



# Guyana

## Fourth National Report to the Convention on Biological Diversity



Convention on  
Biological Diversity







# Guyana

## Fourth National Report to the Convention on Biological Diversity

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## TABLE OF CONTENTS

<b>Acknowledgements</b> .....	<b>ii</b>
<b>Acronyms</b> .....	<b>iii</b>
<b>Executive Summary</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>3</b>
<b>Chapter 1: Overview of Biodiversity Status, Trends and Threats</b> .....	<b>8</b>
1.1 Overview of Guyana's Biodiversity.....	8
1.1.1 ECOSYSTEM DIVERSITY .....	8
1.1.2 SPECIES DIVERSITY .....	8
1.1.3 GENETIC DIVERSITY .....	13
1.1.4 ENDEMISM .....	13
1.2 Forest.....	14
1.3 Agriculture .....	18
1.4 Coastal and Marine Resources .....	20
1.5 Inland Freshwater and Wetlands.....	20
1.6 Overview of Pressures/Threats to Guyana's Biodiversity.....	21
<b>Chapter 2: Current Status of the National Biodiversity Strategy and Action Plan</b> .....	<b>23</b>
2.1 Introduction.....	23
2.2 The National Strategy for the Conservation and Sustainable Use of Guyana's Biodiversity.....	23
2.3 The National Biodiversity Action Plan I (NBAP I) 1999 - 2004.....	24
2.4 Implementing Guyana's NBAP.....	27
2.4.1 CONTRIBUTION TO IMPLEMENTATION OF UNCBD ARTICLES .....	28
2.4.2 PROGRESS ON PRIORITY ACTIVITIES.....	38
2.4.3 OBSTACLES.....	46
2.4.4 DOMESTIC AND INTERNATIONAL FUNDING FOR PRIORITY ACTIVITIES .....	46
2.4.5 ANALYSIS OF EFFECTIVENESS OF NBAP .....	46
<b>Chapter 3: Sectoral and Cross-sectoral Integration or Mainstreaming of Biodiversity Considerations</b> .....	<b>54</b>
3.1 Introduction and Background .....	54
3.2 Processes taken to integrate Biodiversity into the Sectors.....	54
<b>Chapter 4: Conclusions – Progress towards the 2010 Target and the Implementation of the Strategic Plan</b> .....	<b>57</b>
4.1 Progress towards the 2010 Target .....	57
4.2 Conclusions.....	62
<b>Appendix I: Information concerning reporting Party and Preparation of National Report</b> .....	<b>67</b>
<b>Appendix II: Further Sources of information</b> .....	<b>71</b>
<b>Appendix III: Progress towards targets of the Programme of Work on Protected Areas</b> .....	<b>73</b>
<b>Appendix IV: Progress towards Targets of the Global Strategy for Plant Conservation</b> .....	<b>81</b>
<b>Appendix V: list of organisations that comprises the National Biodiversity Advisory Committee</b> 83	

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## **ACRONYMS**

ACTO	Amazon Cooperation Treaty Organisation
BHI	Bina Hill Institute
CATS	Community and Tourism Services Incorporated
CI	Conservation International
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species
COP	Conference of Parties
DI	Darwin Initiative
EIA	Environmental Impact Assessment
EITD	Education, Information and Training Division
EPA	Environmental Protection Agency
EU	European Union
FFI	Fauna and Flora International
FSC	Forest Stewardship Council
GAHEF	Guyana Agency for Health Sciences Education, Environment and Food Policy
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GFC	Guyana Forestry Commission
GGMC	Guyana Geology & Mines Commission
GMTCS	Guyana Marine Turtle Conservation Society
GoG	Government of Guyana
GPAS	Guyana Protected Areas System
GRDB	Guyana Rice Development Board
GUYSUCO	Guyana Sugar Corporation
IIC	Iwokrama International Centre
ISTI	Iwokrama Sustainable Timber Incorporated
ITTO	International Tropical Timber Organization
JVC	Joint Venture Company

KfW	Kreditanstalt für Wiederaufbau (German Bank for Reconstruction and Development)
KNP	Kaieteur National Park
LCDS	Low Carbon Development Strategy
LCE	Low Carbon Economy
MEA	Multilateral Environmental Agreement
MoAA	Ministry of Amerindian Affairs
NARI	National Agriculture Research Institute
NBAP	National Biodiversity Action Plan
NEP	National Energy Policy
NGO	Non-Governmental Organisation
NPC	National Parks Commission
NRDDB	North Rupununi District Development Board
NREAC	Natural Resource & Environment Advisory Committee
NRMD	Natural Resource Management Division
NTFP	Non Timber Forest Product
SFM	Sustainable Forest Management
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
TBPA	Trans Boundary Protected Areas
TGI	Tigerwood Guyana Incorporated
UNCBD	United Nations Convention on Biological Diversity
UNDP	United Nations Development Programme
USDA	United States Department of Agriculture
WB	World Bank
WMA	Wildlife Management Authority
WWF	World Wildlife Fund

## EXECUTIVE SUMMARY

### Introduction

Guyana is the only English speaking country in South America and is bordered by Suriname to the east, Brazil to the south, Venezuela to the west and the Atlantic Ocean to the north. Guyana has a total size of 215 000 km<sup>2</sup> with the majority of the land area, approximately 85%<sup>1</sup>, covered by natural forest.

Guyana's floral diversity is estimated to include over 8000 species (inclusive of Ferns, Mosses etc.) with approximately 6500 of those species being identified. There are approximately 1,815 known species of fishes, amphibians, birds, reptiles and mammals. Some species have significant economic values and are endemic to the Guiana Shield. Of significance, during this reporting period (2006-2008), 30 new species were described and several endemic species (8 reptiles, 35 amphibians, 40 fishes, 7 insects and 11 vascular plants) were found. Limited studies were conducted in the field of genetic diversity and these were mostly restricted to the agriculture sector.

A number of direct and indirect threats (as a result of the mechanics of resource-use and management) associated with the various biodiversity components were identified and provided in greater detail in the report. The threats identified are associated with some of Guyana's main economic activities such as agriculture (mainly rice and sugar) and extractive industries (forestry, gold, diamond and bauxite). It was found that coastal and marine, inland and freshwater ecosystems are still not adequately protected from exploitation and/or threats. Further, the level of baseline data needed for monitoring and informed decision-making is not adequate to assist the Environmental Protection Agency (EPA).

Since the preparation of the First National Report in 1999, there were several developments in the areas of environmental governance, human capacity development, environmental education and public awareness. Despite these efforts, several challenges and gaps remain and these include: adequate funding for several projects components; slow progress towards the establishment of a National Protected Areas System; development, revision and finalization of key policies and legislation; and retention of skilled professionals. The Fourth National Report (4NR) attempts to succinctly capture these developments in four distinct chapters, and where possible, to present an overall context for Guyana while still focusing on the specific requirements and the reporting period. The following sections provide an overview of specific areas<sup>2</sup> and sections of the 4NR:

### Key Actions to support the Convention's Objectives

The EPA in 2005 conducted a formal review of the implementation of National Biodiversity Action Plan (NBAP) I and it was found that the NBAP's goal was perhaps too ambitious to be achieved by the simple implementation of the Action Plan. This goal can be considered as a broad goal for Guyana's implementation of the Convention and for biodiversity management and conservation. The objectives of the NBAP were mainly action oriented and as discussed in several sections of the NBAP, these were achieved during the consultation process, with the exception of stakeholders' implementation of the Plan.

Despite the aforementioned, Guyana has made considerable contributions toward the implementation of the 2010 targets and Articles of the Convention. The 4NR also highlighted through the use of case studies implementation of specific Articles of the Convention. However, while it may be difficult to ascertain the wider impact on improving conservation as a result of implementing the Convention over the years, Guyana's commitment to the process, since ratifying the Convention, is evident through a number of policies. These policies were developed and implemented at the national level for natural resource management. A number of strategies, plans and programmes were also prepared and implemented and these include: National Strategy for the Conservation and Sustainable Use of Guyana's Biodiversity, National Forest Plan, NBAP I & II, National Environmental Action Plan, National Forestry Action Plan, Integrated Coastal Zone Management Plan, Fisheries Management and Development Plan, and the

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<sup>1</sup> Guyana Forestry Commission March 2010

<sup>2</sup> These areas are required by the Conference of Parties (COP) and stated in the Reporting Guidelines for the Executive Summary.



National Mangrove Management Action Plan. In addition, in-situ conservation efforts have successfully established two legal protected areas: the Iwokrama forest and Kaieteur National Park. Work is also on-going on a number of proposed protected areas, inclusive of the Kanuku Mountains Proposed Protected Area and Shell Beach Nature Reserve. Ex-situ conservation efforts have been on-going through field gene banks, seed banks and in-vitro collection, mainly, by institutions such as the National Agricultural Research Institute (NARI), Guyana Sugar Cooperation (GUYSUCO) and the Guyana Rice Development Board (GRDB).

#### Effective National Implementation

Through the Environmental Protection Act 1996 the EPA was mandated with the overall responsibility for natural resources management. The EPA was also designated the national focal point for the UNCBD Convention. Subsequently the EPA created the Natural Resource Management Division (NRMD) to execute the agency's functions related to natural resources management as stipulated in the Act and fulfill Guyana's requirements under the Convention.

The GoG recognised the critical role of public awareness and education in effecting behavioral changes to aid biodiversity management and conservation. Thus, the Education, Information and Training Division (EITD) was established within the EPA to execute the agency's function related to education and public awareness and subsequently a National Environmental Awareness Strategy was developed. Moreover, the First National Report recognised public awareness and education as one of the areas of great need for Guyana. NBAP I also identified and implemented specific projects on conservation education and awareness such as the inclusion of biodiversity into the school curriculum at various levels and trained a number of teachers to deliver the teaching modules. Local Non-Governmental Organisations (NGOs) such as Conservation International (CI) – Guyana, Iwokrama, and World Wildlife Fund (WWF) continue to promote biodiversity conservation and management and to stimulate public interests and involvement. Therefore, work in the area of conservation awareness and education has been the most effective with respect to the implementation of the Convention.

#### Limited Area of National Implementation

Biodiversity research is an important area related to the conservation of biodiversity. It was recognized in the NBAP and specific emphasis was made through efforts aimed at identifying national priority areas for biodiversity research. However, despite this, research in general is still limited. This aspect suffered, at the local level, mainly, due to lack of financial, and technical and human resources. Over the years much of the biodiversity research activities were conducted by expatriate scientists and institutions and to a limited extent these scientists worked with local counterparts.

#### Obstacles encountered during Implementation

Two (2) main obstacles were found to affect the implementation of the Convention and the NBAP. These are the availability of, and access to, financial resources and the availability of human and technical resources. Additionally, other obstacles encountered during the implementation of NBAP include; the lack of a separate implementation structure and workplan for NBAP; limited awareness among stakeholders on the status of implementation; limited, if at all, integration of biodiversity into the sector plans, policies, programmes and work-plans; and limited enforcement of regulations in the sectors.

#### Future Priorities

At the end of 2004 Guyana commenced the process of a national review on the implementation of the NBAP. The review process came to an end in 2005 and a report was prepared. The review identified, among other things, progress and lessons learnt in order to inform the preparation of a more targeted NBAP II. It was found that Guyana needed to prioritize its biodiversity actions and reorient these in line with its major resources in order to maintain the objectives of the Convention. Therefore, Guyana's NBAP II identified specific actions to target the following key resources: agriculture, coastal resources, forest, marine and inland water resources. Implementation of NBAP II is a current and future priority for Guyana.

## INTRODUCTION

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### COUNTRY PROFILE AND BACKGROUND

#### Biogeographic Location and Geopolitical Affiliations

Guyana is located on the Northern Coast of South America, bordered by the Atlantic Ocean to the North, Suriname to the East, Brazil to the South and Venezuela to the West. The country has a total size of 215,000 km<sup>2</sup> with a coastline of approximately 434 km in length and a continental shelf circa 724 km. Guyana, Suriname and French Guiana make up the Guiana Highlands. This eco-region comprises predominantly lowland tropical rainforest and is considered one of the largest continuous and relatively intact tracts in the world (Schipper et. al. unpubl. 2001). Approximately two-thirds of the northeastern portion of the ancient Precambrian Guianan Shield, the underlying geology of northeastern South America, is moist Guianan forests (Gibbs and Barron 1993).

Guyana's forest and biodiversity is considered important and mostly untouched. Approximately, 85%<sup>3</sup> of the total land area is covered by forest and Guyana recorded a net deforestation rate in 2009 of less than 1% (GFC 2010). Guyana's forests are important for the maintenance of regional biodiversity (EPA 1999). Local and Regional endemism is high, particularly for plant endemism. Guyana's forests share similar species assemblages among the Orinoco and Amazon Basins, Guianan highlands and Tepuis formations (Schipper et. al. unpubl. 2001). The Treaty of Amazonian Cooperation of which Guyana is a member links countries of the wider Amazon basin. Brazil, Colombia, Bolivia, Venezuela, Guyana, Suriname, Ecuador and Honduras account for 82% of tropical Latin American forests (ITTO 2009<sup>4</sup>).

Geopolitically and culturally, Guyana is a member state of the 15-member Caribbean Community (CARICOM), a regional body working toward regional integration movement to facilitate free movement of labour and capital, or the coordination of agricultural, industrial and foreign policies. Guyana in many ways is similar to the other English-speaking countries within the Caribbean where the shared history and experiences with colonialism lends to a similar cultural heritage and governance systems which are visible today. The forests and its biodiversity are also unique to the Caribbean.

#### Biophysical Description and Climate

The geography of Guyana is divided into four (4) natural regions as shown in Figure 1. These are (i) a flat coastal clay belt referred to as the Coastal Plain, approximately 1.37m below sea level and in which most of Guyana's population resides and the majority of agricultural activities occur; (ii) the highland region, which runs through the centre of the country from north to south, includes the Pakaraima Formation and Mount Roraima, Guyana's highest peak; (iii) the hilly sand and clay region found just inland of the coastal region and mostly covered with vegetation; and (iv) the interior savannahs, which accounts for almost 11% of the country's area and is covered mainly by grasses, shrub and low trees<sup>5</sup>.

Guyana experiences a wet tropical, hot and humid, climate which is cooled by the North East Trade Winds. There are two distinct (2) dry seasons and wet seasons with annual average rainfall ranging between 1778mm (70.0 inches) and 2800mm (110.2 inches). The annual average daytime maximum temperature is 29.6°C and annual average nighttime minimum temperature is 24.0°C with relative humidity above 70%<sup>6</sup>.

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<sup>3</sup> Guyana Forestry Commission March 2010

<sup>4</sup> Key data from "RRI-ITTO Tropical Tenure Assessment" May 2009. [www.rightsandresources.org/documents/files/doc\\_1108.pdf](http://www.rightsandresources.org/documents/files/doc_1108.pdf)

<sup>5</sup> (1997). GoG. National Development Strategy as cited by EPA (2007d)

<sup>6</sup> (2006-2007). Guyana Hydrometeorological Services

## Guyana's Land Use and Economy

Land use can be described in broader terms as outlined in Table 1. Note that 'Forest' constitutes total highland forest and mangrove forests; 'Other wooded land' is comprised of Savannah and Scrub; and 'Other Land' is considered as cultivated, settlement of deforested areas. Reclassification was conducted by the GFC for reporting requirements to FAO for the Forest Resources Assessment Country Report 2005.

**Table 1: Land area by Categories**

<b>Land Use</b>	<b>Area by sub-category '000s ha</b>	<b>Category total '000s ha</b>
<i>Cultivation, settlement &amp; deforested areas</i>		1,002
<i>Tropical High Forest</i>	16,835	
<i>Mangrove Forest</i>	81	
<i>Savannah and Scrub</i>	3,580	
<i>Total Forest cover</i>		20,496
<i>of which</i>		
<i>State Forest</i>	13,580	
<i>Other forest land</i>	6,916	
<i>Total Land Area</i>		21,497

Over 90% of Guyana's population is located along the coastal belt and the remaining 10% is located in the interior regions. Agriculture dominates on the coast plain due to the fertile nature of the soils and accounts for over 25% of the country's Gross Domestic Product (GDP). Industry accounts for 24.9% and services account for 50.2% of Guyana's GDP (2008 est.). The GDP per capita (2008) is \$3,900 which represents a 3% growth rate. The inflation rate is 8.3% and unemployment stands at 11%. Currently, there are some restructuring and privatization of industries although the export earnings from agriculture and mining have shown increases.

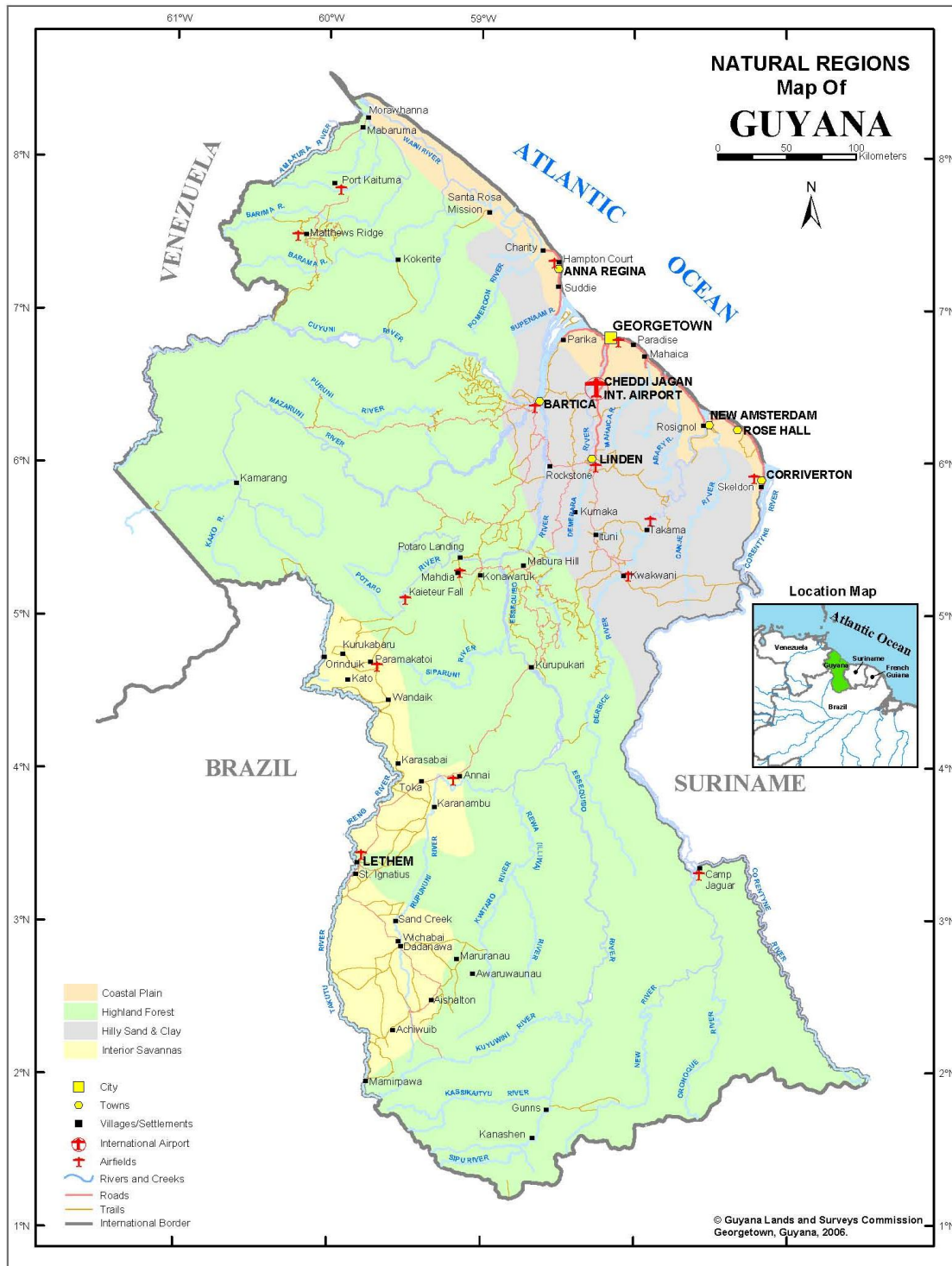


Figure 1: Natural Regions of Guyana Source GL&SC

## LINKAGES BETWEEN BIODIVERSITY AND NATIONAL WELL-BEING

Guyana has recognised that its forest contains immense biological diversity, rich variety of plants and animals inclusive of threatened and endemic species. Therefore, it is within the country's self interest to protect its biodiversity (EPA 2005). There are several links between Guyana's biodiversity and the well-being of its peoples in terms of culture, environmental and ecosystem services and potential economic benefits. Guyana's biodiversity is linked to its rich cultural diversity given the different ethnic backgrounds and belief systems.

Guyana is considered culturally diverse (GINA, Oct 16 2009)<sup>7</sup> as it is also biologically diverse. The myriad of cultures and natural environment from Guyana's geo-political and bio-geographical perspective give its people a sense of national pride. With a population of approximately 751,223 persons (National Census Report 2002), there are six (6) recognized ethnicities and three (3) main religions (Christianity, Hinduism and Islam) within Guyana. These groups still practice religious customs that help to maintain appreciation for the natural environment. In particular, the indigenous peoples have several distinct tribes with unique cultural practices and they still depend on the forest resources. These natural resources are vast and biologically significant when compared with Guyana's CARICOM neighbours. In addition, Guyana is also part of the 'Guiana Shield' which together with the Amazon Basin is the largest equatorial forest in the world and covers an approximate area of 2.5 million km<sup>2</sup>. The Shield is known for its distinct floristic province consisting of over 8000 species of which approximately 50% are endemics.

In Guyana as elsewhere, the well-being of the local population to a large extent depends on the services provided by its ecosystems. Ecosystem services, in general, provide a number of benefits - economical, social and ecological - where people benefit from their use, either directly or indirectly (EPA 2005). These include: access to resources to sustain viable livelihoods such as food and adequate nutrition, shelter, and water. In addition, a safe environment, resilient to ecological shocks and the ability to express cultural and spiritual values are some other components of human well-being garnered from ecosystem services.

*The following points are some specific examples that illustrate the importance of Guyana's Biological resources<sup>8</sup> and demonstrate the relationship between the forest and livelihoods:*

- 1) The intact forests of the Guiana Shield complex are one of the last 4 large scale tracts of tropical forest in the world and host high levels of biodiversity.*
- 2) Guyana's intact forests are carbon rich. It is estimated that Iwokrama alone holds close to 120 million tons of carbon, which is equivalent to the annual green house gas emissions of the U.K.*
- 3) Many "non-timber forest products" (NTFPs) are harvested in Guyana. These include "Kufa" (*Clusia spp*) and "Nibi", "Tibisiri" (*Heteropsis flexuosa*) from palm leaves, Balata latex (*Manilkara bidentata*) and Crabwood oil (*Carapa guianensis*). In 1999, the export value of NTFPs was US\$1,120,612.*
- 4) Amerindian people depend on subsistence and place a high value on wildlife including Tapir (*Tapirus terrestris*), Labba (*Agouti paca*), Agouti (*Dasyprocta agouti*), Capybara (*Hydrochoerus hydrochaeris*), Armadillos, larger birds such as the Curassows, Guans and Tinamous, and many fresh water fishes.*

<sup>7</sup> <http://www.gina.gov.gy/archive/daily/b091016.html>

<sup>8</sup> Direct extract from: USAID. (2008). Biodiversity and Tropical Forest Assessment Guyana

- 5) *Guyana harbors wildlife species important to ecotourism, including the Harpy Eagle (Harpia harpyja), Arapaima (Arapaima sp.), Black Caiman (Melanosuchus niger), Giant River Otter (Pteronura brasiliensis), Red Howler Monkey (Alouatta seniculus), and Black Spider Monkey (Ateles paniscus) (ITTO/IUCN Biodiversity Guidelines in Tropical Timber Production Forests, draft 2008). Because of Guyana's intact ecosystems, wildlife enthusiasts have a greater chance of seeing these species than they would elsewhere, making the country a competitive ecotourism destination for bird and wildlife watching.*
- 6) *Wildlife conservation is critical to commercial forestry in Guyana, since seeds from timber species rely heavily on animal dispersal. A study of 172 timber species at Iwokrama found that 51% are mammal-dispersed, while 21% are bird dispersed<sup>9</sup>.*

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<sup>9</sup> For additional information see also PhD study of Raquel Thomas – fruitfall study in Mabura which assessed a range of 3 forest types- Wallaba, Mora and Mixed forest found that of 123 fruiting species- 46 percent were mammal dispersed and 25 percent bird dispersed.

