p>Target 11: By 2020, at least 17% of terrestrial and inland water, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape</p>	<p>Target 11: A national system, including protected areas, for the management and conservation of biodiversity is developed and established by 2020 This will include, terrestrial areas, wetlands, areas important to migratory species and marine environments</p>
	<p>Target 12: By 2020, extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained</p>	<p>Target 12: By 2020 Implement protection measures for threatened species including the racer snake, marine turtles, Redonda Dwarf Gecko, Redonda Ground Lizard threatened plants, and threatened birds</p>
	<p>Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity</p>	<p>Target 13: By 2020 maintain genetic diversity of local plants by storing germ stocks for re-population should current stocks become contaminated. Maintain stocks of deer in Barbuda to ensure no mixing of breeds</p>
<p>Enhance the benefits to all from biodiversity and ecosystem services</p>	<p>Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, the poor and vulnerable</p>	<p>Target 14: By 2020 at least 2 major watershed and mangrove wetland areas are effectively protected</p>
	<p>Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhance, through conservation and restoration, including restoration of at least 15% of degraded ecosystems there by contributing to climate change mitigation and adaptation and to combating desertification.</p>	<p>Target 15: By 2020 Restoration of biodiversity hotspots in Antigua and Barbuda thereby contributing to climate change mitigation and adaptation and to combating desertification</p>
	<p>Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the fair and Equitable Sharing of</p>	<p>Target 16: By 2015, national legislation consistent with the Nagoya Protocol on Access to Genetic</p>



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Strategic Goals	Aichi Targets	National Targets
	Benefits Arising from their Utilization is in force and operational, consistent with national legislation	Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational.
Enhance implementation through participatory planning, knowledge management and capacity building	Target 17: By 2020, each Party has developed and adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan	Target 17: By 2020, Antigua and Barbuda has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated NBSAP (this current document).
	Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities at all relevant levels.	Target 18: The Formal integration of local communities into the co- management process of Biodiversity in country by 2020
	Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Target 19: By 2020 Implementation of a knowledge management system for biodiversity within Antigua and Barbuda
	Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.	Target 20: The capacity of governmental natural resources management institutions as well as non-governmental organizations, to support the objectives and achieve the overall aim of the NBSAP is strengthened by 2020

2.3 Biodiversity and Conservation use

Over the last ten years, there is a move to integrate the issue of biodiversity into the general programs of all agencies that are directly related to biodiversity and those that are indirectly related. A number of protected areas, marine reserves and at least one national park have been declared over the last 10 years. However, there is still much to be completed to ensure full achievement of this goal. It is envisaged that the recent NBSAP will fill the existing gaps including the identification and development of management plans for critical habitats and species that may be used sustainably in the country, the development and implementation of a monitoring system for ecosystem status and the conservation and protection as well as sustainable use of genetic resources in the country. Initial work has been done to develop a systems plan for protected areas in the country. This document is now currently under revision.

Much work has been done in identifying individual species, habitats and ecosystems vulnerable to human disturbance, for example, a Red List of Plant species has been prepared, a Red List of Pteridophytes (vascular plants (plants with xylem and phloem) that reproduce and disperse via spores, for example, ferns) was also completed. Additionally, the housing of some plant species has been facilitated at the herbarium of the UWI St. Augustine campus and some commercial species also have species being housed by the CARDI for safe keeping. Further to this, management plans have been developed for a number of protected areas including the Nelsons Dockyard National Park, the Codrington Lagoon National Park and the NEMMA. Some research has also been completed on existing species such as bats, turtles and birds frequenting or resident to Antigua and Barbuda. Data has also been collected and reports presented on the management of the Antiguan Racer. Some investigative and continuous removal/control work has also been done for invasive species as mentioned in chapter three. The development of pilot projects to promote sustainable practices has also had a critical impact on the process of biodiversity conservation and management in Antigua and Barbuda. The work undertaken in the Mckinnons Pond area under the IWCAM Project, the work being completed on sustainable island resources and that completed in a number of other protected areas and proposed protected areas has helped to raise awareness of the need for sustainable development methods. The activities, which have been facilitated through help from a number of government, regional and international funds, have been key to ensuring the continued success in the protection of the country's biodiversity.

