Fourth National Report to the Convention on Biological Diversity:

ANTIGUA AND BARBUDA

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Prepared by: Dr. Janil Gore Francis

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EXECUTIVE SUMMARY

1. The Environment Division guided the Fourth National Report for Antigua and Barbuda to the CBD with the assistance of other key Government agencies. A consultant was hired to prepare the report with relevant agencies providing the necessary case studies. The report looked at the past ten years in biodiversity management and the implementation of the targets and programs of work as decided under the convention. In general there has been significant improvement since 2001, but the lack of capacity and legal framework suitable for small island states is a severe limiting factor.

2. Since the preparation of the first national report to the Convention the threats to Biodiversity have not really changed, although the extent of the pressure has intensified. There have been, however, many activities by the Government to address threats. These include policy adjustments, institutional review, capacity building and allocation of more funding to Biodiversity protection. Since 2001 when the first report was submitted, several new areas have been declared protected, EIA is now mandatory for certain projects and several new Biodiversity related legislation have been passed.

3. Government actions were encouraged by the increased knowledge of the population about biodiversity and the importance of it to their health and economic development. This increased awareness and political will have resulted in Antigua and Barbuda making some progress. This progress and the pace of it was also due in part to access to international funding, which acted as a catalyst for Government action. The cost of the institutional, legislative and educational programs however are significant and lack of access to and the small amounts of international funding is an indication that the vast majority of resources for the protection of globally and nationally significant biodiversity will be up to Antigua and Barbuda.

4. A good sign of progress in the management of the threats to Biodiversity is that the actions that were acceptable ten years ago e.g. fill in of mangroves and fresh water ponds, sand mining and hunting of endangered species would be met with outraged in 2010. In this regard it is fair to say that for Antigua and Barbuda the threats are being addressed systematically by the Government with the assistance of the international community within the CBD, it is difficult to say at this time what has been the impact on the rate of decline of species and ecosystems without adequate data. It is fair to say however the rate of decline on the area of ecosystems is declining, for Antigua and Barbuda to reverse the rate in decline by 2020 there will be a need for dramatic increase in effort to actually restore degraded areas.

5. Protected areas in Antigua and Barbuda has increase by over 100% since ten years ago and some of these new areas are highlighted in case studies in chapter 4. The Government will be focusing its efforts on making these areas financially viable; but the steps to provide legal protection of these areas is one of the single most important steps in the management and protection of Biodiversity in Antigua and Barbuda.

6. The NBSAP process was one of the first steps in Antigua and Barbuda to document the country's response to the management of Biodiversity and the implementation of the CBD. The actions and the process were met with welcome support from the NGO community but with reservations by the private sector and the political directorate. With assistance from international funding agencies such as the GEF along with considerable support from the Government itself the elements and objectives of the NBSAP were integrated into the national planning process and since then a significant number of actions and objectives have been implemented or on their way to being implement. The biggest problem has been funding for capacity building and the passage of relevant legislation to make the strides made sustainable.

7. Reports on the implementation of the NEMS and therefore the NBSAP are generated biennially and are available on the website of the Environment Division. A detailed table of actions and the status of Implementation of the NEMS is listed in Annex 2. The Country is obligated to report on the status of its

implementation of these actions and since the NEMs and all its provisions may soon become part of the OECS treaty and will therefore soon transform from a voluntary agreement to mandatory.

8. The Integration of Biodiversity into the national planning process has had significant success in Antigua and Barbuda. The process managed to achieve success in the areas of physical Planning, Education, Environmental Impact assessment, and the national budget process. There has been over 200% more funding available today from the national budget that there was in 2001. There has been improvement in the drafting of legislation, but there has not been enough being passed in the Parliament. In the case of legislation that has been passed, none has had the necessary regulations in place for its effective implementation.

9. The area of main concern is that of institutional and capacity building, the country has seen a reduction within the Government sector of trained personnel in the area of biodiversity management. This has occurred in other areas of the Government, such as education and health. The Government has therefore placed their priority for training in those areas and so opportunities for scholarships in the area of environmental management have lessened. Environmental management does not have the high priority that it had a few years ago and there are no immediate plans to address this problem over the next five years. There is an urgent need therefore to provide resources to train personnel in the area of Biodiversity management and this should be factored into grant funding from relevant international and regional agencies.

10. The integration of Biodiversity into the planning for climate change presents for many countries significant opportunities for the protection of biodiversity particularly the sustainable management of protected areas. The country is moving this issue one step further to use protected areas and their potential for mitigation as a means for financial viable of parks.

11. Notwithstanding the success and failures it is generally agreed there has been a significant strides in the integration of Biodiversity into the planning processes but the stage of integration does not guarantee sustainability and the country is some years away from achieving this target.

12. Over the past ten years there has been significant improvement in the management of Biodiversity. This however may have reduced the rate of losses but the threats are still significant and there is no clear strategy to address these. Biodiversity managers all over the world are in many cases putting their careers on the line for the protection of biodiversity and the implementation of the strategic plan of the convention. The threats are still the same if not increasing, and although the public tolerance of these threats is declining the perpetuators of these threats are driven by the powerful urge for profits and the need to create jobs. These are real concerns and are not an issue of greed and must be considered in the management of resources.

13. Antigua and Barbuda is struggling to rationalize the need for development in a sustainable way but the pressure to develop responsibly is ever increasing. The management of Biodiversity today and the budget allocation is more in 2010 than it was ten years ago. The political will and public expectation is at the point where it is no longer the limiting factor. If the country can resolve the capacity constraints it is facing the rate of decline of biodiversity can be reversed. The case studies featured here clearly demonstrates what is possible.

14. The issue of climate change and the loss of coastal ecosystems and watersheds have created a new dimension that has assisted biodiversity managers to argue successfully for a stay in the development of certain key areas and a review of the way others development plans are proceeding. In the preparation of this report one of the best lessons identified (featured in the case studies) are those demonstrated by the various government agencies and NGOs as being important in the protection of Biodiversity, as well as facilitating development while reducing risks to extreme weather events.

Flashes Wetlands West Coast of Antigua and Barbuda

ACRONYMS

OAS	Organization of American States
GDP	Gross Domestic Product
AB	Antigua & Barbuda
NGO	Non-Governmental Organization
CBO	Community Based Organization
VSP	Voluntary Separation Package
FU	Forestry Unit
CBD	Convention on Biological Diversity
SFO	Senior Forestry Officer
SWEU	Soil and Water Engineering Unit
PCB	Pesticides Control Board
CLO	Chief Lands Officer
AED	Agricultural Extension Division
FD	Fisheries Division
TCP	Town & Country Planner
DA	Director of Agriculture
DCA	Development Control Authority
GEF	Global Environmental Facility
WB	World Bank
UNEP/ UNDP	United Nations Environment Programme/United National Development Programme
CPAAC	Caribbean Planning for Adaptation to Global Climate Change
Ramsar	Convention on Wetlands
UNCCC	United Nation Convention on Climate Change

UNCCD United Nations Convention to Combat Desertification
BC Barbuda Council
PPA Physical Planning Act
NPDP National Physical Development Plan
ED Environmental Division
EAG Environmental Awareness Group
ESAL Environmental Solutions Antigua Ltd
CBH Central Board of Health
NPA National Parks Authority
LRMD Land Resource Management Department = LRMD
LAD Land Administrative Division
FWA Forestry & Wildlife Act
BPOA Barbados Plan of Action for Small Island Developing States
CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora
CFC Chlorofluorocarbon
LBS Protocol to the Cartagena Convention on Land-Based Sources of Marine Pollution
MARPOL Convention on the Prevention of Marine Pollution from Ships
MDG Millennium Development Goal
MSI Mauritius Strategy of Implementation for Small Island Developing States
NBSAP National Biodiversity Strategy and Action Plan
NEMS National Environmental Management Strategy
NOx Nitrous Oxide emissions
ODS Ozone depleting substances
OECS ESDU Organisation of Eastern Caribbean States, Environment and Sustainable Development Unit
SGD St. George's Declaration of Principles for Environmental Sustainability in the OECS
SIDS Small Island Developing State

Chapter 1 – Overview of BIODIVERSITY Status and Trends

Introduction

Antigua and Barbuda has a rich and unique Biodiversity, for example, the country boasts one of the rarest and smallest known Racer Snake (*Alsophis antillensis antiguae*) populations in the world and hosts the largest frigate bird (*Fregata magnificens*) nesting ground in the Caribbean[1]. Based on the country's commitment to the Convention on Biological Diversity (CBD) Antigua and Barbuda is ardent in ensuring the protection of these and other biological resources with the aim of promoting sustainability and sustainable development within both islands.

This chapter will present information on the status, trends and threats of Antigua and Barbuda's biodiversity. The Biodiversity of note mentioned in this report are Flora and Fauna, Ecosystems and Agricultural Biodiversity. Agricultural Biodiversity was studied in detail during this reporting period and so there is significant information on this very important topic. This report was meant to capture quantitative information to contribute to the assessment of the CBD 2010 targets, the high cost of the collection of scientifically sound information however made this difficult and in some cases impossible. Further the island does not have a university so the management of biodiversity in the island cannot benefit from a consistent and independent research program. This main source of new information is predominantly from projects and programs that have received some international support from the GEF and other donors.

[1] Lagoon Conservation and Management Project, Status Report, John Mussington, Marine Biologist, Lagoon Management Committee pg 1

Background - Fauna and Flora

The natural vegetation of Antigua was virtually decimated during the sugar production years, and so most of the coverage is secondary growth, with only a few areas of original growth. Notwithstanding this the country has significant Biodiversity that is unique to and ecosystems of Global significance. There are 54 vegetation communities identified, 1158 species (149 families) of plants; 45 species of ferns (5 families); 4 species of gymnosperms (3 families) and 1109 species of angiosperms (141 families); of which 16 are listed as rare, 26 as uncommon and 12 as common. There are some 197 species of flowering plants of which 22 are identified as endemic to the Lesser Antilles (one of which, *Pectis ericifolia* is endemic to Barbuda). 73 are classified as rare, including several that are believed to have become extinct.

Twenty terrestrial reptile species and sub-species have been recorded - 4 of which are extinct. One, the Racer Snake (*Alsophis antiguae*), exists only on Great Bird Island is considered one of the rarest snakes in the world. The following reptiles are endemic to Antigua and Barbuda: Antiguan ground snake (*Alsophis antillensis antiguae*), Dwarf Woodslave (*Sphaerodactylus elegantulus*), Green lizard (*Anolis bimaculatus leachi*), Lizard (*Anolis wattsi wattsi*), Lizard (*Anolis nubilus*), Ground lizard (*Ameiva griswoldi*) and Ground lizard (*Ameiva pluvianotata atrata*). The only marine reptiles known to nest in Antigua and Barbuda are three species of endangered turtles – the hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*).

Of the 182 species of birds, 20 are considered endemic to the West Indies sub-region, and in some cases, are restricted to the Lesser Antilles. The following species are endemic to Antigua and Barbuda: Broad-winged Hawk (*Buteo platypterus insulicola*), Adelaide's Warbler (*Dendroica adelaidae*), and the Pig-faced or Rat Bat (*Brachyphylla cavernarum*).

There are 36 mangrove sites with 4 main species; Red Mangrove (*Rhizophora mangle*), Black Mangrove (*Avicennia nitida*), White Mangrove (*lagunculaia racemosa*) and Button Mangrove (*Conorcarpus*). These support a wide variety of marine animals (as both habitat and nursery) and act as an excellent filtration system.

Antigua and Barbuda has tremendous biodiversity for such a tiny country. This is not unusual for SIDS in fact the most recent survey of the world's biodiversity hotspots by CEMEX and Conservation International identified the Caribbean region as one of the highest priorities in any global strategy for biodiversity conservation and sustainable management, and deserves priority attention from the global community[2]. The islands of the Caribbean, with their combination of extremely high endemism and the intense packing of species per unit area, should be considered to be the highest-priority biodiversity hotspots on the planet at present. Add to this the high degree of threat -the Caribbean now maintains only 11.3% of its original biological habitat.

Again, there is a wide range of globally important terrestrial and marine habitats represented within the Lesser Antilles (Eastern Caribbean) Archipelago, including coral reefs, sea grass beds, lagoons, beaches, mangrove forests, lowland tropical forests, xeric formations and montane forests. These habitats support many globally rare fauna such as Green turtle *(Chelonia mydas,* CITES-Appendix I, IUCN-EN), Hawksbill Turtle (*Eretmochelys imbricata* CITES-Appendix I, IUCN-CR), Leather Back turtle (*Dermochelys coriacea* CITES-Appendix I, EN), Wood tortoise *(Geochelone carbonaria,* CITES-Appendix II*)* and Queen Conch (*Strombus gigas* CITES-Appendix II). Many of these species are transboundary and so it is important to assess the threats and status at the regional levels.

Agricultural Biodiversity

For the purposes of this report agricultural biodiversity includes cultivated crops, harvested and managed wild plants for food, domesticated animals, wild animals hunted for food, wild and farmed fish, pollinators (bees and

[2] Mittermeier, R.A., et al. Hotspots: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions. CEMEX and Conservation International. Pp. $30. ISBN 968-6397-58-2.

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 was based on a cash crop monoculture policy. This changed over 50 years ago when sugar cane was no longer viable and the agricultural sector rapidly diversified to produce and impressive array of vegetable, livestock and cash crops such as "sea island cotton". This diversification of agriculture formed the basis of a very important sector of the country's economy. The Agricultural product although diversified does not account for a significant amount of export. The Country's low rainfall provides an environment where the agriculture products have intense taste and is favoured all over the world and this is the market that the country's policy would target.

Stand of sea island cotton plants at Central Cotton Station

Cotton boll showing lint

Montserrat Sea Island Cotton (*Gossypium barbadense*)

The threats to Agricultural biodiversity are very different from that of the rest of the country's biodiversity. The main threats are lack of adequate research, lack of *ex situ* facilities, very little protection of intellectual property and finally the lack of trained personnel for the implementation of approved policy initiatives.

Of all areas of biodiversity management in Antigua and Barbuda agricultural biodiversity is the most researched and catalogued. It is the area where most of the Government research institutions and funding are dedicated. This is more so than the area of fisheries, forestry or protected areas combined. This situation is notable since the fisheries sector and biodiversity via ecotourism provides much more income to the country in terms of taxes and jobs than in the area of agriculture. But even with the culture of research it is not nearly enough it is still significant and it is the intention of the NBSAP to build on this culture of research and extend this to other biodiversity sectors.

Notwithstanding this disparity in income generating potential between agriculture and other sectors where Biodiversity plays a central role, agricultural biodiversity is important to the country because of its role as an insurance policy against difficult economy times. Agriculture is an important part of the sustainable livelihood of Antigua and Barbudans, in hard time such as global economic crisis, and natural disasters many residents and citizens can turn to agriculture to subsidize their income and source of food. Agriculture, in good times, plays a significant role in supplementing the income of citizens since the majority of the farms can be considered artisanal and backyard gardens are making a significant comeback.

The Livestock sector is important since there is very little chemical inputs used in this industry and so the meat are considered low fat and virtually organic. The value of this sector is not recognized and poorly managed. In fact this important feature of the livestock industry wreaks havoc on the environment since most livestock roam free thus destroying the watersheds and flora.

Agriculture is an important part of the poverty alleviation and food security thrust of Antigua and Barbuda and in this regard the value of the agricultural biodiversity to the country is enormous. Another important value is not yet explored in Antigua and Barbuda is the genetically diversity agricultural products. A recently concluded study on Agricultural Biodiversity in Antigua and Barbuda highlights some of the interesting species that have developed over the years (final report on the website www.environmentdivison.info. There are no attempts at this time to patent or legally protect the intellectual property but it is the intention to move in this direction.

Ecosystems

Antigua and Barbuda's natural charm is embodied in the range of ecosystems that exist in such a tiny island. In fact this is the singular feature of natural island systems that makes them so special. The islands together have one of the most extensive wetlands, beach and coral reef of any other island in windward and leewards. There are extensive watershed systems with the accompanying waterways and forests. There are smaller offshore islands with extensive marine ecosystems of coral reefs and sea grass beds.

Coastal and Marine Biodiversity - Critical Habitats

Antigua and Barbuda are the emergent parts a of a 3 400 km^2 submarine platform, one of the largest in the Eastern Caribbean (Cooper and Bowen, 2001). This sub tidal shelf is one of the unique features of the Caribbean nation and is of particular importance to the country's fisheries and tourism sectors.

Antigua's coastline, which is distinctly indented with numerous islands, creeks and inlets with associated sandbars, is a vast contrast to Barbuda's more uniformed coastline; whose main coastal feature is the Codrington Lagoon along its north-western coastline and extensive coral reef systems. The Lagoon is an important nursery for numerous species of invertebrates and fish and also holds the second largest nesting population of frigate birds worldwide.

The twin island nation's benthic environment is characterised by several reef beds, submerged vegetation consisting of seagrass and algal beds, sand, mud and rock (Table 13). Each of these habitat types has associated with them a range of species which hold both ecological and commercial value.

TABLE 1: BENTHIC HABITATS AROUND ANTIGUA AND BARBUDA

Habitat bottom types	km^2 of habitat	
	Inside 25 m	Outside 25 m
Sand	4.0 km^2	65
Mud	0.15	3
Rocky	0.35	3
Submerged vegetation	2.08	3000
Reefs (Total)	0.45	25
Fringing reefs	0.25	20
Patch reefs	0.20	5
Other (coral and rocks)		304

In 1997 as part of the CFRAMP project to map marine habitats for assessment of fish production and ciguatoxicity in four northeastern Caribbean countries (including Antigua and Barbuda), a thematic map showing seabed classification for Antigua and Barbuda was produced (See annex 3)

Coral Reefs

Antigua and Barbuda's coastline is protected by approximately 25.45 km^2 of reefs. These include barrier reefs near the Southern shore; bank barrier reefs predominantly on the NE and SW of Antigua; patch reefs found mainly on Barbuda, and fringing reefs around both islands.