## CHAPTER 1: OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

### 1.1 OVERVIEW OF GUYANA'S BIODIVERSITY

This chapter provides a succinct overview of the various components of Guyana's biodiversity: status, trends and threats. The areas discussed are categorized in various sections that include species diversity, forest, agriculture, coastal and marine resources, and inland freshwater and wetlands.

#### 1.1.1 ECOSYSTEM DIVERSITY

Approximately 85%<sup>10</sup> of the total land area is still forested containing a rich diversity of plants and animals. The state of the country's biodiversity is considered, mostly, well-intact and understudied. Guyana's forest is mostly untouched as a result of low populations pressure and concentration of over 90% of its people found along the coast (only 5 percent of the country's total land area) (EPA 2005).

Guyana's biodiversity is ranked alongside countries such as Belize and Suriname within the Caribbean Community (EPA 2007e). The country's biodiversity includes over 8000 species of plants<sup>11</sup>, and approximately 1,800 known species of amphibians, birds, reptiles and mammals.

The NBAP I and the First National Report to the COP of the UNCBD give a number of factors that help to explain why the forests are unique and these include:

1. Its location at the edge of the Amazon basin;
2. Its overlying position on the geologically old Guiana Shield;
3. Its position on the Atlantic seaboard of South America, and therefore its marine/coastal environment; and
4. Its history of low incidence and intensity of conversion of natural habitats.

While there is neither an ecological classification system applied to Guyana nor any formal biogeographic classification for the country, Table 2 indicates the ecosystem diversity of Guyana's biodiversity as proposed by Ramdass & Hanif (1990):

**Table 2: Ecosystem Diversity of Guyana's Biodiversity (Source: Ramdass & Hanif, 1990 as cited in EPA 2007c)**

Forest ecosystems	Agro-ecosystems	Inland Aquatic	Marine/Coastal
Moist lowland	Coastal	Riverine	Marine
Dry evergreen scrub	Riverine	Lacustrine	Littoral
White sand forest	Forest patch		Estuarine
Brown sand forest	Savannah(Berbice; Rupununi)		Mangrove
Swamp			Palustrine
Lower montane			
Montane			

#### 1.1.2 SPECIES DIVERSITY

The last full country study on Guyana's biodiversity was conducted in 1992. And even though many studies were conducted over the years there is no comprehensive documented update on Guyana's biodiversity. However, Guyana's taxonomic information is succinctly captured in the National Biosafety Framework Project Report (EPA 2007e). The report noted Guyana as being a part of the Guiana Shield. The Shield spans an area of 2.5 million km<sup>2</sup> (circa) with a diverse floristic region capturing over 8000 species. Maguire, (1970) as cited by EPA (2007e), claims about 50% of these species are considered

<sup>10</sup> Guyana Forestry Commission March 2010

<sup>11</sup> Guyana Forestry Commission 2007 – Forestry in Guyana <http://www.forestry.gov.gy/Downloads/Fact%20Sheet%202007.pdf>



endemic to the Guyana Shield. "Berry et al (1995), stated that 3763 plant species of 118 genera belonging to 4 families are endemic to Venezuelan Guayana (i.e. Venezuela part of the Guiana Shield) of which 61 endemic genera occur in Guyana. Among regional endemics found in Guyana are *Victoria amazonica*, *Arapaima gigas*, *Pteroneura brasiliensis*, and *Priodontes giganteus*. *Chlorocardium rodiei*, a prime timber species, has a range almost 98% restricted to Guyana" (EPA 2007e).

As of the late 1990s, between 6,300 and 6,500 plant species<sup>12</sup> had been identified in Guyana. Since then, there has been an incremental increase in this estimate as a result of additional research, and the figure now stands at an estimated 8,000 species<sup>13</sup>. Guyana has recorded 1,673 arthropods; over 1,200 fungi (the extent of tropical diversity is only now being understood); 33 bacteria; 13 nematodes; 44 algae; 17 mollusks and an estimated 30 viruses (EPA 2007e). The current status of documented species for the five vertebrate groups is over 467 fish; 130 amphibians; 179 reptiles; 814 birds; and 225 mammals. Table 3 provides an updated summary of species for selected areas in Guyana.

**Table 3: Species List for selected areas found in Guyana**

	Shell Beach <sup>14</sup>	Iwokrama	Konashen	Kanuku Mts. <sup>15</sup>	Kaieteur <sup>16</sup>	CBD Report 1999	Guyana 2009
<b>Area Size</b>	88.9 km <sup>2</sup>	3,700 km <sup>2</sup>	6,250 km <sup>2</sup>	6,110 km <sup>2</sup>	626.8 km <sup>2</sup>		215,000 km <sup>2</sup>
<b>Plants</b>		1,556 <sup>17</sup>	2,700	1,577	1,100	5,646	7,112 <sup>18</sup>
<b>Fungi (macro)</b>	-	-	-	-	-	426	>1,200
<b>Fish</b>	46	420 <sup>19</sup>	110 <sup>20</sup>	113	180*	352	467 <sup>21</sup> . est. >800 <sup>22</sup>
<b>Amphibians</b>	11	59 <sup>23</sup>	25 <sup>24</sup>	20	51	77	130 <sup>25</sup>
<b>Reptiles</b>	16	82 <sup>23</sup>	36 <sup>26</sup>	25	64*	102	179 <sup>27</sup>
<b>Birds</b>	170	475 <sup>28</sup>	318 <sup>29</sup> ; >400 reported <sup>30</sup>	419	200 <sup>31*</sup>	711	814 <sup>32</sup> . est. >800 <sup>33</sup>
<b>Mammals</b>	21	130 <sup>34</sup>	21 <sup>26</sup>	155	53 <sup>35*</sup>	123	225 <sup>34</sup>

**\* Smithsonian Institution to publish checklist**

<sup>12</sup> Boggan, J., V. Funk, C. Kellogg, M. Hoff, G. Cremers, and C. Feuillet. 1997. Checklist of the plants of the Guianas (Guyana, Suriname, French Guiana). 2nd Edition. Biological Diversity of the Guianas Program, Department of Botany, NMNH, Smithsonian Institution, Washington, DC

<sup>13</sup> Guyana Forestry Commission 2007 – Forestry in Guyana <http://www.forestry.gov.gy/Downloads/Fact%20Sheet%202007.pdf>

<sup>14</sup> Shell Beach Rapid Biodiversity Assessment Report of the Shell Beach Protected Area. 2004.

<sup>15</sup> [http://www.conservation.org/Documents/RAP\\_Reports/RAP26\\_Eastern\\_Kanuku\\_Guyana\\_Sep-2001.pdf](http://www.conservation.org/Documents/RAP_Reports/RAP26_Eastern_Kanuku_Guyana_Sep-2001.pdf)

<sup>16</sup> Information for fish, herps, and mammals sourced from G. Watkins 2009, (personal comm.)

<sup>17</sup> <http://botany.si.edu/BDG/iwoksp.html> quoted 1,555 and a new addition in 2009 by Forget, P.-M., Poncy, O., Thomas, R. S. Hammond, D. S. and Kenfack, D. A new species of CARAPA (Meliaceae) from Central Guyana. *HU Brittonia*, 61 (4): 301-402. 2009.

<sup>18</sup> Funk, V. et. al. (2007). Checklist of the Plants of the Guiana Shield (Venezuela: Amazonas, Bolivar, Delta Amacuro; Guyana, Surinam, French Guiana, Smithsonian Institution Volume 55: 1-584)

<sup>19</sup> <http://www.iwokrama.org/forest/animals.htm>

<sup>20</sup> [http://www.conservation.org/Documents/CI\\_Konashen\\_COCA\\_Biodiversity\\_Booklet.pdf](http://www.conservation.org/Documents/CI_Konashen_COCA_Biodiversity_Booklet.pdf)

<sup>21</sup> <http://fish.mongabay.com/data/Guyana.htm>

<sup>22</sup> Estimation does not exclude synonyms and updated taxonomy.

<sup>23</sup> Maureen A. Donnelly, Megan H. Chen and Graham G. Watkins. (Feb., 2005). *Proceedings of the Academy of Natural Sciences of Philadelphia*, Vol. 154, pp. 55-69. <http://www.jstor.org/stable/4065125U>

<sup>24</sup> [http://www.conservation.org/Documents/CI\\_Konashen\\_COCA\\_Biodiversity\\_Booklet.pdf](http://www.conservation.org/Documents/CI_Konashen_COCA_Biodiversity_Booklet.pdf)

<sup>25</sup> <http://botany.si.edu/BDG/guyherps.html>

<sup>26</sup> [http://www.conservation.org/Documents/CI\\_Konashen\\_COCA\\_Biodiversity\\_Booklet.pdf](http://www.conservation.org/Documents/CI_Konashen_COCA_Biodiversity_Booklet.pdf)

<sup>27</sup> <http://botany.si.edu/BDG/guyherps.html>

<sup>28</sup> Iwokrama International Centre for Rain Forest Conservation and Development Business Plan 2005-2006.

<sup>29</sup> <http://www.gina.gov.gy/archive/daily/b070518.html> Guyana Chronicle 2007.

<sup>30</sup> [http://www.conservation.org/Documents/CI\\_Konashen\\_COCA\\_Biodiversity\\_Booklet.pdf](http://www.conservation.org/Documents/CI_Konashen_COCA_Biodiversity_Booklet.pdf)

<sup>31</sup> <http://www.guyanabirds.com/UserFiles/File/Kaieteur%20Bird%20Checklist.pdf> 2008.

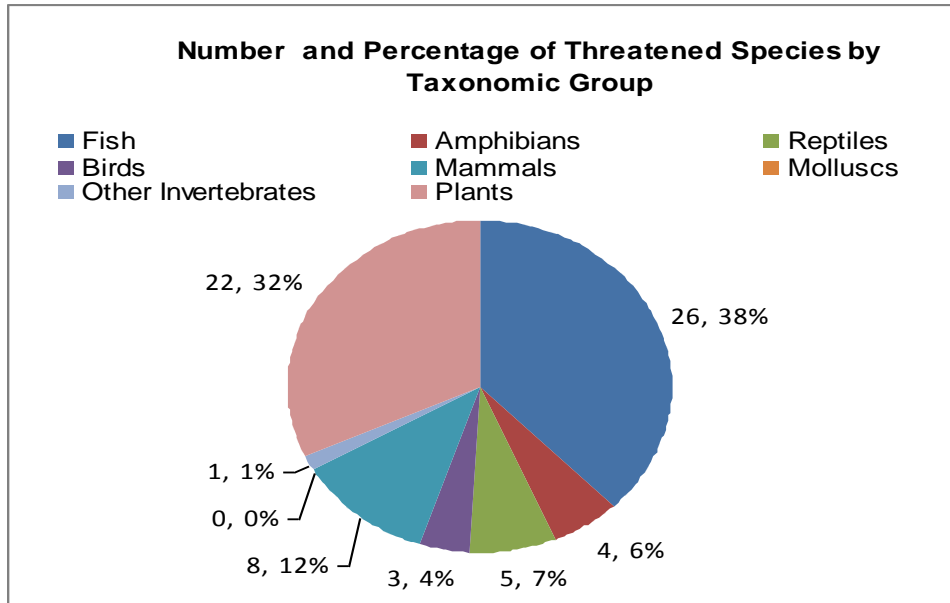
<sup>32</sup> Michael J. Braun 1, Davis W. Finch 2, Mark B. Robbins 3, and Brian K. Schmidt 4 (2007). A Field Checklist of the Birds of Guyana.

<sup>33</sup> <http://www.iwokrama.org/forest/animals.htm>

<sup>34</sup> Burton K. Lim and Mark D. Engstrom. (Feb., 2005). *Proceedings of the Academy of Natural Sciences of Philadelphia*, Vol. 154, pp. 71-108. <http://www.jstor.org/stable/4065126>



The IUCN Red List Version 2010.1: Table 5<sup>36</sup>, lists the totals by taxonomic group of threatened species for each country and Guyana is listed as having a total of 69 threatened species. However, it is stated that “these groups - reptiles, fishes, molluscs, and other invertebrates - there are still many species that have not yet been assessed for the IUCN Red List and therefore their status is not known (i.e., these groups have not yet been completely assessed). Therefore the figures presented [in Figure 2] for these groups should be interpreted as the number of species known to be threatened within those species that have been assessed to date, and not as the overall total number of threatened species for each group<sup>36</sup>”.



**Figure 2: Number and percentage of threatened species by taxonomic group for Guyana**

<sup>35</sup> <http://www.guyanagateway.org.gy/node/262> Guyana Chronicle 2006.

<sup>36</sup> [http://www.iucnredlist.org/documents/summarystatistics/2010\\_1RL\\_Stats\\_Table\\_5.pdf](http://www.iucnredlist.org/documents/summarystatistics/2010_1RL_Stats_Table_5.pdf)

## Box 1: New Species found in the Iwokrama Forest

### **Carapa akuri: New Species found in the Iwokrama Forest.**

The new species, 'Carapa akuri', had long been mistaken for 'Carapa guianensis', a tree widely dispersed across the Amazon and commonly logged for the furniture industry.

The find is significant because it is an important source of natural oil for Makushi Amerindians and the cosmetic market, according to Pierre-Michel Forget, lead author of the paper that describes the species and a researcher at the National Museum of Natural History in Paris.

"Akuri is an important source of sustainable development within the Iwokrama forest," Forget told [mongabay.com](http://news.mongabay.com), referring to Guyana's innovative forest reserve that has become the centerpiece for the country's efforts to protect its forests through sustainable management.

Oil from Carapa's large seeds are used for a variety of purposes, including treatment for dandruff and rashes, insect repellent, and as a moisturizer. When produced from Carapa guianensis the oil is known as Crabwood oil or Andiroba.

The species is also endemic to the region and may be at risk from logging, providing new impetus for protecting its diverse rainforest habitat. "This single tree can save a forest," said Forget.

Carapa akuri is named after the red-rumped agouti (*Dasyprocta leporina*) which is likely the main seed disperser of Carapa in Guyana. The indigenous Makushi name for the agouti is "akuri".

Co-authors on the paper include Odile Poncy of the Centre National de la Recherche Scientifique (National Center for Scientific Research) in Paris, Raquel Thomas of Iwokrama, David Hammond of NWFS Consultancy, and David Kenfack of the Missouri Botanical Garden. Cited from <http://news.mongabay.com/2009/1209-carapa.html>

Some recorded species new for Guyana include:

### **2004- 2005**

#### **Osteichthyes**

##### **Family: Rivulidae**

- *Austrofundulus rupununi*;

##### **Family: Cetopsidae**

- *Denticetopsis iwokrama*;

##### **Family: Loricaridae**

- *Peckoltia cavatica*;
- *Hypostomus macushi*;

##### **Family: Cetopsidae**

- *Cetopsidium roae*;

#### **Reptilia**

##### **Family: Colubridae**

- *Dipsas pakaraina*;

##### **Family: Gymnophthalmidae**

- *Kaieteurosaurus hindsii*;

2006

**Amphibia**

**Family: Dendrobatidae**

- *Dendrobates nubeculosus.*

**Osteichthyes**

**Family: Rivulidae**

- *Rivulus mahdiaensis;*

**Reptilia**

**Family: Colubridae**

- *Atractus tamessari;*

**Family: Gymnophthalmidae**

- *Echinosaura sulcarostrum;*

**Family: Gekkonidae**

- *Gonatodes alexandermendesj;*

**Amphibia**

**Family: Hylidae**

- *Hypsiboas liliae;*

**Family: Bufonidae**

- *Oreophrynella sp.;*

**Dendrobatidae**

- *Anomaloglossus kaiei.*

2007

**Osteichthyes**

**Family: Rivulidae**

- *Rivulus mahdiaensis;*

**Reptilia**

**Family: Colubridae**

- *Atractus tamessari;*

**Family: Gymnophthalmidae**

- *Echinosaura sulcarostrum;*

**Family: Gekkonidae**

- *Gonatodes alexandermendesj;*

**Amphibia**

**Family: Dendrobatidae**

- *Allobates spumaponens;*

**Family: Bufonidae**

- *Oreophrynella dendronastes;*

**Family: Strabomantidae**

- *Pristimantis dendrobatoides;*
- *Pristimantis jester;*
- *Pristimantis saltissimus.*

2008

**Osteichthyes**

**Family: Parodontidae**

- *Apareiodon agmatos*;

**Family: Auchenipteridae**

- *Tatia meesi*;

**Amphibia**

**Family: Eleutherodactylidae**

- *Adelophryne patamona*;

**Reptilia**

**Family: Gymnophthalmidae**

- *Arthrosaura hoogmoedi*.

The list of new species and records for Guyana listed above is not an exhaustive account. Several new species of plants, fungi, insects and vertebrates etc. have been described and may not have been formally repatriated from past research expeditions by collectors from Universities or Museums. Many specimens collected from these expeditions are yet to be cataloged and described. Some of the species described new to science in a particular year may have been collected several years before and have been well preserved in museums and herbarium. Molecular science has transformed taxonomy and traditional classification methods that used morphology to reclassify species (once thought as varieties) – fishes are an example. Further, there are several new publications every year with new descriptions for Guyana but monitoring publications is a challenge. A researcher may send publications to one institution but that record may not be formally captured until updates of species lists are conducted.

The main point in highlighting the few new records/ species for Guyana above is to show that the forests of Guyana still contain many undescribed species. New species and records for Guyana will appear as the interest in biodiversity exploration is encouraged and facilitated.

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### 1.1.3 GENETIC DIVERSITY

To date, limited genetic studies and cataloging were conducted in Guyana. The most prolific work exists in the agriculture sector for introduced plant species such as sugarcane and rice. There were also recent studies on staple crops like cassava and a number of “farmers’ varieties” or land races such as hot pepper. These varieties, though identified, are still to be genetically described and/or tested.

A joint NARI and United States Department of Agriculture (USDA) project is expected to commence in 2009 to collect and conserve genetic resources of crop plants and related species. A main component of the project is to enhance the in-house research and plant biotechnology capacity of NARI.

On the other hand, increasingly over the past few years, more researchers have been collecting animal tissue samples for molecular work. Fish, Herpetological specimens, and to some extent birds, were the main taxonomic groups studied.

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### 1.1.4 ENDEMISM

The 1992 UNDP/GAHEF country report (GoG, 1992) provides values of 173 endemic plant species and 10 animal species. These numbers are not final because the inventory of the country is still incomplete. Hans ter Steege in 2002 in a paper dealing with a perspective on Guyana and its plant richness stated that “there is no clear picture of the extent of plant endemism in Guyana. A preliminary unpublished list was produced by C.A. Persaud (pers. comm.), which contains 284 species, roughly 5% of the species. *Swartzia* and *Licania*, both genera with many restricted species, have the highest number on this list (see also chapter 6). Guyana is no phytogeographic entity in itself but part of the Guiana Shield area.

Consequently, endemism is either caused by accident (restricted-range species) or if a habitat containing endemics is confined to Guyana. Local endemism is often associated with such habitats as white sands, serpentine rock, swamps, igapo, varzea, rock outcrops and cloud forests (Gentry 1992). As such, concentrations of endemics in Guyana are expected in the white sands area and Pakaraima highlands. In terms of conservation, endemism may also have to be defined more broadly in a Guiana Shield perspective. As many as 3763 species, 118 genera and 4 families of the plants of Venezuelan Guyana are endemic to this area (Berry et al. 1995) and also Guyana can contribute significantly to the preservation of such species. The Endemics-Area curve also shows that 90% of Guyana's land area will hold roughly 4500 unique species (not found in the other 10% of Guyana). Such species will not be protected by a park system that encompasses the other 10%. Thus, also outside of protected areas conservation measures have to be in place to protect a substantial part of the country's biodiversity. Secondary and managed forest could play an important role here".

Guyana's forest in Central Guyana and the sources of the Mazaruni are particularly species rich among endemics of selected tree taxa. Some endemics have somewhat restricted ranges and more tend to be habitat specialists of the white sand areas (Tropbenbos, not dated).

An estimated 20% of Guyana's 500 orchid species are endemic to Guyana. Other notable endemic tree species are *Dicymbe altsonii*, *Vouacapoua macropetala*, and *Swartzia leiocalycina* (UNDP/UNEP/GEF, 2001). Ten genera are fully restricted to Guyana: Boyania, Maguireanthus, Ochtophilus, Tryssophyton, Maburea, Whittonia, Potarophytum, Windsorina (Berry et al. 1995).

**Table 4: Summary of recorded Vertebrate Endemics within Guyana**

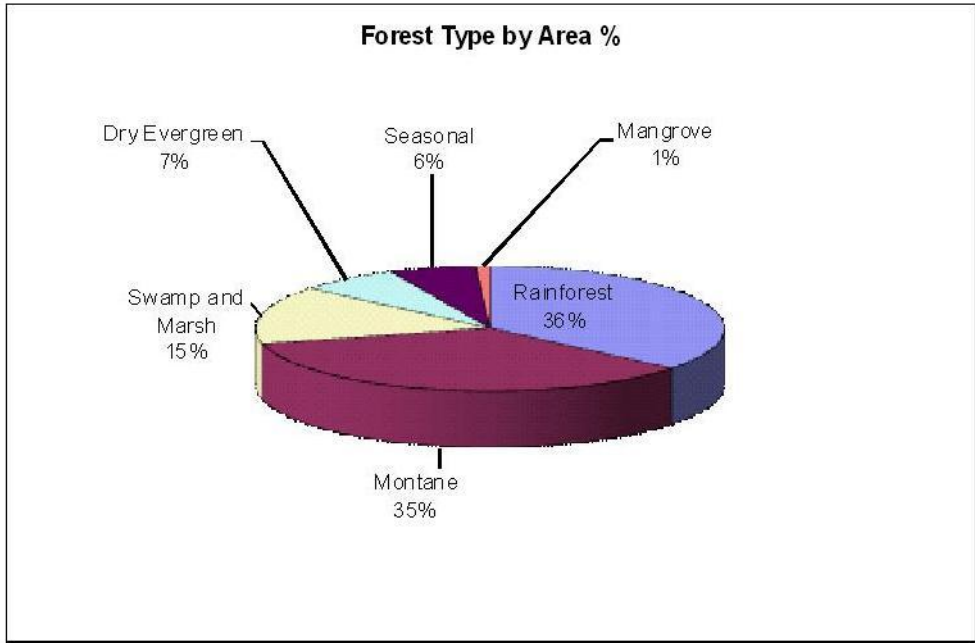
Animal group	Number of endemics
Fresh water fish	83
Amphibians	17
Reptiles	1

## 1.2 FOREST

The estimated forest cover reported in 1999 was approximately 78% (EPA 1999a). Subsequent national estimates ranged between 76%-80% with current estimated forest cover reported as 85% (18 million hectares) in the LCDS (GoG 2009). As of March 2010, GFC's official national estimate stands at approximately 85% (GFC, 2010).