However, there is still a large gap in the existing data and that required to have a complete understanding of the biodiversity of Antigua and Barbuda. The NBSAP also contains an action plan to fill existing gaps in biodiversity management.

2.4 Access to Genetic Benefits and Sharing

Antigua and Barbuda is in the early stages of its gene management. The country has not yet ratified the Nagoya Protocol however efforts are underway to establish the legislative framework that will support the implementation of the protocol through the Environmental Protection and Management Bill (EPMB). The EPMB is currently before the Office of the Attorney General in preparation for its presentation to the Parliament of Antigua and Barbuda. The EPMB seeks to establish the Environment Division as the lead authority for environmental management and planning and addresses the issues of access to biological resources. The draft legislations provides for a standard agreement for research as well as speaks to the right of communities involved in the resource. Currently, a formal Biomaterial Access agreement (BAA) is issued by the Plant Protection Unit for the removal of genetic resources in and out of the country. It is



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envisaged that this will be monitored in an integrated manner to include CITES permits which are applied for through ED, Plant Protection Unit and Fisheries Division.

To safeguard the country's genetic diversity, the Plant Protection Unit, through the recently enacted Plant Protection Act, addresses the issues of GMOs and LMOs. Formal policy procedures have also been established, in that applications to import seeds and other biological resources must be made through the Plant Protection Unit prior to their importation. Plant Protection Officers as well as Customs Officers are trained and strategically placed at both air and sea ports of entry to verify cargo entering the country. Localized testing is in the process of being developed through a regional biosafety project with the Plant Protection Unit spearheading national efforts.

3 Institutional Arrangements

This section examines the advances that have been made in biodiversity management since the fourth national report. It highlights the achievements made in the institutional, legislative and support provided by civil society in national environmental management.

3.1 Biodiversity Coordination & Management

Much has been done to ensure the effective coordination of all the efforts and activities involving the sustainable use and protection of biodiversity. Since the establishment of the Environment Division in 1997, the Environment Division has been earnestly working with a number of national agencies to promote activities aimed at the sustainable use of biodiversity. In helping to meet this objective of effectively coordinating sustainable use and biodiversity management activities, the Division has led the creation of an environmental data mapping system, the EIMAS, to help ensure updated information on the land use and biodiversity related issues for the country. Additionally, there has also been the establishment of a NCM to help with the monitoring of all activities related to multilateral agreements including the UNCBD. With the draft EPMB there is some legislative mandate that is being formalized for this process. However, there is still some work to be done primarily to help enhance the protected areas management capabilities of the country, the assessment of the abiotic and biotic as well as the anthropogenic factors affecting biodiversity, assessment of national financing for biodiversity conservation and the development of policies to promote sharing of technologies relating to effective biodiversity management.

Furthermore, the SIRMZP is a critical master-planning tool that converts national environmental priorities into spatial form that will assist in reducing development pressures on natural resources. The SIRMZP prescribes strategic development guidelines that enhances and preserves critical ecosystem functions. It also enables policy and decision makers to assess the appropriateness of development proposals in Antigua and Barbuda. The SIRMZP advocates development that is compatible to its surrounding while maintaining environmental integrity. For instance, the SIRMZP recommends light recreational development for education in conservation and forest areas. Such development should avoid the use of hard structures.

Finally, existing NGOs have also played a key role in helping to coordinate efforts aimed at conservation and effective management of Biodiversity. Key in this aspect of the program is the EAG, GARDC, and the ACS. These groups have been active in promoting eco-tourism activities in many sensitive areas as well as building national skills capacity in environmental management and awareness. Further, the recent establishment of the national small grants programme (SGP) has resulted in further efforts towards biodiversity conservation on the islands

3.2 Institutional & Legislative Support

The Environment Division remains the focal point of most of the MEAs as well as the GEF focal point. The Division is continually supported by other agencies including NGOs and community based organization. The fourth report highlighted legislation as an area of limited success to efficiently support biodiversity. Since the fourth national report, further strides have been made towards the integration of biodiversity protection, sustainable use and sharing of benefits. As previously highlighted land use



developments have been a significant threat to biodiversity. In 2012, the Parliament of Antigua and Barbuda adopted the first Sustainable Island Resource Management Zoning Plan that acts as National Physical Development Plan (NPDP). The NPDP now provides the context through which the Physical Planning Act (2003) can effectively guide the development process of Antigua and Barbuda. It sets the pace for addressing many of the challenges faced with land and water resources, biodiversity, tourism and agriculture.