The system of coral reefs that occur around Antigua and Barbuda is particularly important to the country's fisheries and tourism sectors. It is alarming therefore to note the dramatic decline in the quality of reef areas across Antigua and Barbuda in the past few decades. Several studies have been conducted and chronicle the decline of coral reef health through the years. Weiss (1990) outlined drastic changes in the health of Antigua's reefs over a forty-year period from 1941-1981. By comparing aerial photographs from the two periods he demonstrated marked losses from the tops of coral patch reefs over half of the area surveyed along with associated losses of seagrass beds on reef

flats, particularly on the North Coast of Antigua. He also indicated a decline in number, area and abundance of coral in fringing reefs along the North and Northeast coasts.

Later reports point to little improvement in the overall health of these reef systems all around Antigua, and in some areas of Barbuda. This was exacerbated by the increasing frequency of hurricanes and tropical storms starting from 1991 and continuing for almost a decade thereafter.

Multer's 1996 report of the damage on Antigua and Barbuda's reefs in the wake of hurricane Luis revealed dramatic declines in coral coverage of the studied areas, with physical breakage, increased sediment loads as well as other man and naturally induced stresses being among the reasons listed for the decline. The three sites Multer surveyed showed drastic declines in coral coverage ranging from 8 – 22% when compared to data from the previous decade. Multer (1996) also gave account of breakage of *Acropora palmata*, *Acropora cerviconis* and *Acropora prolifera* in the northeast.

TABLE 2: CORAL COVERAGE AT THREE STUDIED SITES ON ANTIGUA.

Surveyed area	Year	% Live hard coral	% live soft coral
Nonsuch Bay	1983	35%	10%
	1996	7%	2%
Goat Head	1979	20%	15%
	1996	5%	1%
Bishop's Reef	1983	15%	10%
	1996	2%	2%

These figures are consistent with those stated in the assessment study conducted by Goreau and Goreau in 1996. For the twenty one sites covered in that survey almost all were dominated by dead coral rubble with live coral coverage ranging between 5 – 20%. The poor reef conditions were assumed to be as a result of coral diseases particularly for large branching coral such as *Acropora* species. The author also recorded incidences of coral bleaching and elevated water temperatures of close to 30° C at almost all sites.

Since then a 2003 showed little improvement in the overall quality of the reef health. The preliminary results indicated an average coral coverage of 22.9%; 20% coral and 2.9% gorgonians and sponges. All studies suggest the decline in coral reef health exhibited by the studied system were most likely due to a series of human induced and natural impacts and was most likely not a result of any single catastrophic event. According to the reports, the overall decline in reef health is most likely the result of cumulative impacts of increasing sediment loads as a direct result of drought conditions, coastal erosion and removal of healthy mangrove forests, coupled with anchor damage from boating activities, storm and hurricane damage - as well as natural disease, and predation.

Wetlands

In the 1980's it was estimated that wetland systems constituted approximately 11% of Antigua and Barbuda's total land area, amounting to almost 5000 hectares of wetland (de Albequerque and McElroy 1995). Thirty six mangrove sites exist around the islands ranging from small single species stands to larger complex systems. These areas serve to reduce siltation in coastal waters, and also act as habitat for numerous species of invertebrates and birds including several endangered species such as the West Indian Whistling Duck and the Black-Crown Night Heron (Horowith and Lindsay 1997).

PHOTO: HEALTHY COASTAL ECOSYSTEM

TABLE 3. SELECTED WETLANDS IMPACTED BY DEVELOPMENT IN ANTIGUA AND BARBUDA

Wetland System	Degree of Degradation
Ayres Creek	Severely degraded. Some siltation and considerable area destroyed for development on land.
Darkwood	Severely degraded due to extensive sand mining. Clearing of mangrove stands and hurricane
Emerald Cove	Lost. Mangroves cleared and areas filled in for tourism development
Ballast Bay (St. John's)	System lost as a result of backfilling with dredged materials in order to reclaim land for the construction of a new road to hotel development at Deep Bay
Fort James/The Cove	Lost. Most of the mangrove lost due to deposition of dredged materials from the St. John's Harbour. Pollution from domestic and industrial waste.
Carlisle Bay (Fish Pond)	Severely degraded as a result of destruction and removal of mangrove stands. Portions reclaimed in the development of the hotel.
Galley Bay	Severely degraded. One tenth of the area reclaimed for hotel development. Mangroves cleared and dumping of bulk waste in the wetland
Pinching Bay	Slightly degraded as a result of clearance of brush and trees to create access.
Coconut Hall	Lost. 32 hectares of pristine hillside and mangroves cleared for tourism development.
The Flashes	Severely degraded due to land reclamation from disposal of dredged materials. Clearing of mangrove stands and dumping of bulk waste in the wetland.
Deep Bay	This system was severely degraded as parts were
Yorks Salt Pond	Severely degraded due to extensive clearance of

Yorks Salt Pond	Severely degraded due to extensive clearance of brush and mangrove trees. Some deposition of dredged materials as a result of Jolly Harbour Marina
Jolly Hill	Lost to the Jolly Harbour Marina
Valley Church	Slightly degraded. Extensive brush and tree

These systems consisted largely of salt ponds with adjacent mangrove forests typically populated by four species of mangroves – *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa* and *Conocarpus erectus*. Barbuda's Codrington Lagoon makes up a significant portion of this. This system covers almost the entire West and Northern sections of the island and is approximately 7.5 miles long by 2.5 miles wide (Mussington 1983). The Lagoon is particularly important to Barbuda's economy as it provides an ideal environment for juvenile species of important commercial species of fish and lobster (Van der Meeren, 1998). Barbuda's economy is largely based on the lobster fishery.

While Barbuda's Codrington Lagoon has undergone little change over the years, Antigua's wetlands have suffered severe decline, most as a direct result of coastal development to fuel the island's tourism boom over the past 30 years.

Seagrass Beds

There are extensive areas of seas grass beds in shallow waters around the coasts of Antigua and Barbuda. Turtle grass (*Thalassia testudinum)*, manatee grass (*Syringodium filforme)* and shoal grass (*Halodule wrightii*) are common in these shallow coastal areas (less than 20 m deep). The grasses provide shelter for the juveniles of the commercially important queen couch (*Strombus gigas*) and spiny lobster (*Panulirus argus)*. Seagrasses also act as source of food for some herbivores and also provide surfaces for epiphytic plants upon which other species may graze. Calcareous algae (*Halimeda* spp) are found among sea grasses and are believed to be a major source of white sand. The seagrass have many functions one of which is to stabilize loose sand and retard coastal erosion. After intense storm surge from Hurricanes in the region it is not uncommon for some of this sea grass to appear washed up on the sea shores.

Beaches

Antigua and Barbuda is best known for its magnificent white sandy beaches boasting 365 of them. It is easy to understand why much of the early tourism development centered on beach tourism. These beaches, however, are not only important to the tourism market but are a critical habitat for several species of endangered marine turtles that come to our islands to nest annually. The peak nesting seasons for the three known species occur primarily during the summer months and extend through to early fall (October/November) (Fuller et al 1992). The 1992 Sea Turtle Recovery and Action Plan (STRAP) reported some forty three (43) known nesting beaches on Antigua and 13 on Barbuda. Many of these are adjacent to privately owned lands and almost all have some level of development.

The decline in the quality of nation's beaches threatens the nesting turtle population on these islands. Among the issues of concern are inadequate building setbacks on beaches, removal of natural vegetation and replacing them with exotic species, artificial lighting and alteration of nesting beaches with the installation of beach stabilization structures such as groynes, breakwaters and seawalls. Beach erosion also poses a significant threat to nesting sea turtles as it can lead to decrease in the availability of appropriate nesting sites (Figure 8.)

FIGURE 8. BEACH EROSION ON A NORTHERN BEACH IN ANTIGUA (SOURCE: FISHERIES DIVISION)

Of the twenty five beaches monitored on Antigua and Barbuda, over the period 1996-2001, twelve showed signs of erosion (Table 16) (James 2003). Eleven of these were on Antigua, with the remaining site being Palm Beach on Barbuda - which showed erosion at an alarming rate of -0.8 m per year. Of these surveyed beaches, ten are known nesting beaches, two of which are considered to be important nesting beaches. More recently, Crab Hill

Beach, which at the time of the report was not found to be eroding, has begun to show alarming signs of coastal erosion. This beach is a known nesting beach for the Hawksbill turtle.

TABLE 4. BEACHES THAT SHOWED OVERALL EROSION FOR THE PERIOD 1996-2001.

Beach	Average rate of erosion 1996-2001
Dickenson Bay	-0.59 m/yr
Jabberwock Beach	-0.11 m/yr
Deep Bay	-0.73 m/yr
Pigeon Point Beach	-0.07 m/yr
Mamora Bay	-0,09 m/yr
Mosquito Cove	-1.39 m/yr
Dutchman Bay	-0.30 m/yr
Long Bay	-0.25 m/yr
Fort James Beach	-0.21 m/yr
Ffryes Bay	-0.53 m/yr
Falmouth Beach	-0.08 m/yr
Palm Beach (Barbuda)	-0.80 m/yr

Watersheds

Originally divided into 86 watersheds (Halcrow Study 1977) and according to natural drainage boundaries, Antigua and Barbuda's watersheds have been reclassified in 1985 by the "Natural Resource Assessment Project"

funded by the organization of American States (OAS). After the implementation of the project watersheds were aggregated into 13 sites. The categorization was based on land use, land capability and water resource planning. Six of the thirteen watersheds (Figure 1.1) have been identified as major catchments based on socio-economic and agro-ecological conditions; these six primary watersheds occupy 43% of Antigua's land area and sustain 50% of the islands total forests, 90% of its crops and 60% of livestock production. The watersheds also contain 80% of Antigua's ground water supplies and 90% of its surface water in reservoirs (Fernandez 1990). Watershed is the most important terrestrial ecosystem for biodiversity in Antigua and Barbuda.

The major watersheds (Figure 1.1) include Potworks (1), Body Ponds (2), Christian Valley (3), Parham (4), Fitches Creek (5) and Bethesda (6). Potworks and Body Ponds both drain the northern slopes of the south west volcanic region into the Central Plain. From the Central Plain runoff water is diverted eastward and westward; the eastward flow moving through the Potworks watershed and the westward flow journeying through the Body Ponds basin.

A land-use survey for Potworks and Body Ponds, the two largest watersheds containing vital ecological systems was undertaken in 1995, the area occupied by each category is shown in Table 1.1. These categories are referenced from a Report "Geographic Information System for Antigua: Land-Use, Land Capability Land Ownership and New Urban Development," which was prepared for the Organization of American States (OAS) Department of Regional Development in 1988. Some of the values (acreages) have been updated to give a more accurate reflection of the current situation.

Threats, Root Causes and Barriers Analysis

The threats to Biodiversity in Antigua and Barbuda are well documented and are mainly Anthropogenic. There are some natural causes but these pale in comparison. The list of threats and their impacts are prioritized in Table 5.

Table 5 - List of Threats in order of Impact.

Sector	Threats	Cause	Barriers	Actions
Tourism/Housing	Ad hoc development;	- minimum enforcement of building codes and lack of planning regulations;	- DCA's financial and human resources scant	- strengthen DCA Resources (i) training (ii) regulations
Forestry/Agriculture	Overgrazing of vegetation by live stock in our watersheds Destruction of gene pool and tree cover.	Farmers allowing their animals to roam freely. Uncontrolled land clearing. Uncontrolled fires.	Inadequate legislation and lack of political will	Implement a model water shed manage-ment project, enact a new forestry legislation, and update animal laws
Forestry/Tourism	Reduction of biodiversity due to exceeding the ecotourism sites carrying capacities	Lack of baseline studies to determine carrying capacity	Lack of financial resources to implement comprehensive multiuse ecotourism site management plans	Develop the existing Wallings Forest into a well management multiuse ecotourism area.

Sector	Threats	Cause	Barriers	Actions
Agriculture/ Forestry	Soil degradation leading to desertification.	Soil erosion and improper land use practices.	Lack of awareness among farmers and other resource users.	Awareness campaigns. Demonstration of soil/water conservation methodologies.
Tourism	Damage to coral reefs through anchoring etc.	Uncontrolled boating /dive activities around coral reefs.	Lack of management plan or agency	Develop a management plan for the Cades Bay Marine area

Natural Threats

Antigua and Barbuda is faced with frequent droughts and occasional hurricanes. The climate has been changing however to frequent droughts and frequent hurricanes and therefore it is hard to tell what is natural and what is not. For the purpose of this report hurricanes and droughts will be treated as natural occurring disturbances that is negatively affected the habitats and species of birds and other wildlife thus making them vulnerable to invasive.

Drought

Antigua and Barbuda are tropical islands characterized by warm temperatures, limited temperatures and two seasons – the dry season from January to March/April and the rainy season from June to November. Barbuda is noticeably drier than Antigua and is in fact one of the driest islands in the Eastern Caribbean (CCA – Caribbean

Conservation Association1991). Periods of drought result in a decline in vegetation coverage of the country's landscape, and can in turn lead to soil erosion during periods of intense rainfall. This may potentially impact negatively on near shore marine and coastal ecosystems as the loose soil may be washed into the marine environment. Smothering of near shore reefs or sea grass beds is possible as suspended sediments begin to settle - eventually leading to coral reef decline.

Hurricanes

The hurricane season runs from June to November each year. Between 1995 and 1999 Antigua and Barbuda experienced four major hurricane systems (of category 3 and above) and thirteen named storms. This was one of the most active periods the country had experience in about fifty years.

These storms severely impacted the marine and coastal environment. Hurricane damage was recorded on many reef systems (particularly the branching *Acropora* species) and a number of wetlands and their bird populations. The heavy rains of some storms also contributed to coastal erosion and resulted in increased nutrient and sediment loads into the marine environment. These impacts were compounded by coastal development that made the ecosystems vulnerable to frequent extreme events.

Invasive Species

Then introduction of invasive to Antigua and Barbuda has been predominantly been by man. These were introduced to reduce the population of one species using another as in the case of the mongoose or to for agricultural purposes. Although these introductions are still taking place, most of them took place hundreds of years ago and it is difficult to determine what the exact impacts are.

Invasive species have had many direct and indirect effects which can be categorized as harmful to (1) humans health, (2) agricultural and forest production, (3) aesthetics and (4) Ecosystems and natural resources. The invasive species of the most significance to biodiversity in Antigua/Barbuda is the Indian mongoose (*Herpestes javanicus*).

The Indian Mongoose

The mongoose was originally introduced in the late nineteenth (19th) century to the Caribbean and Antigua, in particular, to destroy the introduced rat populations. By the beginning of the twentieth (20th) century, the mongoose population had rapidly increased and it became a serious pest to reptile and bird species. Unlike Antigua, the mongoose does not occur in Barbuda.

Eurasian Collard Dove

The Eurasian Collard Dove introduced in The Bahamas, has continued its spread throughout the western hemisphere, and was first sited in Antigua in the early 1990's. The dove has since established itself as a competitor in our country's national bird population. The population has continued to increase without any serious monitoring of the impact it has had on the national bird population. However, based on studies done in other countries – and assuming the results to be typical - one of the species to be directly affected would be the Zenedia Dove, which competes with the Collard Dove for food.

Anthropogenic Threats

As Indicated before man made threats is the most significant threat to biodiversity. The connection between the economy, environment and Biodiversity has been well established the solutions are also well established. Antigua and Barbuda has taken significant strides to minimize the impacts of economic activities on Biodiversity. Over the past five years there has been significant usage of EIAs and the development of protected areas. These activities are

in their infancy and although they have slowed down the rate of loss of biodiversity the still a decline in the extent and quality of ecosystems in the islands.

Unplanned Housing, Hotel and Industrial Development

In Antigua the main threats to the flora and fauna results from expanding residential and coastal development (hotels) – and the impact from sand mining (1997 Horwith and Lindsay). Coastal development is a conservation threat in Barbuda as well, but with a larger impact created by sand mining. The loss of nesting habitat for wild birds and especially three (3) species of endangered turtles are examples of such a threat.

Over Grazing of Livestock

The Livestock Industry in Antigua and Barbuda has great potential and if managed properly can supply most of the nations demand for livestock products. In Antigua and Barbuda however land tenure for live stock farmers is not formalized and livestock are allowed to roam freely around the island. This has not only caused reduced the economic potential for the sector but has resulted in the devastation of the country's watersheds.

Uncontrolled grazing of livestock (sheep, goats, donkeys and cattle) is the easiest of the threats to the nation to address but due to cultural reasons this practice has been addressed by any policy initiatives. Roaming animals not only poses a threat to biodiversity but human health as well due to car accidents and yet no action has been taken.