According to an assessment by the ITTO, forests in Guyana can be broken down as shown in Figure 3: rainforest (36%), montane forest (35%), swamp and marsh (15%), dry evergreen (7%), seasonal forest (6%), and mangrove forest (1%)<sup>37</sup> See also FAO's Forest Resource Assessment Country Report for Guyana 2005 for the description of specific forest stand compositions. In addition, the forests of Submontane and Uppermontane forests of the Pakaraima uplands and Submontane forests of south Guyana are described.

<sup>37</sup> <http://rainforests.mongabay.com/20guyana.htm>



**Figure 3: Forest Type by Area**



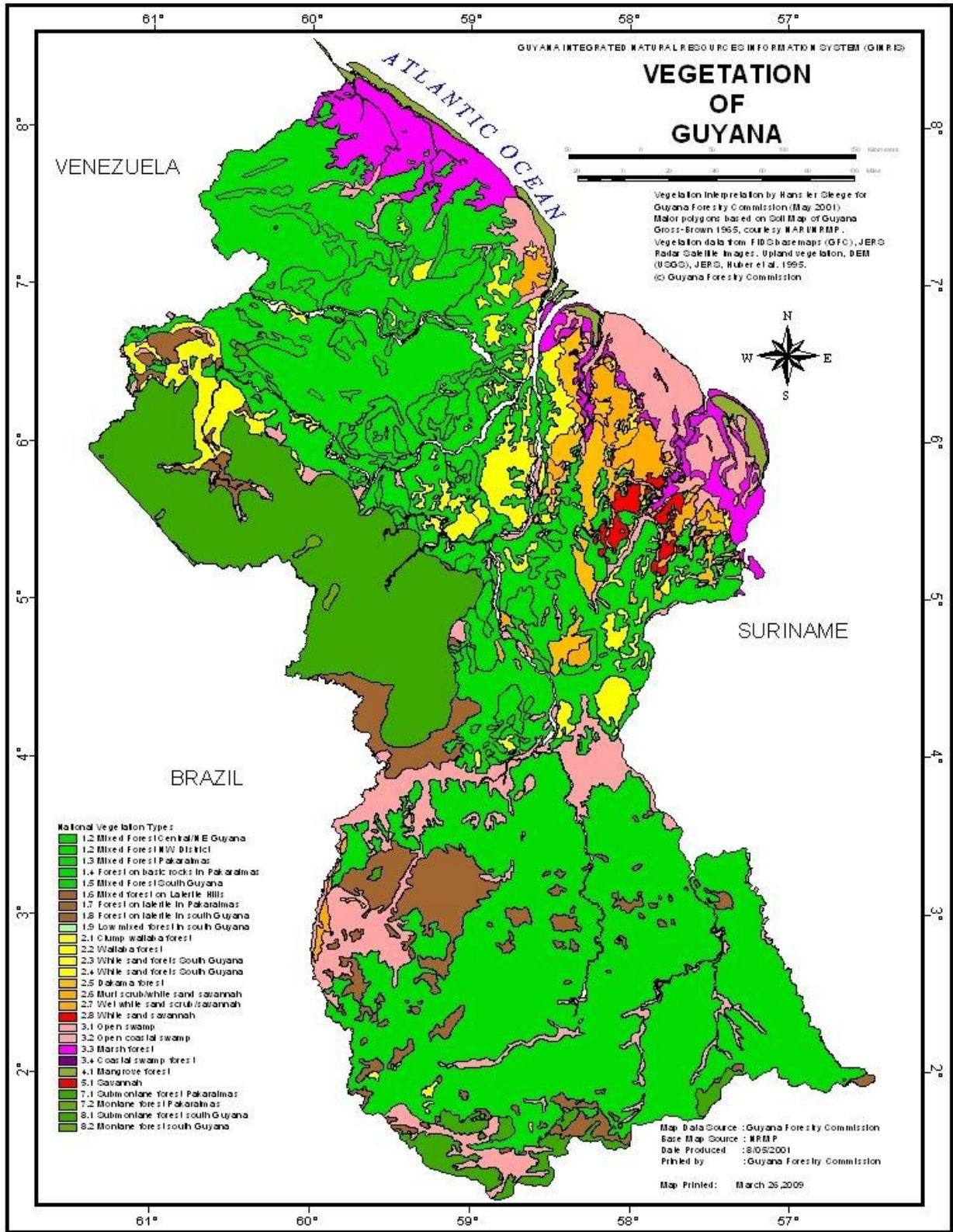


Figure 4: Vegetation of Guyana

The total flora of Guyana comprises approximately 6000 species, compared to 4,100 in Suriname and 4,400 in French Guiana. The forests are typically composed of mono-dominant forest communities (common families include Caesalpiniaceae, Chrysobalanaceae and Lecythidaceae) (Tropbenbos, Date Unknown) See website [http://web.science.uu.nl/Amazon/Plant\\_Diversity\\_Guyana/Index.htm](http://web.science.uu.nl/Amazon/Plant_Diversity_Guyana/Index.htm)

- *Guyana's forests show a gradient in diversity from north (species-poor) to south (species rich);*
- *"Point diversity" is highest in Southern Guyana;*
- *"Regional diversity" is highest in the Pakaraimas, followed by the Central Guyana and the wet Southern Forest Region; and*
- *The abundance of endemic species is very high in the Central Guyana and Pakaraima Mts. Forest Regions. (Tropbenbos, Date Unknown) See website [http://www.bio.uu.nl/~herba/Guyana/Plant\\_Diversity\\_Guyana/differen.htm](http://www.bio.uu.nl/~herba/Guyana/Plant_Diversity_Guyana/differen.htm).*

The variation in rainfall across Guyana influences regions known as the wet and the dry southern forest. The trees within these regions are more representative of true Amazonian forests in Brazil and Suriname. The Central forest regions are characterized by slow-growing hardwoods, many are abundant commercial species. The vegetation of the Pakaraima Mountains varies extensively and with altitude. The Northwestern region is different from the Central forests with its lower abundance of Leguminosae in the Northwest. The Northwest swampy forest dominates the landscape with mangroves forests found along some regions of the coastal belt.

The Forestry Sector is featured extensively in the National Development Strategy with potential to provide economic growth. The value of Guyana's forest resources are recognized by the Government of Guyana. Consequently, Guyana's forest resources are managed for timber production, eco-tourism, conservation, non timber forest products (NTFPs), and ecosystem services.

According to an ITTO 2009 document, the amount of state-managed forests decreased by over 10% from 2002 to 136,800 km<sup>2</sup> (refer to Table 5 below<sup>38</sup>). In 2006, 135,800 km<sup>2</sup> of Guyana's total land mass was classified as state forest (<http://www.agriculture.gov.gy/Parliament/FORESTRY%20ON%20NEW%20GFC%20BILL.html>).

The GFC website indicates that 80% or 171,976 km<sup>2</sup> was managed as state forest in 2008. Currently, 60% of State Forests have been allocated to timber harvest concessions. The forestry sector's annual contribution to 2008 real GDP has averaged 3.49% (GFC 2009<sup>39</sup>).

In 2009, GFC conducted an assessment of deforestation and degradation in Guyana. The assessment found that the rate of deforestation in the State Forest Estate is 0.25% and 0.29% for Guyana's total forested lands (GFC 2009).

In addition, the amount of land owned by communities/ indigenous groups has also increased significantly. Guyana is among other tropical forested countries where land ownership is 18% compared to 9% globally (ITTO 2009).

<sup>38</sup> Cited from Key data from "RRI-ITTO Tropical Tenure Assessment" May 2009.

[http://www.rightsandresources.org/documents/files/doc\\_1108.pdf](http://www.rightsandresources.org/documents/files/doc_1108.pdf)

<sup>39</sup> GFC 2009. Quick assessment paper Deforestation and forest degradation in Guyana.

[http://www.forestry.gov.gy/Downloads/Quick\\_Assessment\\_Report\\_September\\_7\\_2009.pdf](http://www.forestry.gov.gy/Downloads/Quick_Assessment_Report_September_7_2009.pdf)



**Table 5: Guyana's Forest Tenure Distribution**

Public				Private			
Government Administered		Reserved for indigenous groups		Owned by indigenous groups		Owned by individuals & firms	
2002 <sup>40</sup>	2008 <sup>41</sup>	2002	2008	2002	2008	2002	2008
15.4M ha	13.68M ha	0	0	1.4M ha	2.36M ha	0	0

Source: ITTO 2009 (Several national documents were referenced).

### 1.3 AGRICULTURE

The percentage of cultivated land is approximately 2.37% (4,666 km<sup>2</sup> of 197,850 km<sup>2</sup>). Based on data available, the land use<sup>42</sup> for agriculture is categorized as follows:

- **Cultivated Land:** 4,666 km<sup>2</sup> (2.37%), of which 1,500 km<sup>2</sup> is irrigated
  - **Arable:** 4,390 km<sup>2</sup> (2.23%)
  - **Permanent Crops:** 276 km<sup>2</sup> (0.14%)
- **Non-cultivated:** 193,161 km<sup>2</sup> (97.63%)

As Guyana develops its agriculture sector to maintain its national food security needs and those of its CARICOM neighbours, more steps to safeguard its ecosystems against a proliferation of invasive species are required. Currently, the understanding of pollinator species in agricultural ecosystems is limited to few crops and non-crops. Guyana has basic information of what species of insects, birds and small mammals may be classified as pollinators. However, we have not yet ascertained the economic value or the ecological importance of a number of our local pollinator species. Studies that link the yield of fruit crops with the population dynamics of pollinator species is yet to be fully investigated.

The potential impact of environmental pollutants such as pesticides on economically important insects such as pollinator species may need some attention as well.

Generally, taxonomic work in relation to agricultural biodiversity covers the major export crops, sugarcane and rice. In addition, taxonomic work on indigenous peoples' agro-biodiversity has been significant in terms of data collected by Iwokrama and Tropenbos-Guyana, however, much more work remains to be done to avoid loss of the knowledge base.

To a limited extent there is germplasm work by NARI on cassava, sweet potato and a few others. Significant taxonomic work on agro-biodiversity weeds was conducted and compiled in a monograph by UN Volunteers in the early 1990s. According to this compendium on weeds of Guyana, there are:

- 33 grass weeds;
- 14 sedge weeds;
- 104 dicotyledonous weeds; and
- 4 weedy ferns.

<sup>40</sup> 2002 Data is referenced from: Government of Guyana. 2001. Guyana National Development Strategy: 2001-2010. Georgetown, Guyana: National Development Strategy Secretariat. Chapter 14 Forestry, section I.1 (no page # available.) [www.sdn.org.gy/nds](http://www.sdn.org.gy/nds)

<sup>41</sup> 2008 Data is referenced from: FAO. 2007. FAO Tenure Assessment Matrix: Guyana. Data reported by the Guyana Forestry Commission & Ministry of Amerindian Affairs. Rome: FAO. Available online at <http://www.fao.org/forestry/54368/es/guy/>

<sup>42</sup> Cited from FAO 2005. State of Food and Agriculture 2005; <http://waterwiki.net/index.php/Guyana>; <https://www.cia.gov/library/publications/the-world-factbook/fields/2097.html>; [http://www.unicef.org/guyana/media\\_8899.htm](http://www.unicef.org/guyana/media_8899.htm)

However, it has been noted that many of these weeds constitute important components of local ethno-medicinal ingredients of traditional knowledge value.

In addition, the following international agreements aside from the UNCBD also address some aspects of invasive species:

- Agreement on the Application of Sanitary and Phytosanitary Measures;
- Convention on International Trade in Endangered Species (CITES);
- Convention on Migratory species of Wild Animals;
- Ramsar Convention;
- International Convention for the Control and Management of Ship's Ballast Water and Sediments;
- International Health Regulations;
- International Plant Protection Convention;
- Cartagena Protocol on Biosafety;
- United Nations Convention on the Law of the Sea; and
- World Organization for Animal Health Agreement (OIE).

With the exception of phytosanitary measures presently employed by the Ministry of Agriculture at ports of entry, there is very limited scope for compliance and monitoring and enforcement relating to invasive species.

The EPA established an Invasive Alien Species Task Force in 2008, which is a multi agency working group on Invasive Alien Species as mandated by UNCBD. This working group held its first meeting in April, 2008 and held a public awareness television programme shortly after.

The EPA has prepared public awareness material on invasive alien species which aims to highlight known species, such as:

#### Plants

- *Adenanthera pavonina* (Redbead tree or Red Sandalwood tree);
- *Psidium guajava* (Guava); and
- *Leucaena leucocephala* (Jumbie bean).
- *Leucaena leucocephala* (Jumbie bean).

#### Animals

- *Columba livia* (Pigeon);
- *Herpestes javanicus* (Indian mongoose); and
- *Oreochromis mossambicus* (Mozambique tilapia).

The only existing local taxonomic agency/unit that addresses issues related to invasive species is the Pink mealybug Unit of the Ministry of Agriculture.

The Global Invasive Species Database lists the following 9 out of 32 invasive species for Guyana as alien invasive species:

#### **Alien invasive animals:**

- *Columba livia* (bird)
- *Ctenopharyngodon idella* (fish)
- *Herpestes javanicus* (mammal)
- *Oncorhynchus mykiss* (fish)
- *Oreochromis mossambicus* (fish)

#### **Alien invasive plants:**

- *Adenanthera pavonina*
- *Leucaena leucocephala*
- *Psidium guajava*
- *Thunbergia grandiflora*

#### **19 native invasive species:**

#### **4 species with invasive biostatus not specified:**

#### **12 invasive species in agricultural ecosystems:**

#### **11 invasive species in natural areas:**

#### **10 invasive species in coastland; and**

#### **11 invasive species in Guyana's wetlands**

## 1.4 COASTAL AND MARINE RESOURCES

Very limited work has been done on coastal biodiversity taxonomy. Most of this relates to the mangrove ecosystem with the significant part relating to the coastal agro-ecosystem generally (EPA 2009).

Some preliminary work relates to mangrove ecosystem fauna while there is some work on avifauna diversity within the coastal zone of Georgetown environs. GUYSUCO has a collection of invertebrate fauna found within the sugarcane agro-ecosystem, as well as, some rodents. GRDB also has limited documentary evidence of the state of the invertebrate and avifauna encountered in the rice agro-ecosystem (EPA 2009).

Work by the Biology Department of the University of Guyana has also captured some data on insect diversity of organic versus conventional pineapple farms at Lake Mainstay and the Linden-Soesdyke Highway farms (EPA 2009).

Work on marine biodiversity is almost non-existent except for knowledge of sea turtles and edible marine foods – fish, shrimps, prawns, sea bob, squid and lobster. We have no recent knowledge of marine algology/phytology. There is an urgent need for strategic studies of marine biodiversity in Guyana in so far as it provides important information for data on the vast marine resource base and the potential impact of over fishing and climate change issues globally. Marine biodiversity may also be a jewel in the bioprospecting/natural products aspects of sustainable use of biodiversity and prospects for mari-culture industry in Guyana (EPA 2009).

The preparation of the NBAP II further highlighted that Guyana's marine resources are contained within the region extending from the Amazon River to the Orinoco River on the north east coast of South America. Several species of shrimps are abundant in these areas, some of which are restricted to the very shallow waters: the Atlantic Seabob (*Xiphopenaeus kroyeri*), the Southern Brown Shrimp (*Penaeus subtilis*), and the Southern White Shrimp (*Penaeus schmitti*). The Red-spotted Shrimp (*Penaeus brasiliensis*), and the Southern Pink Shrimp (*P. notialis*) are found in deeper waters. Ground fishes are also abundant on the shelf while snappers are abundant on the outer shelf and continental slope (EPA 2007d).

## 1.5 INLAND FRESHWATER AND WETLANDS

There have been limited studies conducted locally on inland waters biodiversity. A number of collaborative studies have been undertaken by Smithsonian Institution under the Biodiversity of the Guianas programme that examined the fish biodiversity of some inland waters.

Extensive work was done on the fishes of Iwokrama and there are works by Sir Robert Schomburgk on the fishes of British Guiana which represents a good piece of historical taxonomic work on inland fishes of Guiana. Rosemary Lowe-McConnel produced another good taxonomic piece on the cichlid fishes of Guyana, South America, with notes on their ecology and breeding behaviour.

The Essequibo River drainage system was a major study area and represents an area with high fish diversity. At least 700 species of fish have been identified; however, scientists suspect these represent only 70-80% of total fish species in the area (Grimes et. al., 2008). Much of the taxonomical work on fishes for 1990s and early 2000s were done via collaborations with the Iwokrama Centre, visiting ichthyologists (Jonathan Armbruster more recent trips include 2002 and 2004) and national biologists experts (Cynthia Watson, Jackie Arjoon, Calvin Bernard and Charles). Still, paucity exists in the understanding of fresh water clams and sponges, though some have been recorded (Grimes et. al., 2008).

In the past decade, major projects and studies were conducted in the North Rupununi Wetlands that included the Darwin Initiative (DI) Project to develop the North Rupununi Adaptive Management Plan. The project commenced in 2003 and ended in 2006. In addition, other major publications included the Monitoring Methods Manual (2006) and a State of the North Rupununi Wetlands Report (2006).

WWF is currently supporting a study on the Black caiman in the Rupununi. WWF is also providing technical assistance to communities and their North Rupununi District Development Board to monitor populations of the endangered Arapaima as part of a harvest management plan.

## 1.6 OVERVIEW OF PRESSURES/THREATS TO GUYANA'S BIODIVERSITY

The threats described in the UNCBD 1999 country report still apply to the current situation in Guyana.

Threats that face Guyana's biodiversity can either be direct or indirect. Direct threats result from developmental or non-human induced activities that directly affect biodiversity and indirect threats can result as a consequence of some policy or legislative measures and/or institutional challenges (EPA 2005). Some threats can be viewed as direct threats or in some ways may indirectly influence biodiversity in some negative manner. These threats, generated from document reviews and stakeholder engagements, are summarized to provide a general overview below:

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### DIRECT THREATS ORIGINATE PRINCIPALLY FROM:

- Overfishing and overhunting on commercial scales;
- Savannah and Forest fires, in particular, in the Rupununi Savannahs and surrounding forested areas of the Kanuku Mountains, Muri Scub etc.;
- Indiscriminate land-use practices (mining, logging practices, agriculture)
- Hinterland road construction;
- Uncontrolled harvesting and poaching of wildlife;
- Uncontrolled harvesting of NTFPs;
- Uncontrolled and inappropriate use of agro-chemicals (human induced pollution);
- Climate change events and related natural disasters (the unpredictable weather patterns can affect availability of water and food resources for some wildlife species- key fruiting trees will be affected; more direct impacts may result from flash floods in some hilly regions); and
- Introduction of Alien Invasive Species.

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### INDIRECT THREATS MAINLY ORIGINATE FROM:

- Climate change events and related natural disasters such as floods and periodic dry spells;
- Institutional fragmentation and conflicting legislation;
- Limited Knowledge of biodiversity and species range and behavior;
- Weak environmental law enforcement;
- Limited number of legalized, demarcated and managed protected areas systems (although there are two legally recognized protected areas<sup>43</sup> – Kaieteur and Iwokrama);
- Limited relevant judicial awareness and experience; and
- Increased accessibility to and economic activities in hinterland areas – rapid opening up of areas to commercial activity may lead to clash of cultures and practices that may make local people more vulnerable to diseases etc.

Some of the major direct and indirect threats are listed below with respect to specific biodiversity components. These are:

#### Forests and savannahs:

- Large scale selective logging (“high grading”) of certain species;
- Fuel wood collection in natural forests;
- Unregulated chainsaw operations;

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<sup>43</sup> It should also be noted that Konashen, which was legally established under the Amerindian Act (2006) in 2007 is now legally protected by law. It is community-owned conservation area.

- Conversion to agriculture and other uses;
- Unregulated and unmanaged exploitation of forest resources in Amerindian communities;
- Indiscriminate burning; and
- Over-harvesting of resources.

#### **Agro-ecosystems:**

- Shifting weather patterns leading to crop loss – shorter rain periods and longer dry spells. The North West Region of Guyana and North Rupununi experienced continuous dry periods resulting in crop loss during 2006-2008. The rainy period arrived earlier than expected in 2007 also contributed to some crop loss;
- Use of agro-chemicals;
- Management and control of crop diseases;
- Soil erosion; and
- Large scale clearing of forests for cattle farming.

#### **Inland aquatic:**

- Loss of aquatic biodiversity resulting from land and river mining;
- Degradation of water quality due to mining and agricultural practices;
- Introduction of potentially damaging exotic species;
- Over-harvesting of fisheries resources with gill nets (Regions of the Essequibo River in particular pose a threat to fish populations with indiscriminate use of Brazilian-made nets made from nylon). For example, the use of nets in North Rupununi is known to entangle and drown *Arapaima sp*; and
- Fish poisoning.

#### **Marine/Coastal:**

- Excessive targeting of certain marine species of fish;
- Introduction of seine for fish harvesting;
- Degradation of water quality due to contamination from solid and other wastes;
- Over-harvesting of mangrove vegetation; and
- Poaching of protected species – endangered sea turtles.

#### **Species:**

- See reasons identified for various sections above and which also include habitat loss and degradation.

#### **Genes:**

- Undermining of local breed characteristics and varietal gene pools due to out-breeding and substitution;
- Inability to identify Genetically modified Organisms (GMOs) and Living Modified Organisms (LMOs), and;
- Inability to preserve traditional crop species for the subsequent crop as a result of crop loss.

## **CHAPTER 2: CURRENT STATUS OF THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN**

### **2.1 INTRODUCTION**

This Chapter provides a brief overview of the main national documents related to biodiversity management and conservation in Guyana. These are the National Strategy for the Conservation and Sustainable Use of Guyana's Biological Diversity and the National Biodiversity Action Plan (NBAP I). The chapter further highlights the status of implementation of these documents and the successes and obstacles faced by the implementing institutions.

### **2.2 OVERVIEW OF THE NATIONAL STRATEGY FOR THE CONSERVATION AND SUSTAINABLE USE OF GUYANA'S BIOLOGICAL DIVERSITY**

The National Strategy for the Conservation and Sustainable Use of Guyana's Biological Diversity laid the basis for the development of the NBAP and it adumbrates Guyana's national policy position regarding the study of, conservation and sustainable use of biodiversity. The Strategy, prepared in 1997, outlines the following broad objectives of national policy on biodiversity:

- To sustainably use Guyana's renewable natural resources, including biodiversity;
- To develop institutional capacity and capability to execute all aspects of environmental management, especially the management of biological resources;
- To integrate the conservation agenda into national development agenda;
- To equitably share benefits which will arise from research, conservation and sustainable use of components of biological diversity; and
- To take all necessary actions to achieve these goals.

Specifically, the Strategy has its basis on the following principles:

- Saving biodiversity;
- Studying biodiversity; and
- Using biodiversity sustainably and equitably.

It notes that Guyana accepts its responsibility to establish systems at the policy, administrative, technical and institutional levels for the management, conservation and sustainable use of biodiversity. In particular, it proposed the development of a number of regulations, standards and guidelines and the development of incentives for sustainable use of Guyana's resources. The EPA, by way of the Environmental Protection Act 1996, assumes the responsibility for biodiversity management. The Act enjoins the EPA with the responsibility to fulfill this mandate through collaboration with public and private sector organisations, inclusive of NGO, communities and individuals.