The Environmental Protection and Management Bill has been fully drafted containing significant elements relating to biodiversity conservation, sustainable use and access to genetic resources and benefit sharing. At the time of preparing this report, the EPMB is now before the Attorney General to be reviewed by Parliament and the Bill's subsequent enactment.

3.2.1 Status of the National Environmental Management Strategy (2004 -2010)

In recognition of the importance of integrated planning, environmental vulnerability (especially because of the threats identified) and sustainable development issues, the Government of Antigua and Barbuda took several initiatives to help it meet its overall sustainability goals and minimize (or if possible eliminate as seen through the eradication programs mentioned in the previous section) the identified threats to Biodiversity. As a result, at the international and regional levels the Government signed several conventions and agreements to effectively address critical environment and sustainability issues. One such agreement, The St. George's Declaration, resulted in the governments of the OECS committing themselves to a sustainable approach to the development of their economies. The St. George's Declaration, which is based on the Small Island Developing States (SIDS) Plan of Action, sets out 21 principles for environmental sustainability within member states. All nine governments during the first quarter of 2001 formally endorsed the Declaration. As part of the outputs for the declaration, each government was mandated to formulate a local environmental management strategy that would form the blueprint for the country's implementation of the St. Georges declaration.

With this in mind, the Government of Antigua and Barbuda developed and approved a comprehensive environmental management strategy (EMS) based on the St. Georges Declaration. The EMS, which was to serve as the management strategy governing the implementation of environment initiatives at the government, private and community levels, also included an outline of the national approach to the implementation of the various international environmental agreements to which Antigua and Barbuda is party.

This Strategy, the National Environment Management Strategy, (NEMS) summarized the urgent actions needed for sustainable natural resource management in Antigua and Barbuda and served as a planning document to guide the new and inter-sectorial actions required to place the country on the path of sustainable development. Furthermore, the Strategy summarized the views of key stakeholders, including representatives of local communities, national, regional and international groups on critical environment and sustainable development issues. Essentially, the development of the NEMS was a process consisting of extensive consultations, literature review, and public awareness.

Central to the NEMS, was a management approach including conservation, sustainable use and the equitable sharing of benefits that accrue from the use of natural resources. Integral to the implementation of the NEMS was a change in old beliefs and attitudes, both of the general public, and of those responsible for planning and making decisions. The most important misconception addressed



included the inexhaustibility of natural resources and the fact that prudent environmental management inhibits development.

The development of the NEMS was concluded after three years of national consultations and reviews of various sector plans and programs. Also included were issues related to various international conventions signed by the government as well as public feedback regarding emerging social issues. The Draft Strategy drew extensively from many other planning documents, including National Environmental Management Action Plans, National Environmental Profiles and National Biodiversity Strategies. The draft NEMS was then submitted to various government agencies and NGOs for feedback with particular emphasis on identifying priorities for the next five years.

The Draft NEMS reflected the growing sub-regional commitment to participatory planning and action. It was based on inputs from local communities and international organizations, government agencies and NGOs, public officials and private sector agencies. It built on the lessons learned from past strategies and planning documents and successful projects. As a result, this Strategy represented a broad consensus on the most urgent actions needed to stimulate sustainable development in the Antigua and Barbuda.