Fires

Fire affects the nation's biodiversity each year, particularly during the dry season. Each year over 50 ha of grasslands and wood lands are burnt. In Antigua, the problem is compounded by the spread of lemon grass and invasive species that thrive in fires set naturally or by farmers. Initially introduced to control soil erosion, this

species has taken over vast tracts of land. It forms part of a vicious cycle in which the grass is burnt by livestock owners to replace the older, unpalatable growth with new re-growth that can be eaten by the livestock. (To a lesser extent some areas are burned primarily to increase accessibility to areas assigned for cultivation). The lemon grass is fire-adapted it out-competes, and soon replaces many native Forests species and habitats. The fact that the fires often spread out of control and burn non-targeted areas, further exacerbates the situation (H*orwith and Lindsay, June 1997 A Vegetation Classification of Antigua-Barbuda-Redonda).*

Pollution

Pollution poses a serious threat, particularly to the fresh water and marine environment, as excessive nutrients from liquid or solid waste, agricultural chemicals and silt from dredging. Pollution from agro-chemical run-off and domestic/commercial wastewater is threatening ground water supplies in many of the watersheds. The absence of a municipal wastewater treatment plant has led to a rapid increase in septic tanks and soak-aways, yet these are usually poorly built and rarely maintained leading to inevitable contamination of the water table as well as downstream coastal waters. In the larger conurbations there are associated health risks. There is one solid waste disposal site on Antigua which is not properly lined and sealed so that leachates of toxic materials and other potential chemical wastes also enter into the ground water and are suspected to be impacting on sensitive coastal habitats such as mangroves. Waste handling and disposal is already beyond the handling capacity of the responsible agencies. One primary driver behind this problem is the inevitable further urban expansion and general development which, in the absence of proper planning for waste management, will only serve to exacerbate this problem in the near future placing water resources, coastal habitats and human welfare under even greater threat. This is partly because existing legislation and enforcement are inadequate and do not focus on the problem. Furthermore, there are insufficient funds to implement and manage national waste treatment and disposal. Waste management at the private level is piecemeal and is not regulated nor does it have to meet specific criteria for levels of treatment, recycling, disposal, etc. Other causes of this threat include uncontrolled and unregulated use of agro-chemicals such as pesticides and fertilisers, and the loss of natural filtration systems such as wetlands, mangroves,

etc which would normally provide a valuable level of protection to the coastal ecosystem and the marine environment.

Dredging

Dredging is carried out in Antigua and Barbuda for a number of reasons: creation of shipping channels, marina development, and harbour maintenance. Unfortunately improper management of these activities has resulted in significant alterations in coastal environments, and could negatively affect many of the country's economic sectors (e.g. tourism and fisheries). Perhaps the most severe of these is the impact left by the dredging of the St. John's Harbour, which was initially dredged in the late 19th century when urban landholders decided to relocate the main port of entry from Parham to St. John's.

In addition to dredging at the main harbour, several marina development projects have also required dredging over the years. The abandoned marina projects at McKinnons and the Jolly Harbour Marina, were both dredged during construction of the marinas. Though the latter was stopped short of completion, the project impacted significantly on the northwest coastline and caused significant damage to near shore reefs.

Sewage Disposal

One of the most obvious problems for Antigua and Barbuda is inadequate disposal of sewage. Sewage is disposed through sewage treatment plants, septic tanks, pit latrines and pit less latrines (CCA 1991). A recent study of sewage management in Antigua and Barbuda[3] indicated that most of the sewage generated in the country particularly in the high density areas are disposes of at sea and the waterways. In the city most of the sewage is

[3] Development of a wastewater Management Strategy for St. John's with specific focus on the Northwest Coast tourism zone – SIRMM and GEF IWCAM Report prepared by Caribbean Water Treatment Ltd.

treated but the grey water runs off into the gutters and into the St. John's Harbour. The country lacks any centralized sewage treatment system, despite many studies and attempts to source the financing such as project.

In St. John's effluent from septic tanks is discharged either directly, or through seepage pits into open drains before eventually being released into the Harbour (CCA 1991). This is exacerbated by the lack of adequate collection systems for ship borne sewage wastes, despite the growing importance of the cruise industry and increasing yacht arrivals. Anecdotal reports indicate that there have been incidences of cruise ships disposing of sewage waste directly into the marine environment.

Sand Mining

Sand is a very important resource for Antigua and Barbuda. Not only is it the symbol of our tourism industry, but it is essential to the construction industry, which is the fourth largest sector of the economy. Construction relies heavily on concrete as a basic material and most of the sand matrix used comes Barbuda and to a lesser extent from directly from local beaches. This activity has an impact on beach stability as it reduces the sediment budge from already eroding beaches (Baldwin 2000).

The mining of sand significantly reduces the areas for turtles to lay their eggs. Mining also exposes the beaches to additional erosion from sea level rise and storm surges during extreme weather events.

Institutional Arrangements For The Management Of Biodiversity

The institutional arrangements for the management of Biodiversity in Antigua and Barbuda are well documented and so there is no need to repeat them here. The recently update NCSA (see Environment Division's website) highlighted the capacity building needs of the country. The institutional requirements for the Country were recently negatively impacted by a policy decision of the Government to reduce Government wage bill by offering

incentives for persons to leave the service. This has resulted in the exodus of some of the most experience and trained technical personnel from the Government service.

Further to this the Government reduced its support for tertiary level education. Since the country does not have a university, the cost of a university education is really expensive with most persons have to leave the country to get advance training. Since most of these people have to get loans that attract high interest rates (8 – 10%) it means that the salary levels of jobs will have to be adjusted to attract these persons to a Government position. So far Government has remained too low to attract trained personnel. The country is therefore facing a chronic shortage of trained and experience personal for the management of biodiversity. One immediate recommendation to address is to provide fully supported scholarships in this area for at least ten persons per annum at all levels of studies. This should be available for the next five years to ten years. The Government will of course have to address the remuneration package for trained civil servants.

Conclusions:

Since the preparation of the first national report to the Convention the threats to Biodiversity has not really changed, although the extent of the pressure has intensified. There has been however many activities by the Government to address threats. These include policy adjustments, institutional review, capacity building and allocation of more funding to Biodiversity protection. Since 2001 when the first report was submitted, several new areas have been declared protected, EIA is now mandatory for certain projects and several new Biodiversity related legislation have been passed.

Government actions however were encouraged by the increase knowledge of the population about biodiversity and the importance of it to their health and economic development. This increase awareness and political will has resulted in Antigua and Barbuda making some progress. This progress and the pace of it was also due in part to access to international funding, which acted as a catalyst for Government action. The cost of the institutional, legislative and educational programs however are significant and lack of access to and the small amounts of

international funding is an indication that the vast majority of resources for the protection of globally and nationally significant biodiversity will be up to Antigua and Barbuda.

A good sign of progress in the management of the threats to Biodiversity is that the actions that were acceptable ten years ago e.g. fill in of mangroves and fresh water ponds, sand mining and hunting of endangered species would be met with outrage in 2010. In this regard it is fair to say that for Antigua and Barbuda the threats are being addressed systematically by the Government with the assistance of the international community within the CBD, it is difficult to say at this time what has been the impact on the rate of decline of species and ecosystems without adequate data. It is fair to say however the rate of decline on the area of ecosystems is declining, for Antigua and Barbuda to reverse the rate in decline by 2020 there will be a need for dramatic increase in effort to actually restore degraded areas.

Chapter 2 – Status of The National Biodiversity and Action Plans (NBSAP)

Background

The NBSAP for Antigua and Barbuda was produced in 2001 after extensive consultations with stakeholders and agencies. The NBSAP however never received the approval of the Cabinet and so it was not submitted to the CBD secretariat until many years later. The draft report is now available on the Websites of the Environment Division and at www.cbd.int. The document is considerably outdated and does not reflect the advances made by the negotiations at the international level. These advances include the 2010 targets and the new Island biodiversity program of Work. There is a need to review and update the NBSAP to reflect these as well as future 2010 targets.

The lack of Cabinet support for the NBSAP was a blow to the implementation of the countries commitment to the CBD. The reasons for the Cabinet reluctance is not entirely clear but one possible reason is that the political directorate felt that the strategy outlined within the current draft of the NBSAP had a heavy focus on the protection of biodiversity in situ which in their view will limit the developmental options available to the country. This was also a concern since much of the lands in proposed protected areas were privately owned. The proposal therefore made landowners uneasy since they wanted the right to develop their lands however they please. The NBSAP did not present a clear strategy to address this problem. The overall cost of implementation was also a cause for concern since the cost identified in the report would have resulted in a more than ten-fold increase in the budget allocation to various ministries (the budget allocation to the Ministries were so low that absolute value of the funds were low but it represented an significant increase).

These concerns were further complicated by a clear misunderstanding of protected areas and the ways that they can be implemented, it was viewed that protected areas were a deterrent to foreign investments into the tourism sector particularly in the area construction of new hotels rooms and related infrastructure.

During the period of time that the NBSAP was produced the decision making process for most developmental projects were extremely controversial and political. There was no EIA process required and developmental projects were normally met with resistance from community and Environmental groups. The reactions of these groups included some confrontational activities that grabbed national and regional headlines. It is clear that there was reluctance by the political directorate to add another layer of complexity to this already complex process. Additional layers of regulation and decision-making were therefore seen as a deterrent to foreign investment an important element in the country's development program.

The process of the development of the NBSAP was unprecedented, in terms of the national consultations and the public awareness of biodiversity. There was very little attempt to get the public views on policy issues that the Government was developing. In fact the Government owned and operated the media and there were very little independent media to bring an objective view to the policies of the Government. The consultation process was groundbreaking but as expected it did not go far enough to convince the public and the political directorate that proper management of biodiversity was an important part of the economic development. It did however raised awareness and started a national debate, for the first time, on the role of Biodiversity in economic development of the country.

In the interviews conducted with Ministers as well as recent speeches (UN speeches, budget and others) it is clear that today in 2009, the country has come a long way from the first national report and there is a better understanding of biodiversity and the links to the economic development of the country. Although this realization

came many years after the preparation of the NBSAP, that process was the first step of many towards the education of the public in the importance of the Biodiversity.

Key aspects of NBSAP and Status of Implementation

The strategy envisaged for the BSAP is a four-pronged strategy encompassing:

i. The sustainable use, protection and conservation of Antigua and Barbuda's biodiversity;
ii. The coordination of all efforts and activities involving the sustainable use, protection and conservation of this biodiversity;
iii. The enforcement of all policies, regulations and legislation affecting these efforts and activities; and
iv. The knowledge and understanding of the processes governing biodiversity, and the information required to guide and coordinate the activities involving the sustainable use, protection and conservation of this biodiversity.

Together, these four aspects of the strategy address the obstacles to biodiversity planning including institutional, scientific, legal and policy arena. The elements of the strategy were aimed at improving and maintaining the well being of the people of Antigua and Barbuda as well as the productivity and diversity of the country's ecosystems.

The overall goal identified for the NBSAP is to promote the conservation and sustainable utilization of the island's terrestrial, marine and freshwater biodiversity. To achieve this, a number of objectives have been identified each with a list of activities and actions. The tables below identified these actions and the status of their implementation from 2001 – 2010. The assessment of implementation status was based on interviews with responsible agencies, as well as reports produced over the past ten years. The implementation status is listed as H. M, L or O, high

medium, low and none respectively. H, M, L are indications that there has been some work done since 2010, O means that there were no action implemented at all since 2010.

Objective 1: To mobilize adequate financial resources for the management and conservation of Antigua and Barbuda's biodiversity

Strategy: Develop mechanisms for funding the conservation and management of biodiversity, ensuring that the costs of protection are equitably shared.	
Actions identified	Implementation status[4]
1. Improve Capacity for International negotiations in Biodiversity agreements and to access funds from Donors such as the GEF	M
2. Allocate additional Government funds for biodiversity conservation and management.	(H) Biodiversity budget from the Government has increased over ten fold
3. Establish appropriate user fees for biodiversity resource users (for example, hoteliers, fishermen, tour operators).	O

Implementing Institutions and Agencies - Ministry with responsibility for Environment

[4] The implementation status between 2001 and 2010 is listed as high (H), Medium (M), Low (L) and None (O). H, M, L represents an improvement over the 2001 baseline. O represents no significant change.

Objective 2: To develop the human resource base and strengthen institutional capacity for biodiversity conservation and management

Strategy: Strengthen the institutional and technical capacity of environmental government agencies to effectively manage the components of biodiversity and promote their sustainable use.	
Actions	Implementation Status
4. Establish a Biodiversity Unit	M This was not done but there was considerable capacity building in the Fisheries and Environment Departments. Other departments such as Forestry and DCA are still neglected.
5. Ensure the Agencies have clearly defined Mandates	M
6. Increase training of staff and increase absolute number of staff in Forestry, Fisheries, Environment Division and DCA	L Salary levels are too low and cost of training too high to attract suitable qualified staff.
7. Strengthen the role of NGOs	L
8. Increase information sharing between agencies within Government as well as with NGOs	L
9. Enhance capacity to conduct research and store samples *ex situ*	O

Implementation Institutions and Agencies –
Ministry of Tourism and Environment, Antigua and Barbuda State College, Museum of Antigua and Barbuda; NGOs

Objective 3: To conduct essential research to inform the development and implementation of management practices for the sustainable use of Biodiversity

Strategy: Establish a national Research Programme to document the status of, threats to and value of, biodiversity.	
Actions	Implementation Status
10. Develop a national strategy for conducting research to collect scientific, economic and social data/information	O
11. Establish the CHM	L The site was established but there is a problem with maintaining credible content.

Implementing Institutions and Agencies
Ministry of Tourism and Environment, Ministry of Planning, Ministry of Agriculture, Lands and Fisheries, Antigua and Barbuda State College, Museum, NGOs

Objective 4: To use the results of the Research Program, to develop appropriate management techniques and mechanisms to ensure sustainable consumptive use, and to preserve non-consumptive use values of biodiversity resources

Strategy 1: to use the results in Objective 3 above to develop management approaches for the sustainable consumptive use of flora and fauna. *Strategy 2: Develop management approaches for conservation of species and ecosystems that have significant non-consumptive use value, for example, for tourism or for ecological services provided;*	
Actions	Implementation Status
12. Identify natural/Ecological factors affecting species populations	O
13. Identify management measures needed to prevent over-exploitation of biodiversity resources by users, including measures to control negative biotic interactions that are simultaneously impacting on exploited biodiversity, e.g. control of invasive species that compete with or prey on the biodiversity resource, and measures to protect critical refuge, foraging or breeding habitats.	L
14. Identify key biodiversity resources with high non-consumptive use value e.g. coral reefs, gullies, mongoose, and sea turtles	L
15. Develop taxon-specific management plans to protect species of significant nonconsumptive use value e.g. fish, turtles etc	L
16. Ensure that appropriate elements are incorporated into management plans to protect biodiversity that is of simultaneously high consumptive and non-consumptive use value e.g. coral reefs.	L
17. Develop management approaches to control alien species where studies have shown demonstrable negative impacts on indigenous biodiversity. Ensure adequate legal protection for critical habitats of key species and important ecosystems.	L

Implementing Institutions and Agencies -
Ministry of Tourism and Environment, Ministry of Agriculture, Lands and Fisheries, NGOs

Objective 5: To revise, consolidate and formulate policy and legislation to achieve the conservation and sustainable use of biodiversity

Strategy: Implement existing national legislation and revise or develop new legislation to incorporate biodiversity management policies that are not currently adequately addressed	
Actions	Implementation Status
18. Create a permanent Post of Legal Officer in the Environment Division	O
19. Incorporate Biodiversity issues into EIA Terms of reference	H
20. Develop Market incentives for the protection of Biodiversity	O
21. Develop Legislation to address Biosafety and Biotechnology	L In draft only
22. Develop specific legislations/Regulations for marine turtle protection including their nesting sites	O
23. Regulations to protect nursing and breeding sites	O
24. Develop regulations to address access and benefit sharing	O
25. Conduct workshops to sensitize the judiciary on the	L

regulations/legislation and their importance	
26. Conduct workshops for police officers, Coast guards, customs and other	M

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Agriculture, Lands and Fisheries, Ministry of Legal Affairs

Objective 6: To promote biodiversity conservation and sustainable use through incentives

Strategy: Develop practical incentive measures so that persons are encouraged to conserve biological diversity	
Actions	Implementation Status
27. Develop innovative mechanisms for funding incentive packages	O
28. Adopt suitable economic valuation methods to value the biodiversity so that it can be included in the national accounting system	O
29. Identify sustainable economic alternatives to activities that threaten biodiversity	O
30. Promote the participation of non-governmental organizations in funding incentive packages.	O

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Finance, Ministry of Planning, NGOs

Objective 7: To incorporate biodiversity conservation requirements into land use planning

Strategy: Rationalize land use designation and encourage sectoral planning for environmentally friendly development.	
Actions	Implementation Status
31. Ensure that the National Physical Development Plan is used as a blue print for land use planning.	H
32. Ensure that biodiversity conservation and sustainable use become limiting factors within all land use planning decisions and processes	L
33. Establish strong and transparent linkages for land use planning among sectors	L
34. Introduce legally binding environmental regulations into the land use planning processes which take into account ecological stability, carrying capacity, vulnerability of ecosystems, and impacts on species. These should incorporate EIAs for all hotels and other large-scale development projects adjacent to the beach or on clifftops, and all golf courses and hotel construction inland	M

Implementing Institutions and Agencies

Ministry of Tourism of Tourism and Environment, Ministry of Planning, Ministry of Agriculture, Lands and Fisheries, DCA

Objective 8: To improve public awareness and education

Strategy: Develop public awareness through educational and training activities to ensure broad-based support and involvement in biodiversity conservation.	
Actions identified	Implementation status[5]
35. Incorporate the biodiversity concerns into the planning and execution of the proposed educational activities and curricular at all levels.	M
36. Disseminate information on biodiversity issues to primary and secondary schools through the development of age-appropriate educational materials (posters, books, videos), essay and poster competitions	L
37. Train teachers to teach courses on the topics of biodiversity conservation and sustainable use.	M
38. Provide scholarships for tertiary level studies in fields related to biodiversity management e.g. taxonomy, ecology, and biotechnology.	L
39. Create a web page on biodiversity issues, concerns and action plans for Antigua and Barbuda. The site should also contain pictures and descriptions of fauna, flora and habitats.	H
40. Encourage tree-planting schemes along roads, in new housing developments and around playing fields.	H
41. Conduct community workshops on biodiversity conservation and sustainable use.	L
42. Conduct workshops at hotels to increase the awareness of hoteliers and visitors of the special challenges of tourism on small island environments, and of the part that they can play in ensuring that the country's biodiversity is conserved.	O

[5] The implementation status between 2001 and 2010 is listed as high (H), Medium (M), Low (L) and None (O). H,M, L represents an improvement over 2001 baselines.