In recognizing the role of each stakeholder and the need for participation of not only government and non-governmental institutions but also private sector agencies and the public at large, the Strategy proposed a strong education and public awareness programme as a critical component for conservation and management. The indigenous peoples, and their role in conservation, are largely recognised, given the strong link between their culture and biodiversity.

The Strategy covers broad areas in line with the Convention Articles and proposes specific actions and activities mainly for the EPA to coordinate and implement with other stakeholders. These actions were subsequently integrated into the development of the NBAP I.

## 2.3 OVERVIEW OF THE NATIONAL BIODIVERSITY ACTION PLAN I (NBAP I) 1999 - 2004

The NBAP I builds on the National Strategy for Conservation and Sustainable use of Biodiversity and its development represents a significant step taken at the national level in the process of biodiversity planning. The Action Plan aims to increase the awareness of issues affecting biodiversity and to integrate concerns for biodiversity into the planning agenda and subsequently transfer those into actions. While it promotes the conservation and sustainable use of biodiversity, the Action Plan also highlights the importance of biodiversity as a national asset that provides various economic options, as well as, basic concepts related to biodiversity and conservation. It outlines specific objectives to assess national capacity, identify gaps, propose actions, and to encourage involvement of stakeholders to support the implementation of the plan and increase public awareness for biodiversity use and conservation. Box 2 highlights the goal and objectives of the Action Plan.

The NBAP I was developed in 1999, for a period of five (5) years (1999-2004), through a participatory process. A number of stakeholder consultations and/or workshops were held across the country to allow stakeholders to raise pertinent issues related to biodiversity management and also to comment on the draft document before finalization. An intensive education and public awareness programme aimed at highlighting issues associated with biodiversity, as well as, to help the general public to understand the purpose of the action plan was conducted in parallel with the stakeholder consultations. Media tools such as television and radio were used to promote awareness around the country.

The Action Plan stipulates a phased approach for biodiversity management and conservation. It laid the foundation through the following strategic principles to guide conservation and sustainable use of biodiversity:

- I. Integrating biodiversity concerns into the work at the local, regional, sectoral, and national levels; and,
- II. All planning and management efforts that either use or impinge on biological diversity should, as far as possible, consider and be based on four approaches/principles:
  - *The Participatory Approach;*
  - *The Cyclical/Adaptive Planning Approach;*
  - *The Ecosystem Approach; and*
  - *The Precautionary Principle.*

The Action Plan comprises of a number of programme areas with specific actions for implementation over a five year cycle occurring in two (2) consecutive phases for the period 1999 to 2004. The first phase focused on establishing a 'foundation' through interventions of nine (9) programme areas that are essential for sustainable biodiversity planning and management in Guyana. This phase mainly aimed to

### Box 2: Goal and Objectives of the NBAP I

**Goal:** *To promote and achieve the conservation of Guyana's biodiversity, to use its components in a sustainable way, and to encourage the fair and equitable sharing of benefits arising out of the use of Guyana's biodiversity.*

#### **Objectives of NBAP I:**

- I. Evaluate the state of capacity nationally to achieve the above goal;
- II. Identify gaps and needs relating to achieving the above goal;
- III. Propose actions to achieve this goal and close the gaps;
- IV. Develop activities in a number of priority areas relating to the overall goal;
- V. Identify the roles and responsibilities of the various stakeholder groups in the implementation of the plan;
- VI. Obtain and harness stakeholder involvement and support for the development and implementation of the plan; and,
- VII. Increase public awareness of biodiversity. *Source: EPA (1999b)*

fill the gaps, in particular, to mobilize resources (human and financial) and to build capacity to address the Convention Articles, as well as to increase awareness.

Central to the design of the Action Plan is the Cyclical/Adaptive Planning Approach in which monitoring and evaluation are essential components. The plan takes into account on-going monitoring and evaluation for the various programme areas during the implementation of Phase I to inform a more targeted Phase II. This second phase focused on seven (7) key areas inclusive of research and biodiversity information, education and public awareness and continued capacity building and mobilization of resources (technical and financial). Table 6 provides a summary of the various Programme Areas and key Actions as highlighted in NBAP I. A detailed NBAP I can be found by accessing the following link: <https://www.cbd.int/doc/world/gy/gy-nbsap-01-en.doc>.

**Table 6: Summary of Programme Areas and Actions**

Programme/Action	Implementing Agency	Time Frame (Yrs)		
		1-2	3-5	>5
<b>PHASE 1</b>				
<b>Mobilization of Financial and Technical Resources:</b>				
1. Ensuring short and long term financing and sustainability of the Biodiversity Action Plan	EPA	X		
2. Mobilization of financial resources from the regional and international donor community	EPA	X		
3. Mobilization of financial resources from national inputs	EPA	X		
4. Mobilization of financial resources from the sustainable use of biodiversity and other new and innovative mechanisms	EPA	X		X
5. Mobilization of technical resources from regional and international sources	EPA			-
<b>Human Resources and Institutional Capacity Building:</b>				
6. Strengthening of the Environmental Protection Agency's capacity for administration and integrated planning of the biodiversity sector	EPA	X		
7. Strengthening of the National Biodiversity Advisory Committee	EPA	X		
8. Strengthening of Regional Institutions	Regions	X		
<b>Research and Information on Biodiversity:</b>				
9. Preparation and implementation of a prioritised programme of biodiversity research for Guyana	EPA/NBAC		X	
10. Preparation and maintenance of a national database on biodiversity	EPA, CSBD, etc.		X	
11. Development and implementation of a national clearing house mechanism for biodiversity	EPA	X		
12. Developing a capacity for the genetic characterization of	UG	X		



economically important species of Guyana				
<b>Consolidation of the Policy, Legal and Administrative Framework:</b> 13. Developing a legal framework for promoting the protection, compensation for local knowledge, innovations and techniques relating to biodiversity	EPA, Min. Amerindian Affairs	X		
14. Comprehensive review and updating of national legislation relating to biodiversity, access and benefit sharing	EPA, Amerindian representatives	X		
15. Comprehensive review and updating of national legislation on natural resources	EPA, Sectoral agencies	X		
16. Developing national policies on wildlife, fisheries and biodiversity	Wildlife Unit, Fisheries Dept.	X		
17. Fortifying the national quarantine and biosafety processes	Min. Agriculture, NARI, EPA	X		
<b>Public Awareness and Education:</b> 18. Incorporating studies on environment and biodiversity into the curricula of schools	MoE, NCERD, CPCE	X		
19. Training of teachers to teach courses on environment and biodiversity	CPCE, EPA		X	
20. Preparation of instructional material for biodiversity education and awareness programmes	EPA, NCERD, CPCE, CI			X
21. Developing non-formal methods of promoting biodiversity education and awareness	EPA, Regions, CI			X
<b>In situ and ex situ conservation:</b> 22. Developing a national system of protected areas	GNRA, EPA	X		
23. Coordination and expansion of <i>ex situ</i> activities	NARI, GUYSUCO, GRDB, NPC	X		
<b>Incentive Measures:</b> 24. Review of incentives and disincentives for conservation and sustainable use of biodiversity and the identification of sustainable economic alternatives to activities that threaten biodiversity	EPA, Min. Finance, Sectoral Agency.		X	
<b>Measures for Sustainable Use:</b> 25. Criteria and indicators for sustainability of biological resources	NBAC, Sectoral Agency.		X	
<b>Monitoring, Evaluation and Reporting:</b> 26. Monitoring, Evaluation and Reporting of the implementation of Programme Areas	EPA Board, Implementing Agency.		X	

26. Advance recommendations on modifications/improvements to the CBD through CoPs and SBSTTA	NBAC	X		
<b>Phase II – Mobilization of Financial and Technical Resources:</b>	Sectoral Agencies			X
28. Strengthening of agencies and groups involved in biodiversity management				
29. Strengthening capacity of other institutions to undertake biodiversity projects	Local communities			X
<b>Research and Information on Biodiversity:</b>				X
30. Support for the establishment of a national centre for biological collections	UG, NARI, GFC			
31. Pilot Study on Economic valuation of biodiversity	UG, GNRA,			X
32. Revision of the Country Study on Biological Diversity	EPA, UG			X
<b>Monitoring, Evaluation, and Reporting:</b>	EPA Board			X
33. Evaluation of implementation of the initial cycle of the National Biodiversity Action Plan				

Source: EPA. (1999b).

## 2.4 IMPLEMENTING GUYANA'S NBAP

Implementation of the NBAP started in November 1999 and occurred in two consecutive phases over a period of five (5) years. During the first two years (Phase I), the NBAP focused on the following nine Program Areas:

1. Mobilization of financial and technical resources,
2. Capacity building at the individual and institutional levels
3. Research and information on biodiversity
4. Policy, legal and administrative framework
5. Public awareness and education
6. *In-situ* and *ex-situ* conservation
7. Incentive measures
8. Measures for sustainable use
9. Monitoring, evaluation and reporting

NBAP Phase II, during the subsequent three years, focused on the following seven Program Areas:

1. Mobilization of Financial and Technical Resources
2. Human Resources and Institutional Capacity Building
3. Research and Information on Biodiversity
4. Public Awareness and Education
5. *In situ* and *ex situ* Conservation
6. Monitoring, Evaluation and Reporting of the implementation of Program Areas 1 to 6 above
7. Planning Biodiversity Action Plan Cycle 2

Each programme area highlighted a number of projects in significant detail outlining their objectives, scope, justification, project duration, implementing institutions and budget. Performance indicators, means of verification and risks or assumptions were considered in some cases. The Action Plan

identified national targets based mainly on raising awareness, capacity development, generation and dissemination of information and the development of policy, legislative and financial environment to achieve these targets (EPA 1999b).

The following sections provide detailed information on specific outcomes of the NBAP I.

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#### **2.4.1 CONTRIBUTION TO IMPLEMENTATION OF UNCBD ARTICLES**

The implementation of NBAP I has supported some of the Articles of the UNCBD. These actions have, to some extent, assisted Guyana towards the implementation of the Convention as detailed below.

##### Article 6: General Measures for Conservation and Sustainable Use

(a) Guyana established the foundation for conservation and sustainable use of biodiversity through the development of a national strategy in 1997, refer to Section 2.2. This strategy laid the framework for the development of the NBAP. The plan outlined specific actions and activities for institutional strengthening, enhanced capacity building and targeted thematic areas of the Convention for the conservation and management of Guyana's biological resources.

(b) The integration of conservation and sustainable use of biodiversity into sectoral and cross-sectoral plans, programmes and policies is discussed in Section 3.2.

##### Articles 7 and 14: Identification and Monitoring; Impact Assessment and Minimizing Adverse Impacts

Implementation of the NBAP has contributed towards achieving some aspects of Articles 7 and 14. While the Action Plan lacked specific targets for monitoring and impact assessment, these areas are cross-cutting and therefore were addressed through the broader objectives of conservation and sustainable management of biodiversity. Components of biodiversity important for conservation and sustainable use have been identified, mainly, through the selection of specific areas, representative of Guyana's ecosystems and biogeographic regions, for protection.

Guyana has enacted legislation to regulate all existing and new developments that may cause or are likely to cause significant impact on the environment. The legislation also stipulates the legal requirement for environmental impact assessment and strategic impact assessment, key components of Article 14. Guyana has been facilitating the Environmental Impact Assessment (EIA) process since the promulgation of the EP Act in 1996.

Guidelines for the monitoring of biodiversity in the mining and logging operations were also developed by the Guyana Geology and Mines Commission (GGMC) and the Guyana Forestry Commission (GFC). Moreover, processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity have been identified by the EPA.

##### Articles 8 and 9: *In-situ*<sup>44</sup> and *Ex-situ* Conservation

Programme Area 6 in NBAP I focused on the establishment of a national system of protected areas and to coordinate and expand *ex-situ* conservation measures.

In selecting areas for conservation, as stipulated by the Strategy, Guyana ensured that these areas are *“representative of the full range of the nation's biological diversity and areas of biogeographical provinces, ecosystems and habitats domesticated or cultivated species and endemic, threatened and vulnerable species which are of national, regional and global importance”* (EPA 1997).

The key outcomes are:

1. The establishment of a protected areas secretariat to coordinate the development of the protected areas system;
2. Establishment of a protected areas unit as part of the EPA. The Unit through the EPA and the Protected Areas Secretariat facilitated the following institutional implementation activities:

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<sup>44</sup> Refer to Appendix III for detailed status on Guyana's progress towards targets of the Programme of Work on Protected Areas

- Planning of proposed activities with relevant agencies;
  - Assist in the preparation of proposals;
  - Seek funding and meeting with donor agencies;
  - Facilitate training and capacity building;
  - Facilitate community consultation and participation;
  - Conduct awareness programmes;
  - Conduct site visits; and
  - Facilitate biological research.
3. Two(2) legally established protected areas – Kaieteur National Park (KNP) and Iwokrama Rainforest Reserve;
  4. One (1) community owned Conservation Area in the Konashen District. Konashen is a legally established and titled village under the Amerindian Act (2006);
  5. Two (2) conservation areas – Moraballi Forest Reserve and CI Conservation Concession;
  6. Five (5) proposed protected areas
    - Southern Region
    - Orinduik Falls
    - Kanuku Mountains
    - Shell Beach Nature Reserve
    - Mount Roraima
  7. Development and implementation of an Arapaima Management Plan, in collaboration with a local NGO and local communities, as a means to recover this threatened species, refer to Case Study 1 below.
  8. Delineation of the Kanuku Mountains and Shell Beach, see Figure 5 which shows the maps of the pilot study areas;
  9. Livelihood enhancement of communities within and around protected areas and proposed protected areas; and
  10. Establishment of small gene banks (traditional seed storage and vegetative field gene banks) for selected crops and evaluation of land race varieties such as hot peppers and cassava.

**Case Study 1: Strengthening Arapaima Population through the Arapaima Management Plan: Article 8 (f)**

The management plan is based on a successful Brazilian system. The system relies on determining the number of fish to be harvested based on the annual counts of Arapaima. The plan was prepared through a series of consultations with community fishermen, Government and Non-Governmental Organisations (NGOs). It aims to increase the local Arapaima (*Arapaima Gigas*) population and consequently income of local fishermen and improve local organisation and institutions in the North Rupununi. The plan is the brainchild of the Iwokrama International Centre and the North Rupununi District Development Board.

Fishing is an extremely important activity in the 16 Amerindian communities in the North Rupununi. In the last three decades, over harvesting and illegal exploitation of the Arapaimas have decreased the fish population. Since the enactment of the Fisheries Act in 1953, it was forbidden to exploit the Arapaima. North Rupununi residents did not harvest the fish until the 1960s when trading with Brazil began. Fishing became so intense that by 2001, there was a marked decrease in the Arapaima population.

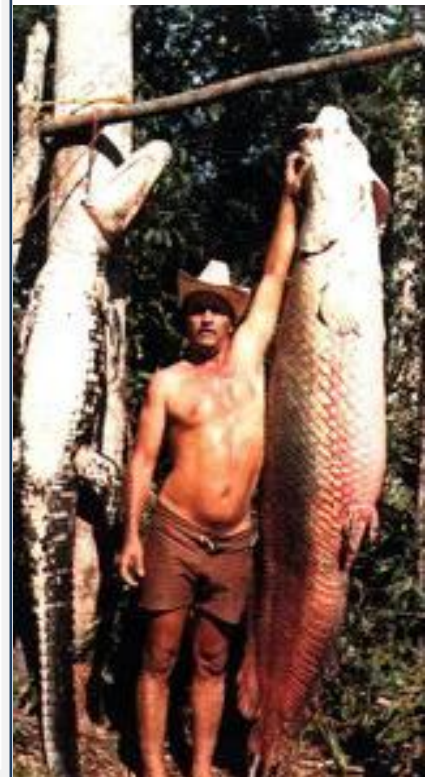
With the assistance of Iwokrama and the NRDDDB, a ban on harvesting was re-enforced to allow the stock to replenish, with intent to controlled harvest methods in the future. Today, the population of the Arapaima has increased significantly. From fish counts in March 2001, 450 fish one meter and over and October 2001 - 825 fish one meter and over were estimated. In November 2002, 1105 Arapaima one meter and over were counted, and in January 2004, 1170 Arapaima were counted. Consequently, with the implementation of the management plan sustainable harvest of the fish will become a reality.

Approval of the plan marks a very significant step in managing inland fisheries and cementing the principle of collaborative management of natural resources. The Arapaima Management Plan satisfies the requirements of the revised Fisheries Act of 2002 which outlines specifications on fisheries management and development.

*Source WWF 2007 & IWOKRAMA 2009*



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**Case Study 2: Sustainable Use of Biological Resources:  
Iwokrama**

The **Iwokrama International Centre (IIC) for Rain Forest Conservation and Development** is an autonomous non-profit institution established by Guyana and the Commonwealth. The Centre manages the nearly one million acre (371,000 hectares) Iwokrama Forest in central Guyana to show how tropical forests can be conserved and sustainably used to provide ecological, social and economic benefits to local, national and international communities.

The Iwokrama Forest is known for its rich biodiversity and cultural significance to the Makushi people. Iwokrama has healthy populations of wildlife including several endangered giants; Jaguars (*Panthera onca*), Giant River Turtles (*Podocnemis expansa*), Arapaimas (*Arapaima Gigas*), Harpy Eagles (*Harpia harpyja*) and Giant Otters (*Pteronura brasiliensis*). Alongside IIC's business development initiatives, the IIC's integrated monitoring protocol tracks the status of and maintains the integrity of forest biodiversity and social-economic impacts on villages.

The IIC builds partnerships with local communities and the private sector. These partnerships combine traditional knowledge, science and business to develop "green", socially responsible and sustainable forest products and services. Some of these unique business ventures include the Canopy Walkway as a tourism enterprise and sustainable forest management. In February 2007, IIC established a Joint Venture Company (JVC) between its subsidiary ITI (Iwokrama Timber Inc) and Tigerwood Guyana Inc (TGI). This JVC is known as Iwokrama Sustainable Timber Inc. (ISTI). In 2008, sustainable forest management was further strengthened with Forest Stewardship Council (FSC) Certification for the Iwokrama Forest.

In addition, Iwokrama shares forest with Fairview Village, the only community within the Iwokrama Forest that has Land Title to 21,950.83 ha of the Iwokrama Forest; and opts to remain a part of the Protected Area. A MoU where their rights under the Amerindian Act 2006 are fully respected and a stakeholder agreement ensures benefits from the ISTI joint-venture is shared. The IIC's Sustainable Forest Management (SFM) practice is current and exemplary. (Source: [www.iwokrama.org](http://www.iwokrama.org)).



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### **Case Study 3: Iwokrama Canopy Walkway -Benefit-Sharing**

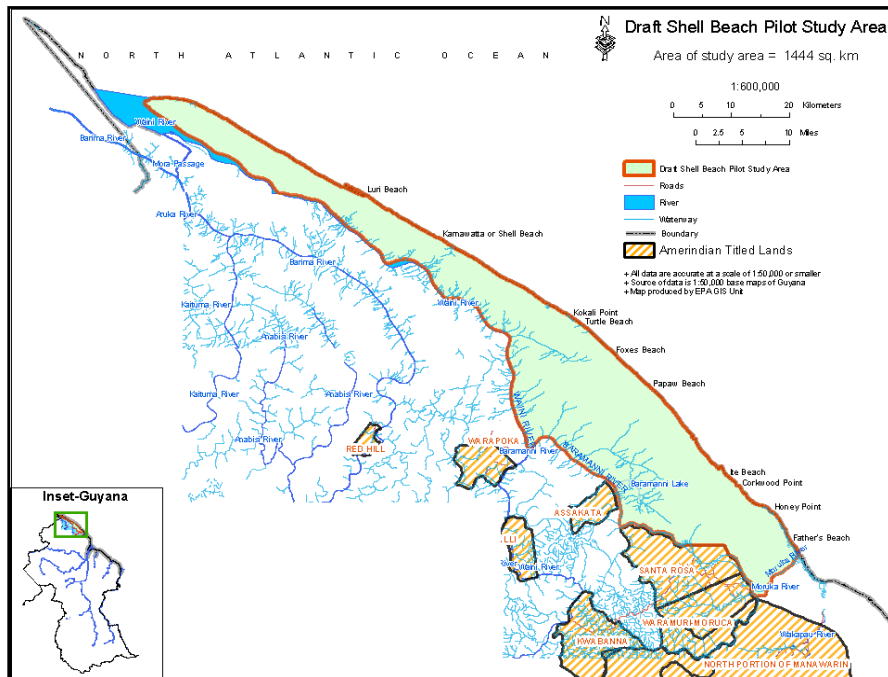
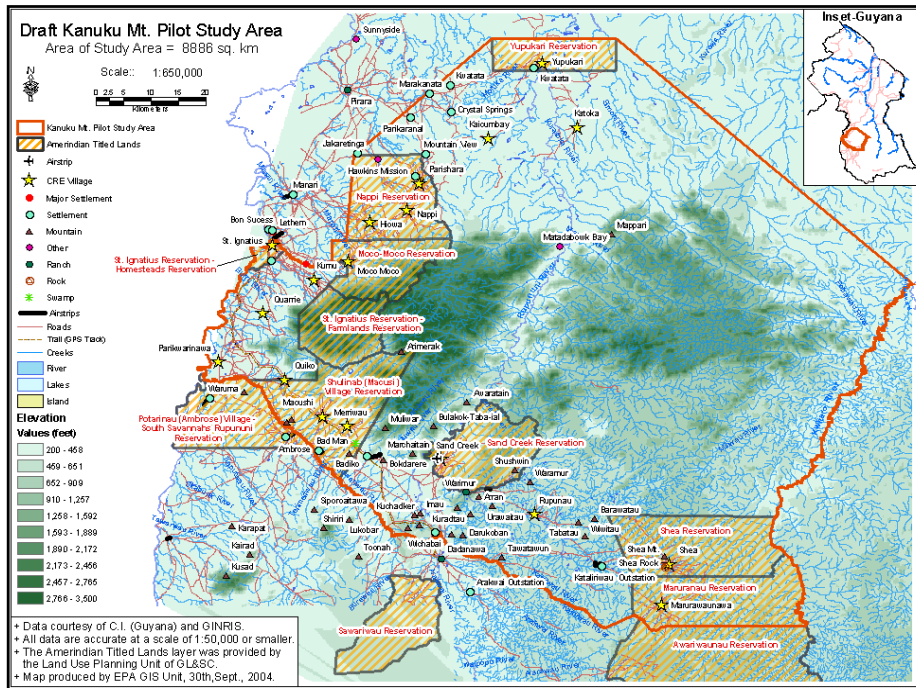
The Iwokrama Canopy Walkway is located in the Iwokrama Forest with a total of 154 metres long suspension bridges and viewing decks of up to 30 metres in height. The walkway gives visitors a unique view of the forest canopy and its wildlife.

The forest around the walkway contains some important flora and fauna. Among these are the Jaguar (*Pantera onca*), the Bullet Wood tree, Greenheart and the Waramadan tree.

The management of the Iwokrama Canopy Walkway is a unique benefit-sharing example of a forest-based business partnership. Community and Tourism Services Inc (CATS) manages the operations on behalf of Iwokrama International Centre. CATS is an equal partnership between the Makushi community at Surama, Annai and two private sector businesses: Rock View Lodge and Wilderness Explorers. CATS demonstrates how an ecotourism venture can be financially successful with tangible benefits and ownership for indigenous communities. The Canopy Walkway was opened in 2003.