The NEMS was developed based on seventeen different principles founded on the following objectives:

1. A Policy and Planning framework - To integrate environmental and natural resources management into development policies, plans, legislation and budget processes at all levels.
2. Improvement in the country's legal and institutional frameworks - To protect the environment while improving the quality of development projects and programs.
3. Provide a framework for Sustainable Livelihood - Provide the private sector with a framework for enhanced participation and maximization of economic benefit from natural resources.
4. Civil Society participation - Ensuring meaningful participation by civil society in environmental decision-making.
5. Capacity Building –To strengthen local expertise and technical ability in planning and implementing sustainable natural resource management programs and for negotiating multilateral environmental agreements through the development of appropriate tools and techniques, training, policy formulation, and cooperation in science and technology. Additionally, there is the desire to foster a culture of participation by Civil Society in decision-making and implementation and to build the capacity to achieve this.
6. Economic incentives - Develop a package of economic instruments that will provide incentives or disincentives and the necessary funds to protect and or restore the environment.
7. Environmental education, training and awareness - To strengthen environmental education, raise awareness and provide training in support of environmental management and the sustainable use of natural resources.

To date, many of the objectives of the NEMS have been commissioned and the strategy outdated since 2010. However, there is still much work to be done to fully achieve all the objectives. The NEMS was designed to build on the previous NBSAP completed in 2001 and the recent revision of the NBSAP will now support the review of the new NEMS.