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Education, Government Information Service, NGOs

Objective 9: To establish effective *In situ* and *Ex situ* biodiversity conservation measures

Strategy 1: Establish an effective and sustainable system of protected areas *Strategy 2: Establish effective and sustainable ex situ facilities for biodiversity conservation*	
Actions	Implementation Status
43. Establish Natural Heritage Conservation Areas and sites under the National Physical Development Plan as measures to protect critical habitats of rare and endangered species in terrestrial, coastal, marine and freshwater environments.	O
44. Provide for adequate buffer zones and plan for environmentally sound developments in areas bordering the protected areas.	L
45. Identify degraded ecosystems for rehabilitation and restoration.	L
46. Develop and implement ecosystem rehabilitation activities and recovery plans such as the removal of alien species and replacement with indigenous species.	M
47. Encourage adjacent communities to assist in habitat protection and enforcement of regulations.	M
48. Identify species of fauna and flora requiring *ex situ* conservation measures	M
49. Establish or support captive breeding facilities/plant nurseries/arboreta or support existing facilities (Governmental or non-governmental) for appropriate threatened	L

species.	
50. Manage and control the collection of biological resources from natural habitats for *ex-situ* conservation.	L

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Agriculture, Lands and Fisheries

Objective 10: To ensure equitable biodiversity access and benefit sharing

Strategy: Promote necessary actions to facilitate equitable biodiversity access and benefit sharing	
Actions	Implementation Status
Identify entities that are involved in granting access to biodiversity and traditional knowledge and create a database to store this information.	O
Clearly delineate the responsibilities of relevant national actors for biodiversity access,	O
Create an inventory of local/traditional innovations and technologies.	L
Creation of conditions to facilitate access to genetic resources for environmentally sound uses only.	O

Creation of conditions and policies to facilitate equitable benefit sharing for access.	O

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Agriculture, Lands and Fisheries, Ministry of Planning, NGOs

Objective 11: To establish biosafety regulations in order to safeguard biodiversity

Strategy: Encourage activities that will safeguard the environment from risks caused by genetically modified organisms and other forms of biotechnology.	
Actions	Implementation Status
51. Designate authority(ies) responsible for biosafety control, including the establishment of an early warning system.	H
52. Develop regulations to reduce the release of, and to control the use of, genetically modified organisms in the environment.	O
53. Elaborate detailed procedures and measures for risk assessment concerning the release of genetically modified organisms.	M
54. Develop appropriate administrative regulations to promote access to the results of biotechnologies.	L
55. Introduce basic standards for testing, labeling, importing, exporting and commercial use of genetically modified organisms.	L

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Agriculture, Lands and Fisheries, Ministry of Legal Affair

Objective 12: To promote the conservation and sustainable use of biodiversity in various sectors (agriculture, health, fisheries, and tourism)

Strategy 1 (Agriculture): Encourage agricultural biodiversity conservation and sustainable use by revising approaches towards agricultural management.	
Action	Implementation Status
Strengthen the role of the Ministry of Agriculture, Lands and Fisheries with respect to the conservation and sustainable use of agrobiodiversity.	L
Promote knowledge in the agricultural sector of the economic value of biologically diverse farms arising from improved yields, prevention of soil erosion, biological pest control, use of organic fertilizers collected from rearing livestock, and reduction in use of agrochemicals**.[**	H
Collect and disseminate indigenous knowledge and innovations about environmentally sound and biologically diverse farming practices.	M
Develop local organic farming standards and train persons to certify organic farms.	O
Establish an organic Farm Management Programme, which promotes and supports biologically diverse organic businesses.	L
Establish a National Integrated Pest Management Programme.	H
Establish an effective National Plant and Animal Quarantine Programme.	H

Educate farmers on the impacts of agro-chemicals on the environment, including effects on human health, and the benefits resulting from the use of organic fertilizers from livestock**.**	H
Promote the cultivation of crops that require less water and less agrochemicals to produce good yields.	H
Encourage the marketing of organic farming produce.	L
Develop a national planting material programme to include awareness, certification and standards for seed exchange.	M
Regulate and restrict use of herbicides and pesticides, which result in biodiversity loss. This can be done in conjunction with a fully staffed and equipped Pesticide Control Board	M

Implementing Institutions and Agencies

Ministry of Agriculture, Lands and Fisheries, Government Information Service

Strategy 2 (Health): Incorporate biodiversity conservation issues into disease control and waste management practices	
Actions	Implementation Status
56. Review existing management strategies for mosquito and rodent control in relation to harmful impacts on non-target species and sensitive ecosystems.	M
57. Ensure that pesticides in use and timing of application conform to international standards in order to minimize negative environmental impacts on biodiversity.	H

58. Promote natural biological control of disease vectors where appropriate	M
59. Endorse and support the revision and enforcement of existing legislation by the Solid Waste Project Unit to impose significant monetary penalties for illegal dumping and littering.	H
60. Design and implement a national programme to increase awareness of the value of natural habitats for wildlife, and to inform the public of the impacts of illegal dumping on terrestrial wildlife and on the marine environment, e.g. deterioration of water quality and impacts on sensitive nearshore ecosystems, entanglement of fish, sea turtles, and sea birds in plastic garbage.	M
61. Ensure that appropriate techniques and equipment are used to clean up illegal dump-sites to ensure minimum disturbance to natural habitats.	M
62. Actively support recycling schemes through subsidies and incentives to reduce costs associated with landfill maintenance.	H
63. Ensure that solid waste and hazardous waste disposal sites are adequately distanced and buffered from sensitive ecosystems and critical habitats of endangered species.	L

Implementing Institutions and Agencies

Ministry of Health, Solid Waste Authority

Strategy 3 (Fisheries): Encourage fisheries conservation and sustainable use by revising approaches towards fisheries management	
Actions	Implementation Status
64. Ensure that important breeding grounds are protected within Conservation	L

Areas.	
65. Provide mechanisms to facilitate consultations between the Fisheries Division, fishermen and other marine and freshwater resource users, including neighboring community members.	M
66. Ensure that the regulatory systems are in place to maintain populations of exploited species at levels that ensure ecosystem integrity and function.	O
67. Regulate fishing apparatus and methods to reduce adverse effects on marine biodiversity, for example, damage to corals and incidental catch of non-target species.	H
68. Reduce at-sea dumping of garbage and discarded fishing gear.	L
69. Maintain comprehensive catch per effort statistics to provide quantitative estimates of population sizes of targeted species, and thus provide more accurate information on the impacts of exploitation on marine species.	M
70. Sensitize fishermen to the importance of sustainable fishing practices and the need for marine protected areas or reserves to protect critical habitats.	H
71. Train fishermen to allow for self-enforcement of regulatory measures.	H
72. Improve monitoring and enforcement capabilities at sea by strengthening the Coast Guard.	H
73. Develop and implement a consistent monitoring and surveillance program, to scrutinize and document information on the influence that climate change has on the life-cycles of the local fish stocks.	L

Implementing Institutions and Agencies

Ministry of Agriculture, Lands and Fisheries

Strategy 4 (Tourism): Encourage measures to reduce threats to biodiversity resulting from improperly planned and managed tourism development	
Actions	Implementation Status
74. Conduct research to determine the extent to which tourism facilities and their associated activities directly and/or indirectly contribute to the loss of biodiversity.	M
75. Conduct workshops to sensitize the hotel sector to the negative impacts of tourism on the environment, e.g. the negative impacts of beachfront lighting marine life.	L
76. Encourage the application of sound environmental management techniques at existing tourism facilities e.g. encourage the pursuit of Green Globe accreditation by hotels.	L
77. Encourage programs aimed at educating tourism personnel of the importance of the relationship between tourism and biodiversity conservation.	L
78. Promote regulatory measures (seasonal restrictions, entrance fees) to keep the number of visitors in balance with the carrying capacity of sensitive habitats.	O
79. Restrict further development of large hotels, particularly in or adjacent to, protected areas and conduct cost-benefit analyses to determine whether further development should proceed.	O
80. Prevent high impact tourism development in currently undeveloped areas of significant biodiversity importance	L
81. Promote only small-scale, fully trained guided tourism in important biodiversity areas.	L
82. Consider the need for an additional head tax for all arrivals (including cruise ship	M

passengers) specifically to assist in mitigating environment impacts.	There is an environment levy on cruise passengers and this is used for the management of Solid waste.

Implementing Institutions and Agencies

Ministry of Tourism and Environment, Ministry of Finance, Antigua and Barbuda Hotel Association

Summary of Implementation Status

Since the development of the NBSAP there is significant effort in the implementation of the actions recommended. The areas of no improvement tend to be in the area of research, legislation and market measures for protection. Another area that was slow to move was protected area but since 2001 the Government has provided protection status to the top give wetlands and coastal ecosystems. Some of the newly protected areas include:

- Codrington Lagoon National Park;
- North East Marine Managed Area (NEMMA) See Fisheries Division website);
- Obama National Park;
- Cades Reef protected areas;

More information on these areas can be found on the Government's websites and in the case studies detailed in Chapter IV.

Environment awareness and education made significant strides in implementation. Many persons contacted consider the implementation of the NBSAP to be average. Although this is below the high expectations of many, there is general recognition that there is a momentum that will bode well for making any 2020 targets.

An overview of strategy for implementation of NBSAP

The strategy for the Implementation of the NBSAP was to integrate the activities and targets into all stages of the planning and decision-making processes of the country. This integration process was designed to take into consideration the limited capacity of SIDS to allocate its human resources. To make this process successful the following steps were taken:

1. Development of a National policy document that would address all issues that impact on Biodiversity. These include MEAs such as climate change and POPs, national and regional threats to the environment in general. This document would also design plans and programs to take SIDs peculiarities into consideration and would form one major mechanism of reporting to the regional and international community;
2. The document would form the basis for the development of enabling legislation;
3. Develop a capacity building strategy;
4. Full Implementation of the strategy and the development of monitoring indicators;

These steps were completed sequentially and if successful would see the implementation of the NBSAP and related activities in a holistic manner that is consistent with the Strategy of the Convention and the capacity of Antigua and Barbuda.

National Environmental Management Strategy (NEMS)

Notwithstanding the lack of initial political support there was regional and international momentum for the implementation of the Convention. The Organization of Eastern Caribbean States (OECS), whose thrust was to

provide a sub-regional process for the implementation of the Barbados Plan of Action (BPOA), led one such process. This regional process was designed to develop a document that would address the issue outlined in this landmark document and to make a commitment to integrated the BPOA principles into the national planning process. The OECS countries developed a regional mechanism to accomplish this via the Development of the St. Georges Declaration for Sustainable Development principles (SGD). The SGD was considered a regional agreement that is voluntarily implemented by member states. It was envisaged that this agreement would eventually be included into the text of the OECS treaty which would then make it mandatory. Each member state is required to prepare National Environmental Management Strategies (NEM)s. The NEMS for Antigua and Barbuda can be found on the Environment Division's Website and is was produced with funding from the GEF, USAID and other donors operating via the OECS.

The National Environmental Strategy (NEMS) in each of the OECS countries was not only a response to the mandate outlined in the BPOA but was also used to formed the basis of nationally coordinated approach to the sub-region's and national response to most of the MEAS including the CBD. The NBSAP as well as the national reports for UNCCD and the UNFCCC national communication are all fully integrated into the NEMS. Although the NBSAP was incorporated into all Principles of the NEMS it had its own and distinct principle, principle 13 for "*Biodiversity protection and management*".

The NEMS process took into consideration the role of NGOs by providing the community its own resources to ensure that they can provide their own input at their pace. This process ensured that views of the community were included in the final document.

At the end of the NEMS process (which took over 18mths in Antigua and Barbuda) the Cabinet of Antigua and Barbuda in 2004 adopted this as the main policy document for the implementation of all of the Rio conventions including the CBD and its NBSAP.

Legislative review and action;

The NEMS formed the basic policy document (along with issues such as the Montreal protocol and CITES) for the development of draft Environmental Legislation (see division's website). The draft legislation is being developed now for over seven years and it is still to be brought before parliament. It is unclear if this slow pace is an indication of lack of political support or an indication of more work required on the draft. The draft legislation gave special emphasis on protected areas and on the establishment of a trust fund for the management of these areas. If passed the NBSAP would be the one of the last steps in the integration of the CBD and the NBSAP into the national planning and budgetary system of the country. The legislation would give the NBSAP some legal status once it is developed and gazette. It would also provide the framework for the improvement of the capacity requirement for the management of Biodiversity in Antigua and Barbuda.

Institutional arrangements

The NBSAP identified significant institutional changes for the effective implementation of the convention as well as the maximization of the contribution of biodiversity to the economic stability of the country. Since the development of the NBSAP there was the development of the National Capacity Strategy Assessment (NCSA), which contained a detailed assessment of capacity needs of the country for the implementation of all the Rio conventions. This exercise was completed in 2004- 2005 and was approved by the Cabinet. The resulting document has since been reviewed and updated in 2009 to include the new information related to the implementation of the GEF funded SIRMM project.

Implementation of Biosafety National Framework

The NBSAP provided a list of activities that would be taken nationally and regionally for the implementation of the Article 19 of the Convention. At the time of the development of the NBSAP the issue of Biotechnology and its

relevant to Antigua and Barbuda was not widely known or understood. The activities listed in the NBSAP were therefore a direct reflection of the Convention text. The activities highlighted were:

- *"Consult with competent authorities in countries with similar biological resources, on successful policies and mechanisms being used to ensure maximum benefits from the exploitation of those resources*
- *Through a process of consultation, seek advice from relevant expert technicians, the judiciary, other stakeholders including the public at large on ways to ensure safety and equitable sharing*
- *Develop a policy to address biotechnological issues within the framework of relevant international instruments.*
- *Develop and put in place the legal and institutional framework to govern the safety of biotechnology and the equitable sharing of benefits*
- *Promote the adoption of a regional approach to establishing appropriate policies and legislation to ensure bio-safety and fair distribution of the benefits"*

Notwithstanding the lack of Knowledge of the issue of Biotechnology and Biosafety this objective 3.2 of the NBSAP is almost fully implemented. To date the following has been achieved:

- The ratification by the parliament of the Biosafety Protocol of the CBD;
- The development and approval of the National Biosafety Framework in 2005;
- The follow up project to be initiated in 2010 that will see the implementation of the NBF;

Conclusions

The NBSAP process was one of the first steps in Antigua and Barbuda to document the country's response to the management of Biodiversity and the implementation of the CBD. The actions and the process were met with welcome support from the NGO community but with reservations by the private sector and the political directorate. With assistance from international funding agencies such as the GEF along with considerable support from the Government itself the elements and objectives of the NBSAP were integrated into the national planning

process and since then a significant number of actions and objectives have been implemented or on their way to being implement. The biggest problem has been funding for capacity building and the passage of relevant legislation to make the strides made sustainable.

Reports on the implementation of the NEMS and therefore the NBSAP are generated biennially and are available on the website of the Environment Division. A detailed table of actions and the status of Implementation of the NEMS is listed in Annex 2. The Country is obligated to report on the status of its implementation of these actions and since the NEMs and all is provisions may soon become part of the OECS treaty and will therefore soon transform from a voluntary agreement to mandatory.

Chapter 3 – Sectoral and Cross-Sectoral Integration Or Mainstreaming Of Biodiversity

Introduction

The integration of biodiversity protection, sustainable use and sharing of benefits into national policies and programs has been a major thrust of the work of the Government. This process has been long and laborious but has yielded considerable success over the past ten years. Biodiversity issues and protection has been integrated into the Physical Planning process (particularly with respect to Climate change adaptation and mitigation), Education curriculum, and the Financial Sectors of the Government. Other areas of success are the sustained involvement of NGO community where biodiversity is an important part of their education programs and the projects they support. The interest of the media in biodiversity issues has also improved with a significant increase in the number and quality of articles about biodiversity.

Although the integration strategy for biodiversity was the inclusion of the three objectives of the convention it should be noted that in the case of Antigua and Barbuda protection and sustainable use dominated the integration process. The issue of sharing of benefits is still not clearly defined at the national level and therefore did not feature prominently in this process.

The area of limited success and low momentum is the passage of modern legislation to give a legal framework for many of the administrative actions taken to integrate biodiversity and the use of biodiversity for adaptation and mitigation for Climate Change. There has been very limited success in the provision of sustained institutional

support to maintain the success achieved over the past ten years. These capacity building issues are seen as the limiting factor in the integration process and will therefore provide the focus of the biodiversity activities within the country for the next ten years.

Sectoral Integration of Biodiversity – Policy

The nature of SIDS is such that most if not all of the sectors rely significantly on all aspects of biodiversity for their economic growth. Fisheries, tourism, agriculture, are all reliant on nature for their continued success and growth. The integration process was driven by several agencies with the lead agency being the Environment Division. The Environment Division is the focal point of most of the MEAs as well as the GEF focal point. Other agencies involved in the process included the Fisheries Division, Central board of Health and Forestry Departments and of course the Ministry of Foreign Affairs. This process was further supported and even made possible by NGOs and an increasingly aware public.

The approach to integration was the inclusion of biodiversity issues into most national and regional strategy documents. The aim of this exercise was to ensure the eventually inclusion of biodiversity protection and sustainable use into the work programs of key agencies. It is hoped that this approach would result in a efficient and coordinated approach to the implementation of the NBSAP and the NEMS by the inclusion of more projects and programs within the national budget process.

At the time of this exercise there was a relatively new initiative by the Government to develop and document policies on a wide range of issues using

Box 1.