*To provide a viable business model for sustainable use of the rainforest in partnership with indigenous communities and private sector. The company will operate in the spirit of good company governance, exercise fairness in business, provide benefits to the indigenous communities we work with and exhibit care and concern for the environment in which we operate.*





**Figure 5: Kanuku Mountains and Shell Beach Pilot Study Areas**  
Source :EPA 2007a



#### Article 10: Sustainable Use of Components of Biological Diversity

The NBAP Programme Area 8 focused on developing measures for the sustainable use of biodiversity. Criteria and indicators for sustainability of biological resources have been developed at the macro and micro level for the forest sector.

In the wider context of the Convention, the Iwokrama International Centre for Rainforest Conservation and Development, an international NGO, leads by example in the sustainable use of biological resources. Case study 2 provides an overview of Iwokrama's activities related to the sustainable use of biological resources. Case study 4 highlights the study documented by the South Central and South District Toshias Council on the customary use of biological resources within their traditional territory in South Rupununi.

#### Article 11: Incentive Measures

Programme Area 7 focused on incentive measures and alternatives. The NBAP aimed to review incentives and disincentives for conservation and sustainable use of biodiversity and to identify sustainable alternatives or sustainable livelihood activities to reduce the impact on biodiversity. The focus has been mainly in the forestry sector through the adoption of the voluntary forest certification scheme and the institutionalization of sustainable forest management.

#### Article 12: Research and Training

Programme Area 3 focused on research and information on biodiversity. A public consultation was held in 2002 to develop national biodiversity research priority areas. These research priority areas were developed to guide local and foreign researchers on the country's research needs. The seven research areas identified as highest priority are:

- Biodiversity assessments, including Taxonomic and Genetic Diversity;
- Bioindicators of pollution;
- Inventories of present land use;
- Keystone species in different ecosystem types;
- Mangrove ecology and regeneration;
- Non-timber forests products, and
- Wildlife identification, characterization and management.

Local NGOs such as Conservation International (CI) and Iwokrama also facilitates research, mostly driven by the researcher, on their conservation concessions.

**Case Study 4: South Central & South District Toshias Council & Communities Article 10 (c) Project: Documenting Customary Use of Biological Resources within their Traditional Territory in South Rupununi - Guyana**

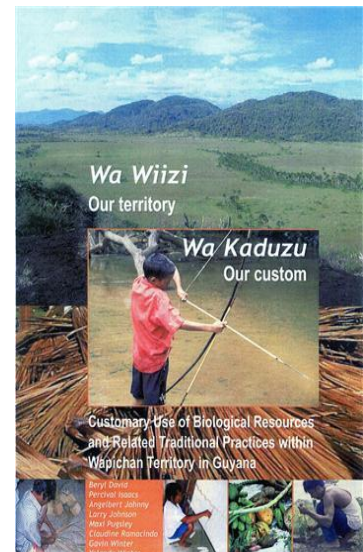
In April 2006 members of the South Central and South District Toshias Council published a study, ***Wa Wiizi Wa Kaduzu: Our Territory Our Custom*** as part of a project on Customary Use of Biological Resources and Related Traditional Practices within the Wapichan Territory in Guyana. This work summarizes customary use practices of Wapichan people in South Rupununi in Guyana and explores the opportunities and challenges relating to the effective implementation of article 10(c) of the United Nations Convention on Biological Diversity (UNCBD).

The study was conducted by a team of eight Wapichan researchers in 16 main villages and other smaller settlements in the South Rupununi District. The study is divided into the following seven sections:

1. *The UNCBD and article 10 (c): context for the study*
2. *Indigenous people in the South Rupununi*
3. *Customary use of biological resources*
4. *Traditional practices*
5. *Management of territory and sustainable use*
6. *Legal framework and national policies*
7. *Conclusion and recommendations*

The study documents how the Wapichan communities customarily use the land for farming and use a wide variety of uncultivated plants and animals for food, craft, construction, medicines and cultural activities. Customary use areas span the range of ecosystems and habitats that are found in the South Rupununi: savannah, forest, mountains, swamps, lakes, rivers etc. The work also examines and documents the Wapichan **Kaduzu** custom which includes settlement patterns, norms and beliefs, customary law that sanction over harvesting and wasteful activities. Traditional practices that promote selective and rotational resource use to enable regrowth and regeneration are also explored.

The study concludes that the sustainability of traditional resource use in the South Rupununi stems from the maintenance of the customary land tenure regime. This land-use system enabled access to extensive areas of lands and diverse resource use. In addition, continuity in a dispersed settlement pattern, the extensive system of shifting cultivation and the Wapichan **Kaduzu** custom of sensible use of land and natural resources were also unique.



Front cover of the publication



Part of the Wapichan *wiizi*

### **Case Study 5: Makushi Research Unit (MRU)**

The MRU resulted from a local community, North Rupununi District Development Board (NRDDB), Iwokrama and Amerindian Research Unit research initiative in 1995 to study the ethnobiology of the North Rupununi.

The Unit consists of predominantly women researchers from local communities who conduct inquiries on social, economic, and ecological aspects of life in the North Rupununi. The MRU plays an important role in understanding local knowledge systems and cultural affirmation. It is also a primary force in ensuring local communities in the North Rupununi are informed of research.

The MRU has been recently supported by the Gender Equality Fund of the Canadian International Development Agency (CIDA). MRU projects include working with the Ministry of Education to develop Makushi language teaching in schools. The group published several books including "Makusipe Komanto Iseru" freely translated as "Sustaining the Makushi Way of Life". (Source: [www.iwokrama.org](http://www.iwokrama.org))

### **Article 13: Public Education and Awareness**

Programme Area 5 of the NBAP focused extensively on public education and awareness. The outcomes include:

- Awareness activities such as workshops, seminars, and media programmes;
- Printed education materials such as posters, brochures, bookmarks and newsletters that were distributed at publicly held exhibitions and seminars;
- A video on best practices in the mining sector was promulgated at targeted mining communities around the country and on local television stations;
- NGO's such as CI and Iwokrama also conducted public awareness programmes in the field;
- The National Parks Commission (NPC), the Botanical Gardens and the Jenman Education Centre conducted public education and awareness programmes in collaboration with the Nature School and CI;
- Teaching manuals were prepared incorporating environmental themes as curriculum supplements in Social Studies, English language, Mathematics and Science for level three in primary schools. A five day national workshop was held to train teachers to use the manuals;
- A module on environment for Integrated Science curriculum for secondary schools was prepared; and
- Community based training and education centres such as the Bina Hill Institute demonstrates grass root level capacity building for management and conservation of resources and preservation of community well-being. Refer to Case Study 6 below.

**Case Study 6: The Bina Hill Institute: Training in Traditional Knowledge Systems, Natural Resource Management and Skills for Employment and Economic Development**

The Bina Hill Institute (BHI) located at Annai Central in Region 9 (Upper Takatu/Upper Essequibo), was established in 2001 and works with several partners under the umbrella of the North Rupununi District Development Board (NRDDB), to develop training, research and other resources in the North Rupununi. For example, the institution is used as a base when conducting fisheries surveys for arapaima and aquarium fish.

The institute provides an opportunity for youths from the North and South Rupununi, who did not complete secondary school, to further their training and education and there are currently 26 students enrolled. The skills taught are meant to build the capacity of the students in areas that can increase their employment marketability and preserve traditional knowledge systems and language.

The BHI offers courses such as Wildlife Management, Forestry, Computer Science, Agriculture and other skills and leadership programmes.

The BHI is in the process of expanding its training in the areas of:

- natural resource management;
- traditional knowledge systems; and
- capacity building for occupational and economic development.

The institute also started a radio station in 2004 called Radio Paiwomak (FM 97.1) which is the first hinterland radio station. The station is located within the Bina Hill Institute and operates under the umbrella of the NRDDB. The station affirms the culture and tradition of the Makusi people by producing and broadcasting programmes highlighting local culture and issues about the environment and biodiversity. Some of these programmes are in the local language (Makusi) and the station serves 9 communities in the area.



Bina Hill Institute – Annai

**Article 15 & Article 19: Access to Genetic Resources & Handling of Biotechnology and Distribution of its Benefits**

Programme Area 4: Consolidation of the Policy, as well as the Legal and Administrative Framework focused extensively on developing the policy and legal framework on biodiversity through the execution of five (5) projects, Table 7, provides detailed information on these projects (Projects 13 -17). These projects also aimed to institute the national mechanisms related to access and benefit sharing; biosafety and to provide the support for the protection, compensation for local knowledge, innovations and techniques relating to biodiversity.

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## 2.4.2 PROGRESS ON PRIORITY ACTIVITIES

Table 8 summarizes the progress/outcomes associated with the implementation of NBAP I. EPA in collaboration with stakeholders through its Natural Resource Management Division (NRMD) has the overall responsibility for the implementation of the Action Plan.

Activities associated with implementation of the NBAP have been integrated into the work plan of the NRMD and executed through its three (3) functional Units – Biodiversity, Protected Areas and Wildlife. The NRMD has the capacity, according to its organizational structure to staff a total of nine (9) persons. As of January 2010, NRMD has seven (7) persons on staff, inclusive of the director and secretary. During the period of NBAP implementation, the EPA and NRMD in particular, was affected by continuous staff turnover.

Many project activities continued beyond the allocated five (5) years (1999 – 2004) due to a number of factors and these are outlined in Section 2.4.3.

In the last quarter of 2004, EPA conducted a review of its NBAP to identify progress and lessons learnt in order to inform the preparation of a more targeted NBAP II focusing on specific resources. The resource targeted NBAP II was developed based on a key recommendation from the review of NBAP I. It was recommended to maintain the objectives of the Convention and to use these to guide the preparation of NBAP II by focusing on Guyana's major resources, their conservation, benefit sharing and sustainable use. *“Agricultural lands, forests, coastal, marine and freshwater resources, crucial for the future of Guyana, are important sources of employment and income, and their degradation would be harmful to its people and the world at large”* (EPA, 2005c). NBAP II (2007 – 2011) was prepared in 2006 and approved in 2007 and the EPA is currently in the implementation phase.

Table 7: Summary of progress/outcomes of NBAP projects to-date

Program Area	Number <sup>45</sup>	Title	Status/Outcomes
<b>PHASE I: FOUNDATION PROGRAMS</b>			
<b>Mobilization of Financial and Technical Resources</b>	1	Ensuring short- and long- term financing and sustainability of the National Biodiversity Action Plan	A Biodiversity Development Specialist (BDS) was hired by the EPA to assist in the sourcing of funds for projects under the NBAP during the early period of implementation. After 2004 the BDS has been absorbed into the core staff of the EPA as a Senior Environmental Officer (SEO). However, this position has been vacant since the last quarter in 2007 until the end of this reporting period (2008).
	2	Mobilization of financial resources from the regional and international donor community	While no specific programme was developed to carry out this activity during the reporting period it has been a core component of the NRMD workplan. Project proposals were developed and submitted to donors for funding and financial resources were received from Flora Fauna International (FFI), World Wildlife Fund (WWF), Global Environment Facility (GEF), European Union (EU), United States Agency for International Development (USAID), United Nations Development Programme (UNDP) and German Bank for Reconstruction and Development (KfW).
	3	Mobilization of financial resources from national sources.	Counterpart funding was provided by the Government of Guyana (GoG) for projects such as the Wildlife Surveys Project. GoG also provided funding for staff positions in the NRMD, EPA and contributed significant in-kind resources such as human resources, office space and administrative support to execute projects associated with the implementation of NBAP I.
	4	Mobilization of financial resources from the sustainable use of biodiversity and other new and innovative mechanisms.	Revenue generating mechanisms have been established and managed by the EPA through the Biodiversity Research Process for applications and Permits and the Environmental Authorization Process. Further, the Permitting process required by CITES ensures that wildlife is traded in a sustainable manner. Funds are generated for the GoG by application of levies and taxes and managed by Wildlife Management Authority (WMA). Innovative mechanisms have been executed or implemented by sector agencies such as the GFC and the conservation concession managed by Conservation International (CI) is an example of such a mechanism. CI and the Government of Guyana signed an agreement to lease 81,000ha for conservation instead of logging.

<sup>45</sup> Each number in this column represents a project number and corresponds to the same number as outlined in the NBAP I (1999 – 2004)

Program Area	Number <sup>45</sup>	Title	Status/Outcomes
	5	Mobilization of technical resources from regional and international sources.	Continued partnerships with international NGOs such as WWF, CI, FFI, and Iwokrama have facilitated significant technical support for programmes during the implementation of NBAP and include both capacity building and the provision of equipment.
<b>Human Resources and Institutional Capacity Building:</b>	6	Strengthening of the Environmental Protection Agency's capacity for administration and integrated planning of the biodiversity sector.	EPA formalised the NRMD in 2001. The Division was created to support three Units - Protected Areas, Biodiversity Research and Wildlife headed by a Director. During this reporting period (2006 – 2008), a few staff positions within the NRMD, such as SEO for Protected Areas and Environmental Officer responsible for wildlife are vacant. In collaboration with the Ministry of Local Government, the EPA conducted training in biodiversity and protected areas in several of the Administrative Regions in Guyana. International Development Bank (IDB) Phase I and II Programmes have provided significant infrastructural support for the EPA such as vehicles, computers, field equipment, office equipment etc. and a number of persons within the Natural Resource Management Division (NRMD) have benefited from local and overseas training.
	7	Strengthening of the National Biodiversity Advisory Committee (NBAC).	The National Biodiversity [Advisory] Committee has been reconstituted in February 2008 to a statutory body to improve its <i>locus standi</i> on biodiversity issues and to have wider representation among stakeholders, refer to Appendix V for a detailed list of the Organisations that comprises the NBAC.
	8	Strengthening of Regional Institutions	There has been strengthened collaboration with the various Administrative Regions, public institutions such as the Ministry of Amerindian Affairs (MoAA), Ministry of Local Government and Regional Development and local Non-Governmental Organisations (NGOs) as well as a number of Amerindian NGOs. Memoranda of Understandings (MoU) were signed with the South Rupununi Conservation Society (SRCS), Iwokrama, Guyana Marine Turtle Conservation Society (GMTCS), etc for further collaboration on conservation and biodiversity management.
<b>Research and Information on Biodiversity</b>	9	Preparation and implementation of a prioritized programme of biodiversity research for	A national workshop was held in April 2002 to establish priority areas for biodiversity research in Guyana and a report was prepared outlining key areas of interest for biodiversity research in Guyana.

Program Area	Number <sup>45</sup>	Title	Status/Outcomes
		Guyana	
	10	Preparation and maintenance of a national database on biodiversity	A National Biodiversity Research Information System (NBRIS) has been developed in 2007 and is currently in the testing/implementation phase.
	11	Development and implementation of a national clearing house mechanism for biodiversity	A project proposal has been re-submitted to the UNDP-GEF for funding this component as part of the Enabling Activity Project. The project has been approved and development of the Clearing House Mechanism (CHM) is expected in 2009.
	12	Developing a capacity for the genetic characterization of economically important species of Guyana.	The National Agricultural Research Institution (NARI) has taken the lead to develop the capacity for genetic characterization of economically important species, such as coconut, mango, cassava and avocado, in collaboration with the EPA and other stakeholders. This is a joint initiative between the NARI and United States Department of Agriculture (USDA), with funding provided through USAID. The project is expected to commence in 2009 and it aims to collect and conserve genetic resources of crop plants and other related species, as well as, to enhance NARI's in-house research capacity.
<b>Consolidation of the Policy, Legal and Administrative Framework</b>	13	Developing a legal framework for promoting the protection, compensation for local knowledge, innovations and techniques relating to biodiversity	Through the Enabling Activity Project, supported by UNDP-GEF, EPA will conduct an assessment of capacity building needs for traditional knowledge in biodiversity conservation. The Enabling Activity Project commenced in 2008 and is expected to be completed at the end of 2009. The Amerindian Act 2006 makes provision for establishing conservation areas within titled communities. The draft regulations on Access and Benefit Sharing sets out the framework for promoting the protection and compensation for local knowledge, innovations and techniques relating to biodiversity.
	14	Comprehensive review and updating of national legislation relating to biodiversity, access and benefit sharing	The National Policy on Access and Benefit Sharing of Genetic Resources has been finalised and approved by Cabinet in August 2008 and the draft Regulation on Access and Benefit Sharing is currently being finalised.
	15	Comprehensive	A draft Protected Areas Legislation has been prepared and is being finalised.



Program Area	Number <sup>45</sup>	Title	Status/Outcomes
		review and updating of national legislation on natural resources.	The draft Wildlife Conservation and Management Regulations have been prepared and is being finalised. The Forestry Act of 1953 is currently being revised and a Forest Bill 2008 has been prepared.
	16	Developing national policies on wildlife, fisheries and biodiversity.	Integrated Coastal Zone Management Plan developed; Mangrove Management Plan reviewed and is being finalised; Fisheries Act revised and enacted; Wildlife Conservation and Management Regulations prepared; National Policy on ABS developed; Forest Act 1953 revised; Mining and Environment Regulations enacted; National Biosafety Framework developed and approved by Cabinet in 2008; Wildlife Import and Export Regulations prepared and, Species Protection Regulation revised.
	17	Fortifying the national quarantine and biosafety processes	National Biosafety Framework was approved in 2008 for implementation. Proposals were prepared and submitted for funding for the implementation of the National Biosafety Framework. A National Biosafety Clearing House Project was executed by the EPA. The Plant Protection legislation is being revised to meet the requirements of the international Plant Protection Convention (IPPC).
<b>Public Awareness and Education</b>	18	Incorporating studies on environment and biodiversity into the curricula of schools	Teaching manuals incorporating environmental themes were produced as curriculum supplements in the Social Studies, English Language, Mathematics and Science subjects areas for level three in primary schools. This was a pilot project. Due to inadequate financial resources, the extent of the use of the supplement has not yet been surveyed.
	19	Training of teachers to teach courses on environment and biodiversity.	A national workshop was conducted over a period of 5 days to train teachers to use the manuals outlined in Project # 18 above. Approximately sixty teachers were trained during this workshop.
	20	Preparation of instructional material for biodiversity education and awareness programs.	A module on the environment was produced as part of the Integrated Science curriculum for secondary schools
	21	Developing non-formal methods of	Over ninety Environmental clubs have been created around the country. To date no assessment was conducted to determine the level of activity in the clubs.

Program Area	Number <sup>45</sup>	Title	Status/Outcomes
		promoting biodiversity education and awareness	Several workshops, seminars, exhibitions and media programs were held and a variety of bookmarks, posters, brochures, newsletters were produced.
<b>In situ and ex situ conservation</b>	22	Developing a national system of protected areas	The Small Grants component of the Guyana Protected Areas System (GPAS) Project began in February 2006 with funding from the German Government. The project's overall goal to conserve ecosystems through livelihoods enhancement of various Amerindian communities living in or in close proximity to protected or proposed protected areas. The Protected Areas Legislation is being developed with financial support from KfW. A management plan was prepared for Guyana's Southern Region – Konashen and the process commenced to prepare a management plan for the proposed Kanuku Mountains Protected Area. Public Awareness and community resource evaluation were conducted for the Kanuku Mountains and Shell Beach. Guyana is in the process of preparing a management plan for the Kaieteur National Park.
	23	Coordination and expansion of ex situ activities	The collections at the Botanical Gardens and Zoological Park, National Museum, Centre for the Study on Biological Diversity, GFC are being maintained. NARI and the Guyana Sugar Corporation (GUYSUCO) continue to hold small genebanks (seed and field) for selected crops.
<b>Incentive Measures</b>	24	Review of incentives and disincentives for conservation and sustainable use of biodiversity and the identification of sustainable economic alternatives to activities that threaten biodiversity	Forest Certification, which facilitates access to important markets, is a valuable incentive for sustainable forest management. Also, a voluntary legal verification system is being promoted by the GFC. Some economic alternatives have been pursued to support conservation of biodiversity at Shell Beach targeting women as part of the efforts to support conservation of biodiversity and to reduce pressures on the resources. The GFC is also pursuing sustainable economic alternatives related to chainsaw use for logging. Under the Biodiversity Enabling Activity Project, the EPA is currently conducting an assessment on the Implementation of Incentive Measures for Biodiversity Management and Conservation.
<b>Measures for Sustainable</b>	25	Criteria and indicators for	Macro and micro level forest indicators were developed for the forestry sector and implementation commenced.

<b>Program Area</b>	<b>Number<sup>45</sup></b>	<b>Title</b>	<b>Status/Outcomes</b>
<b>Use</b>		sustainability of biological resources	A strategy for indicators in the Agriculture sector is being developed.
<b>Monitoring, Evaluation and Reporting</b>	26	Monitoring, Evaluation and Reporting of the implementation of Programme Areas	The first report was prepared and submitted to the CBD in November 1999 and EPA is currently preparing the second, third and fourth reports.
	27	Advance recommendations on modifications/improvements to the CBD through CoPs and SBSTTA	The EPA attended, participated in and supported regional and national positions at these fora.
<b>PHASE 2</b>			
<b>Mobilization of Financial and Technical Resources</b>	28	Strengthening of agencies and groups involved in biodiversity management	Support, in the form of technical collaboration, was provided to agencies and NGO's.
	29	Strengthening capacity of other institutions to undertake biodiversity projects	FFI Capacity Building Project for Shell Beach.
<b>Research and Information on Biodiversity</b>	30	Support for the establishment of a national centre for biological collections	An assessment was completed with recommendations to reorganise the national biological collections.
	31	Pilot Study on Economic valuation of biodiversity	The Iwokrama Concession (371,000 ha) is being used as the pilot site in Guyana for the Guiana Shield Project. Fundamental to the project is payment for ecosystem services.

Program Area	Number <sup>45</sup>	Title	Status/Outcomes
	32	Revision of the Country Study on Biological Diversity	The revision of the country study on biodiversity has not yet commenced. However, data exists among a number of institutions responsible for biodiversity conservation and management. The data collected by foreign researchers also provide additional sources of information on Guyana's biodiversity.
<b>Monitoring, Evaluation, and Reporting</b>	33	Evaluation of implementation of the initial cycle of the National Biodiversity Action Plan	A review of the NBAP was conducted in 2005 with recommendations for the development of NBAP II.

### 2.4.3 OBSTACLES

The main obstacles encountered during the implementation of NBAP are:

- Limited technical/human resource capacity;
- Limited financial resource;
- The lack of a separate implementation structure and workplan for NBAP;
- Limited awareness among stakeholders on the NBAP and areas for collaboration;
- Limited, if any, integration of biodiversity into the sector plans, policies, programmes and work-plans; and
- Limited enforcement of regulations in the sectors.

### 2.4.4 DOMESTIC AND INTERNATIONAL FUNDING FOR PRIORITY ACTIVITIES

EPA's principal funding is sourced through the Government of Guyana's annual subvention to execute its operational activities. Specific project activities listed in the NBAP were funded by a number of agencies/institutions and these include:

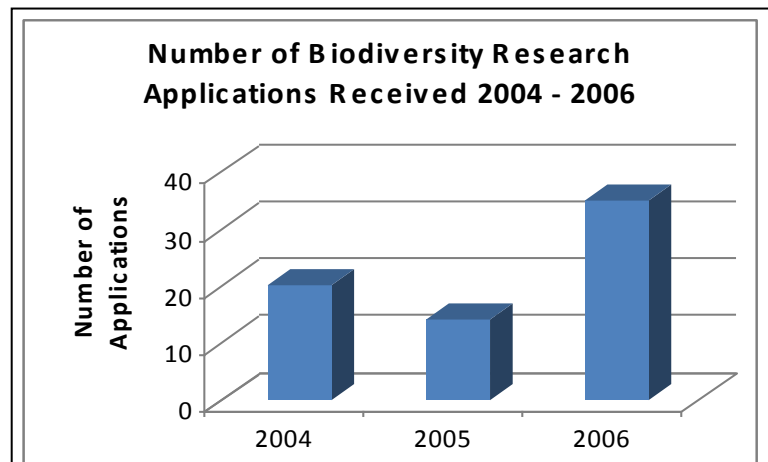
- Fauna and Flora International (FFI);
- World Wildlife Fund (WWF);
- Global Environment Facility (GEF);
- European Union (EU);
- United Nations Development Programme (UNDP);
- Darwin Initiative (DI);
- German Bank for Reconstruction and Development (KfW);
- Conservation International (CI); and
- World Bank (WB).