3.2.2 National Protected Areas

Protected Areas of Antigua showing Vegetation Cover

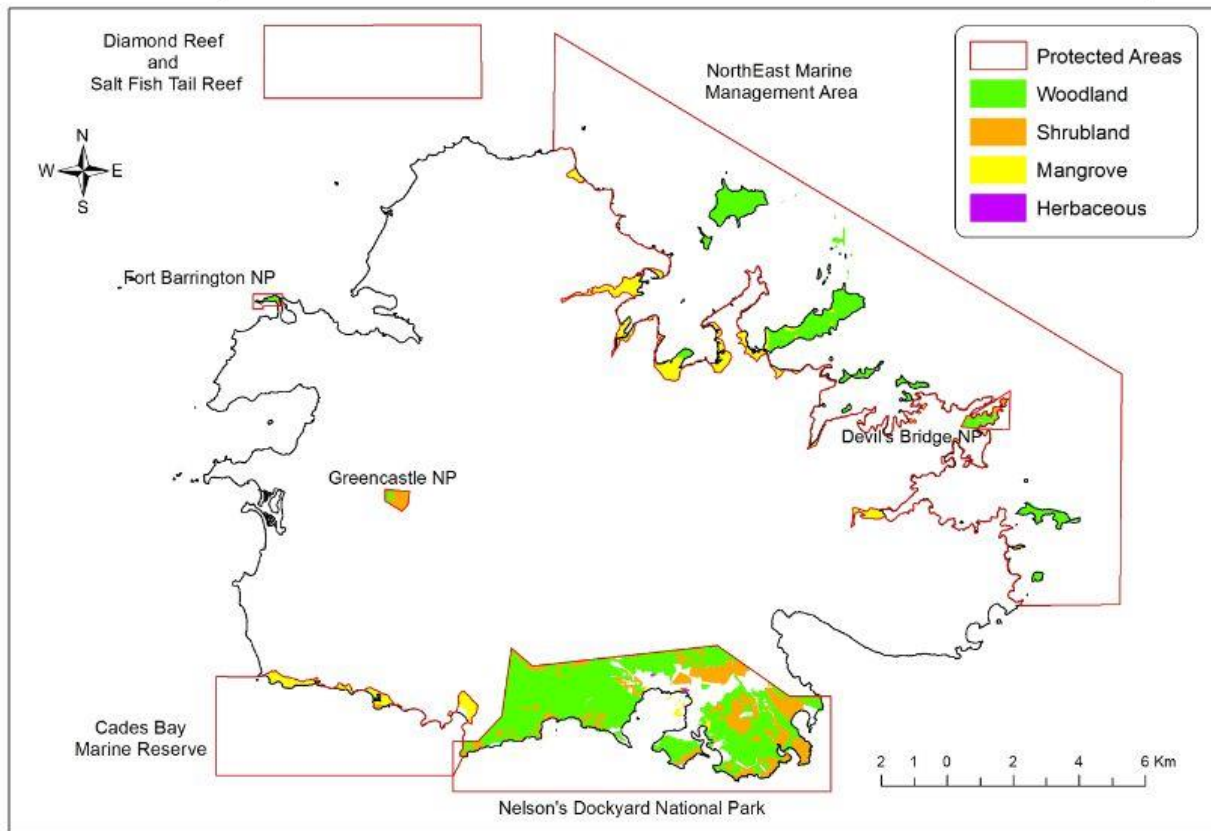


Figure 13: Antigua's Protective areas with vegetative cover

In addition to the NEMS, the Government of Antigua and Barbuda has established nine protected areas, 5 marine and 4 terrestrial, to achieve a range of management objectives, including resource protection, maintenance of scenic and historical landscapes as well as for sustainable development and to meet its obligations to the CBD. However, protected areas are often poorly managed and independent of each other. The first protected areas system plan was completed with assistance from the Organization of Eastern Caribbean States (OECS). This plan has recently been placed under revision and is currently being adjusted to include more recent information on the protected areas system for the country. The review was undertaken in light of the country's acquisition of updated and in some cases new data sets relating to the country's natural resources and the GIS mapping of its land usage. This was also necessary as a result of the development of the SIRMZP and the EIMAS system.