Sustainable Island Resource Management Mechanism

As mentioned earlier the integration strategy involved the inclusion of Biodiversity provisions into key development and planning processes. These actions however required that funding and capacity building must follow closely for the integration to be successful and sustainable. The timing of the integration and the enabling capacity building and education programs is very important. Antigua and Barbuda therefore decided to use a project approach to ensure that the timing was appropriate. This project called the Sustainable Island Resource Management Mechanism (SIRMM) is funded by the GEF and Implemented by UNDP. Project implementation was initiated in 2007 and is expected to be completed in 2011. The objectives of the project are specifically design to play a catalytic and coordinated role in developing and implementation a comprehensive cross-sectoral ecosystem approach for biodiversity management. All project outcomes reports and monitoring of indicators are available on the www.gefantigua.org website.

public consultation. This new approach to policy development provided significant opportunities for the including of biodiversity into as many areas of national development as possible. The limited capacity of the lead agencies to address all of these processes dictated a more strategic approach where only a small number of sectors strategies could be targeted for the necessary lobbying for political and technical support. At the end of this exercise biodiversity management and the objectives of the convention (and to some extent the elements of the 2010 targets) were integrated into the following key processes:

- The use of EIA in the physical planning and development process;
- The inclusion and rationalization of funds within the national budgetary process via a Public Sector Investment Process (PSIP);
- Integration of Biodiversity specific legislation into the draft national environmental management bill;

The process also saw the development of biodiversity strategy reports where more focus is required. These processes produced the following documents:

- National Environmental Strategy[6]
- Protected areas program of work
- Biosafety National Framework[7].
- NBSAP (2010 – 2020)[8]

The integration process encountered unexpected obstacles that slowed the momentum. The inclusion of biodiversity issues into several policy initiatives is highly dependent on having trained personnel in various departments to ensure the implementation of actions identified within the plans and programs. The rate of

[6] See Chapter 2
[7] all of which are available on the website www.gefantigua.org
[8] Still to be initiated

acquiring new trained and experience personnel or the training of personnel was too slow for sustain a meaningful rate of integration. This was made worse with the Government voluntary separation package that resulted in those who were trained leaving for greener pastures. Further to this the actions were not adequately followed up with the passage of new enabling legislation and hence the sustainability of the integration process was not secured. In this regard a comprehensive integration approach with accompanying capacity building and technical support in SIDS was developed and submitted to the GEF for funding. This project, Sustainable Island Resource Management Mechanism (SIRMM) was approved in 2005 with implementation beginning in 2006 (**Box 1**).

Physical Planning and Environmental Impact Assessment.

In 2003 the Government after twelve years of consultations finally passed into law the Physical Planning Act, which for the first time required Environment Impact Assessment for certain types of projects. The Act also provides for the protection of Biodiversity rich areas and for the development of management plans for the effective management of the area. One key feature of this Act that is unique is that changes to boundaries or land use of a particular protected area will require Parliamentary review rather than just Cabinet Decision or publication in the national Gazette.

The Physical Planning Act requires certain types of projects to have an EIA conducted prior to approval. The implementation of this provision of the Act is very good but since there are no regulations to guide the process, the legislation impact is still not as good as it can be. The regulation necessary for the management of the EIA process is yet to be drafted, without these there is some limit to the effectiveness of the Act in terms of both process and transparency.

The Agency responsible for the implementation of the Act is also severely understaffed and is in dire need of modern equipment and trained personnel. These capacity constraints prevent the full implementation of the extent of the Act and the protection that it can provide for Biodiversity. The implementation of the EIA provision of the Act received a boost recently however when the tax incentives provided to investors were linked to the

provision of the EIA and the full implementation of the recommendations within the report. Failure to do so may result in the suspension of incentives to developers. To date this provision has not been tested, but based on the existing threats outlined in chapter one it is clear that this is expected to be tested in the near future.

The entire Act and it schedules can be found on the website of the Government of Antigua and Barbuda at www.ab.gov.ag.

Public Sector Budgetary Process:

In 2003 the Government revamped its budgetary process to make it more relevant to the work program of agencies as well as to improve consistencies with an overall national developmental plan. Prior to these changes the development of the Government's sector recurrent and investment budget evolved as an uncoordinated series of activities undertaken by different units within different ministries. There was very little focused on an overall national development strategy. Further the programs and projects being developed and implemented were not subjected to a review process to determine any potential impacts on the environment. Since the government was conducting most of the infrastructure projects in the island, this step was important mechanism to get the relevant agencies to conduct adequate environment assessment of their projects.

The Public Sector Investment Programme (PSIP) process covers investment activities planned and undertaken by and on behalf of public sector agencies. Coordination and monitoring of the PSIP is important not only for logistical planning for the budgetary process but is also key to the optimization of the use of limited resources in planning. An integrated and coordinated PSIP focuses on achieving predetermined goals as set out by government policy decisions including targets such as those set by the CBD.

Te process is remarkable simple where each agency has to fill out a form and the projects and programs have to meet several criteria, including Environmental integrity. This new criteria for programs was formally adopted in 2006. Taking into consideration that Government programs and projects make up over 50% of development and

that prior to this Government agencies were not required to conduct EIAs this was a big step in the integration of environmental and biodiversity concerns into government projects.

To compliment this, a budget line was approved for EIA within the Environment Division and in 2010 this budget line is almost fully funded with adequate resources to conduct EIA for Government projects and programs. The full manual for the PSIP process can be found at http://www.ab.gov.ag/gov_v3/pdf/treasury/PSIP_Manual.pdf.

Environmental Education:

The success of the integration process is due to one singular factor and that was the improved education of nationals on the economic, health and spiritual importance of biodiversity. The integration of environmental issues into the curricula of schools at all levels began well over 20 years ago in Antigua and Barbuda. The low level of knowledge and even awareness of teachers about environmental issues however limited the success of this program. This and other limitations took several decades to overcome and today most teachers in the primary and even secondary schools are familiar with basic environmental education.

The curricular of schools in Antigua and Barbuda is based on a regional approach by all OECS countries and at the broader regional (Caricom) level for Caribbean Examination Council (CXCs). Each year teachers gather at the regional level to review the curriculum and to make adjustments. There recommendations are however first gathered at the national level via various committees, environmental issues are addressed within the national science committee. As of 2005, the Environment Division was giving the opportunity to serve on the science committee in the Ministry of Education and to make decisions about the science curricula from primary to secondary levels.

This position on the committee also provides the Division with and insight in the resources that the Ministry would require for the implementation of the curricula. This information is then included into projects funding request to

international communities. At the national level the Division has lobbied and received considerable funding for the integration process for formal education. Since 2001, there has been over 200% increase in funds for this activity.

The years 2009 – 2010 have seen an over 50% cut in funding for this activity due to the economic crisis. It is not clear at this time how much more resources are needed for this very important activity but it is clear that the country has achieve considerable success in this area and it is important, for the sake of sustainability, that the country continue this trend for at least another ten years.

Biodiversity & Climate Change

Adaptation

SIDS are considerable the most vulnerable to Climate Change. It is anticipated that entire island ecosystems will be eliminated based on current projections. The draft second National Communication to UNFCCC has indicated that in Antigua and Barbuda the vulnerabilities of human settlements to existing climate related events are in many instances enhanced by decades unsustainable land use practices, coastal degradation, and weak development controls. As the focus for most human activity, the need for sustaining the viability of human settlements against the adverse impacts associated with global climate change is a critical concern in efforts to adapt to climate change.

These areas are likely to be particularly at risk to many of the projected adverse impacts of climate change particularly sea level rise, intensified storm activity, rainfall variability (flooding and drought), and increasing temperatures. These components of climate change will affect human settlements in diverse ways including environmental, health and economic impacts. Since 1995 Antigua and Barbuda has been subjected to over six hurricanes at various strengths including category 5 (the strongest), the country has also experience coastal erosion and frequent flooding events. These events have demonstrated the high risk that the concentrations of settlements

in coastal areas and along waterways are currently subjected to. These risks are likely to worsen based on PRECIS and IPCC projections for climate change.

A diverse range of adaptation options will be required. These will include the use of biodiversity ecosystems as agents of flood control and coastal defense. Ecosystems will be critical as part of an overall national development plan for the strengthening of capacity for disaster response. The strategic use of ecosystems can be used as a potential mode for risk reduction and for assessment of insurance.

Adaptation and risk reduction within the human settlements sector must be integrated with those being implemented in other sectors and areas. Regional and international cooperation and implementation will be essential given the limited capabilities that exist in a small island State like Antigua and Barbuda. A central element of such multinational action must also be to support and encourage action for reducing global emissions, as this is essential for sustainable development.

Some examples of the integration of Climate Change mitigation and adaptation in Antigua and Barbuda include:

- The Northwest Coast rehabilitation project;
- The Rehabilitation of Body Pond watershed;

Each of the above mentioned project is designed to reduce the incidence of flooding in coastal communities while rehabilitating wetlands that are important habitats for numerous birds and marine species. Other projects soon to be implemented are reefs and coastal rehabilitation projects that will restore important marine habitats while reducing coastal erosion. These projects are however contingent on the rate at which the country can recover from the severe economic down turn in 2009.

In many communities such as Urlings there is the protection of the wetlands as part of the adaptation of that area to the impact of hurricanes (see photos below). This strategy has been working and more and more the protection of coastal wetlands as the most important and cost effective program to protect the coastline from extreme weather events.

Photo: *The Urlings community is normally the first and the worst impacted by the eye wall of the storm. This wetland is protected to provide protection to the community and the fishing vessels of most fishers in that area of the coast.*

Mitigation

The use of protected areas as a mechanism for the management of biodiversity is emerging as one of the important building blocks for mitigation negotiations under the UNFCCC. Deforestation is estimated to account for 20% of global emissions (Fourth IPCC report) most of which is taking place in developing countries. Under the CBD there are steps being taken to ensure that over 20% of all forest is under some form of protection by 2020. In some countries like Brazil, there are plans to reverse deforestation by 2020 all in the effort to protect biodiversity and mitigate against climate change. The political support for these steps did not come from the need for the protection of biodiversity on its own, but also for the dire need to reduce the release of green house gases into the atmosphere as well as the urgent need to have forests to continue to ask as sinks for gases already released. To date the only reliable form of sinks are forest and agriculture. This state of affairs provides an opportunity for Biodiversity to provide an important form of mitigation potential in addition to risk reduction from extreme weather events.

In Antigua and Barbuda, although we are so small our forest cannot contribute significantly to global mitigation potential, it is firmly believed that this is an issue which cannot be ignored. The country hopes that by placing most if not all of its watersheds under some form of protection such action would contribute significantly to mitigate against climate change.

More importantly however, there is significant renewable energy potential in the use of wind energy and solar in protected areas and these are currently being assessed. The use of renewable energy within protected areas will be the focus of the country's mitigation and biodiversity work program for 2010 onwards and there has been a policy decision to utilize most of the funds allocated under the GEF 5 Resource Allocation Framework, to achieve this goal. If this project is successful it can form the basis for the financial sustainability of protected and will provide added incentives for more protected areas to be declared around the region. A summary of the project is provided in Chapter 4 - Case Study 2.

An important initiative is the development of a new national park, Mount Obama National Park, and the use of the renewable energy potential of the park to ensure its financial sustainability. The park management plan will be designed to incorporate renewable energy options such as wind and or solar. Excess energy generated will be sold back to the electricity company. This proposal is in its infancy but has so far received significant support from the Government.

Conclusions

The Integration of Biodiversity into the national planning process has had significant success in Antigua and Barbuda. The process managed to achieve success in the areas of physical Planning, Education, Environmental Impact assessment, and the national budget process. There has been over 200% more funding available today from the national budget that there was in 2001. There has been improvement in the drafting of legislation, but there has not been enough being passed in the Parliament. In the case of legislation that has been passed, none has had the necessary regulations in place for its effective implementation.

The area of main concern is that of institutional and capacity building, the country has seen a reduction within the Government sector of trained personnel in the area of biodiversity management. This has occurred in other areas of the Government, such as education and health. The Government has therefore placed its priority for training in those areas and so opportunities for sourcing scholarships in the area of environmental management have lessened. Environmental management does not have the high priority that it had a few years ago and there are no immediate plans to address this problem over the next five years. There is an urgent need therefore to provide resources to train personnel in the area of Biodiversity management and this should be factored into grant funding from relevant international and regional agencies.

The integration of Biodiversity into the planning for climate change presents for many countries significant opportunities for the protection of biodiversity particularly the sustainable management of protected areas. The

country is moving this issue one step further to use protected areas and their potential for mitigation as a means for financial viable of parks.

Notwithstanding the success and failures it is generally agreed there has been a significant strides in the integration of Biodiversity into the planning processes but the stage of integration does not guarantee sustainability and the country is some years away from achieving this target.

Chapter 4 – Conclusions. Progress Towards The 2010 Targets

Introduction;

The COP to the CBD in 2000 adopted a strategic plan that was designed to reduce the rate of global biodiversity loss over the next ten years. These global efforts are due to be assessed in 2010. Like most targets one of the important elements of the work program at the national level was to establish a way to measure the progress made towards these targets. Antigua and Barbuda although supportive of the strategy, did not establish specific national targets and a way to measure them until 2009. Baseline data was also not collected until 2009 and since then there has been no quantitative assessment of species or ecosystems status and the impacts of the actions identified in preceding chapters of this report. Antigua and Barbuda like many of the OECS countries without a university is limited in its capacity for quantitative research on biodiversity. This chapter will therefore reflect this limitation.

There are however adequate and reliable qualitative information to make an assessment of the status and trend of Biodiversity since 2000. To this end this chapter provides a table of assessment of the targets and goals and also detailed assessment through several case studies in a wide range of biodiversity issues of national and international importance.

Establishment of National Targets and Goals

The national targets and goals for Antigua and Barbuda were only developed in 2009. This was done as part of the national GEF project, SIRMM (see chapter two), extensive consultations were conducted as part of this process to provide the list included here. Since the establishment of the targets and indicators there has been the collection of baseline information. These were however collected too late for any meaning input into this report for this report. The table of targets and status of these are included below:

Focal Area: Protection of the components of biodiversity

Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes

Target #	Draft Targets	Status of actions since 2000
Target 1.1.	At least 50% of Antigua and Barbuda's watersheds are provided some level of protection.	20% under some level of protection
Target 1.2	100% of Mangrove Swamps and Beaches protected;	30% under some level of protection
Target 1.3	Conserve 10% of reefs for Dive Tourism only;	Not accomplished
Target 1.4	Ban fishing within the first 2miles of the coastline	Not accomplished
Target 1.5	All LAP produced by the SIRMM project formally accepted by the Cabinet and the DCA,	No LAP produced as yet.
Target 1.6	Ecosystems protection incorporated into Climate Change Adaptation strategy	Not accomplished as yet
Target 1.7	50% of watersheds demarcated and legally Protected	No demarcation achieved as yet
Target 1.8	50% of Bat habitat conserved;	10% of bat habitat conserved.

Goal 2. Promote the conservation of species diversity

Target #	Draft targets	Status of Actions since 2000
2.1	Develop national Land Use plan with areas identified for protection zoned and provide legal protection Under the Physical Planning Act.	Ongoing will be completed in 2010
2.2	20% of the threatened species will see an improvement in their status.	Lack of data cannot assess status
2.3	Develop a Bat management strategy	No
2.4	Preparation of Bees management strategy	No
2.5	Preparation of agricultural biodiversity protection strategy	Completed
2.6	Development and Implementation of the botanical garden plan by 2012	No initiated;
2.7	Marine Turtle habitat protection plan	Initiated
2.8	Prepare and implement an action plan for control of mongoose population and other invasive species	Initiated for lemon grass only ;

Goal 3. Promote the conservation of genetic diversity

Target #	Draft targets	Status of Actions since 2000
3.1	Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable	In the case of traditional species developed in the country this is so far accomplished

	species conserved, and associated indigenous and local knowledge maintained.	but gains not considerable sustainable.
3.2	Establishment of formal registry of livestock in Antigua and Barbuda	Almost completed
3.3	Establishment of formal registry of local agricultural plant species;	Not initiated
3.4	Legal protection provide for species identified on the list in 3.2 and 3.3 above;	Not accomplished
3.5	Propagation plan established for species on formal registry.	Initiated

Focal Area: Promote sustainable use

Goal 4. Promote sustainable use and consumption.

Target #	Draft targets	Status of Actions since 2000
4.1	All Biodiversity-based products derived from sources that are sustainably managed, and Production areas managed consistent with the conservation of biodiversity.	Policy document prepared and standards being established should be completed in 2012;
4.2	Assessment of 20% of biological resources for carrying capacity;	Completed for one of four protected areas;
4.3	100% of threatened plant and animal species banned from commercial trade	Completed;

4.4	Conduct fisheries assessment to provide guidance for landings assessment;	Incomplete
4.5	Conduct and implement carrying capacity assessments for all ecotourism sites;	To be initiated;

Focal Area: Address threats to biodiversity

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

Target #	Draft targets	Status of Actions since 2000
5.1	Update National Land Use Plan	Almost complete
5.2	Provide Protection of 100% lands for agricultural use, watersheds and ecosystems important for Biodiversity use.	Incomplete
5.3	Increase national awareness of land use and development control	10% improvement in national awareness and knowledge (KAP assessment)
5.4.	All Beach setbacks adhered to in planning decisions;	Over 60% of projects adhered to setback requirements;
5.5.	Sand Mining from beaches stopped;	Accomplished;

Goal 6. Control threats from invasive alien species.

Target #	Draft targets	Status of Actions since 2000

6.1	Reduce the areas infested with fever grass by 25%	Initiated the amount cannot be assessed at this time;
6.2	Management plans in place for major alien species;	Except for the offshore islands this has been little progress in this area;
6.3	Including species specific protection plans for at least three species threatened	Not completed as yet;

Goal 7. Address challenges to biodiversity from climate change, and pollution.