### 2.4.5 ANALYSIS OF EFFECTIVENESS OF NBAP

The effectiveness of the NBAP is assessed based on the guidelines proposed in the UNCBD's Guidelines for the Fourth National Report, by examining (i) changes in the status and trends in biodiversity as described in Chapter 1; (ii) the adequacy of NBAP to address the identified threats to biodiversity; and (iii) the ability of the NBAP to achieve its goals and objectives.

In general, NBAP lacked measurable targets for all the programme areas and projects; therefore, this assessment has a strong qualitative basis.

Limited data is still available on the overall status and trends related to biodiversity since the preparation of the Guyana's First National Report and NBAP (1999). This resulted from the slow pace of biodiversity assessment and research over the years and the fact that a key project (Project 32 – Revision of the Country Study on Biological Diversity) under the NBAP is still incomplete. However, as outlined in



**Figure 6: Biodiversity research applications for the period 2004-2006**

Section 1.2.2 Guyana has been able to document a number of new and endemic species through its biodiversity research process, thus, giving a clear indication of what can be found in the remaining unexplored areas. This increase in the record of new biodiversity information correlates with the interest of foreign researchers to conduct biodiversity research in Guyana's interior regions. The year 2006 recorded a considerable increase in the biodiversity research applications processed by the EPA. The EPA noted a represented increase of 150% - a recorded 35 applications, as compared to 14 in 2005 and 20 in 2004<sup>46</sup> as shown in Figure 6. However, 2007 and 2008 showed a decline in the number of applications received, from 21 to 16 respectively<sup>47</sup>. These numbers fluctuate due to the varied interest of the applicants. During 2006 and 2007 the number of applications increased for filming/documentaries and this may have contributed to the large increase. While, the number of biodiversity researchers remained somewhat constant. During the period 2006 - 2008 the categories of research interest varied, two out of the three years faunal interest dominated.

The NBAP was designed to strengthen the institutional capacity and to develop its human resource base not only to implement the action plan but also to improve the country's ability to address the threats identified. The NBAP identified the paucity of skilled persons as a major weakness in specific sectoral or thematic areas such as: agriculture, forestry, fisheries, wildlife, biosafety, public awareness, *in situ* and *ex situ* conservation among others for biodiversity planning and management. The NBAP specifically states: *"In Guyana's circumstances the need for biodiversity conservation and planning are met by drawing on a limited pool of specialists in many of the sectoral areas highlighted above. Even in the traditional sectoral areas, however, the expertise is very limited to the extent that it threatens the ability of the country to address what ought to be her long-term strategic needs for planning the use, management and conservation of her biodiversity resources. One of the critical skills which is so important at this nascent stage of biodiversity development and which is lacking, is in the area of systematic biology. A significant part of this weakness relates to the remote location of sites in the country where most of the use, threats and likely needs relating to biodiversity occur"* (EPA, 1999b).

Human resource development and institutional strengthening were identified as priority issues since these are essential components for Guyana to achieve its goal as outlined in the NBAP (Section 2.3, Box 2). Moreover, Guyana's commitment towards biodiversity conservation is an underlining driver to develop systems and establish institutional mechanisms for biodiversity planning and management. The most significant outcome in this regard is the creation of the NRMD within the EPA. The Division has the overall responsibility to coordinate, with stakeholders, and regulate activities that may impact biodiversity. While the capacity of the Division needs further strengthening, in particular capacity for biodiversity monitoring, the Division's collaboration with key natural resource stakeholders has been heightened given the remoteness of some areas in Guyana. Cooperation with NGOs such as Iwokrama, Guyana Marine Turtle Conservation Society (GMTCS) and CI; the Ministry of Amerindian Affairs (MoAA), and sector agencies such as GGMC, WMA and GFC have contributed to some level of threat management. As a result, most of the threats identified in the NBAP have been kept to a minimum. Moreover, continuous public awareness and increased management measures within the sectors have contributed to containing these threats. Despite these efforts, however, the human/technical resource capacity continues to be a challenge for biodiversity management in Guyana, especially at the EPA.

Inputs from stakeholders were also garnered in an attempt to address the overall effectiveness of the NBAP and its ability to achieve the defined goal and objectives. The review conducted in 2005 on the implementation of the NBAP also attempted to assess the effectiveness of the Action Plan. The following observations were noted:

- The design of the NBAP was ambitious and the document perhaps aimed to achieve too much within a short time;

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<sup>46</sup> EPA. (2006). Annual Report.

<sup>47</sup> EPA. (2007, 2008). Annual Report

- Limited or no reporting on NBAP's implementation to stakeholders. Many stakeholders noted that they were not aware of the status of implementation;
- A few of the respondents/stakeholders were not aware of how the work of their institutions fit within the context of the NBAP;
- Some of the programme areas were the means to achieve the goal and not a goal itself, for example mobilization of financial and technical resources;
- The staffing capacity within the NRMD limits the ability of the Division to adequately implement the NBAP;
- The lack of a separate work plan for implementation and dedicated staff for same;
- The access to, and availability of financial resource;
- Delayed project start-up, in most cases because of lack of funding, delayed the implementation of the Plan;
- Limited technical resource persons and small resource pool affected project collaboration. In most cases the same person represents his/her institution at a number of fora, thus, the institution/individual commitment to project collaboration is hindered and affected by 'stakeholder fatigue'; and
- A number of stakeholders noted that while the NBAP's programme areas were not extrapolated and integrated into their workplans, the document was used as a guide to develop programmes and proposals for funding in line with national development.

In general, it can be discerned that the goal of the NBAP was perhaps too ambitious to be achieved by just its implementation. The NBAPs goal can be considered as a broader goal for Guyana in its implementation of the Convention and for biodiversity management and conservation. The objectives were found to be action oriented and as discussed in several sections of the NBAP, were achieved during the consultation process, with the exception of stakeholder's implementation of the Plan. The country-wide consultations during the preparation of the NBAP and the public awareness campaigns thereafter have contributed to some level of increased awareness among Guyanese.

However, despite the above-mentioned and the constraints experienced by the implementing agency, Guyana has made considerable progress on the implementation of the NBAP as summarized in Table 8. All the project areas were either completed or are on-going, with the exception of 2. Thus, within the context outlined, the NBAP can be considered effective.

**Table 8: Objectives, targets and outcomes for biodiversity management and institutional strengthening in Guyana**

Broad Objective	Targets	Corresponding Projects (refer to Table 7)	Outcomes (Linked with Table 7 for additional details)
<p>1. A high and supporting level of public awareness of the country's biological diversity and its role and values.</p>	<ul style="list-style-type: none"> <li>▪ Biodiversity integrated into existing school curriculum by year 2002</li> <li>▪ Implementation of a multi-agency public awareness programme on biodiversity by 2000</li> </ul>	<ul style="list-style-type: none"> <li>▪ Projects 18,19 &amp; 20</li> <li>▪ Project 21 (complementing current initiatives)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Completed: Biodiversity has been integrated into the Integrated Science Curriculum for secondary schools under the broad framework of environment. Teaching manuals produced as curriculum supplements in the Social Studies, Language, Mathematics and Science for level three of primary schools.</li> <li>▪ Project completed under NBAP Public awareness is an on-going activity and focal area for EPA and managed by a separate Division.</li> </ul>
<p>2. The creation of an enabling environment for the conservation and use of biodiversity through the development of a policy, legislative and administrative framework for achieving desired improvements</p>	<ul style="list-style-type: none"> <li>▪ Incorporation of biodiversity into policy and planning of relevant sectors/regional organs by 2006</li> <li>▪ Revision and drafting of legislation in relevant areas; completion of sectoral policy statements by 2005</li> </ul>	<ul style="list-style-type: none"> <li>▪ Projects 8,28 &amp; 29</li> <li>▪ Projects 13,14,15 &amp; 16</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project incomplete. There has been limited integration of biodiversity, if at all, into the sectors. Refer to Section 3.2 for additional information.</li> <li>▪ On-going. Some of the activities and therefore the outcomes are not directly under the NABP. But EPA has participated in or contributed to those processes. A number of legislation have been prepared and/or revised in the sectors. These include Fisheries Act; Mining and</li> </ul>



Broad Objective	Targets	Corresponding Projects (refer to Table 7)	Outcomes (Linked with Table 7 for additional details)
			Environment Regulations; Revised Forest Bill 2008; Wildlife Management and Conservation Regulations; Protected Areas Legislation; Amerindians Act; Species Protection Regulations.
3. An adequate level of institutional capacity to execute biodiversity research, development, management, and conservation programmes	<ul style="list-style-type: none"> <li>▪ Development of institutional capacity at EPA for coordinating national biodiversity initiatives by 2002</li>   <li>▪ Improvement of skills pool by training specialist personnel in key areas of expertise by 2006</li> </ul>	<ul style="list-style-type: none"> <li>▪ Projects 6 &amp; 7</li>   <li>▪ Projects 12 &amp; 21</li> </ul>	<ul style="list-style-type: none"> <li>▪ Completed. The EPA has established the institutional structure for biodiversity research, management and conservation since 2001 and the Natural Resource Management Division, a core division of the EPA, was created to fulfill these responsibilities.</li>   <li>▪ Project 12 is on-going. The time frame identified is 2 years beyond the timeframe allocated for the NBAP. But not directly through the NBAP implementation process.</li>   <li>▪ Project 21 is on-going. The time frame identified is 2 years beyond the timeframe allocated for the NBAP. General training in specialized areas is on-going for officers of the EPA because of high staff turn-over but this is not directly related to the implementation of the NBAP.</li> </ul>

Broad Objective	Targets	Corresponding Projects (refer to Table 7)	Outcomes (Linked with Table 7 for additional details)
4. The generation of information on national biodiversity through research activities	<ul style="list-style-type: none"> <li>▪ Initiate strengthening of the CSBD by 2002</li> <li>▪ Development and implementation of prioritised research activities in Guyana by 2001</li> <li>▪ Establishment of integrated national herbarium and museum collections by 2002</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project 30</li> <li>▪ Project 9</li> <li>▪ Project 30</li> </ul>	<ul style="list-style-type: none"> <li>▪ Incomplete.</li> <li>▪ Completed. A list of priority areas for biodiversity research has been developed and this serves as a guiding document for local and foreign researchers.</li> <li>▪ On-going.</li> </ul>
5. The compilation, dissemination and analysis of biodiversity information for planning, management, conservation and monitoring	<ul style="list-style-type: none"> <li>▪ Creation of evolving national databases on key areas of biodiversity by 2005</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project 10</li> </ul>	<ul style="list-style-type: none"> <li>▪ On-going. Timeframe identified for completion is 1 year beyond the time frame allocated for the Plan. A National Biodiversity Research Information System (NBRIS) was developed in 2007 and is currently in the testing/implementation phase to work out a few glitches. EPA has a database of foreign researchers, research reports and status of collections, among other information.</li> </ul>
6. Using economic measures to conserve biodiversity	<ul style="list-style-type: none"> <li>▪ Initiation of innovative long term financing by 2002</li> <li>▪ Review of incentives and</li> </ul>	<ul style="list-style-type: none"> <li>▪ Projects 1,2,3, &amp; 4</li> <li>▪ Project 12</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited, if at all. EPA continues to work on developing an innovative and sustainable financing mechanism.</li> <li>▪ Project is expected to be completed</li> </ul>

Broad Objective	Targets	Corresponding Projects (refer to Table 7)	Outcomes (Linked with Table 7 for additional details)
	implementation of alternatives by 2003		in 2009
<p>The ultimate achievement of the conservation and responsible use of the country's biological diversity in support of the national objective of sustainable development and to protect the national biodiversity from misuse, degradation and depletion</p>	<ul style="list-style-type: none"> <li>▪ Guidelines/Code of Practice of sustainable resource use adopted for relevant sectors by 2006</li>   <li>▪ Initiation of process of planning second cycle of NBAP by 2005</li>   <li>▪ Natural forest cover of Guyana maintained above 60%</li> </ul>	<ul style="list-style-type: none"> <li>▪ Extension of current forest sector initiative to other sectors</li>             <li>▪ Project 13</li> </ul>	<ul style="list-style-type: none"> <li>▪ On-going. The time frame identified is 2 years beyond the timeframe allocated for the NBAP. Initiated by the sectors and not directly under the NBAP however the EPA participated/contributed to the process. Codes of Practice are in place for: <ul style="list-style-type: none"> <li>- Forest Harvesting (timber and non-timber products)</li> <li>- Mining</li> <li>- Sustainable Utilization of Mangroves</li> <li>- Harvesting of nibbi, kufa, and heart of palm</li> </ul> </li>   <li>▪ NBAP I has been reviewed and NBAP II prepared and is being implemented.</li>   <li>▪ Guyana continues to maintain its forest cover above 85% with an estimated deforestation rate at 0.1% to 0.3% per annum<sup>48</sup>F. And aims to market its forest through the Avoided Deforestation, Reduce Emissions from [Forest]</li> </ul>

<sup>48</sup> UN FAO FRA 2005; Colchester 1999 as cited by Guyana Forestry Commission. (2009). Assessment of Current Drivers Affecting Forest Carbon Stock

Broad Objective	Targets	Corresponding Projects (refer to Table 7)	Outcomes (Linked with Table 7 for additional details)
	<ul style="list-style-type: none"> <li>▪ 10% of Guyana under protected status by 2010*</li> <li>▪ Establishment of mechanism to address biosafety and benefit sharing by 2002</li> </ul>		<p>Degradation and Deforestation Schemes.</p> <ul style="list-style-type: none"> <li>▪ Approximately 7% of Guyana is under protected and/or conservation status.</li> <li>▪ The National Biosafety Framework Project was executed during the period 2004 – 2006. A major output of the project is a National Biosafety Framework for Guyana which has been endorsed by Cabinet in August 2008 and is currently in the implementation phase.</li> <li>▪ Guyana ratified the Cartagena Convention in 2008.</li> </ul>

Source: EPA (1999b). \* using this general rule of thumb, protected areas will be established under various categories to meet various objectives and be representative of ecosystem type.

## **CHAPTER 3: SECTORAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS**

### **3.1 INTRODUCTION AND BACKGROUND**

This section of the report outlines the extent of sectoral and cross-sectoral mainstreaming of biodiversity considerations.

Guyana is committed to the implementation of the Convention on Biological Diversity and to the conservation and sustainable use of its biodiversity. Guyana also recognises the value of biodiversity not only for economic development but also for protection and enhancement of the well-being of Guyanese. On this basis, Guyana's commitment to Article 6 and in particular 6 (b) of the UNCBD has been demonstrated over the years through a number of measures to promote the integration of conservation and sustainable use of biodiversity, as far as possible, into the sectors and society at large in order to reduce the rate of loss of biodiversity.

Key steps taken since becoming a signatory to the Convention include: (i) enactment of the Environmental Protection Act 1996 that mandates the EPA to coordinate, among others, a programme for conservation of biological diversity and its sustainable use and to coordinate and establish national parks, protected area systems and wildlife protection and management programme<sup>49</sup>; (ii) the legislative requirement for environmental impact assessments and authorization of any developmental project that may have significant impacts on the environment and may affect biodiversity (iii) a process of sectoral and cross-sectoral consultations and public participation for the development of national documents, reports etc. related to biodiversity use, conservation and management; and, (iv) preparation of a national policy position on biodiversity conservation through the development of a National Strategy for the Conservation and Sustainable Use of Guyana's Biological Diversity and preparation of NBAP I.

The National Strategy for the Conservation and Sustainable Use of Guyana's Biological Diversity (1997) recognized the important role of biodiversity to Guyana and its valuable components for social, economic and cultural purposes, among others. This Strategy sets out the basis for mainstreaming biodiversity into the sectors. It notes that while the EPA has a pivotal role in the implementation of the Strategy, the established framework for successful implementation lies in a cross-sectoral and multidisciplinary approach to the management and conservation of biodiversity. The NBAP I further stressed the importance of sector collaboration and participation for successful implementation and attainment of its conservation objectives and proposes mechanisms for such collaborations.

### **3.2 PROCESSES TAKEN TO INTEGRATE BIODIVERSITY INTO THE SECTORS**

Guyana lacks a formalized system or process to strategically integrate biodiversity into sectoral and cross-sectoral plans, programmes and policies and eventually the work-plans of sector institutions. Nevertheless, over the years biodiversity issues have been considered in development planning across the sectors, in particular, forestry and mining. This level of mainstreaming, however limited, occurs on a case by case basis and, in particular at the level of developmental project planning and collaboration.

Guyana's informal approach to biodiversity consideration occurs on two (2) fronts: through national and sector level coordination with stakeholders and at the project planning level. National level, policy planning occurs mainly through the Natural Resource and Environment Advisory Committee (NREAC). This statutory body comprises Directors of natural resource agencies (including forestry, mining, energy and land use) and the EPA. This committee examines environmental and natural resource policies prior to submission to the Cabinet for approval and has the overall role of coordinating the work of the United Nations Conventions<sup>50</sup>. The National Biodiversity Committee, a sector level statutory body, addresses

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<sup>49</sup> EPA. (1996). Environmental Protection Act. pg. 10

<sup>50</sup> Specifically the United Nations Convention on Biological Diversity, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification.

issues specific to biodiversity, especially resource use conflicts before matters are presented to NREAC for actions. This committee<sup>51</sup> was reconstituted in February 2008 to strengthen sector level collaboration on natural resource management and to ensure stronger biodiversity policy integration. The NBC comprises representatives from key sector agencies<sup>52</sup>, NGOs and the University of Guyana (UG). Therefore, issues associated with biodiversity are tabled at this level in the wider context of biodiversity planning to reduce the associated threats on biodiversity.

The environmental impact assessment process is the only mechanism that facilitates, to some extent, biodiversity integration into the sectors within the environmental management context. By law the EIA process supports extensive public participation at the stage of project screening and scoping to identify potential impacts and at the stage of presenting the findings from the study at public hearings. The Environmental Protection Act 1996 and its Environmental Management Regulations 2000 stipulate the legislative requirement for environmental authorisation for any new development activity that may have significant impacts on the environment and, as a consequence, may affect biodiversity. The sectors regulated are mining, forestry, agriculture, infrastructure, energy, tourism and fisheries. EPA in 2000 prepared Guidelines for the preparation of EIAs. These guidelines are generic, as well as, sector specific, in particular, targeting mining and forestry sectors given their resource extractive nature. In 2002 the EPA prepared a list of processes and activities that may have significant impact on the environment and require environmental authorization.

The Act, Regulations and the EIA guidelines stipulate the requirement for all EIAs to identify, describe and evaluate the direct and indirect effects of the project activities/processes on the environment, inclusive of biodiversity assessment at the species, habitat, ecosystem and landscape levels.

Applications for environmental authorizations have increased over the years and this trend is consistent for this reporting period (2006 – 2008). In 2006 the EPA received 100 new applications and in 2008 received 162, with the forestry and mining sectors recording the largest numbers<sup>53</sup>. The total number of projects requiring EIAs has increased for the period 2006 to 2008 (2, 3, and 4 respectively), however, the numbers have fluctuated in the previous years with 2003 and 2005 recording the highest (8 and 7 respectively)<sup>54</sup>. Consistent with earlier years, most of the EIAs were required for the mining and forestry sectors.

Therefore against the foregoing, the following statements can be discerned:

- Stronger collaboration among the sector agencies, in particular the forestry and mining sectors, have resulted in forestry permits and mining licenses being contingent on receiving environmental authorizations;
- Increased regulation of development activities based on increased awareness among sector agencies on environmental issues, inclusive of threats to biodiversity;
- Increased awareness on environmental issues, in general, and threats to biodiversity in particular, by the general public; and
- The public awareness campaigns conducted during the preparation of the NBAP and the implementation of Programme Area 5 have led to increased levels of awareness of threats and impacts on biodiversity and thus the institutionalization of mechanisms to manage natural resources. A number of policy actions have been taken within the sectors and together these aim to reduce impacts/threats on specific resources and contribute towards biodiversity conservation. These measures are: National Forest Policy and Forest Plan; National Land Use Policy and Regional Land Use Plans (Region 6 and 9), Corridor Land Use Plan (Linden Lethem Road Corridor and Linden

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<sup>51</sup> The revised TOR recognised the committee as NBC instead of a National Biodiversity *Advisory* Committee. The Committee serve in the capacity of policy development, sector level cooperation and has an advisory role on emerging issues related to biodiversity planning and management.

<sup>52</sup> These Agencies include Guyana Forestry Commission, Wildlife Management Authority, National Agriculture Research Institute, University of Guyana, Iwokrama, Conservation International, Ministry of Foreign Affairs, and Ministry of Amerindian Affairs among others.

<sup>53</sup> EPA. 2006, 2007 & 2008 Annual Reports.

<sup>54</sup> EPA 2003, 2005, 2006, 2007, 2008 Annual Reports.

Soesdyke Road Corridor); National Mangrove Management Action Plan; National Coastal Zone Management Plan; Fisheries Act; Fisheries Management and Development Plan; Amerindian Act 2006; and Mining and Environment Regulations among others. In particular, the Amerindian Act 2006 and the Revised Forest Bill 2008 have integrated biodiversity in their sector legislation. The Amerindian Act 2006 provides the requirement for titled communities to designate conservation areas/protected areas and the Forest Bill 2008 has a specific section highlighting conservation, current conservation areas and stipulates that in collaboration with the EPA, land can be identified for conservation for a maximum of 25 years.

While the EIA process is a means used to consider biodiversity issues in environmental planning within the sectors and the eventual management of such issues, implementing this process is not completely removed of challenges, especially, the aspect related to biodiversity assessment. A review conducted by UNDP in 2001 on the *“Integration of Biodiversity into National Environmental Assessment Procedures”* found that some EIAs provide a brief overview of biodiversity issues and these are mainly site specific covering only terrestrial habitat, species and communities. The report further stated that *“in the few cases where aquatic biodiversity has been given some scant consideration, only fish fauna and a few emergent aquatic macrophytes have been considered. Soil biodiversity has not been considered in any of the EIAs reviewed. Likewise, there is no mention of algae, fungi (including lichens) and epiphytic bryophytes, although epiphytic vascular plants such as bromeliads and a few orchids have been mentioned on two occasions”* (UNDP 2001). These findings remain mostly imminent and demonstrate a more fundamental issue for the holistic assessment of impacts on biodiversity. This fundamental issue is the limited number and sometimes absence of adequate biologists from key sub-disciplines on the EIA teams. Where specialists are included on the teams, their experiences are limited to either flora or faunal disciplines and in cases where both specialists are included their specializations are limited to mainly terrestrial species.