Protected Areas of Barbuda showing Vegetation Cover

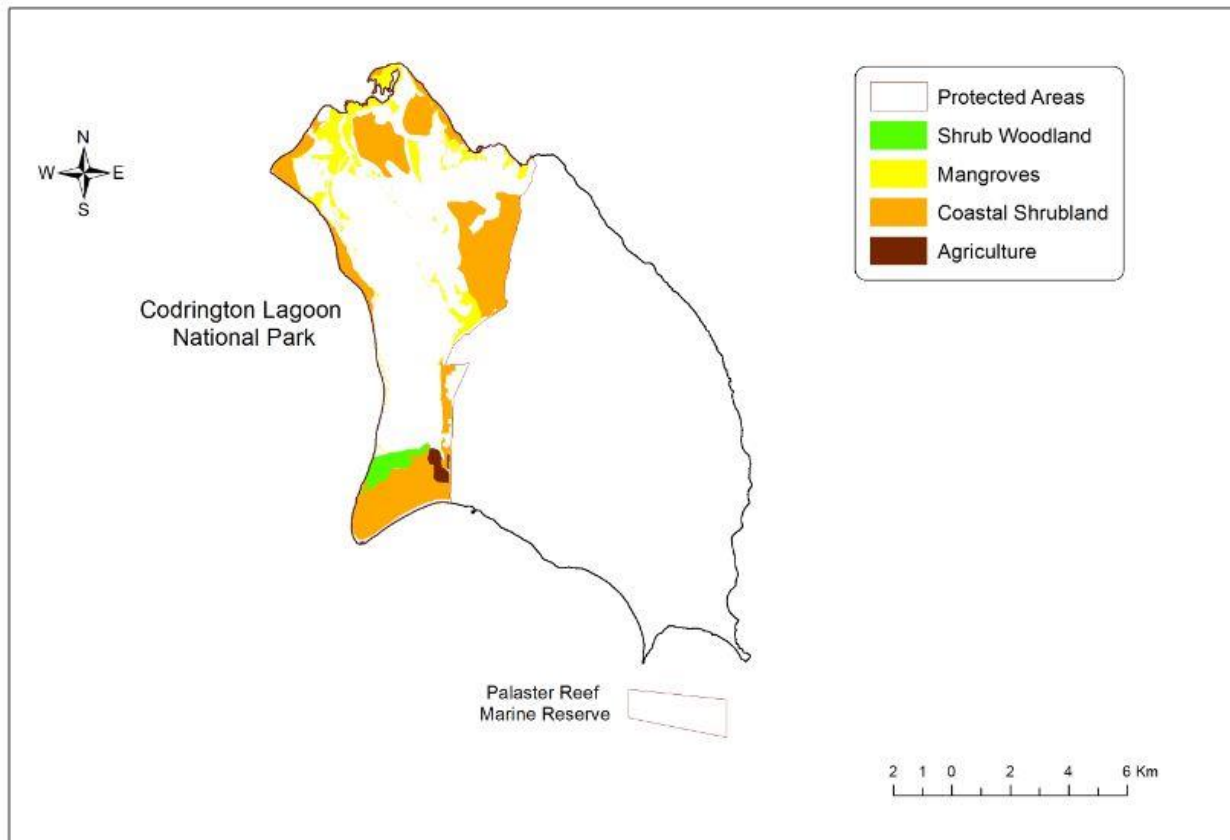


Figure 14: Protected areas in Barbuda

Furthermore, there has been updated information on the protected areas for Antigua as well as Barbuda including the declaration of new protected areas. In order to ensure the incorporation of the issues relating to the RAMSAR convention and the CMS, the system of protected areas will seek to include areas considered as important wetlands as well as those deemed as being important to the migratory routes and habitats of migratory species. The RAMSAR convention and the CMS are both biodiversity related conventions.

Table 8: Protected Areas of Antigua and Barbuda

ANTIGUA AND BARBUDA PROTECTED AREAS				
Marine Protected Areas	Protected	Protection Date	Managing Agency	Size (hectares)
Cades Bay		6/1/1999	Fisheries Division, Ministry of Agriculture	1927.9



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Diamond Reef	6/1/1973	Fisheries Division, Ministry of Agriculture	1457.3
Northeast Marine Management Area	12/29/2005	Fisheries Division, Ministry of Agriculture	10783.5
Palaster Reef	6/1/1973	Fisheries Division, Ministry of Agriculture	382.9
National Parks			
Nelson's Dockyard	11/15/1989	National Parks Authority	6300.1
Devils' Bridge	10/1/2008	National Parks Authority	98.9
Fort Barrington	10/1/2008	National Parks Authority	34.5
Green Castle Hill	10/1/2008	National Parks Authority	35.3
Codrington Lagoon	3/24/2005	The Barbuda Council	6680.9

3.2.3 Legislation

Over the years there have been a series of legislation aimed at environmental protection. However, these have been piecemeal and without outlined authority for responsible parties to ensure effective legislative and policy protection for environmental issues. All of these legislations formed parts of acts administered by other government agencies such as the DCA, the CBH, the APUA as well as the NSWMA. Based on this fragmentation, in 2005, the country began its quest to develop an overarching environmental management bill for the protection of the environment. In the interim, the legislations available for environmental protection are captured below:

Table 9: Environment legislation relevant to biodiversity ecosystem protection

Protected Area Designation by Type	Applicable Legal Authority			Agency
	Law	Year	Instrument	
Forest Reserve	The Forestry Act (Cap 178) and Forestry	1941 (Revised 1989)	Declaration by Order under	Forestry Unit, MoA



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	Regulations (SRO No 13, SRO No 42, 1952)		Section 10 of Forestry Act	
Public Park	Public Parks Act	1965	Declaration order under the Act	Parks Commission under Minister of Lands
Restricted Area	Marine Areas (Preservation and Enhancement) Act	1974	Marine (Restricted Areas) Order	Fisheries Division, MoA
National Park	National Parks Act	1984	Order made under NP Act	National Parks Authority
Marine Reserve	Antigua and Barbuda Fisheries Act Cap 173 Fisheries Act No. 22 of 2006	1984 (1989) 2006	Order under Section 22 of Fisheries Act Order	Fisheries Division, MoA
Environmental Protection Area (EPA)	Physical Planning Act	2003	Declaration order by the Minister under sub-section 3 of Section 54	Development Control Authority

In order to address existing gaps for environmental and natural resource management the government of Antigua and Barbuda has completed the development of the Environment Protection and Management Bill. This act, once presented and approved by Parliament, will strengthen the overall environmental management process. It is anticipated that this act will be presented to parliament and passed into law by the end of the year 2014.

The Fisheries Act was recently updated and new regulations enacted. Additionally, the Plant Protection Act has been passed by the legislature and is soon to be enacted as well.