Target #	Draft targets	Status of Actions since 2000
7.1	Ecosystems important to adaptation identified and protected.	Watersheds and wetlands identified as well as reefs but only 10% have been given some form of protection;
7.2	Reduce risk of pollution by 30%	Policy reform has been identified but not implemented as yet so this target has not been met;
7.3	Enact the pesticide and Toxic chemical Act.	Completed
7.4	Increase forest cover in all watersheds by 30%	This target has not been met. It is not possible to assess if any has been met since there was no baseline.

Focal Area: Maintain goods and services from biodiversity to support human well-being

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target #	Draft targets	Status of Actions since 2000
8.1	Conduct assessment of the economic, cultural and health impact of ecosystems goods and services delivered in the Body Ponds and Codrington areas;	Completed for Condrington Lagoon only (only 25% complete);
8.2	Biological resources that support sustainable livelihoods, local food security and health care, protected and maintained in two protected areas.	Completed. This is the Codrington Lagoon Park and the Mount Obama Park (50% complete);
8.3	Development of Biodiversity and ecosystems conservation plans for watershed;	0% completed
8.4	Approval and recognition of plans (8.3) by the Development control authority (DCA)	0% completed

Focal Area: Protect traditional knowledge, innovations and practices

Goal 9: Maintain socio-cultural diversity of indigenous and local communities

Target #	Draft targets	Status of Actions since 2000
9.1	Protect traditional knowledge, innovations and practices	0% completed
9.2	Increase capacity of the Barbuda Council and the Body community to develop and implement management plans for their protected areas;	50% completed (see case study)
9.3	Provide a site for the respective communities to meet	50% completed

	and display their work;	
9.4	Establish reliable funding mechanisms for NGOs and Community groups to implement aspects of the plans;	Initiated, about 15% towards completion;

Focal Area: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target #	Draft targets	Status of Actions since 2000
10.1	Drafting of legislation for the management of Genetic materials;	Not initiated
10.2	Establish the necessary institutional arrangements to ensure that benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources.	0% complete

Lessons Learnt and Case Studies

The Protection of Biodiversity in Antigua and Barbuda in symptomatic of most SIDS, there is severe capacity constraints. One or more person leaving the government service or the NGO community can easily undermine the capacity of the country to manage its biodiversity. There is very little one can do to address this situation at this time. Without the national capacity to easily train citizens in the area of biodiversity management and the low

wages Antigua and Barbuda will continue to face the difficult situation where the gains in momentum will always be at risk of being eroded. Further without this capacity the cost of biodiversity management in the country will continue to be expensive from a human resource point of view.

The role of the international community especially donors cannot be understated and should be maintained. The recent economic crisis has resulted in Antigua and Barbuda having to approach the IMF for assistance, this will no doubt place the gains made over the past few years in further jeopardy. At the time of the preparation of this report it is still unclear the extent of the impact of the economic crisis will have on the national biodiversity program but already there have been significant cuts in the budget for various agencies including that of the Environment Division.

Case Studies:

The cases studies presented below have provided important lessons for the management of biodiversity. As part of this exercise the author tried to provide case studies of success and failures. The latter was difficult to access since it was felt that may present a poor reflection of agencies and the Government overall. There was general agreement however that the successes overwhelmed the failures and so the report is not lacking for not highlighting these.

Case Study 1. Invasive Species - Removal of fever grass from the Body Pond Watershed;

Case Study 2. - Integration Biodiversity into the national planning process – Use of EIA in the Physical Planning Process

In 2003, the Government finally passed the Physical Planning Act (2003), among other things required certain projects to have an EIA before being approved. Matters for which environmental impact assessment is required;

- An airport, port or harbour, including a yacht marina;
- A power plant;
- A crude oil or refinery facility or a petroleum and natural gas storage and pipeline installation;
- An incinerator, sanitary landfill operation, solid waste disposal site, sludge disposal site, toxic waste disposal site or other similar site;
- A wastewater treatment, desalination or water purification plant;
- An industrial estate development project;
- An installation for the manufacture, storage or industrial use of cement, paints, chemical products or hazardous materials;
- **A** drilling, quarrying, sand mining and other mining operation;
- An operation involving land reclamation, dredging and filling of ponds; and
- A hotel or resort complex.

The TORS for the EIA is developed jointly by the Environment and Fisheries Divisions and can be designed to include Biodiversity and Climate Change issues. This was put in place in 2004 – 2005. This has had an important impact in the collection of data and the management of ecosystems. In 2002 there were three EIAs conducted as part of the planning process. In 2005, there were over 13 conducted. Over 90% of EIAs are conducted for tourism and or housing project.

Case Study 3. - Integration Of Climate Change Mitigation And Adaptation Into Biodiversity Protected Area:

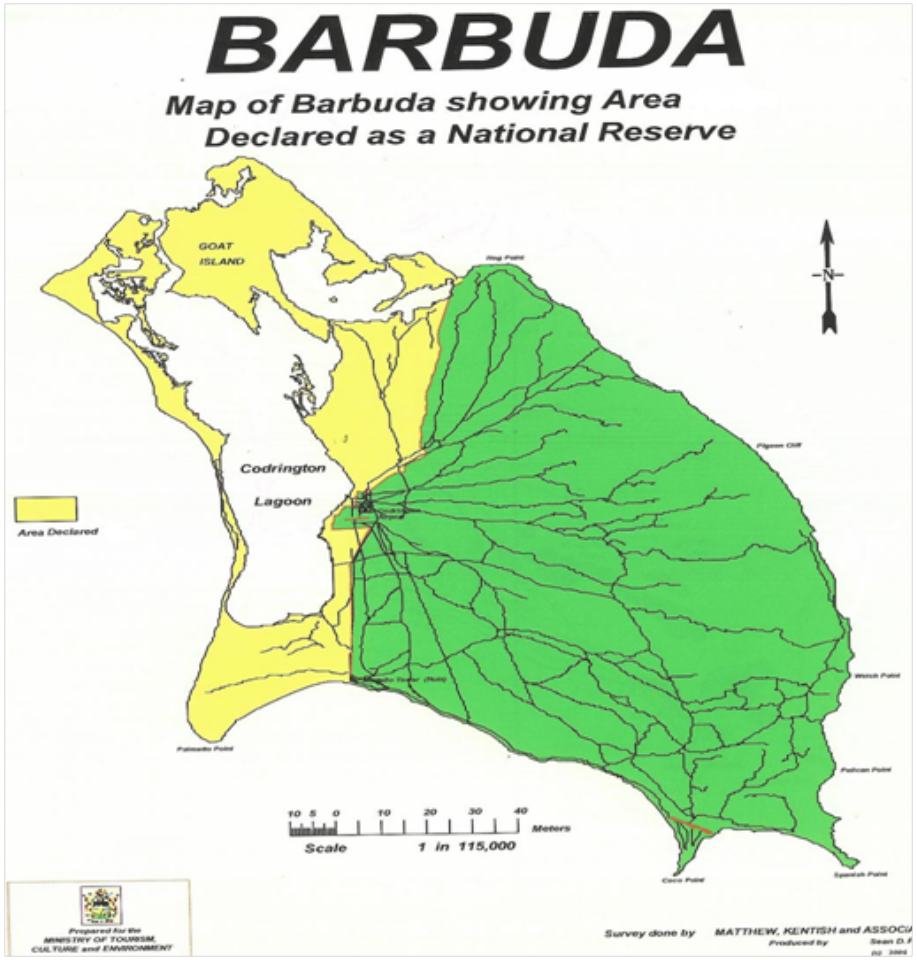
The project is in the design phase and it is being developed to play a catalytic role in developing options for financial sustainability of protected areas within Antigua and Barbuda. The lead agencies for this project are the Prime Ministers Ministry, the Forestry Department, Environment Division and the National Parks Authority. In the Caribbean protected areas have suffered from a lack of a reliable source of financing some attempts to address this problem are trust funds, entrance fees, and market measures. Many of the parks are subsidized by Governments and this presents a barrier to the establishment of new and the maintenance of existing national parks. In order to ensure the protection of ecosystem functionality and biodiversity conservation within a sustainable system it is essential to ensure the financial stability of the protected areas that have been developed. . A new initiative is that National Parks especially in watersheds has the potential to generate significant amount of energy from wind and solar. The power generated can be sold to provide income to the park.

The project will also seek to enhance partnerships between the private and public sectors so as to optimize integrated financial and natural resource management practices in the country. The project will be established in two sites one in Antigua and one in Barbuda. The total project cost will be in the area of 8M USD and will be implemented over a four year period beginning in 2011. The project activities and outputs will include:

i. Develop a renewable source of energy for protected areas which will assist with sustainable financing for protected areas in the country;
ii. Develop a Strategic management Plan for protected areas management which will feature the LULUCF principles and integrate those into the land use plan for the country;
iii. Realign and strengthen policy, legislation and institutional capacity to support the development and management of protected areas in Antigua and Barbuda; and,
iv. Implement the approach through the use of two selected on-the-ground demonstrations at targeted hotspot areas. This is a four year project requiring approximately US$4.9M of incremental assistance from GEF.

Case Study 4. - Codrington Lagoon Protected Area, Barbuda

The Codrington Lagoon was declared a national park in March 2005. Following this, in June 2005 it was designated a RAMSAR site due to its recognition as a wetland of international importance for migratory birds, in particular the Magnificent Frigate Bird (*Fregata Magnificens*). With its environmental importance recognized internationally, it wasn't long before a number of agencies beginning with the European Union through the Caribbean Regional Environment Program (CREP) offered their assistance with establishing the Codrington Lagoon National park. Since then, three other organizations have helped with the further development of the Park into a functioning efficiently managed entity.



Map 1: Map of Barbuda Showing Area Declared as a National Park

Summary of Flora and Fauna for the Codrington Lagoon National Park

A total of 311 species of plants belonging to 84 different families were recorded for the national park. 103 (87%) species are considered native while the remaining 15 (13%) of species are introduced (or exotics). There are 18 terrestrial vegetation community types (also referred to as alliances) and 20 associations found within the Codrington Lagoon Park area.

Table 1. *Physionomic Plant Categories*

Category	Numbers	Percentage
Herbs	11	10
Shrubs	43	36
Vines	8	7
Trees	56	47
Total	**118**	**100**

Table 2. ***Some of the Terrestrial Vertebrates found in the park***

Species	Scientific Name
Native Bats	
Black Rats	*Rattus rattus*
Norway Rats	*Rattus norvegicus*
House Mouse	*Mus musculus*
Fallow Deer	*Dama dama*
Wild Boar	*Sus scrofa*
Helmeted Guinea Hen	*Numida meleagris*

In addition to those listed there are a number of other native birds and reptiles. At least 99 species of terrestrial, wetlands and seabirds have been observed in the national park. There are 13 species of terrestrial and marine reptiles and amphibians recorded for Barbuda most of which are found in the park. There are also feral donkeys, horses, free-roaming and feral goats and sheep, most of which stay largely on the outskirts of the core area of the forest.

The Park is approximately 18km^2 and spans about a third of the island of Barbuda. This is depicted as the yellows section in the map above. The park hosts a great deal of biodiversity with a number of different habitats. The park is not only important for its environmental and status, it is the largest contributor to the economic income of Barbuda. Approximately 50% of the fishing industry in Barbuda depends either directly or indirectly on the Codringon Lagoon for its continued survival.

Project Goals

The long-term goal of the activities undertaken leading up to the declaration and development of the management plan for Park was to develop the park into an effectively managed area with a park management authority and revenue streams that would lead to the sustainability of the park's operation.

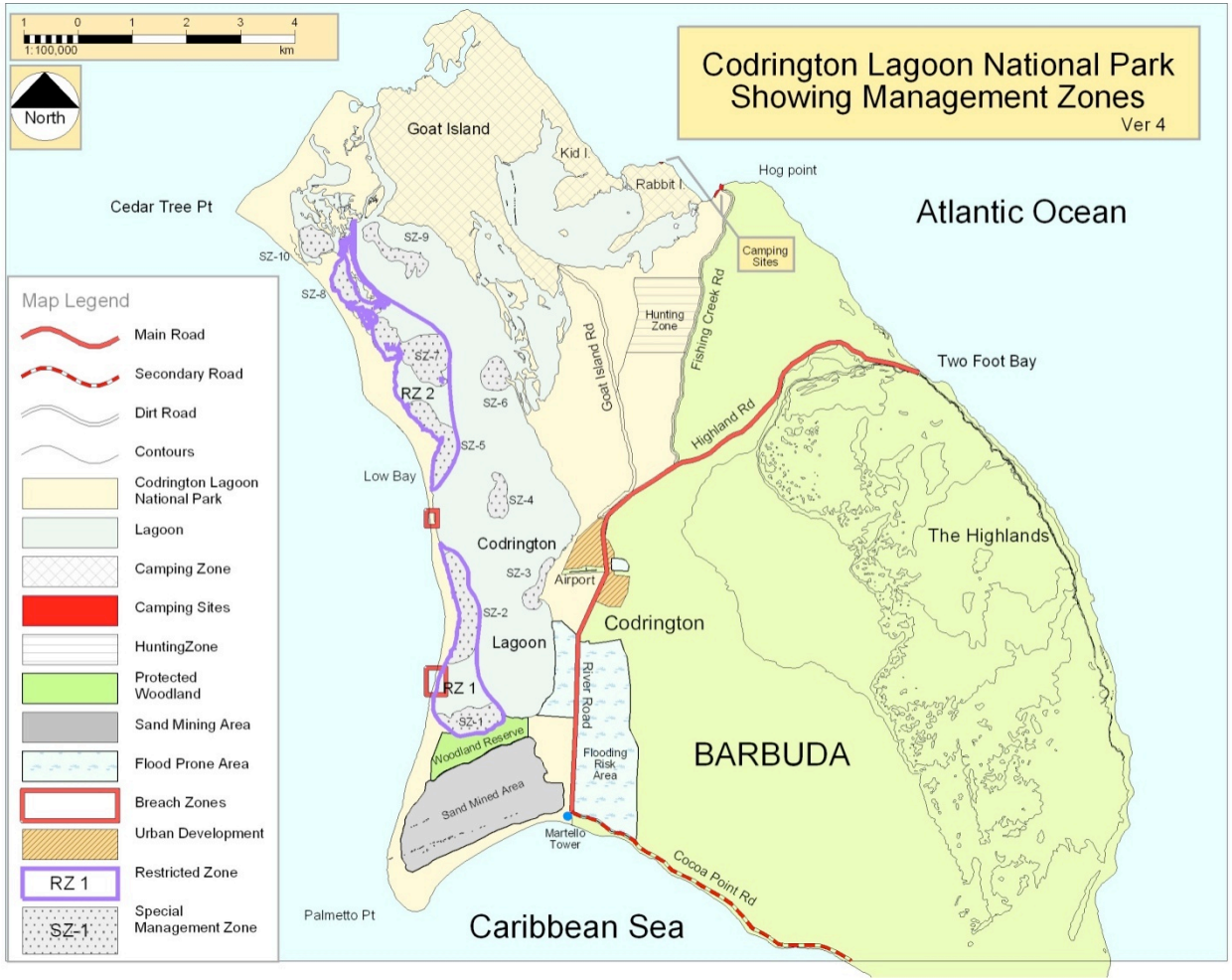
Under the GEF funded SIRMM project with co-financing from the Organization of American States as well as the Organization of Eastern Caribbean States, the following activities were implemented to meet the above stated objectives:

- A stakeholder committee was commissioned to oversee the implement the project.
- A carrying capacity assessment for commercial activities in the park was completed.
- A financial sustainability plan indicating the financial requirements for the sustainability of the park has been produced.
- With assistance from the USAID COTS project, a five year management plan was developed;
- User zones have been identified and markers have been installed to ensure awareness of these zones. The overall zoning of the national park for various activities, including areas with revenue potential was also been completed.
- Construction of Park offices and interpretation center;
- Public awareness and communication plan developed and implemented.

Photo 1. Markers used to demarcate the motorized channel to the Frigate Bird Sanctuary for use by sea taxis with guests

Photo 2: Markers used to demarcate the Bird Sanctuary and prevent guests from getting too close to the Colony of Frigate Birds.

Map 2: Map of Barbuda Showing Use/Management Zones



In addition to the list of activities above an effective public awareness was developed and implemented. Included in this effort has led to the creation of a logo outlined in figure 1. below. Through these efforts, a website (www.nationalparksbarbuda.com).

The hiring of staff for the national park was a tremendous achievement that showed the commitment of the Barbuda Council for the continued success of the national park. A temporary office for the staff was created with a dedicated phone line. Through assistance of the OECS USAID project, a permanent structure to house the office of the national park and an interpretation centre aimed at providing visitor information is currently under construction.

Figure 1: Logo - Codrington Lagoon National Park

Stakeholder Participation in Biodiversity Management

The project was implemented through the use of extensive consultation and actually involvement of the community of Codrington through the Barbuda Council to undertake the implementation of the project. This has resulted significant community ownership of the project. Though the project was not without its difficulties, this method helped to ensure that there was a smoother flow of the implementation of the project. The stakeholder groups included the fishermen association, the small business association, the taxi association and the Barbuda council to name a few.

Case Study 5. Integrating the Ecosystem Approach for the adaptation to Climate Change - Northwest Coast rehabilitation Project

Many of the coastal ecosystems in Antigua and Barbuda consist of wetlands and beaches, with the classic ridge to reefs systems. The Mckinnon's watershed in the Northwest Coast of the Island is one such system. The area is characterized by the waterway, which flows through a densely populated community and drains into a 2Km^2 Mangrove pond. It is bounded by the Caribbean Sea on the western side and Friar's Hill Road on the east side. On the northern side it is bounded by Weatherill's Estate and on the south by Fort James and Cove Lagoon. The area includes McKinnon's Pond, the three main beaches in the NWC, Dickenson Bay, Runway Bay and Fort James Beach and the urban and suburban communities north of downtown St. John's. Once the major tourism resort are of the country, the NWC is resource rich but has been experiencing environmental deterioration and

economic decline in recent years because of the negligence in managing land and resource uses.