Against the preceding, unless biodiversity is integrated into the work plans and programmes of sector agencies, institutions will continue to consider biodiversity management as an adjunct activity. On this basis the EPA is in the process of preparing a project proposal for funding through the Global Environment Facility (GEF) focusing on mainstreaming biodiversity concerns into forestry and mining practices under the broad objective of strengthening biodiversity management in Guyana. A number of sector agencies, NGO's and private sector entities will be targeted, inclusive of the GFC, GGMC, Guyana Lands and Surveys Commission, the Forestry Training Centre Inc., Guyana Gold and Diamond Miners Association, the Forest Producers Association, MoAA, Ministry of Local Government and Regional Development, Private Sector Commission, Guyana School of Agriculture, University of Guyana, Amerindian NGOs and Iwokrama among others. The main objective of the project is *“to assist in creating the necessary conditions, capacity and skilled labour pool for biodiversity to be effectively managed, including through mainstreaming biodiversity conditions into the forestry and mining sectors”*<sup>55</sup>.

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<sup>55</sup> GEF/UNDP/EPA (not dated). Project Proposal (Draft)

## CHAPTER 4: CONCLUSIONS – PROGRESS TOWARDS THE 2010 TARGET AND THE IMPLEMENTATION OF THE STRATEGIC PLAN

### 4.1 PROGRESS TOWARDS THE 2010 TARGET

The provisional framework of goals and targets for assessing progress towards the 2010 biodiversity target, developed by COP, outlined 11 goals, 21 targets and several indicators. To-date Guyana has not held a national stakeholder consultation to develop national targets and to promote the 2010 biodiversity campaign. Therefore, there is no workplan or implementation mechanism to operationalise the 2010 targets. However, work within the context of implementing the UNCBD contributed towards some level of achievement of these targets. It is on this basis that the 2010 biodiversity target is being assessed.

**Table 9: Guyana’s Progress Towards the 2010 Target**

GOALS AND TARGETS	STATUS
<b>Protect the components of biodiversity</b>	
<b>Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes</b>	
<p>Target 1.1: At least 10% of each of the world’s ecological regions effectively conserved.</p>	<p>Established protected areas in Guyana are:</p> <ul style="list-style-type: none"> <li>▪ Kaieteur National Park which has a surface area of approximately 63,000ha</li> <li>▪ Iwokrama Forest with a surface area approximately 370,000 ha</li> <li>▪ Konashen (Community Owned Conservation Area) with a surface area approximately 625,000 ha</li> <li>▪ Moraballi Reserve with a surface area of 11,000 ha.</li> </ul> <p>Proposed protected areas are:</p> <ul style="list-style-type: none"> <li>▪ Kanuku Mountains</li> <li>▪ Shell Beach Nature Reserve</li> <li>▪ Orinduik</li> <li>▪ Mount Roraima</li> </ul> <p>The Low Carbon Development Strategy (LCDS) (2010) prepared by the GoG proposed to have 10% of Guyana’s forest under protection.</p> <p>Refer to Appendix III Programme of Work on Protected Areas for additional information.</p>
<p>Target 1.2: Areas of particular importance to biodiversity protected</p>	<p>Areas identified in 1.1 for protection/conservation represents major and/or important biomes in Guyana. Working with key species such as Sea Turtles [Leatherback (<i>Dermochelys coriacea</i>), the Olive Ridley (<i>Lepidochelys olivacea</i>), the Green turtle (<i>Chelonia mydas</i>) and the Hawksbill (<i>Eretmochelys imbricate</i>); Arapaima (<i>Arapaima gigas</i>), Giant River Turtle (<i>Podocnemis expansa</i>), Black Caiman (<i>Melanosuchus niger</i>); institutions like Iwokrama, WWF, and CI facilitate ecological and taxonomic and studies, and RAP assessments. These institutions, as well as, the Guyana Marine Turtles Conservation Society (GMTCS) also conduct/facilitate biodiversity monitoring.</p>



GOALS AND TARGETS	STATUS
	<p>This helps to maintain ecosystems ranging from the Iwokrama forest and North Rupununi wetlands to coastal mangrove ecosystems.</p> <p>Further, every logging concession is required by law to set aside 4.5% of land for protection. Keystone species must be protected.</p>
<b>Goal 2. Promote the conservation of species diversity</b>	
<p>Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.</p>	<p>Arapaima (<i>Arapaima gigas</i>) is listed as CITES Appendix II. Through the Iwokrama and North Rupununi District Development Board (NRDDB) initiative Arapaima stock assessments were conducted in 2000, 2001, 2002, 2004 and 2008. With careful management, the population has increased almost three folds.</p> <p>Sea Turtle monitoring was conducted by GMTCS. The use of Turtle Exclusion Devices (TEDs) for trawlers was promoted in 1994 and is currently a requirement for operators who seek markets to EU etc. The Shell Beach area has been selected during this reporting period for the protection of its mangroves and flagship species like the Scarlet Ibis and the endangered sea turtles.</p> <p>The Guyana Forestry Commission has taken steps to restore/protect keystone species listed in the Code of Practice for Forest Harvesting.</p> <p>Iwokrama and the NRDDB places emphasis on the bullet wood, giant river turtles, giant river otters and other key species.</p>
<p>Target 2.2: Status of threatened species improved.</p>	<p>Refer to 2.1. Additionally, a new population of the Red Siskins (<i>Carduelis cucullata</i>) was discovered in the southern regions of Guyana and the South Rupununi Conservation Society (SRCS), through an MOU with the EPA has been monitoring its population density. A management plan to protect and conserve this species and its habitat is being developed by SRCS.</p> <p>Black Caiman (<i>M. niger</i>) research and Song Birds studies were conducted by Iwokrama during the period 2000-2002.</p>
<b>Goal 3. Promote the conservation of genetic diversity</b>	
<p>Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.</p>	<p>NARI has conducted limited germplasm work on cassava, sweet potato and a few others crops.</p> <p>Several documents are available on indigenous foods (Arawak, Wapishana, Makushi, Patamona Arekuna etc.) within the indigenous knowledge database.</p> <p>GFC has a nursery of harvested species (<i>Arboretum</i>). Every logging concession is required by law to set aside 4.5% of land for protection.</p>
<b>Promote sustainable use</b>	

GOALS AND TARGETS	STATUS
<b>Goal 4. Promote sustainable use and consumption.</b>	
Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.	<ul style="list-style-type: none"> <li>▪ Northwest Organics – a community group located at Shell Beach that produces soaps etc.</li> <li>▪ Makushi Research Unit – makes soaps, honey etc.</li> <li>▪ Orealla Women’s Group – makes fruit cheese from fruits etc.</li> <li>▪ Iwokrama markets honey and other NTFPs from communities mentioned.</li> <li>▪ Production of heart-of-palm for export markets.</li> <li>▪</li> </ul>
Target 4.2. Unsustainable consumption, of biological resources, or that impact upon biodiversity, reduced.	<p>This target is not immediately measurable. However, several environmental NGOs have developed awareness materials that encourage better environmental behavior. In addition, harvesting is controlled via part of the Wildlife Regulations and a quota system is in place for Export, as well as, Species Protection and Import/Export Regulations.</p> <p>In addition, through the work of the Guyana Geology and Mines Commission (GGMC) Environmental Department and the introduction of the Mining and Environment Regulations (2005) have contributed to this target.</p> <p>While Project Fauna is not a national entity, this National Science Foundation (NSF) sponsored project is “<i>a large-scale interdisciplinary research initiative</i>” which includes sites within Guyana. The project commenced in 2008 and “<i>uses hunting and vertebrate population dynamics as a model system to glean an understanding of the feedbacks between indigenous cultures undergoing socio-economic transitions and their natural environment</i>” (further information can be obtained from <a href="http://www.fsd2010.org/program/fragoso.htm">http://www.fsd2010.org/program/fragoso.htm</a> ).</p>
Target 4.3: No species of wild flora or fauna endangered by international trade.	No recent population assessments for the wildlife trade have been conducted. A socio-economic assessment of the trade was conducted.
<b>Address threats to biodiversity</b>	
<b>Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.</b>	
Target 5.1. Rate of loss and degradation of natural habitats decreased.	<p>Between 1990 and 2000, Guyana had no significant change or no reported change in forest cover, according to data from the GFC. The GFC estimate deforestation as 0.1%-0.3% per annum (GFC, 2009).</p> <p>The Guyana Lands and Surveys Commission (GL&amp;SC) is currently implementing a Sustainable Land Management Project. A component of the project includes a land degradation assessment and base line studies, as well as, watershed management for the Linden Soesdyke Road Corridor.</p> <p>The Guyana Geology and Mines Commission (GGMC) conducted environmental sweeps in 2008 to collect information</p>

GOALS AND TARGETS	STATUS
	on forest cover and deforestation in Mahdia.
<b>Goal 6. Control threats from invasive alien species</b>	
Target 6.1. Pathways for major potential alien invasive species controlled.	Guyana has established systems for quarantine and export.
Target 6.2. Management plans in place for major alien species that threaten ecosystems, habitats or species.	<p>The EPA established Invasive Alien Species Task Force in 2008. Awareness materials have been developed outlining basic concepts and list some species found in Guyana:</p> <p>Plants</p> <ul style="list-style-type: none"> <li>▪ <i>Adenanthera pavonina</i> (Redbead tree or Red Sandalwood tree);</li> <li>▪ <i>Psidium guajava</i> (Guava); and</li> <li>▪ <i>Leucaena leucocephala</i> (Jumbie bean).</li> </ul> <p>Animals</p> <ul style="list-style-type: none"> <li>▪ <i>Columba livia</i> (Pigeon);</li> <li>▪ <i>Herpestes javanicus</i> (Indian mongoose); and</li> <li>▪ <i>Oreochromis mossambicus</i> (Mozambique tilapia).</li> </ul> <p>The Ministry of Agriculture and NARI continue to work on the control of invasive species such as aquatic plants Duck Weed (<i>Lemna minor</i>) and the Carmambola Fruit Fly (<i>Bactrocera sp.</i>)</p>
<b>Goal 7. Address challenges to biodiversity from climate change, and pollution</b>	
Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.	Limited studies were conducted on the phenology of various taxa. Studies are limited to flora and faunal pollinators and impacts of forest clearing on amphibians.
Target 7.2. Reduce pollution and its impacts on biodiversity.	<p>The EPA enforces legislation to prevent and/or reduce pollution and its impacts on biodiversity. Specifically, the Environmental Protection Act 1996 and its air, hazardous waste and water quality regulations address pollution on the environment from all development activities. EPA also monitors environmental conformity, in particular within the forestry and mining sectors. Forestry and mining operations are mandated to use environmentally sound techniques to reduce emissions and impacts of the operations. GGMC and GFC routinely engaged in capacity development and research that could enhance operations.</p> <p>GGMC enforces the mining regulations and continuously engage mining operators on effective tailings management. GGMC in 2007 conducted a national monitoring programme on all major rivers to assess the water quality.</p> <p>EPA and GGMC conducted a public awareness programme in 2007 for small and medium scale miners on mining best practices.</p> <p>Iwokrama has conducted public awareness programmes on pollution prevention and its impacts on biodiversity.</p>

GOALS AND TARGETS	STATUS
<b>Maintain goods and services from biodiversity to support human well-being</b>	
<b>Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods</b>	
Target 8.1. Capacity of ecosystems to deliver goods and services maintained.	<p>Assessments include:  Non Timber Forest Products (NTFP) – Thomas et. al. 2003.  Bushmeat trade by WWF.  A database on publications/research/ studies conducted on indigenous knowledge was prepared and housed with the EPA.  NARI and GUYSUCO continue to work to preserve and maintain crop diversity and to develop techniques to guard against flooding within the agro-biodiversity ecosystems.</p>
Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.	<p>Assessments include:</p> <ul style="list-style-type: none"> <li>- NTFP market study.</li> <li>- Bushmeat trade by WWF.</li> <li>- Database on indigenous knowledge publications.</li> <li>- Sustainable production and market reports prepared by GFC as part of its National Secure Livelihood Programme. GFC also conducts outreach and training for local communities.</li> <li>- GGMC has been implementing a sustainable community based chicken rearing project in the communities of Mahdia and Campbelltown. And conducted Flocculation Experiment in mining areas in 2007.</li> </ul>
<b>Protect traditional knowledge, innovations and practices</b>	
<b>Goal 9 Maintain socio-cultural diversity of indigenous and local communities</b>	
Target 9.1. Protect traditional knowledge, innovations and practices.	<p>A database on publications/research/ studies conducted on indigenous knowledge was prepared and housed with the EPA.  Access and Benefit Sharing policy and legislation prepared.</p>
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing.	<p>Guyana has enacted the Amerindian Act in 2006 which recognizes and protects traditional and customary rights to titled lands. After the State, the Amerindians are the second largest legal land holders in the country, with approximately 14% of Guyana's total land mass.  Access and Benefit Sharing policy and legislation prepared.</p>
<b>Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</b>	
<b>Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</b>	

GOALS AND TARGETS	STATUS
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.	NARI has a mechanism in place to facilitate exchange of materials through a signed agreement between NARI and international institutions to secure benefits arising from genetic materials.
Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions.	Indicators are to be developed.
<b>Ensure provision of adequate resources</b>	
<b>Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention</b>	
Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.	Guyana has received financial support from a number of sources and these include: GEF, KfW, WWF, CI, FFI, DI, UNDP, EU
Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.	Limited progress has been made in this area. NARI has ongoing training material transfers through crop germplasm (rice and vegetables). NARI also received financial support for the period 2005-2010 to establish a bio-technology laboratory. Germplasm exchanges also occur among other institutions such as GUYSUCO and Guyana Rice Development Board.

*Source: A guide to 2010 NBTs and Fourth National Reports (2008)*

## 4.2 CONCLUSIONS

Guyana has made significant progress towards the implementation of the Convention despite the numerous constraints encountered. While it may be difficult to ascertain the wider impact on improving conservation as a result of implementing the Convention over the years, Guyana's commitment to the process, since ratifying the Convention, is evident through the following brief status updates:

- A number of policies have been developed and are being implemented at the national level which covers natural resource management, in general, and also biodiversity in particular. These include: National Development Strategy, National Forest Policy, National Land Use Policy, Policy on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising from their Utilization, National Biosafety Framework and Biotechnology, Biosafety and Biosecurity Policy;

- A number of strategies, plans and programmes have been developed and are being implemented. These include: National Strategy for the Conservation and Sustainable Use of Guyana's Biodiversity, National Forest Plan, NBAP I & II, National Environmental Action Plan, National Forestry Action Plan, Integrated Coastal Zone Management Plan, Fisheries Management and Development Plan, National Mangrove Management Action Plan;
- A number of natural resource legislation have been developed that collectively aim to assist Guyana to meet the obligations of the Convention;
- Guyana acceded to the Cartagena Protocol on Biosafety in 2008;
- The designated national focal point for the Convention was identified as the EPA and the Agency has created the Natural Resource Management Division (NRMD) committed to implementing the Convention;
- The EP Act 1996 outlines the legal requirement for environmental impact assessments for development projects considered to have significant impacts on the environment, inclusive of biodiversity;
- *In-situ* conservation efforts through the legal establishment of two protected areas and work continues on the proposed protected area sites, refer to Appendix III ;
- *Ex-situ* conservation, through field gene banks, seed banks and *in-vitro* collection, mainly, by institutions such as NARI, GUYSUCO, GRDB; and
- Other biodiversity related initiatives such as the work of key/specific organizations, agencies and institutions: Iwokrama International Centre for Rain Forest Conservation and Development, Centre for Study on Biological Diversity, CI-Guyana, FFI, WWF, KNP, and NPC.

It is evident that since Guyana ratified the Convention there has been a number of positive influences on the country as it relates to biodiversity conservation and management. These are summarized below inclusive of an overview of lessons learnt and the way forward for the country in light of international developments related to Reduce Emissions from Deforestation and [Forest] Degradation (REDD)-plus initiatives and events surrounding the United Nations Framework Convention on Climate Change (UNFCCC).

### **Positive Impacts**

The convention has had a positive impact on the conservation of Guyana's natural resources; although, the pace of implementation has been slower than expected (EPA, 2005c). The Government of Guyana has built its institutional capacity through the establishment of several agencies and the enactment of corresponding legislation: EPA and the Environmental Protection Act 1996, the National Environmental Education and Public Awareness Strategy (NEEPAS) and the National Biodiversity Action Plan; GFC as a semi-autonomous income-generating agency with its forestry legislation and Code of Practices, MoAA and the Amerindian Act (2006), the Iwokrama Forest and Iwokrama Act, GGMC and its mining and environment regulations.

Protected/conservation areas represent one of the many conservation tools used to protect and maintain Guyana's biodiversity. Significant progress has been made since 1999 in terms of identifying and designating areas for protection/conservation with just about 7%<sup>56</sup> of Guyana's surface area set aside for protection/conservation. Guyana has established its first Community Owned Conservation Area (COCA) in the Sothern Rupununi (Konashen) under the Amerindian Act 2006. Further, the recognition of indigenous lands through the Amerindian Act 2006 and titling of approximately 14% of their land thus far demonstrates Guyana's intent on fulfilling its obligations under the Convention and article 8(j).

The drafting of an access and benefit sharing (ABS) regulations and preparation of the ABS policy are also significant steps taken within the reporting period.

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<sup>56</sup> This 7% conservation areas include legally protected areas, proposed areas and community own conservation areas.

## **Some Lessons Learnt**

In general, Guyana recognised the need for cross-sectoral and inter-sectoral implementation of the Convention and the NBAP as highlighted in the National Strategy for the Conservation and Sustainable Use of Biodiversity and NBAP respectively. In reality, however, this can be very challenging given the limited availability of resources, such as funding and human/technical. Despite such challenges, wide stakeholder engagements and national consultations through the NBC were held for some of the NBAP projects, in particular, developing a national system of protected areas. Through the process of national consultations partnerships were established with local communities, thereby, resulting in less conflicts and more constructive dialogue, and as a result, moving the process forward on protected areas.

Conservation in Guyana is now guided more by collaborative management and adaptive management. The Government of Guyana is working more closely with other conservation NGOs to partner in the process. The management of a forest concession by CI; the passage of the Arapaima Management Plan and collaboration with the NRDDDB and Iwokrama; the Small Grants component of the Guyana Protected Areas System (GPAS) project; and micro-projects in areas such as Kaieteur and Shell Beach are all examples of conservation work moving forward in Guyana. Moreover, the Konashen Community Owned Conservation Area demonstrates a unique example of how conservation can be achieved with the community as a partner.

The Convention and the NBAP have given Guyana a roadmap from which several achievements have been made. However, the implementation of the NBAP was found to be challenging based on the prospects of funding for various aspects of the Action Plan since the EPA was expected to receive co-financing for many NBAP activities. Despite such a challenge, the EPA has seen an increase of funding by partnering with institutions such as the German Bank for Reconstruction (KfW), Darwin Initiative (DI), UNESCO, UNDP and EU, and through MoUs between the GoG and NGOs to undertake other projects (EPA, 2005c).

The EPA was assigned the prime responsibility for implementing the UNCBD, without adequate government-wide co-ordination, human capacity and resources to implement the necessary response measures in key sectors such as agriculture, energy, transport and others. The extent of overlapping responsibilities reduced the ability of any one institution to function to its maximum potential. Therefore, there is a need to coordinate multilateral environmental agreements in order to reduce duplication and encourage effective use of scarce resources.

## **Moving Forward: the UNCBD within the context of Guyana's Low Carbon Development Future**

At the end of 2004 Guyana commenced the process of a national review on the implementation of the NBAP. The review process came to an end in 2005 and a report was prepared. The review identified, among other things, progress and lessons learnt in order to inform the preparation of a more targeted NBAP II. It was found that Guyana needed to prioritize its biodiversity actions and reorient these in line with its major resources in order to maintain the objectives of the Convention. Therefore, Guyana's NBAP II identified specific actions to target the following key resources: agriculture, coastal resources, forest, marine and inland water resources. Implementation of NBAP II is a current and future priority for Guyana. Additionally, at the end of 2008 Guyana launched its position on Avoided Deforestation and commenced the process of preparing a roadmap towards the attainment of a Low Carbon Economy (LCE). Guyana intends to achieve a LCE through the implementation of its Low Carbon Development Strategy (LCDS). The LCDS addresses issues related to climate change through a compensatory scheme by marketing Guyana's standing forest. The strategy is built on Guyana's vision to encourage investments/economic development while protecting and maintaining its forest resource and ecosystems services. The strategy has three pillars: (i) investment in low carbon economic infrastructure; (ii) investment and employment in low carbon economic sectors; and (iii) investment in communities and human capital. Biodiversity conservation is an indirect positive aspect of the LCDS. A review of natural resource use and management will be undertaken as part of the LCDS process inclusive of institutional arrangements and legislation.



A key output of this process is the development of national biodiversity legislation to enable national-scale maintenance, management and conservation of ecosystems and therein biodiversity.

Available human and technical resource capacity is recognised as critical and central to the implementation of the LCDS and the UNCBD. Guyana is required to have a multi-faceted approach in place to develop and sustain this capacity. National consultations<sup>57</sup> on the LCDS were facilitated by CI and Iwokrama and stakeholders identified the need to have a cadre of professionals with the capacity in key areas as listed in Table 10. Therefore, human resource capacity development is recognised as an urgent future priority in Guyana, in all areas inclusive of biodiversity management and conservation.

Table 10 below was presented by Professor Carrington from the University of Guyana as part of the LCDS consultations. The table highlights some critical areas for human capacity development and many areas are relevant to the implementation of the UNCBD. The table summarises succinctly, the challenges and needs in terms of human capacity as Guyana moves forward to adequately meet the requirements of the UNCBD.

**Table 10<sup>58</sup>: Areas for Human Capacity Development**

<b>Monitoring, Reporting And Verification</b>	<b>Sustainable Exploitation Of Protected Resources</b>	<b>Economic Production From Natural Resources</b>
<ul style="list-style-type: none"> <li>▪ GIS – observation mapping</li> <li>▪ Forestry – soil science, aerial surveillance, wildlife monitoring, silviculture</li> <li>▪ Soil science – land use, carbon sequestration monitoring</li> </ul>	<ul style="list-style-type: none"> <li>▪ Natural products research (Chemists, Biologists etc.)</li> <li>▪ Biological protection</li> <li>▪ Material sciences</li> <li>▪ Biotechnology (manufacturing processes associated with food processing downstream for agricultural output)</li> <li>▪ Tissue culture</li> </ul>	<ul style="list-style-type: none"> <li>▪ Agricultural economics</li> <li>▪ Land management</li> <li>▪ Crop production</li> <li>▪ Post harvest management</li> <li>▪ Nutrition</li> <li>▪ Production engineering</li> <li>▪ Chemical engineering</li> <li>▪ Flood control technology related to land use for agriculture</li> </ul>
<b>Economic Diversification</b>	<b>Governance, Management And Regulatory Practice</b>	<b>Inter-human Interactions And Human Interactions With Systems</b>
<ul style="list-style-type: none"> <li>▪ Aquaculture</li> <li>▪ Tourism and related training for the hospitality industry</li> <li>▪ IT and computer science</li> <li>▪ Entrepreneurship and business</li> <li>▪ Creation of alternative employment – business process outsourcing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Decision analysis</li> <li>▪ Diplomacy and international relations, negotiations</li> <li>▪ Legislation, legal drafting, arbitration</li> <li>▪ International finance</li> <li>▪ International law</li> <li>▪ Project management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anthropology, rural sociology</li> <li>▪ Study of indigenous languages</li> <li>▪ Media studies, communication studies, public education</li> </ul>

<sup>57</sup> Conservation International -Guyana and Iwokrama International Centre for Rain Forest Conservation and Development (2009) LCDS Session Report on the Stakeholder Dialogue Series.  
 Conservation International -Guyana and Iwokrama International Centre for Rain Forest Conservation and Development (2009) LCDS Session Report on the Stakeholder Dialogue Series.