3.2.4 Other Support Structures

Since the establishment of a National Small Grants Programme during GEF 5 in 2013, participation of NGOs and community based organization have greatly improved. Many of these projects have been geared towards biodiversity conservation as well as combined focal areas in both biodiversity and climate change adaptation as seen in *Diagram 2*.

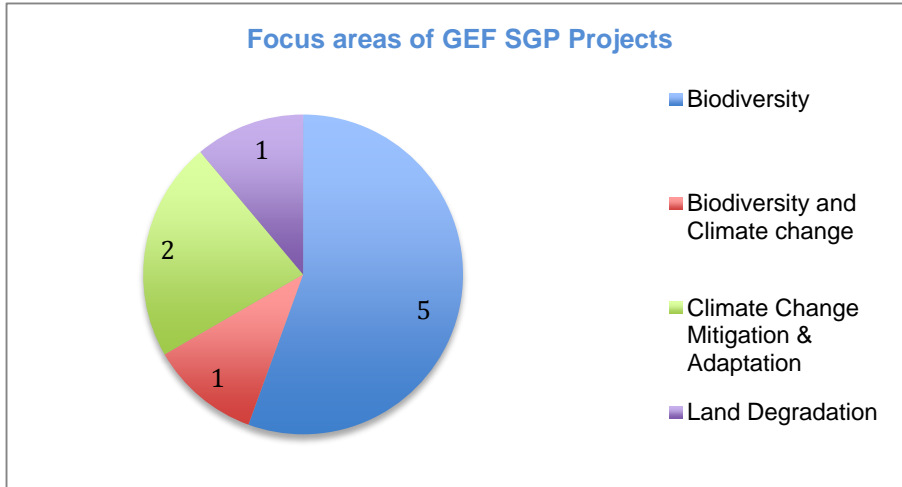


Chart 3: Focus areas of GEF SGP project proposals during GEF 5

Source: SGP National Project sheet file 2013- 2014

3.3 Resource Mobilization

In an effort to address the issue of effective biodiversity management, one of the key threats identified is that of adequate financial resources. To circumvent this potential problem in implementing the NBSAP, the government of Antigua and Barbuda has embarked on a sustainable financing plan for biodiversity and in particularly protected areas management. This financing mechanism, the SIRF (Sustainable Island Resource Fund), is a self-sustaining non-profit entity that once enacted (through the Environment Management Bill by December 2014) will earn revenue and attract funding to care for the protected areas and reduce fossil fuel consumption in Antigua and Barbuda. The SIRF will be established to own assets from which it will generate an income. In the first instance these assets will be wind turbines, solar panels, sewage treatment systems and a system to recycle waste oil. The services of sewage treatment, electricity and water generation will be purchased by APUA, or directly by specifically targeted consumers. The “profits” generated will be used for environmental management in general.

It is anticipated that this fund will operate with little or no central government financial support. The main source for the fund will be from the sale of electricity generated through renewable energy (wind) to the APUA through an agreement already signed. Presently, it is expected that the energy project will generate up to 20 megawatts of electricity per year with a value of between four to eight million United States dollars (ten to twenty million Eastern Caribbean Dollars). Other potential sources for stimulation of the fund include the green climate fund, the adaptation fund, the GEF, bilateral agreements, the Caribbean Biodiversity Fund, water levy (co-financing), proceeds from investments and soft loans. Essentially therefore, the sources of income will include, sale of renewable energy technology, small loans facility, recycling of used oil, sewage services, micro-financing facility, where possible payments from the Government (debt for climate swaps) and grants from international agencies. Presently, the purpose of the fund entails primarily the provision of financing for biodiversity conservation and sustainable use particularly as it relates to protected areas as well as climate change adaptation.



The SIRF will not be a statutory body but a department within the Government. The department will have its own accounts and be independent without the high overhead cost of a statutory Body. The SIRF Fund will have minimal staff that is funded through its own earnings. Only 10% of the funds will be allocated to salaries and administration. The board of the SIRF will be comprised of permanent secretaries, NGOs, Private Sector, Finance specialists (e.g. commercial banks and credit unions) and donors. The core board will be five persons and will have observer from the private sector, and donors. The secretary to the Board will be the Environment Division. Board members will not be paid a stipend, but their cost of participation can be funded (for eg. transportation, meals and other similar expenses). This structure will follow as much as possible the current structure used under the central Government.