The NWC forms part of one of 13 watersheds identified for Antigua. Eight small surface drainage basins have been identified for the NWC. These are mapped on the Drainage Basin Data Map, a reduced version of which is provided in Appendix 1 (c). The largest basin (Basin # 6) drains into the McKinnon's Pond Watercourse and eventually into McKinnon's Pond itself. Hydrological characteristics of these basins were often overlooked in building and other land use practices. As a result of this the incidence of flooding increase with each passing year until eventually flooding occurred with even the slightest amount of rain.

McKinnon's Pond is a major feature of the landscape and hydrology of the NWC. The Pond is hydrological linked to surrounding areas, particularly the low lying adjacent areas < 10 ft in Yorks, McKinnon's area, Dickenson and Runaway Bays. Adjacent lowlands are poorly drained and are typical of flood plain areas providing temporary storage and slow release of storm water. Development adjacent to the Pond in Yorks and other areas has reduced the Pond's natural flood mitigation function. As a flood mitigation measure, permeable soils should not be replaced by soils that retard ground water recharge during land reclamation. Over the years, constructed houses, other buildings, roads and parking areas reduced water infiltration and in so doing increased runoff in critical parts of the area. Measures successfully applied to mitigate flood effects will need to be considered for the NWC. Some of

these measures have been tried for urban areas in various parts of the world and are appropriate for addressing issues encountered in the NWC. Examples of these measures are given in Box 2.1.

The McKinnon's Pond and watershed area is also the home of significant biodiversity. These include Mangroves, fish, crustaceans and of global significant migratory birds. The area has significant colonies of cattle egrets and other local species. During the summer the area was the home to hundreds of thousands of birds, up until 2005 however the number of species and distribution of species across the pond has severely declined.

Restoration of pond

For years the various government agencies and some international groups have argued for the restoration of the McKinnon's area for the sake of biodiversity, the manner in which this was to be done and the cost of it was the source of significant debate. In 2005 however, significant amount of rains caused severe flooding and for the first time a break out of black flies. This latest manifestation of environmental degradation prompted the Government to act. The pond work conducted includes:

- Dredging of the pond to increase the capacity of the pond contain water (up to 6 inches of rain within 24 hours);
- Stabilization of the periphery to facilitate the growth of Mangroves;
- The establishment of "islands" in the pond to provide a safe place of the birds nesting;
- Public awareness campaign about the role of ecosystems and adaptation to climate change

Results:

- Within four months of the initiation of the project, thousands of birds returned to the area for feeding and nesting.
- The area has not recorded any flooding even in excess of the targeted six inches of rain in 24 hours;

- New areas of mangrove growth have been recorded.
- There has been less smelling in the area which signals the return of health to the sediment and water quality of the area;


Photos: New Bird Population Since The Upgrading of the Mckinnons Pond.

The project was executed by the Environment Division and the Department of Public Works and it demonstrated the use of a wetland ecosystem to reduce flooding in an area of significant national and global economic and biodiversity importance. The project however is still incomplete due to lack of funding but once completed will see the return of the area to a level of support for biodiversity that was even more than nature would have intended.

Case Study 6: North East Marine Managed Area

The NEMMA encompasses an area of over 30 square miles and is located in the Atlantic Ocean, on the windward side of Antigua. The area was declared protect in 2006 and through a GEF funded regional project called

OPAAAL, there has been significant strides in the development of Management plans and advanced zoning of the area. There is however much more work to be done to make the area protected. The area is managed by the Fisheries Division within the Ministry of Agriculture, Lands and Marine Affairs.

The area is bounded seaward by:

• lat. 17? 10' 14"N and long. 061? 48' 16"W to
• lat. 17? 12' 09.26"N and long. 061? 48' 14.87"W to
• lat. 17? 06' 34.72"N and long. 061? 38' 36.59"W to
• lat. 17? 02' 47.07"N and long. 061? 38' 36.89"W to
• lat. 17? 02' 48.23"N and long. 061? 40' 26.74"W

Landwards it is bounded by the edges of the mangrove and wetland systems from Beggars Point in the Parish of St. Peter to Friars Head, in the Parish of St. Phillip, where they exist and the line of permanent vegetation at the coastline where they do not. There are over 30 islands, islets and rocks, (named and unnamed), in the NEMMA. There several existing protected areas and other proposed areas located within the NEMMA.

The northeastern areas of the island experience a mean annual rainfall between 900 to 1015 mm. The coastline bordering the NEMMA is very indented with numerous islands, creeks and inlets and associated sand bars and wetlands at their inland end. A large portion of the east, north and south coast is protected by fringing reefs. Areas of sandy bottom in shallow water are found on the west coast and between the fringing reefs and the shore. The numerous islands are largely coralline and range in elevation from as low as 3 m at Nanny Island, to heights of 75 m at Green Island. Channels draining the northeastern areas of the mainland enter the waters of the NEMMA at Fitches Creek (North Sound Stream), Mercers Creek, Ayres Creek (Black Ghaut) and Winthropes Foot Creek. The literature cites discharges from sewage treatment and desalination plants operated by surrounding hotels and from industries as the major contributors for water pollution problems in the NEMMA.


N
NORTHEAST MARINE MANAGEMENT AREA (NEMMA)
ANTIGUA
NEMMA SEAWARD BOUNDARY
0
5km
SCALE
Ecoengineering Caribbean Ltd.
Eco Report No. 10/2007
Date: 31/07/07
CLIENT: OECS -ENVIRONMENT AND SUSTAINABLE DEVELOPMENT UNIT
PROJECT: NORTHEAST MARINE MANAGEMENT AREA (NEMMA), ANTIGUA
DWG. NAME: NEMMA SITE MAP
FIGURE NUMBER 1

Biological

- There are extensive reef systems in the park. They are at various stages of health since they are exposed to significant threats. These include hurricanes and storms, anchors, fishing gear, sedimentation, eutrophication, pollution and disease.
- Seagrass beds are common within lagoons on sandy bottoms and were dominated by turtle grass. Seagrass beds have been damaged by algal growth and anchor damage.
- There are over 240 ha of mangroves (four species) and associated wetlands in the NEMMA. Hurricanes are the major cause of damage to seaward mangroves. Land development has also resulted in removal of mangrove.
- Beaches within the NEMMA are important for recreation, as nesting habitats for marine turtles and for beach replenishment. Some of the beaches show erosion caused by oceanic conditions and hurricanes.
- Many of the vegetation alliances found on the islands within the NEMMA and the adjacent coastline of the mainland are considered uncommon or rare and are likely to become in danger of extirpation due to coastal development.
- Several faunal species of conservation interest occur within the NEMMA including the hawksbill turtle (endangered), the Antiguan racer snake (endemic and endangered), the Antiguan ground lizard (endemic), and a number of endangered, vulnerable and threatened sea bird species.

Conclusions:

Over the past ten years there has been significant improvement in the management of Biodiversity. This however may have reduced the rate of losses but the threats are still significant and there is no clear strategy to address these. Biodiversity managers all over the world are in many cases putting their careers on the line for the protection of

biodiversity and the implementation of the strategic plan of the convention. The threats are still the same if not increasing, and although the public tolerance of these threats is declining the perpetuators of these threats are driven by the powerful urge for profits and the need to create jobs. These are real concerns and are not an issue of greed and must be considered in the management of resources.

Antigua and Barbuda is struggling to rationalize the need for development in a sustainable way but the pressures to develop responsibly is ever increasing. The management of Biodiversity today and the budget allocation is more in 2010 than it was ten years ago. The political will and public expectation is at the point where it is no longer the limiting factor. If the country can resolve the capacity constraints it is facing the rate of decline of biodiversity can be reversed. The case studies featured here clearly demonstrates what is possible.

The issue of climate change and the loss of coastal ecosystems and watersheds have created a new dimension that has assisted biodiversity managers to argue successfully for a stay in the development of certain key areas and a review of the way others development plans are proceeding. In the preparation of this report one of the best lessons identified (featured in the case studies) are those demonstrated by the various government agencies and NGOs as being important in the protection of Biodiversity, as well as facilitating development while reducing risks to extreme weather events.

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Annexes

Annex 1 – Information concerning reporting Party and preparation of national report

Annex 2 – National Progress Towards Achievement of NEMS (SGD) Targets

Annex 3 –Figure 5 below is a representation of one of the maps produced from the project and shows benthic classification of the shelf area around Antigua and Barbuda.

Annex 4(a) – Targets of the Global Strategy for Plant Conservation

Annex 4(b) - Goals and Targets of the Programme of Work on Protected Areas

Annex I - Information Concerning Reporting Party and Preparation of National Report

A. Reporting Party

Contracting Party	Antigua and Barbuda
NATIONAL FOCAL POINT	
Full name of the institution	OFFICE OF THE CBD FOCAL POINT, MINISTRY OF FOREIGN AFFAIRS
Name and title of contact officer	DIANN BLACK-LAYNE, AMBASSADOR
Mailing address	QUEEN ELIZABETH HWY
Telephone	1-268-462-1052, 1-268-462-4610
Fax	1-268-462-2482
E-mail	*dcblack11@yahoo.com*,*dcblack11@gmail.com*,
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	
Name and title of contact officer	
Mailing address	
Telephone	

Fax	
E-mail	
SUBMISSION	
Signature of officer responsible for submitting national report	…… Diann Black-Layne
Date of submission	30TH JANUARY 2010

B. Process of preparation of national report

Antigua and Barbuda is fortunate to have been working on several national and regional processes and projects that have produced reports, maps and some data, on Biodiversity that never existed in one place before. These were very helpful in the writing of chapters one and four. Chapters two and three also relied on reports recently generated but were updated with interviews with Permanent Secretaries and Ministers. These interviews were conducted to determine if there were changing political views to the management of biodiversity.

Since the preparation and submission of the first national report in 2001 Antigua and Barbuda has prepared most of the necessary reports and draft legislation necessary for the sustainable management of Biodiversity. The next step is public and political acceptance for the implementation of the policy recommendations.

One thing remained the same since 2001 and that is the lack of an organized and sustained program of research. Most of the research conducted was mainly in agricultural biodiversity and plant taxonomy. With respect with the former the Ministry of Agriculture has a well developed research program for plant and livestock species, this program is badly in need of equipment and researchers.

Although there is very little research in other agencies where this is happening there is a problem with the sharing of data and information between agencies and with the public. There is a need to work on a data sharing protocol between agencies

Over 2000 pages of reports, and hundreds of photos and maps were reviewed for the preparation of this report. The preparation of the third national report took over 12 months due to the lack of information this report took somewhat less time but the detailed data required for the indicators and to accurately identify trends is still not readily available. The collection, storing and retrieving of data is still not an activity that the Government of a developing country can afford.

The draft report was circulated to Government agencies for review and comments. The draft report was also placed on the website for general public review. It is not expected however that the public will provide much input since the language is somewhat difficult for the general public to appreciate and the length of the report is a deterrent. Public consultations were held however on the draft project documents for biodiversity protection drafted for 2010 and beyond.

The draft report was submitted to the secretariat on the 15th December 2009 and the final Cabinet approved submitted on the 30th January 2010.

Annex II: National Progress Towards Achievement of NEMS (SGD) Targets

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
1. Build the capacity of Member States and regional institutions to guide and support processes of sustainable development	Adoption and initiation of national sustainable development strategies, integrated development planning strategies or their equivalent	Targets and standards have not yet been developed		• Economic Planning • Environment Division • Physical Planning		

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Establishment of a co-ordinating framework for sustainable development, with adequate resources to support the operation of that framework	Establishment of the Sustainable Island Resource Management Strategy for Antigua and Barbuda; Completion of National Land Use Plan; Adequate resources provided to implement plans	No SIRMS Drat land use plan that is over 5 years old No baselines available as yet;	▪ Environment Division; ▪ Development Control Authority; ▪ Ministry of Agriculture; ▪ Ministry of Planning;	Work is in progress and expected to be completed in the next reporting period for the NEMS,	Reports of the SIRMM project; Adoption of new land use plan in Parliament; Funding allocated to Natural resource management;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Full integration of national environmental priorities into institutional and legal frameworks	Full enforcement of legislation related to EIAs and the zoning recommendations;	There are no baselines established as yet	▪ Environment Division; ▪ Fisheries Division; ▪ Central Board of Health and; ▪ Development Control Authority;	There is a significant improvement in the enforcement of legislation. This is however dependent of political will and resources allocated to agencies.	# of illegal development identified and regularized;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Ratification and full participation in the major international and regional environmental conventions that support the priorities and objectives of Member States	Attend the meetings of the MEAs;	There is about 75% representation of Antigua and Barbuda at international and regional meetings.	Environment Division; Forestry Unit; Fisheries Division; Ministry of Foreign Affairs; DCA	There is relatively good participation of Antigua and Barbuda in meetings and training opportunities presented by meetings, there are some limits however on staff and financial resources on meetings which are not funded by the respective Secretariats.	# of meetings called # of meetings attended;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Preparation of, and commitment of funding for, capacity development plans for national environmental management agencies	The targets have not been set as yet		Environment Division Ministry of Agriculture; Developmental Control authority	There is a capacity building strategy being developed and this will be ready in 2009.	
	Establishment of agreements with relevant regional institutions	This is not yet been addressed and to date there are no plans to address this anytime soon.				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Creation of centralised or networked national data management systems	There is a generalized target which is the establishment of a national environmental database. A detailed target and indicators are still being developed.	Not yet available.	Environment Division; National IT Center; Ministry of Agriculture; Developmental control Authority; Survey Department;	This activity has been initiated and will see results in 2010.	▪ # of GIS maps produced; ▪ Access to information; ▪ # of technical studies conducted using the database; ▪ # of consultants using database for EIAs and other purposes; ▪ Availability of data online; ▪ Use of data in schools; ▪ Production of a state of the Environment Report;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
2. Incorporate the objectives, perspectives, resources, and talents of all of society in environmental management	Acknowledgment of and making appropriate provision for the meaningful and informed participation of civil society, local governments and administrations, and the private sector as managers and decision-makers	▪ Development of environmental codes of practice for the hotel on the Northwest coast; ▪ Increase environment education into the hotel training school as well as other technical schools; ▪ Increase general environmental education to the public;	▪ There is a very limited baseline for this area, but this will be collected as part of a GEF project for 2009. ▪ One hotel in the area has implemented Green Globe standards; ▪ Baseline for environmental quality is currently being collected;	▪ Central Board of Health; ▪ Environment Division; ▪ Solid Waste Management Authority; ▪ Ministry of Tourism; ▪ Attorney General Office	The standards and other technical documents are underproduction. These should be completed by 2010.	▪ Project reports; ▪ Water quality baseline reports; ▪ Number of hotels using international environmental standards; ▪ Establishment of legal framework;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Identification of and commitment of resources to strategies to: • increase the extent and quality of environmental education;	Increase level of environmental education to at least levels of primary school;	There is considerable effort already in t he schools and in the public;	Environment Division; Ministry of Education;	There is considerable knowledge but there is significant room for improvement;	Periodic KAP studies;
	• improve the technical capacity of non-governmental partners;	There are no targets at this time;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• encourage the adoption of acceptable environmental standards and codes of practice by private companies;	There are no targets at this time;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• provide incentives for good environmental practices at the individual, household and community levels.	There are no targets at this time for this goal;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
3. Achieve the long-term protection and sustained productivity of the region's natural resource base and the ecosystem services it provides	Development, adoption and monitoring of the implementation of national policies and strategies for: • water resource management and use efficiency	Development of a National water management protocol;		APUA; Ministry of Agriculture;		
	• land development, administration and management	Upgrade and finalize the National Land use plan				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• biodiversity protection	Increase number of protected areas; Establishment of a trust fund for the funding of protected areas;	▪ No trust funds at this time; ▪ There are several protected areas already established;	▪ Fisheries Division; ▪ Environment Division; ▪ National parks Authority;	▪ New protected area in Barbuda declared in Codrington lagoon Barbuda; ▪ New marine protected area in North Sound in Antigua.	Number of areas protected; # of staff hired for the management of the protected areas and; Establishment of trust fund;
	• marine and coastal resource management	Establishment of marin e proteted areas; Update the Fisheries Act;			See above; Fisheries Act passed in 2007 - 8	Establishment of park management Authority; Enforcement of legislation;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• creative and sustainable management of solid, liquid, hazardous and biomedical wastes that includes provision and incentives for reuse and recycling wherever appropriate	There are no targets set for this as yet;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• protected area management	See above				
	Maintenance or increase in water availability, supply and quality	Se above				
	Improvement in soil conservation practices	See above				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Reversal of reduction in extent of key ecosystems, including coral reefs, mangroves, seagrass beds and forests	See above				
	Halting or reduction in the loss of biological species	See above				
	Reduction in amounts of pollution in fresh water supplies	There are no targets as yet				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Increase in the use of clean technologies	There are no targets discussed as yet;				
	Increase in percentage of solid and liquid waste that is properly treated or disposed of	Targets are not being developed;				
	Environmentally sound management of chemicals and hazardous waste	Passage of updated Pesticide and Toxic Chemicals Act;		Ministry of Agriculture; Pesticide Control Board;	Legislation passed	

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Legal protection of important natural sites					
	More efficient use of energy	There are no targets set as yet;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
4. Ensure that natural resources contribute optimally and equitably to economic, social and cultural development	Incorporation of natural resource values, revenues and management costs into systems of national accounting	In general there are no plans to address this issues over the next reporting period since there are concerted efforts to address the issue of decline in economy and this action may increase the cost of goods and services;				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	Identification of and commitment of resources to strategies to: • assure that all international trade agreements signed by Member States conform to national sustainable development objectives and include safeguards against environmental damage	Environmental provision included in all new trade agreements;	Not sure of baselines	Department of International Trade; Ministry of Trade;	Environmental provisions in EPA; Draft Provisions provided in the upcoming Canada/ Caribbean negotiations	Final agreements signed;

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• explore options for increasing the sustainable contribution of natural resources and environmental services to local livelihoods and national economic development					

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• adopt policies and measures to reduce risk and improve disaster preparedness and response	Update of national land use plan; Development of a mitigation and adaptation strategy;	Draft land use plan already in place; No mitigation and adaptation strategy;	National Office of Disaster DCA	All policy documents are currently being developed;	Adoption of the plans at the level of Cabinet;
	• adopt strategies, plans and policies to address climate change and disasters	See above				

1 SGD Goal	2 SGD Target (2010)	3 National Target(s) or Standard(s)	4 Baseline	5 Lead agency(ies)	6 Results or progress	7 How measured?
	• increase equity in the allocation of and access to environmental goods and services	There are no plans to address this in a coordinated manner.	No baselines available			

Annex III - Figure 5 below is a representation of one of the maps produced from the project and shows benthic classification of the shelf area around Antigua and Barbuda.