Alternative Energy Development And Exploitation	Protection And Mitigation Of Anticipated Effects Of Sea-level Rise	Education And Training
<ul style="list-style-type: none"> <li>▪ Civil, hydraulic, electrical and electronic engineers</li> <li>▪ Technologists – hydro, wind, solar and other exploitable power sources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Biologists, hydraulic engineers, civil engineers, technicians for coastal zone management, sea and river defence maintenance</li> <li>▪ Engineers technicians related to flood control</li> <li>▪ Technicians related to control systems for drainage, irrigation, water management</li> <li>▪ Drainage and irrigation technology (public)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Appropriate to the creation of cadres mentioned above</li> <li>▪ Continuing education</li> <li>▪ Teaching of science and especially physics and mathematics</li> </ul>

**APPENDIX I: INFORMATION CONCERNING REPORTING PARTY AND PREPARATION OF NATIONAL REPORT**

**A: REPORTING PARTY**

Contracting Party	Republic of Guyana
<b>NATIONAL FOCAL POINT</b>	
Full name of the institution	<i>Environmental Protection Agency</i>
Name and title of contact officer	<i>Dr. Indarjit Ramdass, Executive Director</i>
Mailing address	<i>7 Broad &amp; Charles Street, Charlestown, Georgetown</i>
Telephone	<i>(592) 225-2062; (592) 225-1218; (592) 225-6917</i>
Fax	<i>(592) 225 - 5481</i>
E-mail	<u><a href="mailto:epa@epaguyana.org">epa@epaguyana.org</a></u>
<b>CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)</b>	
Full name of the institution	
Name and title of contact officer	
Mailing address	
Telephone	
Fax	
E-mail	
<b>SUBMISSION</b>	
Signature of officer responsible for submitting national report	
Date of submission	

## B: PROCESS OF PREPARATION OF NATIONAL REPORT

A number of approaches were undertaken for the preparation of this report, mainly, through a consultative process with stakeholders involved in biodiversity management. Information was also obtained from documents and reports on various programmes and strategies related to biodiversity conservation and management.

### Stakeholder Consultations

EPA is currently executing the Biodiversity Enabling Activity Project which involves the execution of several sub-projects associated with specific Convention Articles as follows:

- (i) Access to Genetic Resources and Benefit Sharing in particular the Assessment of Existing Policy Measures and Capacity and the formulation of a Benefit Sharing Mechanism;
- (ii) Preservation and Maintenance of Biodiversity Related Knowledge, Innovations and Practices of Indigenous and Local Communities employing Traditional Lifestyles;
- (iii) Initial Assessment of Monitoring Programmes, including Taxonomy; and,
- (iv) Approaches relevant to the Implementation of Incentive Measures.

Consultations were held with a number of stakeholders during the implementation of these projects and the information obtained highlighted, among others, the measures taken by Guyana to implement the Convention, in general, and specific to the programme areas outlined in the NBAP. The following stakeholders were consulted:

Conservation International (CI)	Guyana Sugar Corporation (GUYSUCO)
Forest Producers Association (FPA)	Guyana Tourism Authority (GTA)
Guyana Forestry Commission (GFC)	Iwokrama
Guyana Geology & Mines Commission (GGMC)	National Museum
Guyana Lands & Surveys Commission (GLSC)	National Parks Commission (NPC)
Ministry of Education (MoE)	Ministry of Foreign Affairs (MoFA)
Ministry of Agriculture (MoA)	Private Sector Commission (PSC)
Ministry of Amerindian Affairs (MoAA)	World Wildlife Fund (WWF)
Ministry of Health (MoH)	Wildlife Management Authority (WMA)
Ministry of Foreign Trade and Int'l Cooperation (MoFTIC)	The Amerindian Action Movement of Guyana (TAAMOG)
Ministry of Local Government and Regional Development (MoLGRD)	University of Guyana - School of Earth & Environmental Sciences (SEES)
National Centre for Education & Resource Development (NCERD)	University of Guyana - Faculty of Forestry and Agriculture
Pesticides and Toxic Chemicals Control Board (PTCCB)	University of Guyana - Centre for Studies on Biological Diversity (CSBD)
Guyana Organisation of Indigenous Peoples (GOIP)	University of Guyana - Faculty of Natural Sciences
National Amerindian Development Foundation (NADF)	National Agriculture Research Institute (NARI)
Conservation of Ecological Interaction & Biological Association (CEIBA)	Guyana Amazon Tropical Birds Society (GATBS)

Specific follow-up with key institutions as listed below were necessary and these were in the form of face-to-face, telephone interviews and/or electronic mail:

- National Biodiversity Committee;

- WMA;
- NARI;
- CI – Guyana;
- Centre for Studies on Biological Diversity – University of Guyana;
- Environmental Management Division (EPA)

### Document Review

The following key documents, reports and other materials collected for review and used for the report are:

- National Strategy for the Conservation and Sustainable use of Guyana’s Biodiversity
- Environmental Protection Act, No. 11 of 1996;
- First National Report to the COP of the UNCBD;
- National Environmental Action Plan (NEAP) (2001 – 2005);
- National Biosafety Framework Project Report
- National Biodiversity Action Plan I & II;
- National Capacity Self Assessment Report, Strategy and Action Plan and Stocktaking and Thematic Assessment UNCBD;
- Stocktaking of Existing Capacity and Mechanisms
- Assessment and Thematic Report on Initial Assessment and Monitoring, including Taxonomy;
- Assessment and Thematic Report on Traditional Knowledge;
- Guyana Country Environmental Profile;
- The Integration of Biodiversity into National Environmental Assessment Procedures: National Case Studies – Guyana;
- Biodiversity and Tropical Forest Assessment Guyana;
- Arapaima Management Plan;
- Draft Forest Bill 2009;
- Amerindian Act;
- Fisheries Act 2002;
- EIA Guidelines 2000;
- Kanuku Mountains Protected Area Management Plan (Draft)
- Proposal: Mainstreaming Biodiversity Concerns into Forestry and Mining Practice and Strengthening Biodiversity Management in Guyana; and,
- Review of Guyana’s NBAP.
- Priorities programme for Biodiversity Research: Implementing the National Biodiversity Action Plan
- National Capacity Self Assessment Project Report, Strategy and Action Plan and Thematic Assessments Reports
- Report on the consultancy “Incorporating Priority Work of the Conventions into Annual Work Plans”
- FAA 118/119 Biodiversity and Tropical Forest Assessment Guyana, April 2008. USAID.
- Fuentes Report 2005: Review of Guyana’s National Biodiversity Action Plan (199-2004).

### National Workshop

National workshops were held on March 19 and June 22, 2010 to present the draft report and to further engage stakeholders to review and comment on the draft. The institutions targeted are as follows:

#### Government Institutions

- Guyana Forestry Commission
- Guyana Sugar Corporation
- Ministry of Agriculture
- Ministry of Amerindian Affairs

- Guyana Tourism Authority
- National Trust
- National Parks Commission
- Guyana Geology and Mines Commission
- Ministry of Local Government and Regional Development (REOs, REDOs)
- Ministry of Education
- Wildlife Management Authority
- National Agriculture Research Institution

#### International Conservation Organisations

- Conservation International
- World Wildlife Fund
- Iwokrama

#### Local Conservation Organisations

- Guyana Amazon Tropical Birds Society
- Conservation of Ecological Interaction & Biological Association
- Karanambu Trust
- GMTCS

#### Private Sector Organisations

- Tourism and Hospitality Association of Guyana
- Private Sector Commission

#### Amerindian Organisations

- The Amerindian Action Movement of Guyana
- Amerindian Peoples Association
- Guyana Organisation of Indigenous Peoples
- National Amerindian Development Foundation

#### Education Institutions

- Centre for Studies on Biological Diversity - University of Guyana

## APPENDIX II: FURTHER SOURCES OF INFORMATION

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Government of Guyana. (1997). National Development Strategy

Government of Guyana (2009) Low Carbon Development Strategy: Transforming Guyana's Economy while Combating Climate Change (Draft)

Guyana Lands and Surveys Commission: <http://www.lands.gov.gy/maps.html>

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### APPENDIX III: PROGRESS TOWARDS TARGETS OF THE PROGRAMME OF WORK ON PROTECTED AREAS (DECISION VIII/28)

The following Table provides an overview of progress made in Guyana towards targets of the Programme of Work on Protected Areas. The matrix, as recommended in the Guidelines for the Fourth National Report and as developed for the review of implementation of the Programme of Work on Protected Areas, found in Annex II to Recommendation 1.4 of the Ad Hoc Working Group in Protected Areas, was used as a guide to prepare the Table.

Goals	Target	Implementation Progress
<p>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.</p>	<p>By 2010, terrestrially<sup>59</sup> 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 MDGs – particularly Goal 7 on ensuring environmental sustainability; and (iii) the Global Strategy for Plant Conservation.</p>	<ul style="list-style-type: none"> <li>▪ Guyana developed a draft Strategy for the establishment of a National System of Protected Areas. This document has been the guiding framework for the establishment and management of protected areas in Guyana. Additionally, NBAP I, and more recently the NBAP II, outlines Programme Areas for <i>in-situ</i> conservation.</li> <li>▪ Currently, there are two established protected areas in Guyana. These are the Kaieteur National Park, which has a surface area of approximately 63,000 ha, and Iwokrama with a surface area of approximately 370,000 ha. These two areas represent 2.3% of Guyana’s terrestrial landmass. Two additional sites have also been identified for protection, namely, the Kanuku Mountains and Shell Beach.</li> <li>▪ A proposed boundary and Management Plan have been developed for the Kanuku Mountains, which are based on a comprehensive stakeholder consultation process.</li> <li>▪ A similar process to identify a proposed boundary for the Shell Beach area is on-going. The management planning process will soon follow.</li> </ul>

<sup>59</sup> Terrestrial includes inland water ecosystems

Goals	Target	Implementation Progress
<p>1.2. To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.</p>	<p>By 2015, all protected areas and protected area systems are integrated into the wider land-and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity<sup>60</sup> and the concept, where appropriate, of ecological networks.</p>	<ul style="list-style-type: none"> <li>▪ In November 1999, a workshop was conducted with various stakeholders to arrive at priority sites for conservation and inclusion in the protected area system of the country. Areas were selected after consideration was given to Guyana's contribution to the biodiversity value of the Amazon region. In keeping with the need for connectivity, representative ecosystems were considered for protection.</li> <li>▪ A proposal for the "Mainstreaming of Biodiversity Concerns into Forestry and Mining Practices and Strengthening Biodiversity Management in Guyana" is currently being developed.</li> <li>▪ Guyana is also in the process of developing a comprehensive national land-use plan, which will significantly contribute to the integration of protected areas into broader land- and seascapes and sectors.</li> </ul>
<p>1.3. To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.</p>	<p>Establish and strengthen by 2010/2012<sup>61</sup> 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.</p>	<ul style="list-style-type: none"> <li>▪ Mount Roraima is the primary frontier area proposed for protection in Guyana. The proposed area is adjacent to Protected Areas and community lands in Venezuela and Brazil. Although the designation of Mount Roraima as a PA is still in the early stages, the area represents an ideal opportunity for trans-boundary protection and cooperation among Guyana, Venezuela and Brazil. Guyana has been integrally involved in the consultations conducted by ACTO for the drafting of the Regional Programme for Sustainable Management of Amazonian Protected Areas. The Regional Programme which is currently being implemented by the Amazonian countries aims to enhance the cooperation of countries with similar interests in an effort to effectively conserve and protect biodiversity.</li> <li>▪ The Government of Guyana is also working with WWF Guianas to promote coordination among Guyana, Suriname and French Guiana in</li> </ul>

<sup>60</sup> The concept of connectivity may not be applicable to all Parties

<sup>61</sup> References to marine protected area networks to be consistent with the target in the WSSD plan of implementation

Goals	Target	Implementation Progress
		the areas of conservation and Protected Areas.
1.4. To substantially improve site-based protected area planning and management.	All protected areas to have effective management in existence by 2012, using participatory and science-based 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.	<ul style="list-style-type: none"> <li>▪ Stakeholder consultation is required by law when establishing Protected Areas adjacent to Amerindian Communities in Guyana (Amerindian Act, 2006). Management plans for the two Protected Areas in Guyana are either in place (Iwokrama Forest) or in preparation (Kaieteur National Park). In both cases, extensive stakeholder consultation has played a major part in the development of the plans.</li> <li>▪ A draft co-management plan has already been developed for the proposed Kanuku Mountains Protected Area (based on significant input from 18 user communities) and a similar plan is expected for the proposed Shell Beach Protected Area. It is expected that these management plans will be considered once the two areas have been officially declared as Protected Areas.</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ Mining contributes significantly to the economy of Guyana. However, mining activities are known to negatively impact the environment, and are a key threat to protected areas. To combat these impacts, the government has published a clear mining policy, and has developed strict mining laws and regulations. The EPA, together with a multi-stakeholder committee, has also drafted updated Mining Regulations (Mining, Amendment No.1 Regulations, 2001) that are more comprehensive regarding the use of poisonous substances, and the management of the environment and protected areas.</li> <li>▪ Another threat to protected areas is the acquisition of land for other use, e.g. industrial, agricultural, and residential. The implications of this are that the size and the boundaries of protected areas may be affected, and all the user groups must be brought into the entire process for the planning, establishment and management of a system of protected areas. It must be noted however, that to date, these groups, especially</li> </ul>

Goals	Target	Implementation Progress
		<p>Amerindian communities, have been generally supportive of the process, and are given the option under the Amerindian Act, 2006, to declare all of part of their titled lands for protection.</p> <ul style="list-style-type: none"> <li>▪ Because of the limited institutional capacity of the principal Government Agencies, responsible for establishing this system will serve as a threat to the process. While technical personnel exist in the country, the financial resources to retain them are limited.</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ A collaborative approach is being taken to the management of Protected Areas in Guyana. As such, communities are represented in the management and decision-making bodies for both of Guyana's PAs. In case of the Iwokrama Forest, the community is a shareholder and part owner of the sustainable timber business initiative. The co-management approach will be further expanded in the creation of the Kanuku Mountains and Shell Beach Protected Areas. This inclusion of communities in decision-making provides a mechanism for the equitable sharing of both costs and benefits arising from the establishment and management of protected areas.</li> <li>▪ The EPA has also developed a Policy for Access to Genetic Resources and Benefit Sharing. This Policy is being used to guide the use of natural resources in an effort to ensure the conservation of resources and equitable sharing of benefits.</li> </ul>
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,	<ul style="list-style-type: none"> <li>▪ Indigenous and local communities were consulted in the identification and designation of Guyana's two Protected Areas. They have also been consulted in the management of the PAs. Discussions leading to the identification and delineation of the proposed Kanuku Mountains and Shell Beach Protected Areas have involved extensive community consultation and input.</li> <li>▪ Amerindian communities are also given the option to declare part or all of their titled lands as a protected area under the Amerindian Act of 2006.</li> </ul>

Goals	Target	Implementation Progress
	in the management of existing, and the establishment and management of new, protected areas.	<p>Konashen, a Wai Wai Community in southern Guyana, has indicated that their Titled Lands will be managed as a Community Owned Conservation Area, and has solicited the assistance of Conservation International in the development of a management plan for the area.</p> <ul style="list-style-type: none"> <li>▪ A draft co-management plan has been developed for the proposed Kanuku Mountains Protected Area (based on significant input from 18 user communities) and a similar process is expected for the proposed Shell Beach Protected Area</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ The EPA is currently the Agency responsible for the development and management of a National System of Protected Areas in Guyana. The absence of a National Protected Areas Legislation along with financial and human resource constraints are the primary impediments to the establishment and management of Protected Areas.</li> <li>▪ The drafting of a proposed National Protected Area Legislation has just been completed. This draft legislation is the result of extensive consultations with relevant stakeholders and local Amerindian communities. The draft Legislation has been submitted to the relevant authorities for consideration, and will outline the necessary institutional framework, <i>inter alia</i>, to support the establishment of a national protected area system.</li> </ul>
3.2. To build capacity for the planning, establishment and management of protected areas.	By 2010, comprehensive capacity-building programmes and initiatives are implemented to develop knowledge and skills at individual, community and institutional levels, and raise professional standards.	<ul style="list-style-type: none"> <li>▪ The Government of Guyana has secured funding from the Government of Germany through the KfW (German Development Bank) to facilitate the training of community members as Forest Rangers, Tour Guides and Natural Resource Managers. Further capacity building needs have been and will be identified during the management planning processes for each PA, and will form part of the respective management plans for each area.</li> </ul>

Goals	Target	Implementation Progress
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.	<ul style="list-style-type: none"> <li>▪ In the development of the ACTO's Regional Programme for Sustainable Management of Amazonian Protected Areas, it was recognised that some countries within the Amazon Region, such as Brazil, have advanced in the development of a national system of Protected Areas. Guyana has already benefited from the transfer of a Brazilian-based software model, which has been modified to indicate resource needs for the management of protected areas. It is anticipated that technologies, such as remote sensing, will be increasingly utilised once the formation of a national system has advanced.</li> </ul>
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 developing states.	<ul style="list-style-type: none"> <li>▪ Various financial mechanisms are currently used to support PAs in Guyana, such as Government subventions, user revenues, project support funding, and endowments.</li> <li>▪ The draft Protected Areas Legislation will provide the legal framework necessary for the establishment of a Protected Area Trust Fund. To date, the Government of Germany, through KfW, has signed a Financing Agreement for the sum of €4M to be put into the Trust Fund.</li> <li>▪ Conservation International has also pledged an additional US\$5M for this purpose. Additionally, it is expected that a percentage of the revenues to be generated from the services offered by the protected area, will be used for the management of the area.</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ Education and awareness activities constitute a core programme of the work by the Iwokrama Forest, and to a lesser extent by the Kaieteur National Park. NGOs such as Conservation International and the GMTCS have also facilitated extensive E&amp;A programmes in the Kanuku Mountains and Shell Beach, respectively. Manuals, brochures and videos were some of the tools developed targeting mainly resource users as well as the general public. The manuals, etc. have been distributed to communities and are being used in the schools in these areas as part of the curriculum. The videos are frequently being aired on national</li> </ul>

Goals	Target	Implementation Progress
		television. Generally, these programmes have served to encourage participation and garner support for the processes in the establishment of a national system.
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.	<ul style="list-style-type: none"> <li>▪ The main criteria applied to site selection were that the areas needed to be comprehensive, balanced and representative of the full range of ecosystem types in Guyana. The Government of Guyana has also endorsed a “Parks with People” approach to Protected Areas establishment and management.</li> <li>▪ With respect to the development of management plans, it was ensured that participatory and science-based site planning processes were utilised. The Amerindian communities and other key governmental and non-governmental institutions have been involved in the drafting of the management plans from the initial stages.</li> <li>▪ The Management Plans will outline the Site level Governance Structure in such a way that the communities play an integral role in the day-to-day management of the area. Additionally, it was ensured that the <i>management plans make provisions for the Communities to obtain maximum benefits from the area.</i></li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ Iwokrama is in the process of developing a lessons-learnt document which will provide an evaluation of Park Management.</li> <li>▪ Each protected area Management Plan will comprise a section on monitoring and evaluation and outline a mechanism to complete these activities. The intervals at which monitoring and evaluation are to be conducted are also indicated in the plans that have already been completed.</li> </ul>

Goals	Target	Implementation Progress
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 at national, regional and global scales, and to assist in evaluating progress in meeting global biodiversity targets.	<ul style="list-style-type: none"> <li>▪ Aside for the declaration by Konashen as a Community Owned Protected Area in 2007, no other national Protected Areas have been established in the last five years. Although there is no national system currently in place for the monitoring of Protected Areas, the draft PA Legislation will outline the institutional structure for national level monitoring and enforcement. It is recognised however, that there is a trend towards payment for ecosystem services and carbon storage, rather than simply Protected Areas for the conservation of species and ecosystems.</li> </ul>
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.	<ul style="list-style-type: none"> <li>▪ The acquisition and use of scientific data are vital components of the establishment of protected areas in Guyana. While extensive scientific data are not available, some significant studies were used to guide management decisions in the existing and proposed PAs. Rapid Biological Assessments have been conducted for the Iwokrama Forest, Kaieteur National Park, Kanuku Mountains and Shell Beach. These assessments yielded information that were used and are being used in the management and/or delineation exercises. It is also important to note that Community Resource Evaluations have been completed for all areas. These evaluations capture local and traditional knowledge related to resource use and traditional practices in and around the protected and proposed protected areas. It is recognised that additional research needs to be conducted. As such, programmes and strategies to achieve this have been integrated in the existing Management Plans for the areas.</li> </ul>



## APPENDIX IV: PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION

Guyana has not commenced direct implementation of the targets of the Global Strategy for Plant Conservation. However, within the context of implementing the Convention some activities have contributed toward some level of achievement of these targets. It is on this basis that the targets of the Global Strategy for Plant Conservation are being assessed. Therefore this table only highlights, where applicable, the status of implementation.

Targets	Status
Target 1: A widely accessible working list of known plant species, as a step towards a complete world flora	Checklist of the Plants of Guyana prepared by Smithsonian Institution and GFC.
Target 2: A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels	Economically important species are listed by the GFC with a harvest regime and monitoring programme to ensure that species are sustainably harvested. Timber species found in the Bartica Region were assessed in a 2002 study by H. ter Steege.
Target 3: Development of models with protocols for plant conservation and sustainable use, based on research and practical experience	Guidelines for plant conservation and sustainable use are: the GFC Code of Practices and Sustainable Forest Management Programme, GFC Forest Certification Initiative, Iwokrama Forest Management Programme, Chainsaw Milling Studies toward the development of improved chainsaw milling practices.
Target 4: At least 10 per cent of each of the world's ecological regions effectively conserved	NA
Target 5: Protection of 50 per cent of the most important areas for plant diversity assured	NA
Target 6: At least 30 per cent of production lands managed consistent with the conservation of plant diversity	Through the Guyana Lands and Surveys Commission, Guyana has prepared a draft land use policy and several regional and corridor land use plans.
Target 7: 60 per cent of the world's threatened species conserved in situ.	NA
Target 8: 60 per cent of threatened plant species in accessible <i>ex situ</i> collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes	NA
Target 9: 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated	Limited work exists in this field. However, future capacity development is planned for the National Agriculture Research Institute (NARI).

Targets	Status
indigenous and local knowledge maintained	
Target 10: Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems	NA
Target 11: No species of wild flora endangered by international trade	NA
Target 12: 30 percent of plant-based products derived from sources that are sustainably managed	NA
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.	NA
Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.	Iwokrama International Centre, Conservation International, Guyana, World Wildlife Fund, the EPA through its EITD are among the agencies that work in collaboration with GoG via various education and public awareness programmes.
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.	NA
Target 16: Networks for plant conservation activities established or strengthened at national, regional and international levels	NA

## **APPENDIX V: LIST OF ORGANISATIONS THAT COMPRISES THE NATIONAL BIODIVERSITY ADVISORY COMMITTEE**

- Conservation International – Guyana
- Customs
- Environmental Management Division, EPA
- Guyana Forestry Commission
- Guyana Tourism Authority
- Guyana Lands & Surveys Commission
- Guyana Police Force
- Institute of Applied Sciences and Technology
- Iwokrama Rainforest Centre
- Ministry of Health
- Ministry of Amerindian Affairs
- Ministry of Local Government and Regional Development
- Ministry of Tourism, Industry & Commerce
- National Agricultural Research Institute
- School of Earth & Environmental Studies, University of Guyana
- Wildlife Management Authority