The fund will have several funding windows. The main funding windows are, general environmental management, protected areas, and a window for NGOs and CBOs. These windows will be established by the Act and any new windows can be established by regulations.

A Director and necessary administrative and technical staff will manage the day-to-day business of the Board. The director and the Board will have a Technical Advisory Committee established to assess the impacts of funding decisions including programs and projects.

The fund will have an open and transparent management system, which will include a redress mechanism.

Since the concept of the fund was first proposed the Division has managed to secure over 8M USD to start the various windows of the Fund. By 2015, the fund will be in a position to achieve the following;

- 1) Provide green electricity at a lower rate than that of the cost of fossil fuel energy. The electricity will be generated from several sites around the country and then transmitted via the national grid. As a prerequisite the project requires an agreement with the Government and APUA to generate up to 20MW of power from green technologies by 2020.
- 2) Provide capital for the establishment of marine and terrestrial Parks;
- 3) Recycle all of the used oil from APUA and other areas;
- 4) The fund also includes a component to implement activities, which would result in watershed restoration. This is important in the generation of cheaper water from surface areas as well as an adaptation measure. This will also include funding for the restoration of at least on one dam.
- 5) The sale of sewage treatment services on a non-profit basis to hotels and homes. There is already one sewage treatment system that will come online in 2013. The relevant windows of the SIRF will fund elements of the NBSAP.

3.4 Monitor and Evaluation

In an effort to ensure that the NBSAP and other ongoing initiative meet the objectives of the Convention, data collection and monitoring will be critical activities. Annex one to this document highlights the monitoring and implementation plan that will guide the NBSAP over the next six years to 2020. The following two point emphasizes the critical issues that are the focus of the implementation plan.

- Conduct annual reviews and monitoring of the plan in relation to established targets and implementation plans, and with a view towards making appropriate adjustments



- Produce national and other reports to fulfill reporting requirements, including compliance with environmental treaties and conventions that have been ratified by Antigua and Barbuda

The EIMAS enables geo-referencing of data sets used in planning and the use of land, etc. Policy Makers are now able to identify areas high in biodiversity richness as part of the consideration to developments. Annual data collection for visual monitoring of biodiversity areas is still required; currently this is done at random.

3.5 Knowledge Management and Awareness

Public awareness and sharing of information on environmental issues has always been a major issue for the country. Over the years the Environment Division has engaged in a number of activities aimed at providing relevant information regarding the conventions, local and international environmental issues to the public. This has been done in an effort to ensure their continued awareness on the environmental issues of concern and relevance to the country. The Department has engaged in television programs, radio, as well as primary and secondary school programs in an effort to help the public understand the key issues affecting effective environmental management. Recently, a new public relations strategy was created with the aim of ensuring everyone visiting or interacting with the Environment Division is exposed to knowledge and awareness of the importance of the natural resources of the country and the threats currently being addressed.

Keeping in mind the location of the new offices of the Environment Division, the strategy, which is developed includes a number of information kiosks established within the botanical gardens. It also includes the establishment of an afterschool center. It is envisaged that a variety of information will be provided for students, schools and the public on the environment and its related international agreements and concerns on a consistent basis through this media. These interactive media centers will feature important information from all aspects of the environment such as climate change, biodiversity, land degradation and marine biodiversity. It is here that the recently approved NBSAP and national targets will also be promoted. It is noted, however, that public relations is never a completed activity and as such, there will still be some focus on the potential activities that may be possible before we move on from this point forward.

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5 ANNEX I

I. Contracting Party	Antigua and Barbuda
II. National Focal Point	Ambassador Diann Black- Layne Environment Division
III. Full Name & Contact of the Institution	Environment Division #1 Victoria Park Botanical Gardens St. John's Antigua
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IV. Signature of Officer responsible for submission Amb. Diann Black-Layne
V. Date of Submission	