Interpreted Seabed Classification

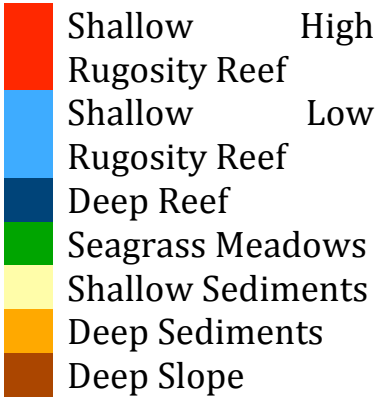
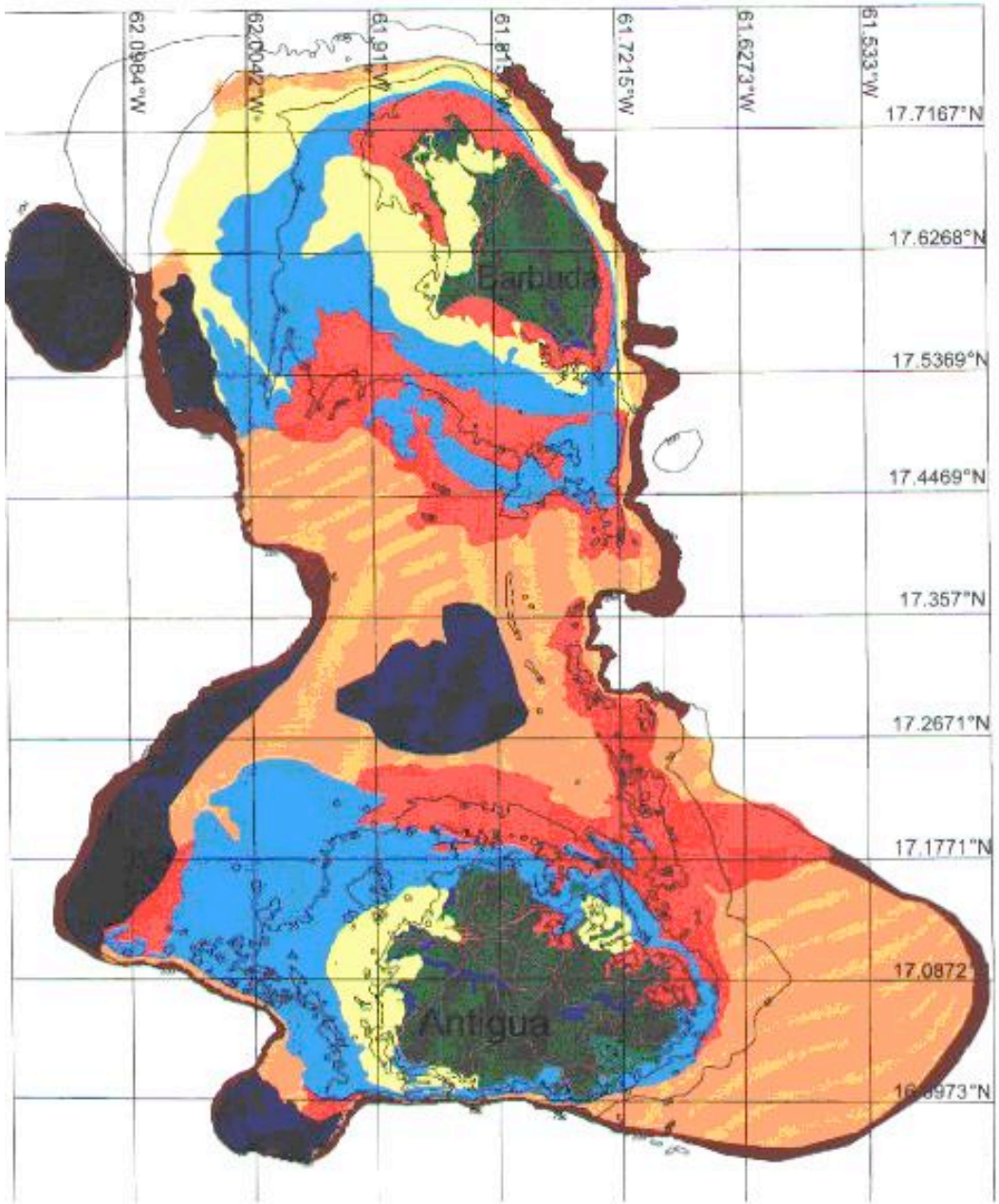


Figure 5 below is a representation of one of the maps produced from the project and shows benthic classification of the shelf area around Antigua and Barbuda.


62.0984°W
62.0042°W
61.91°W
61.7215°W
61.6273°W
61.533°W
17.7167°N
17.6268°N
17.5369°N
17.4469°N
17.357°N
17.2671°N
17.1771°N
17.0872°N
Barbuda
Antigua

Annex IV. – Plant Biodiversity and Protected Areas

Annex IV (a) - Targets of the Global Strategy for Plant Conservation

Targets	Progress
Target 1: A widely accessible working list of known plant species, as a step towards a complete world flora	Work in this area has already begun. A Red List of endangered plant species has already been compiled. Additionally, through the work being completed under the GEF Program of Work on Protected Areas project among other initiatives, a list of know plan species has been compiled and work is constantly being done to update the information on these lists for the country. A database on plants is in the process of being compiled for the Antigua and Barbuda.
Target 2: A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels	A preliminary assessment of the conservation status of known plant species on a national level has been undertaken. Through the initiatives of a number of projects undertaken with government and donor assistance, efforts are underway to establish a database of information on the species of plants that are in need of protection or are currently being protected.

Target 3: Development of models with protocols for plant conservation and sustainable use, based on research and practical experience	This target has been undertaken through the development of a number of areas within Antigua and Barbuda as protected areas. Currently, the country is trying to increase the number of protected areas declared and managed as well as implement an effective management system that would lead to the overall conservation and better or sustainable use of the plant species within the island.
Target 4: At least 10 per cent of each of the world's ecological regions effectively conserved	With the work currently being undertaken locally for the declaration of protected areas and recent initiatives to develop a biodiversity corridor within the Caribbean region it is likely that this goal will be met.
Target 5: Protection of 50 per cent of the most important areas for plant diversity assured	The country has begun some work on this goal through initial biodiversity analysis which are currently being undertaken. It is anticipated that once the gaps analysis have been completed the country will have a better idea of the areas in need of protection. The development of a land use plan, which is currently underway, will ensure that areas most important to the protection and conservation of important plant species will be adequately protected.
Target 6: At least 30 per cent of production lands managed consistent with the conservation of plant	Through recent initiatives under the Sustainable Island Resource Management Mechanism, actions have been

diversity	undertaken to ensure that farmers cultivate their lands with the intension of ensuring the sustainable use of the land and thus essentially promoting conservation of plant diversity. The land use plan also being developed is also intend to ensure the conservation of plant diversity.
Target 7: 60 per cent of the world's threatened species conserved in situ	Work has begun on this target through the gap analysis being conducted and through the Sustainable Island Resource Mechanism Project.
Target 8: 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes	Work on this has begun through the gap analysis and the work being done in the creation of protected areas within the country.
Target 9: 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained	Work has begun in this area with the gap analysis being completed and the protected areas being created.
Target 10: Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems	Work on the location and management of alien species is currently being undertaken as an initial step towards the creation of management plans for these species which threaten the native plants etc.
Target 11: No species of wild flora endangered by	Through steps undertaken to incorporate the CITES into the

international trade	operations of the country, this objective is currently being met. Though there is still some work to be completed, much has been done to ensure that no species of wild flora is endangered by international trade.
Target 12: 30 percent of plant-based products derived from sources that are sustainably managed	There are not many species of plants currently used for commercial production in Antigua and Barbuda. In the areas where this has been noted as a priority, public awareness campaigns have been undertaken to ensure that the producers are aware of the importance of the raw material they use and the need to sustainably manage same.
Target 13: The decline of plant resources, and associated indigenous and local knowledge innovations and practices, that support sustainable livelihoods, local food security and health care, halted.	Community groups are involved in the development of protected areas as well as national programmes relating to the use of resources and their sustainability. Sustainable livelihood activities are currently being undertaken in areas where it is deemed necessary in order to ensure that this target is met.
Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.	A comprehensive community awareness program has been embarked on in each of the protected areas that have been established thus far. Additional PR work is being planned as the country moves forward with the development of a systems plan for the management of protected areas and its demonstration on how to sustainable manage the ecosystems

	found in small islands such as Antigua and Barbuda.
Target 15: The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy	The capacity building needs of the Plant Protection unit as well as the Environment Division and other units working directly or indirectly with the conservation of plant species is currently being assessed/addressed to ensure that this target is met.
Target 16: Networks for plant conservation activities established or strengthened at national, regional and international levels	This is currently being done through the Plant Protection Unit, particularly with respect to the protection of plants from the effects of pests and diseases. Additionally, at the level of CARICOM, Plant Health Directors of Member States participate in Working Groups which discuss and decide on actions to be taken to manage specific plant pest situations in the region.

Annex IV (b) – Goals and Targets of the Programme of Work on Protected Areas

Goals	Target	Assessment
1.1. To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.	By 2010, terrestrially [9]/ and 2012 in the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area system is established as a contribution to (i) the goal of the Strategic Plan of the Convention and the World Summit on Sustainable Development of achieving a significant reduction in the rate of biodiversity loss by 2010; (ii) the Millennium Development Goals – particularly goal 7 on ensuring environmental sustainability; and (iii) the Global Strategy for Plant Conservation	The country has undertaken work on this target through the help of the Organization of Eastern Caribbean States and the Global Environment Facility. Through both organizations, the country has undertaken the development of a systems plan which will lead to the overall development and management of protected areas on a sustainable basis throughout Antigua and Barbuda. Through the assistance from both organizations, the country is currently completing a data and ecological gap analysis which will lead to the overall assessment and development of an effective protected areas system for the country.
1.2. To integrate protected areas into broader land- and	By 2015, all protected areas and protected area systems are integrated into the wider land-	Once the system plan has been completed and the current protected areas system being developed has been established it is anticipated that this goal will be

[9]/ Terrestrial includes inland water ecosystems.

Goals	Target	Assessment
seascapes and sectors so as to maintain ecological structure and function.	and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity [5]/ and the concept, where appropriate, of ecological networks.	met. To ensure the goal is met however, initial work has begun through the development of a land use plan which will indicate the areas of primary concern with regards to protected areas status.
1.3. To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.	Establish and strengthen by 2010/2012 [6]/ transboundary protected areas, other forms of collaboration between neighbouring protected areas across national boundaries and regional networks, to enhance the conservation and sustainable use of biological diversity, implementing the ecosystem approach, and improving international cooperation	Initial work has been undertaken in this area as all the Caribbean countries are now working on the establishment of a biodiversity corridor through the Caribbean Challenge Initiative being spearheaded through The Nature Conservancy.
1.4. To substantially improve site-based protected area planning and	All protected areas to have effective management in existence by 2012, using participatory and science-based	The system of management for protected areas is a critical part of the activities currently being undertaken. In some cases, draft management plans for different types of protected areas have already

[5]/ The concept of connectivity may not be applicable to all Parties.
[6]/ References to marine protected area networks to be consistent with the target in the WSSD plan of implementation.

Goals	Target	Assessment
management.	site planning processes that incorporate clear biodiversity objectives, targets, management strategies and monitoring programmes, drawing upon existing methodologies and a long-term management plan with active stakeholder involvement	been developed. These will be incorporated into the necessary policy decision to be undertaken once the system plans for protected areas is developed.
1.5. To prevent and mitigate the negative impacts of key threats to protected areas.	By 2008, effective mechanisms for identifying and preventing, and/or mitigating the negative impacts of key threats to protected areas are in place.	The country is behind on achieving this target. Presently the areas to be protected are being assessed. Additionally, in making this determination the threats to the protected areas are also being determined. Once this activity has been completed, it is anticipated that the mechanisms needed to ensure the mitigation or prevention of negative impacts of these key threats will be established and implemented.
2.1. To promote equity and benefit-sharing.	Establish by 2008 mechanisms for the equitable sharing of both costs and benefits arising from the establishment and management of protected areas	The country is behind on achieving this target. Currently, a national financial capacity study on protected areas is being commissioned. Regionally, through the assistance of the OECS, such a study is also being undertaken. These studies will help to ensure that the country moves towards guaranteeing an equitable sharing of both the costs and benefits arising from the establishment and management of protected areas.

Goals	Target	Assessment
2.2. To enhance and secure involvement of indigenous and local communities and relevant stakeholders.	Full and effective participation by 2008, of indigenous and local communities, in full respect of their rights and recognition of their responsibilities, consistent with national law and applicable international obligations, and the participation of relevant stakeholders, in the management of existing, and the establishment and management of new, protected areas	The government has embarked on a program to include the communities surrounding areas declared as protected areas as well as those being proposed for declaration in the dialogue surrounding the management of these protected areas. This is a continued integration process.
3.1. To provide an enabling policy, institutional and socio-economic environment for protected areas.	By 2008 review and revise policies as appropriate, including use of social and economic valuation and incentives, to provide a supportive enabling environment for more effective establishment and management of protected areas and protected areas systems.	This goal has not yet been met. With the commissioning of the development of a system of protected areas for the country, it is anticipated that this goal will be met by 2010.
3.2. To build capacity for the planning,	By 2010, comprehensive capacity-building programmes and initiatives are implemented	Work towards achieving this goal has been undertaken. A capacity building study is currently in progress. On completion it will highlight the capacity

Goals	Target	Assessment
establishment and management of protected areas.	to develop knowledge and skills at individual, community and institutional levels, and raise professional standards	building needs of the relevant agencies currently involved in the development and management of protected areas.
3.3. To develop, apply and transfer appropriate technologies for protected areas.	By 2010 the development, validation, and transfer of appropriate technologies and innovative approaches for the effective management of protected areas is substantially improved, taking into account decisions of the Conference of the Parties on technology transfer and cooperation.	No work on meeting this target has yet been undertaken in Antigua and Barbuda. However, with the initiatives being launched through the Governments of various developed countries including Germany, it is anticipated that the country will move towards working with other countries in the transferring of technology to ensure better management of the protected areas that are created in Antigua and Barbuda.
3.4. To ensure financial sustainability of protected areas and national and regional systems of protected areas.	By 2008, sufficient financial, technical and other resources to meet the costs to effectively implement and manage national and regional systems of protected areas are secured, including both from national and international sources, particularly to support the needs of developing countries and countries with economies in transition and small island	This goal has not yet been met. However, Antigua and Barbuda has initiated activities to ensure its completion. Currently, a national financial study for the overall management of protected areas is being commissioned. As a preliminary step to ensuring that this target is met, two studies on the financial sustainability of two protected areas currently being developed have been completed.

Goals	Target	Assessment
	developing States.	
3.5. To strengthen communication, education and public awareness.	By 2008 public awareness, understanding and appreciation of the importance and benefits of protected areas is significantly increased	Work has already been commission on meeting this target. A continuous effort in this area is required however and as such, a comprehensive public awareness strategy for the distribution of information related to protected areas is currently being developed.
4.1. To develop and adopt minimum standards and best practices for national and regional protected area systems.	By 2008, standards, criteria, and best practices for planning, selecting, establishing, managing and governance of national and regional systems of protected areas are developed and adopted.	The government of Antigua and Barbuda is behind on achieving this target. Some work has begun in terms on the developing of criteria for the establishment, management and governance of national protected area systems however there is still some work to be completed before this target is met.
4.2. To evaluate and improve the effectiveness of protected areas management.	By 2010**,** frameworks for monitoring, evaluating and reporting protected areas management effectiveness at sites, national and regional systems, and transboundary protected area levels adopted and implemented by Parties	Antigua and Barbuda is behind on achieving this target. However, through the protected areas system plan being developed as well as the works commissioned through other initiatives, it is anticipated that the target will be met by 2010.
4.3. To assess and monitor protected area status and trends.	By 2010, national and regional systems are established to enable effective monitoring of protected-area coverage, status and trends	Work on this target has begun. The government has initiated activities to develop a comprehensive system of protected areas with databases created that will lead to the effective monitoring of the protected areas

Goals	Target	Assessment
	at national, regional and global scales, and to assist in evaluating progress in meeting global biodiversity targets	and ensure proper evaluation both from a national and international standpoint.
4.4 To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.	Scientific knowledge relevant to protected areas is further developed as a contribution to their establishment, effectiveness, and management	As part of the capacity building study commissioned by the government, the available scientific knowledge and the necessary training to improve such knowledge in the country will be assessed. Recommendations to fill any gaps that exist will be made.